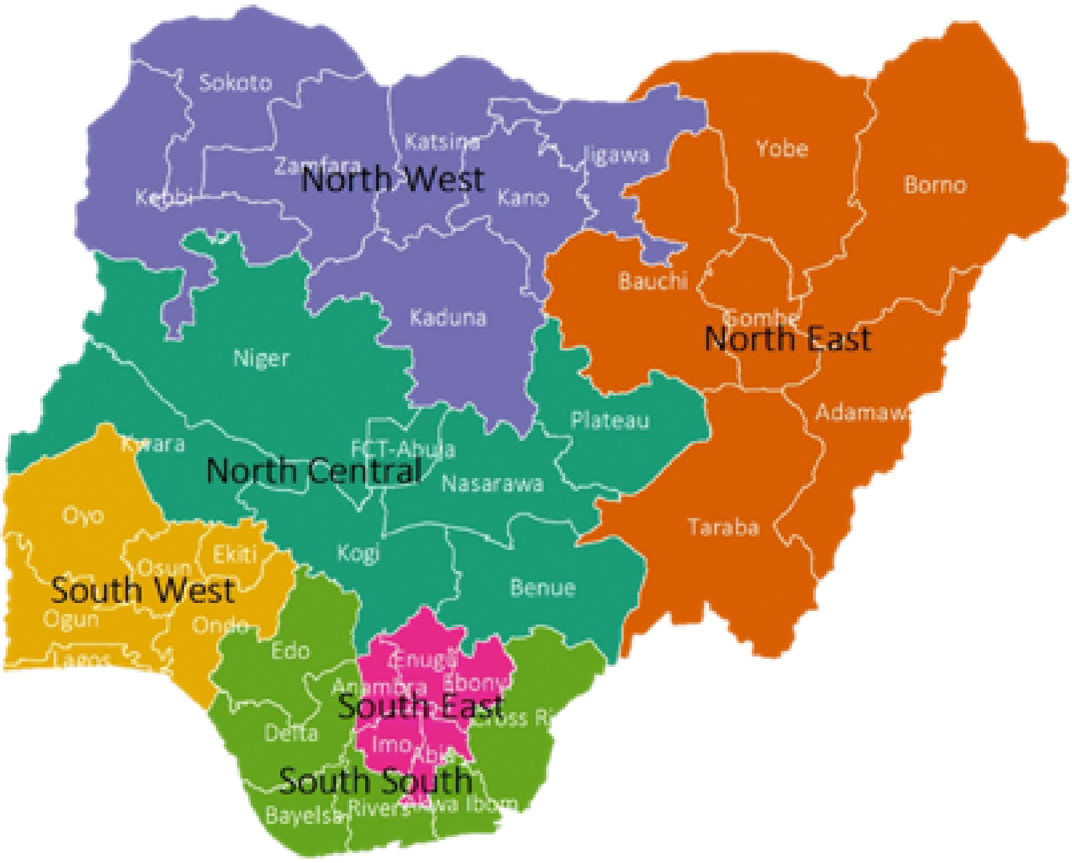
The Federal Republic of Nigeria

National Food Consumption and Micronutrient Survey 2021

Preliminary Report

September 2022



Federal Ministry of Health

Federal Ministry of Agriculture and Rural Development

Federal Ministry of Finance, Budget, and National Planning

International Institute of Tropical Agriculture

September 2022

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Published by the International Institute of Tropical Agriculture (IITA)
Ibadan, Nigeria

The International Institute of Tropical Agriculture (IITA) is a not-for-profit institution that generates agricultural innovations to meet Africa’s most pressing challenges of hunger, malnutrition, poverty, and natural resource degradation. Working with various partners across sub-Saharan Africa, we improve livelihoods, enhance food and nutrition security, increase employment, and preserve natural resource integrity. IITA is a member of CGIAR, a global agriculture research partnership for a food secure future.

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ISBN 978-978-131-406-3

Recommended citation: Federal Government of Nigeria (FGN) and the International Institute of Tropical Agriculture (IITA). 2022. National Food Consumption and Micronutrient Survey 2021. Preliminary Report. Abuja and Ibadan, Nigeria: FGN and IITA. 288 pp.

Printed in Nigeria by IITA

Contents

Tables

Figures

NFCMS Collaborating Institutions

The 2021 National Food Consumption and Micronutrient Survey was implemented by the International Institute of Tropical Agriculture (IITA), in collaboration with the following organizations:

Federal Ministry of Health (FMOH)
Federal Ministry of Agriculture and Rural Development (FMARD)
Federal Ministry of Finance, Budget, and National Planning (FMFB&NP)
National Population Commission, Nigeria (NPC)
National Bureau of Statistics, Nigeria (NBS)
United Nations Children's Fund (UNICEF)
Tufts University- International Dietary Data Expansion Project (INDDEX)
FHI360 Solutions-*Intake* Center for Dietary Assessment
Oxford Policy Management (OPM)
Food and Agriculture Organization of the United Nations (FAO)
University of Ibadan
University of Calabar
University of Wisconsin-Madison, USA
Cornell University, USA
Gates Foundation
World Bank Group

Donor Support and Disclaimer
This project is supported by the Federal Ministry of Health and World Bank Group under the cooperative agreement # NG-ND, FMOH-127145-CS-CDS/01, and the Gates Foundation, United Nations Children's Fund, and Foreign, Commonwealth & Development Office under the cooperative agreement # NIWPCA2020240/PD2020200, United States Agency for International Development, Nutrition International under the cooperative agreement # 10-2097-INTINS-01, and Federal Ministry of Agriculture and Rural Development to the International Institute of Tropical Agriculture. The findings and conclusions of this report are those of the authors and do not necessarily represent the official position of the funding agencies.

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Acronyms and Abbreviations

ANC	Antenatal Care
ASF	Animal Source Foods
CAPI	Computer-Assisted Personal Interviews
CI	Confidence Interval
CM	Community Mobilizers
DHS	Demographic and Health Survey
EAs	Enumeration Areas
FAO	Food and Agriculture Organization of the United Nations
FCDB	Food Composition Database
FCDO	Foreign, Commonwealth & Development Office
FCT	Federal Capital Territory
FGN	Federal Government of Nigeria
FIES	Food Insecurity Experience Scale
FMARD	Federal Ministry of Agriculture and Rural Development
FMFB&NP	Federal Ministry of Finance, Budget, and National Planning
FMOH	Federal Ministry of Health
FRIL	Food, Recipe, and Ingredient Listing
GAIN	Global Alliance for Improved Nutrition
GLP	Good Laboratory Practice
HH	Household
HIV	Human Immunodeficiency Virus
HPLC	High-Performance Liquid Chromatography
IFA	Iron Folic Acid
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
IMCI	Integrated Management of Childhood Illness
INDDEX	International Dietary Data Expansion Project
IYCF	Infant and Young Child Feeding
LGAs	Local Government Areas
LSMS	Living Standards Measurement Survey
MNCHW	Maternal Neonatal and Child Health Weeks
MNDC	National Micronutrient Deficiency Control
MOS	Measure of Size
MRDR	Modified Relative Dose Response
NBS	National Bureau of Statistics
NC	North Central
NCD	Non-Communicable Diseases
NDHS	Nigeria Demographic and Health Survey
NE	North East
NFCMS	National Food Consumption and Micronutrient Survey
NFPN	National Policy on Food and Nutrition
NHREC	National Health Research Ethics Committee of Nigeria
NPC	National Population Commission
NPHCDA	National Primary Health Care Development Agency
NW	North West
OPM	Oxford Policy Management
ORS	Oral Rehydration Salt
PPS	Probability Proportional to Size

PSEM-CF	Portion Size Estimation Methods Conversion Factors
PSEMs	Portion Size Estimation Methods
PSUs	Primary Sampling Units
RDT	Rapid Diagnostic Test Kit
SC	Steering Committee
SCD	Sickle Cell Disease
SE	South East
SES	Socioeconomic Status
SMARD	State Ministry of Agriculture and Rural Development
SMOH	State Ministry of Health
SPHCDA	State Primary Health Care Development Agency
SS	South South
SW	South West
TAC	Technical Advisory Committee
ToT	Training of Trainers
UNICEF	United Nations Children’s Fund
USA	United States of America
USAID	United States Agency for International Development
VA	Vitamin A
VAD	Vitamin A Deficiency
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WRA	Women of Reproductive Age

Foreword

Malnutrition has been identified as a major constraint to development. The proportion of individuals and households that are both malnourished and food insecure has been on the increase in Nigeria; and children, women, adolescent girls, and the elderly are the most affected.

The Federal Government of Nigeria, in collaboration with other stakeholders, implemented the National Food Consumption and Micronutrient Survey (NFCMS) as one of its landmark steps towards addressing the burden of malnutrition and its associated consequences, and ensuring the availability of very reliable data for decision making.

The dearth of food consumption and nutrition data poses great challenges to addressing questions that policy makers need to answer in tackling issues of undernutrition, micronutrient deficiencies, overweight and obesity, and diet-related chronic non-communicable diseases (DR-NCDs), and in improving the food systems to deliver healthy diets to the population. Some data are available from a variety of sources to help identify dietary trends in adults, infants, young children, women, and households experiencing poverty, but the picture is fragmented and incomplete making it difficult for policy makers to take an informed decision towards addressing malnutrition in the country.

The National Food Consumption and Micronutrient Survey (2021), which is the third nationally-representative survey of its kind in Nigeria, was conducted to assess the micronutrient status and dietary intake of Women of Reproductive Age (15–49 years), including pregnant and lactating women and children aged 6 –59 months. The study also assessed the micronutrient status of non-pregnant adolescent girls aged 10–14 years and identified key factors associated with poor nutrition in these populations. The information generated will provide a foundation for the formulation of evidence-informed policies and programmes and in monitoring progress, going forward. The outcome of the Survey will enhance the deliverables of the National Multisectoral Plan of Action for Food and Nutrition (NMPFAN 2021 – 2025) as well as priority actions identified in the Nigeria Food Systems Transformation Pathways both of which are consistent with the policy thrust of the present administration as encapsulated in the National Development Plan (2021-2025) and Nigeria Agenda (2050).

A very high consultative process was adopted in the implementation of the Survey. All stakeholders in food and nutrition sectors including representatives of government, Organised Private Sector, Civil Society Organisations, Academia, local NGOs, Development Partners, and International Donor Agencies were involved in its implementation. This preliminary report presents a first look at selected findings from the (NFCMS) 2021 and covers sample households' socioeconomic and demographic characteristics, diet questionnaire, anthropometry, biomarker questionnaires, food sample analysis, and biomarker indices analysed in-country. The report does not include findings from the 24-hour dietary recall and biomarker indices currently undergoing independent analysis and whose result will be presented in a final report in July 2023.

Prince Clem Ikanade Agba
Honourable Minister of State, Budget, and National Planning

Preface

Nigeria is undergoing rapid urbanization with a rapidly growing population. Nigeria continues to face high rates of chronic undernutrition, micronutrient deficiency, overweight and obesity, and associated diet-related non-communicable diseases (a.k.a. triple burden of malnutrition). There is a significant rise in the incidence of diet-related non-communicable diseases (NCDs) and the prevalence of overweight and obesity, as well as Type 2 diabetes in adults. The Global Panel estimates that the number of people with Type 2 diabetes in the country would double by 2030. The complexity in food systems (e.g., due to urbanization) implies that any attempt at improving the multiple burden of malnutrition would require a systemic approach to identifying risk factors and designing evidence-informed policies and interventions that account for spatial and socio-cultural issues.

When defining and understanding the scope and magnitude of food and nutritional issues and their causes, there is a need for high quality, timely, and complete data. In addition, reliable data is also required to examine the use and targeting of resources and determine the impact and cost-effectiveness of intervention programmes. Nutrition data can be used to bolster social accountability and are necessary to assess progress on national and global nutrition targets. The lack of current data on food consumption and micronutrients from a representative sample remain a major constraint to understanding nutrient and dietary gaps in Nigeria. The National Food Consumption and Micronutrient Survey (NFCMS) 2021 is the third nationally representative survey of its kind conducted in Nigeria, following those implemented in 1968 and 2001. It provides up-to-date information on micronutrient status, anthropometry, and dietary intake indicators.

The NFCMS 2021 is a cross-sectional population-based survey with the sample stratified by geopolitical zone. Sampling within each zone followed a two-stage random selection strategy with enumeration areas (EAs) as the sampling units for the first stage. A total of 390 EAs were selected with probability proportional to size (PPS) using systematic sampling. The second stage was a complete listing of households carried out in each of the 390 selected EAs, followed by a line listing of all eligible respondents per target group in each sampled EA. The target groups were women of reproductive age (WRA) aged 15-49 years, children (aged 6-59 months), pregnant women, and non-pregnant adolescent girls (aged 10-14 years). A representative sample of 14 820 respondents was selected for the survey. The NFCMS 2021 collected information on types and amounts of foods consumed in the last 24 hours, height/length, weight, age, and biological samples, precisely blood, urine and stool and analyzed locally and internationally for haemoglobin genotype, HbA1c, status of iron and inflammation, vitamin A, folate, zinc, iodine, vitamin B1, vitamin B2, vitamin B12, malaria, H. *pylori*, haemoglobin, plasma glucose, and helminths. In addition to presenting national estimates, the report provides estimates of key indicators for both rural and urban areas, and the country's six geopolitical zones. Estimates are not provided at the state level.

The NFCMS 2021 is unique in several ways. For the first time, the survey was implemented using computer-assisted personal interviewing (CAPI), allowing more rapid provision of data than in previous surveys. The survey tools and design used can serve as a model for the use of the application in other African country's food consumption surveys, especially the INDDEX24 Mobile Application used to capture dietary intake data. Nigeria is the first country to use this innovative dietary intake assessment tool in a large-scale survey. Some of the dietary data of interest include the use of fortifiable vehicles to assess the impact of large-scale fortification programme, and consumption of biofortified crops, which will be used to measure the impact of these programmes.

Different databases were also created (Food, Recipe, and Ingredient List Database; Conversion Factors Database; Recipe and Yield Factors database). This is an important resource for Nigeria in dietary intake assessment, especially when using the novel INDDEX 24 Mobile Application. Also, the Nigerian Food Composition Database that document all commonly consumed foods and beverages with their nutrient values, was revised after 26 years. These are intended to be used as reference, as well as adoption by other African countries, especially in West Africa. National food composition table/database is a resource every county needs to assess dietary intake for strategic interventions.

The International Institute of Tropical Agriculture (IITA) is a not-for-profit institution that generates agricultural innovations to meet Africa's most pressing challenges of hunger, malnutrition, poverty, and natural resource degradation. Working with various partners across sub-Saharan Africa, IITA improves livelihoods, enhances food and nutrition security, increases employment, and preserves natural resource integrity. IITA is a member of CGIAR, a global agriculture research partnership for a food secure future. We believe that with these data and evidence, Nigeria is better placed to improve the nutrition outcomes of its population, especially women and children.

The quality, volume and diversity of the data collected in the NFCMNS has set Nigeria apart in the African continent and globally because it will spark a global conversation about how to invest in agriculture, nutrition, and food systems to ensure a future in which all children get good quality food they need to thrive, not just to survive. And it is not just talk, the dialogue among like-minded investors will lead to action and action will bring results and impact.

Dr Nteranya Sanginga
Director General, International Institute of Tropical Agriculture

Acknowledgments

The Federal Ministry of Health (FMOH) and the Federal Ministry of Agriculture and Rural Development (FMARD) wishes to acknowledge the following organizations that participated and contributed immensely to the success of the survey which implementation took place between January to September 2021.

Special thanks to the Lead implementing Agency, the International Institute of Tropical Agriculture IITA, which oversaw the technical and implementing aspect of the survey, under the charismatic lead investigator and overall survey coordinator, Dr Bussie Maziya Dixon. The lead Biomarker Dr Mercy Lung'aho, the lead Dietary intake, Dr Olapeju Phorbee and Mr Samuel Ofodile, database manager, Dr Isiaka Olarewaju and Dr Kolapo Usman as consultant statisticians.

Special appreciation goes to the Bill and Melinda Gates Foundation (BMGF), Global Alliance for Improve Nutrition (GAIN), FMOH through the World Bank supported Accelerated Nutrition Result in Nigeria (ANRIN) project, FMARD, Foreign Commonwealth and Development Office (FCDO), United States Agency for International Development (USAID), Nutrition International (NI), for their financial and technical support.

Worthy of note is the effective collaboration and support from UNICEF as the financial custodian of the survey, and WHO for their support in shipping and clearing of samples to China. Furthermore, we wish to appreciate the contributions of Prof Rasaki Sanusi, University of Ibadan. Prof Henrietta Ene-Obong, University of Calabar, who served as co-principal investigators and additional resource persons during the training of field teams. The Federal Ministry of Health and the Federal Ministry of Agriculture also extends its appreciation to Dr Victor Ajieroh of BMGF, Dr Adeyinka Onabolu senior adviser to the Honourable Minister of Agriculture and Dr Chris Isokpunwu senior adviser to the Honourable Minister of Health for their valuable contributions to the survey.

The FMOH and FMARD, also appreciate the technical advisors in the survey namely CDC Atlanta USA which provided technical support in the designing and planning of the survey through December 2020, FHI Solution- *Intake*, Tufts University-INNDEX, Cornel University, University of Wisconsin, National Bureau of Statistics, National Population Commission, Oxford Policy Management, the Zonal Coordinators, Assistant Zonal Coordinators, supervisors, interviewers, and the respondents.

We sincerely appreciate the sustained leadership provided by the Honorable Minister of Health, Dr Osagie Ehanire, Honourable Minister of Agriculture Dr Mohammed Mahmood Abubakar and the Honourable Minster of Budget and National Planning Zainab Shamsuna Ahmed, throughout the National Food Consumption and Micronutrient Survey (NFCMS). Similarly, we extend appreciation to the Permanent Secretaries of Health, Agriculture and Budget as well as the Honourable Minister for State for Health, Ministry of Agriculture and MBNP, for their immense contributions to the success of the survey.

Finally, the overall effective coordination efforts of the Director Nutrition FMOH Dr Binyerem Ukaire, Director Social Development MBNP Dr Faniran Sanjo, Deputy Director FMARD Dr Rasaq Oyeleke, and Deputy Director MBNP Mrs. Nelson Chito towards the successful implementation of the survey is highly commendable.

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Executive Summary

The National Food Consumption and Micronutrient Survey (NFCMS) is a cross-sectional population-based survey. The primary objective of the survey is to assess the micronutrient status, anthropometry, and dietary intake of women of reproductive age (WRA), aged 15-49 years, including pregnant and lactating women, and children (aged 6-59 months) as well as the micronutrient status of non-pregnant adolescent girls (aged 10-14 years) and identify key factors associated with poor nutrition in these populations. The information generated will provide a foundation for the formulation of evidence-informed policies and programmes. In the short- to medium-term, the information will provide a baseline from which to monitor changes over time.

The NFCMS 2021 collected information on four distinct components: (1) socioeconomic and demographic information of household in sample; (2) dietary intake – types and amounts of foods consumed in the last 24 hours; (3) anthropometry – height/length, weight, age; and (4) micronutrient status through a series of biomarkers such as haemoglobin genotype, HbA1c, status of iron and inflammation, vitamin A, folate, zinc, iodine, vitamin B1, vitamin B2, vitamin B12, malaria, H. pylori, haemoglobin, plasma glucose, and helminths, which were analysed from blood, urine, and stool samples. Analyses of the biological samples were carried out in both local and international laboratories that adopted rigorous quality control measures. For dietary intake, the results are presented separately for children aged 6-23 and aged 24-59 months at the national level and by location. For WRA, including pregnant women, data were disaggregated by geopolitical zone and by location at the national level. In addition, lactating women, because of their higher energy and nutrient requirements, are presented separately.

This preliminary report presents selected findings from the NFCMS 2021 and covers respondent's household socioeconomic and demographic characteristics, including information collected from household listing, diet questionnaire, anthropometry, biomarker questionnaire, food sample analysis, and biomarker indices analysed in-country. The report does not include findings from the 24-hr dietary recall, and biomarker indices currently being analysed in international laboratories. Presented below are selected key findings.

A total of 9107 households were enumerated, with 3990 in urban areas and 5177 in rural areas. The number of households in sample varied among the geopolitical zone with the smallest (1328) in the South East and the largest (1687) in the North West. At the national level, only a small proportion of the household heads were females (11.8 percent in urban and 9.7 percent in rural areas). The proportion of female-headed households was highest in the South East compared to the North West, which had the least. Distribution of household by type also showed that the proportion of female-headed households was higher among those with primary or no formal education as compared with those with higher education.

Results obtained for water, sanitation, and hygiene (WASH) show that in Nigeria, 62 percent of households drink water from an improved water source located within the premises. The most common main source of drinking water is the borehole (42.6 percent). The use of borehole is prevalent in urban (46.3 percent) and rural (39.9 percent) areas. At national level, 26.5 percent of the households used improved toilets that were not shared with any other households while 29.5 percent households used improved toilets shared with at least one other household. The proportion of households that shared improved toilets was high in the urban areas compared to rural areas with only about 18 percent. One in every five (21.5 percent) households in Nigeria use an unimproved toilet facility, while 23.5 percent of households did not have a toilet facility.

Our findings on food security indicate that: (1) overall, 79 percent of the sample households were food insecure (57 percent moderately food insecure and 22 percent were severely food insecure) indicating that they went without eating for a whole day because of lack of money or other resources; and (2) the proportion of food insecurity reduced with increase in education attainment.

For infant and young child feeding (IYCF) practices and diet, preliminary analysis indicates that: (1) almost all children (97 percent), aged 6-23 months, were ever breastfed and 58 percent of children (aged 12-23 months) received continued breastfeeding (it was more practiced in the rural than in the urban areas); (2) few non-pregnant women reported having consumed biofortified crops or any products made from yellow cassava (3 percent), orange-fleshed sweet potato (5 percent), and orange maize (13 percent) in the 30 days preceding the survey; 3) among the non-pregnant women who reported having consumed yellow cassava, and orange maize, the vast majority reported consuming it on 1 to 9 days in the past 30 days, whereas few consumed it daily.

A high proportion of households of sampled non-pregnant women of reproductive age (WRA) consumed vegetable oil (90 percent), sugar (88 percent), salt (99 percent), and bouillon (99 percent) in any form. Fewer households of sampled non-pregnant WRA consumed flours in any form (57 percent for maize flour, 29 percent for semolina flour, and 28 percent for wheat flour). The proportion of households that consumed foods that were obtained through purchases (as opposed to for example gifts or food aid) were similar to those consuming the food in any form for most food vehicles, except for maize flour (57 percent of household consumed it, but only 29 percent purchased it).

The proportion of respondents whose households consumed these foods in a branded form (which was used as a proxy for commercially processed and thus amenable to large-scale fortification) was considerably lower for most foods, i.e., vegetable oil (33 percent), sugar (22 percent), wheat flour (13 percent) maize flour (<1 percent), semolina flour (23 percent), salt (47 percent), except for bouillon, which remained high (96 percent). The same proportion of households that consumed branded foods also consumed foods labelled as fortified and confirmed to be fortified (in any amount) based on linking the report brand to secondary market data on fortification quality.

Consumption of foods that were branded was lower among respondents from rural households compared to respondents from urban households for most foods, i.e., vegetable oil (20 percent vs. 48 percent), wheat flour (8 percent vs. 27 percent), semolina flour (7 percent vs. 40 percent), sugar (15 percent vs. 31 percent), and salt (37 percent vs. 59 percent) except bouillon (95 percent vs. 97 percent).

Based on the analysis of food samples that were collected in a sub-sample of households of the sampled non-pregnant WRA and analysed for micronutrient contents, most samples were fortified at any level for vitamin A in sugar (74 percent), iodine in salt (100 percent), iron and zinc in wheat flour (100 percent each) while iron and zinc in semolina flour was also 100 percent. Conversely, about one third was fortified at any level with vitamin A in vegetable oil (31 percent) and vitamin A in wheat flour (26 percent).

The prevalence of stunting, wasting, underweight, and overweight in children (aged 6-59 months) nationally was 33.3, 11.6, 25.3, and 1.5 percent, respectively. Stunting was highest in the North West zone (47.9 percent), wasting was highest in children (aged 6-59 months) in the North East zone (17.2 percent), and underweight was highest in the North West zone (35.5 percent). The prevalence of severe stunting, severe wasting, severe underweight, and obesity in children (aged 6-59 months) nationally was 16.7, 3.0, 9.2, and 0.6 percent, respectively. Severe stunting was highest in children (aged 6-59 months) in the North West zone (27.3 percent), severe wasting was highest in children (aged 6-59 months) in the North East zone (6.3 percent), severe underweight was highest in children (aged 6-59 months) in the North West zone (13.6 percent), and obesity was the highest in the South East zone (1.7 percent).

For adolescent girls and women of reproductive age, results obtained for nutrition status indicates that the percentage of adolescent girls with thinness was 15.1 percent, overweight was 3.1 percent, and obesity was 1.1 percent nationally. Thinness was recorded highest in the North West zone (20.6 percent). For women of reproductive age, the prevalence of thinness, overweight, and obesity was 14.1, 14.8, and 8.2 percent, respectively. Thinness was highest among WRA in the North West zone (21.6 percent), overweight and obesity were highest among WRA in the South East zone at 21.2 and 15.5 percent, respectively.

The prevalence of anaemia among children (aged 6-59 months), was 62 percent nationally. Specifically, 31 percent of children (aged 6-59 months) were found to be mildly anaemic, 29 percent were moderately anaemic, and 2 percent were severely anaemic. Anaemia was more prevalent in children in the North West zone (73 percent). Additionally, at the national level, anaemia was present in 41 percent of adolescent girls. The prevalence of mild anaemia was 16 percent, moderate anaemia was 24 percent, and severe anaemia was 1 percent. Severe anaemia was higher in adolescent girls residing in rural areas (1.7 percent). About 55 percent of women of reproductive age suffered from anaemia. The prevalence of mild anaemia was 31 percent, moderate anaemia was 22 percent, and severe anaemia was 1 percent. Anaemia was highest in women of reproductive age in the North East zone (46 percent).

Findings on national interventions of interest for all four target groups, in the past six months preceding the survey, indicated that nationally iron/micronutrient powder use among children (aged 6-59 months) was 7 percent, vitamin A supplementation was 25 percent, and the percentage of children whose caregivers received any nutrition counselling was 15 percent. For women of reproductive age, 13 percent took multivitamins, while iron/folic acid usage was 15 percent nationally.

From the preliminary findings, it can be concluded that: (1) two in every three households drank water from an improved water source located on premises, and that the most common main source of drinking water was the borehole; (2) there is high level of food insecurity and that the proportion of food insecurity reduced with higher education; (3) consumption of biofortified crops is low; (4) stunting and anaemia are public health problems and that there are zonal differences; and (5) coverage of some national interventions is low. Therefore, the results present opportunities for the formulation of evidence-based policies and programmes and a baseline from which to monitor changes over time.

Key Findings

Household in-sample characteristics

- A total of 9107 households were enumerated, with 3990 (43.8 percent) in urban areas and 5177 (56.6 percent) in rural areas. Number of households in sample varied among the geopolitical zone with the smallest (1328) in the South East and the largest (1687) in the North West. A total of 34 469 individuals (10 546 children 6-59 months of age, 18 781 non-pregnant WRA aged 15-49 years, 2040 pregnant women, and 3102 non-pregnant adolescent girls) were sampled **(Table 15)**.
- Most of the household heads (89.4 percent) were males. Nationally, only a small proportion of the household heads (10.6 percent) were females with 11.8 percent in urban and 9.7 percent in rural areas. The proportion of female-headed households was highest in the South East (15.7 percent) compared to the North West (5 percent), which had the least. Distribution of household by type also showed that the proportion of female-headed households was higher among those with primary (14.8 percent) or no formal education (13.2 percent) as compared with those with higher education (7.6 percent) **(Table 15).**
- In terms of educational qualification among the female heads of household, the results show that 24 percent of female-headed did not have any formal education, 33 percent had primary education, and about 30 percent had secondary education. A small proportion (13 percent) of female heads of household had education beyond secondary **(Table 16)**.
- Overall, 94 percent of households' heads were engaged in income-generating activities. The proportions are similar in urban (93.8 percent) and rural areas (94.1 percent). Analysis by type of activities shows that the agricultural sector took the lead with 36.8 percent, while sales and services-related activities followed with 16.3 percent and 12.6 percent, respectively. However, the pattern of distribution was different among the geopolitical zones. Engagement in agricultural sector was higher in northern zones as compared to the south **(Table 18 and 19)**.
- At the national level, 11 percent of households were engaged in the production of animal source foods (6.4 percent own any livestock, herds, other farm animals, or poultry; 1 percent raise rabbit, guinea pigs, grass cutters, snails, fish, or other small animals; 1.5 percent raise fish; and 5 percent catch/harvest fish from the wild). The proportion of HHs involved in the production of animal source foods was very low between rural (14 percent) and urban areas (8 percent) **(Table 30)**.
- Overall, 3 out of 10 households indicated that they have land for vegetable gardening. The proportion was higher in rural areas (38 percent) compared to urban areas (16 percent). Among the zones, the households in South East (68 percent) and South South (41 percent) had higher proportions of households who had access to land for vegetable production than in any other geopolitical zones **(Table 31)**.
- Results obtained for households in sample that have trees or bushes that produce fruits indicated that 31 percent had trees or bushes that produce fruits. A high proportion of households that have trees or bushes that produce fruits were found in the South East (56 percent), South South (44 percent), and North Central (39 percent) **(Table 32)**.

Water, sanitation, and hygiene

- In Nigeria, 62 percent of households drink water from an improved water source located on premises, and the most common main source of drinking water is the borehole (42.6 percent of households) The use of borehole is prevalent in urban (46.3 percent) and rural (39.9 percent) areas. A borehole is a deep, narrow well that tap into naturally occurring underground water **(Table 23)**.
- At the national level, 26.5 percent of the households used improved toilets that were not shared with any other households, while 29.5 percent of households used improved toilets shared with at least one other household. The proportion of households that shared improved toilets was high in the urban areas (about 44 percent) than in the rural areas (18 percent) **(Table 24)**.
- One in every five households (21 percent) in Nigeria use an unimproved toilet facility. Usage of unimproved toilets is more prevalent in the North West (40 percent). Percentage in other zones ranged between 8.4 in South West and 20.4 in North East. The proportion of households practicing open defecation system was 21.5 percent. The practice was more prominent in the rural areas (34.5 percent) than in the urban areas (7.4 percent). The practice was highest in North Central (44 percent) **(Table 24)**.

Food Security and coping strategies

- Our findings on food security indicate that: (1) overall, 79 percent of the sample households were food insecure (57 percent moderately food insecure and 22 percent were severely food insecure) indicating that they went without eating for a whole day because of lack of money or other resources; and (2) the proportion of food insecurity reduced with increase in education attainment **(Table 26)**.
- Respondents were asked if in the past seven days there were times when their household did not have enough food or money to buy food. A very small proportion (3.5 percent) of households belonged to the group of “none or minimal food insecurity”, 54.3 percent belonged to the “stressed food consumption”, while 42.3 percent were found in the “crisis food consumption” group **(Table 27)**.

Infant and Young Child Feeding

- Almost all (97 percent) children (aged 6-23 months) were ever breastfed. Similar patterns were observed in urban and rural areas, and for girls and boys **(Table 40)**.
- About 58 percent of children (aged 12-23 months) received continued breastfeeding. As expected, the practice of continued breastfeeding decreased with age (84, 55, and 27 percent for children aged 12-15, 16-19, and 20-23 months, respectively). For children aged 12-23 months, continued breastfeeding was more common in rural areas (64 percent) than in urban areas (48 percent). Similar patterns were observed for boys and girls **(Table 41)**.
- Twenty (20) percent of children (aged 6-23 months) were bottle-fed. The use of bottles with a nipple decreased with age (28, 18, and 14 percent for children aged 6-11, 12-17, and 18-23 months, respectively). Similar patterns were observed for urban and rural areas, and boys and girls **(Table 42).**

Biofortification Coverage

- Few non-pregnant women reported having consumed biofortified crops or any products made from them in the past 30 days. Only three percent consumed yellow cassava, five percent consumed orange-fleshed sweet potato and 13 percent consumed orange maize **(Figure 6).**

- Although consumption of yellow cassava was low across the country, significant differences were observed by zone; consumption was one percent in the North West and eight percent in the North East. No differences were observed by residence (i.e., urban vs rural) and wealth quintile **(Figure 7).**
- Although consumption of orange-fleshed sweet potato was low across the country, significant differences were observed by zone; consumption was 16 percent in the North East and around two percent in all other zones. No differences were observed by residence and wealth quintile **(Figure 9).**
- Although consumption of orange maize was relatively low across the country, significant differences were observed by zone; coverage was 38 percent in the North East and between 4 and 14 percent in all other zones. No differences were observed by residence and wealth quintile **(Figure 11).**
- Among the non-pregnant women who reported having consumed yellow cassava, orange-fleshed sweet potato, and orange maize, the vast majority reported consuming it on 1 to 9 days in the past 30 days (77, 84, and 56 percent for yellow cassava, orange-fleshed sweet potato, and orange maize, respectively), whereas few consumed it daily (2, 0, and 16 percent for yellow cassava, orange-fleshed sweet potato, and orange maize, respectively) **(Figures 8, 10, and 12).**

Fortification coverage

- A high proportion of households of sampled non-pregnant women of reproductive age (WRA) consumed vegetable oil (90 percent), sugar (88 percent), salt (99 percent), and bouillon (99 percent) in any form. Fewer households of sampled non-pregnant WRA consumed flours in any form (57 percent for maize flour, 29 percent for semolina flour, and 28 percent for wheat flour). The proportion of households that consumed foods that were obtained through purchases (as opposed to for example gifts or food aid) were similar to those consuming the food in any form for most food vehicles, except for maize flour (57 percent of household consumed it, but only 29 percent purchased it) **(Figure 13).**
- The proportion of respondents whose households consumed these foods in a branded* form (which was used as a proxy for commercially processed and thus amenable to large-scale fortification) was considerably lower for most foods, i.e., vegetable oil (33 percent), sugar (22 percent), wheat flour (13 percent) maize flour (<1 percent), semolina flour (23 percent), salt (47 percent), except for bouillon, which remained high (96 percent). That said, the same proportion of households that consumed branded foods also consumed foods labelled as fortified and confirmed to be fortified (in any amount) based on linking the report brand to secondary market data on fortification quality **(Figure 13)**
- A high proportion of non-pregnant women came from households that either consumed unbranded or unknown brand of all the selected food vehicles except semolina flour and bouillon **(Figure 13)**
- The proportion of non-pregnant women from households that consumed unbranded and unknown oil was higher in the northern zones (65% North central, 56% North East, and 68% North West) compared to the southern zones (South East 23 percent, South South 26 percent and South West 32 percent) **(Table 45)**

*A proportion of fortified foods manufactured by large industries may also have been repackaged without branding, and therefore they were not identified at the household level.

- Consumption of foods that were branded was lower among respondents from rural households compared to those respondents from urban households for most foods, i.e., vegetable oil (20 percent vs. 48 percent), wheat flour (8 percent vs. 27 percent), semolina flour (7 percent vs. 40 percent), sugar (15 percent vs. 31 percent), and salt (37 percent vs. 59 percent) except bouillon (95 percent vs. 97 percent) **(Tables 45, 49, and 50)**

Fortification status of household food samples

- Based on the analysis of food samples that were collected in a sub-sample of households of the sampled non-pregnant WRA and analysed for micronutrient contents, it was revealed that most samples were fortified at any level for vitamin A in sugar (74 percent), iodine in salt (100 percent), iron and zinc in wheat flour (100 percent each) while iron and zinc in semolina flour was also 100 percent. Conversely, about one third was fortified at any level with vitamin A in vegetable oil (31 percent) and vitamin A in wheat flour (26 percent) **(Figure 35).**
- The measured mean amounts of micronutrients in the fortified samples were 2.6 mg/kg vitamin A in vegetable oil, 3.1mg retinyl palmitate/kg vitamin A in sugar, 60 mg/kg iodine in salt, 0.8 mg retinyl palmitate/kg vitamin A, 53.9 mg/kg iron, and 42.2 mg/kg zinc in wheat flour, and 0.8 mg retinyl palmitate/kg vitamin A, 38.6 mg/kg iron, and 36.0 mg/kg zinc in semolina flour **(Table 54)**

Anthropometry

- At the national level, the prevalence of stunting, wasting, underweight, and overweight in children was 33.3, 11.6, 25.3, and 1.5 percent, respectively. Stunting was highest in the North West zone (47.9 percent), wasting was highest in children in the North East zone (17.2 percent), and underweight was highest in the North West zone (35.5 percent) **(Figure 36).**
- The prevalence of severe stunting, severe wasting, severe underweight, and obesity in children at the national level was 16.7, 3, 9.2, and 0.6 percent, respectively. Severe stunting was highest in children in the North West zone (27.3 percent), severe wasting was highest in children in the North East zone (6.3 percent), severe underweight was highest in the North West zone (13.6 percent), and obesity was highest in the South East zone (1.7 percent) **(Table 56).**
- The percentage of adolescent girls with thinness was 15.1 percent, overweight was 3.1 percent, and obesity was 1.1 percent. Thinness was highest in the North West zone (20.6 percent) **(Figure 37).**
- At the country level, the prevalence of thinness, overweight, and obesity among WRA was 14.1, 14.8, and 8.2 percent, respectively. Thinness was highest among WRA in the North West zone (21.6 percent), overweight was highest among WRA in the SE zone (21.2 percent), and obesity was highest among WRA in the South East zone (15.5 percent) **(Figure 38).**

Intervention Coverage

- In the six months preceeding the survey, the use of iron/micronutrient powder (seven percent) and therapeutic feeds in the past 12 months (three percent) was low. At the national level, the prevalence of children (aged 6-59 months) receiving a vitamin A capsule in the past six months was 25 percent. The percentage of children receiving deworming treatment in the past six months was 28 percent. The percentage of children (aged 6-59 months) whose caregivers received any nutrition counseling in the past six months was 15 percent **(Figure 39)**.
- About 25 percent of adolescent girls reported using deworming treatment in the six months preceeding the survey. The use of iron/folic acid tablets and multivitamins in the six months preceeding the survey was reported among 11 and 9 percent of adolescent girls, respectively **(Figure 43)**.

- In the six months preceeding the survey, the use of deworming treatment was reported in 19 percent of women of reproductive age. Also, at the national level, 13 percent of WRA took multivitamins, while 15 percent used iron/folic acid **(Figure 48)**.
- At the national level, 44 percent of pregnant women reported receiving at least one antenatal care visit. About 66 percent of pregnant women took iron/folic acid tablets the day before the interview, while 87 percent reported taking iron/folic acid tablets at least once in the past seven days before the interview. Pregnant women (34 percent) were reported speaking to a health worker or community volunteer about what food to eat during pregnancy. On the other hand, women (32 percent) were reported talking to a health worker or community volunteer about breastfeeding their newborn **(Figure 53)**.

Self-reported morbidity and other anaemia risk factors

- In the two weeks preceeding the survey, the prevalence of diarrhoea among children (aged 6-59 months) was 35 percent. At the national level, the presence of blood in stool was reported among 8 percent of children (aged 6-59 months), and 14 percent reported having diarrhoea a day before the interview. Fever was reported in 46 percent of children (aged 6-59 months). Furthermore, 37 percent of children (aged 6-59 months) had cough in the two weeks preceeding the survey, while the prevalence of fast, short, rapid breaths or difficulty breathing was 13 percent. Pica in the past seven days preceeding the survey, was reported among 20 percent of children (aged 6-59 months) **(Figure 41)**.
- The overall prevalence of self-reported illness (cough, fever, malaria, and diarrhoea) and hospitalization/clinic visits among adolescent girls in the two weeks preceeding the survey at the national level were 32, 29, 20, 16, and 6 percent respectively **(Figure 46)**. The occurrence of self-reported smoking among adolescent girls was low (0.3 percent). Furthermore, the prevalence of pica in the seven days preceeding the survey and clinically diagnosed anaemia in the six months preceeding the survey among adolescent girls was 9 and 4 percent, respectively **(Figure 47)**.
- Nationwide, the overall prevalence of self-reported illness (fever, malaria, cough, and diarrhoea) and hospitalization/clinic visits in the two weeks preceeding the survey among women of reproductive age (aged 15-49 years) was 36, 27, 23, 17 and 8 percent respectively **(Figure 51)**. Also, the incidence of smoking among WRA was low (0.5 percent). The prevalence of pica in the past seven days and clinically diagnosed anaemia in the six months preceeding the survey among WRA was 5 and 6 percent, respectively **(Figure 52)**.
- The overall prevalence of self-reported illness (fever, malaria, diarrhoea, and cough) and hospitalization/clinic visits in the two weeks preceeding the survey among pregnant women (aged 15-49 years) was 40, 30, 21, 20, and 19 percent, respectively **(Figure 57)**. The occurrence of smoking among pregnant women was 0.4 percent **(Table 81)**.

Malaria, H. pylori, Helminth, and Plasma glucose

- Malaria: The national prevalence of malaria among children (aged 6-59 months), adolescent girls, women of reproductive age, and pregnant women was 24, 33, 13, and 14 percent, respectively **(Figure 58)**.
- H. pylori: The national prevalence of H. pylori among children (aged 6-59 months), adolescent girls, women of reproductive age, and pregnant women was 36, 55, 64, and 59 percent, respectively **(Figure 58)**.

- Helminth: The national prevalence of helminth among children (aged 6-59 months), women of reproductive age, and pregnant women was 11, 6, and 4 percent, respectively **(Figure 58)**.
- Elevated plasma glucose (plasma glucose > 200 mmol/L or mg/dL): The national prevalence of elevated plasma glucose among women of reproductive age was 0.2 percent **(Figure 58)**.

Anaemia

- Children (aged 6-59 months): anaemia was present in 62 percent of children. The prevalence of mild anaemia was 31 percent, moderate anaemia was 29 percent, and severe anaemia was 2 percent **(Figure 60)**.
- Adolescent girls (aged 10-14 years): anaemia was present in 41 percent of adolescent girls. The prevalence of mild anaemia was 16 percent, moderate anaemia was 24 percent, and severe anaemia was 1 percent **(Figure 60)**.
- Women of Reproductive Age (aged 15-49 years): anaemia was present in 55 percent of WRA. The prevalence of mild anaemia was 31 percent, moderate anaemia was 22 percent, and severe anaemia was 1 percent **(Figure 60)**.
- Pregnant women (aged 15-49 years): anaemia was present in 86 percent of pregnant women. The prevalence of mild anaemia was 20 percent, moderate anaemia was 62 percent, and severe anaemia was 4 percent **(Figure 60)**.
- Preliminary analysis of the relationship between anaemia, infection, haemoglobin genotype (blood disorders), and the use of micronutrient powder among children showed that 74 percent of children with severe anaemia had malaria. About 78 percent of children with any anaemia had normal haemoglobin genotype. Severity of anaemia was also associated with normal haemoglobin genotype. About 52 percent of children with moderate anaemia and 61 percent with severe anaemia had fever in the two weeks preceeding the survey **(Table 91)**.
- Preliminary analysis of the relationship between anaemia, infection, haemoglobin genotype (blood disorders), and use of supplements among women of reproductive age showed that 77 percent of WRA with mild anaemia had normal haemoglobin. Also, 76 percent of WRA with moderate anaemia had normal haemoglobin, while 66 percent of WRA with severe anaemia had normal haemoglobin **(Table 95)**.

Background

The last National Food Consumption and Micronutrient Survey (NFCMS) was undertaken about 20 years ago in 2001 (Maziya-Dixon, et al., 2004; Nigeria Food Consumption and Nutrition Survey 2001-2003, IITA, https://hdl.handle.net/10568/100010). The findings of that study likely no longer represent the current micronutrient status or dietary consumption patterns of the Nigerian population. This lack of recent and reliable information presents several challenges, both in terms of reviewing ongoing programmes and in informing the development of new guidance and policies. Updated information on the population's micronutrient status and dietary intakes is required for informed, evidenced-based decisions about current and future food, nutrition, and agriculture programming and policy making in Nigeria.

During a high-level national nutrition data stakeholder workshop in Abuja in July 2017, stakeholders agreed that a national survey to collect information on dietary intake and micronutrient status was needed. Subsequently, in January 2018, a NFCMS methodology workshop was held in Abuja, during which agreements were reached on the scope and level of representativeness for the survey, and key decisions pertaining to the survey governance structure. In this light, UNICEF was nominated as the fund management agency for the survey, and IITA as the lead implementing agency.

Introduction

The 2021 NFCMS is the third nationally representative survey of its kind conducted in Nigeria, following those implemented in 1968 and 2001. The Federal Government of Nigeria, in collaboration with the International Institute of Tropical Agriculture (IITA), and other stakeholders, implemented this survey. Data collection took place from 17 February to 16 June 2021 for household (HH) listing and HH questionnaire with a one-week break for Easter holidays; and 8 March 2021 to 4 July 2021 for dietary intake, anthropometry, and biomarker, excluding that of the Modified Relative Dose Response (MRDR) with a four-week break during Ramadan. Data collection for MRDR commenced on 17 August 2021 to 17 September 2021. Funding for NFCMS 2021 was provided by the Federal Ministry of Health, Gates Foundation, World Bank Group, Foreign, Commonwealth & Development Office, United Nations Children's Fund, and Nutrition International. Technical assistance was provided by the National Population Commission, Nigeria (NPC), National Bureau of Statistics, Nigeria (NBS), Tufts University- International Dietary Data Expansion Project (INDDEX), FHI360 Solutions-Intake Center for Dietary Assessment, University of Wisconsin-Madison, USA and Cornell University, USA.

This preliminary report presents selected findings from the NFCMS 2021 and covers respondent's household socioeconomic and demographic characteristics, including information collected during household listing, diet questionnaire, anthropometry, biomarker questionnaire, food sample analysis, and biomarker indices analysed in-country. The report does not include findings from the 24-hr dietary recall, and biomarker indices being analysed outside the country. A comprehensive analysis of the data will be presented in a final report in July 2023.

Objectives

The primary objective of the survey is to assess the micronutrient status and dietary intake of women of reproductive age (WRA) (aged15-49 years), including pregnant and lactating women and children (aged 6-59 months). The study also assessed the micronutrient status of non-pregnant adolescent girls (aged 10-14 years) and identified key factors associated with poor nutrition in these populations. The information generated will provide a foundation for the formulation of evidence-informed policies and programmes. In the short- to medium-term, the information will provide a baseline from which to monitor changes over time.

The specific objectives of the survey include (dietary related objectives in bold):

1. assess the food consumption of children (aged 6-59 months), excluding breastmilk, and WRA to determine their intakes of energy, protein, fat, and selected micronutrients, as well as the amounts of specific nutrient-dense foods relevant for food-related nutrition policies and programmes;
2. determine the adequacy of nutrient intake in children (aged 24-59 months) and WRA to identify populations at risk of inadequate intake;
3. assess infant and young child feeding (IYCF) practices among children (aged 6-23 months) and compare the nutrient density of their complementary feeding diets with recommendations;
4. assess the prevalence, severity, and distribution of specific micronutrient deficiencies and other forms of malnutrition (e.g. stunting, wasting, overweight/obesity) among WRA, adolescent girls, and children (aged 6-59 months);
5. identify key factors (e.g. infection, blood disorders, supplement use) associated with anaemia in WRA and children (aged 6-59 months) to inform strategies to prevent and treat anaemia in these populations;
6. measure the coverage of national interventions to improve micronutrient status and dietary intake in WRA and children (aged 6–59 months), including iron folic acid (IFA) supplements, IYCF counselling, vitamin A supplementation (VAS), biofortification, and food fortification programmes; and
7. assess the prevalence of food insecurity and identify other key factors at individual and HH level (e.g. education, SES) that are associated with micronutrient status and dietary intake in WRA and children (aged 6–59 months), and the micronutrient status in adolescent girls.

Survey Design

Study area

The country's 2006 Population and Housing Census, which placed its population at 140 431 790, served as the sampling frame. Nigeria is the most populous black nation in the world. Nigeria is comprised of 36 states and the Federal Capital Territory (FCT) (**Figure 1**) with 774 Local Government Areas (LGAs) and 662 529 enumeration areas (EAs) categorized into six geopolitical zones (North West, North East, North Central, South West, South East and South South). Nigeria has more than 500 ethnic groups with the most populous being Hausa, Yoruba, and Igbo.

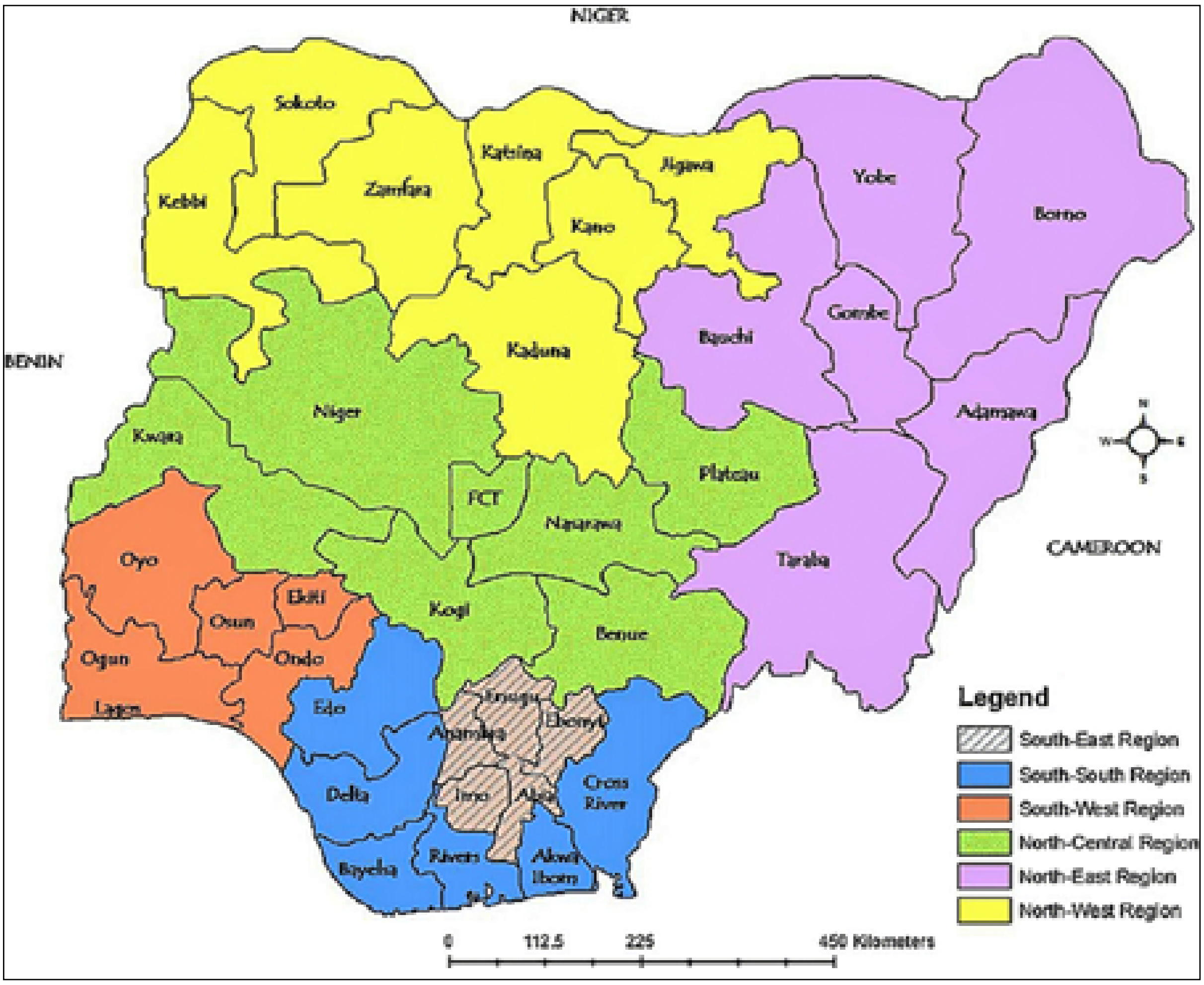


Figure 1. Geopolitical zones in Nigeria

Survey design, target populations, and reporting domains

The NFCMS is a cross-sectional population-based survey that collects data on dietary intake, micronutrient status, and anthropometry. The following demographic groups are the focus for the survey: (1) children aged 6-59 months; (2) non-pregnant WRA (aged 15-49 years), including lactating women; (3) pregnant women (aged 15-49 years); and (4) non-pregnant adolescent girls (aged 10-14 years). No dietary data was collected for adolescent girls aged 10-14 years. **Table 1** shows the sampling target groups for which data is collected for specific survey components.

Table 1. Sampling target groups by survey components

Sampling target groups	Micronutrient biomarker/ anthropometry	Dietary intake
Non-pregnant WRA (15-49 years old)	√	√
Children (6-59 months old)	√	√
Pregnant women (15-49 years old)	√	√
Non-pregnant adolescent girls (10-14 years old)	√	Not collected

The survey was successfully carried out in 364 Primary Sampling Units (PSU) referred to as EAs, after 26 EAs with security challenges during fieldwork were dropped. These areas were in Lagos (1 cluster), Ogun (1 cluster), Sokoto (2 clusters), Kebbi (1 cluster), Zamfara (1 cluster), Yobe (2 clusters), Borno (8 clusters), Anambra (1 cluster), Cross River (1 cluster), and Rivers (2 clusters). More clusters were lost in the NE zone (10) followed by NC (6), NW (4), SS (3), SW (2), and SE (1). The reporting domains and level of disaggregation are presented in **Table 2.** For dietary intake, the results are presented separately for children aged 6-23 versus 24-59 months at the national level and by location (urban and rural). For WRA, including pregnant women, data was disaggregated by geopolitical zone and by location (urban and rural) at the national level. In addition, lactating women, with higher energy and nutrient requirements are presented separately. For biomarker and anthropometry, results are presented at the national level, geopolitical zone, and by location (urban and rural) for WRA and children (aged 6-59 months); and at national level and by location (urban and rural) for pregnant women (15-49 years old) and non-pregnant adolescent girls (10-14 years old).

Table 2. Reporting domain by target groups and survey components

	Sampling target groups			
	Non-pregnant WRA (15-49 years old)	Children (6-59 months old)*	Pregnant women (15-49 years old)	Non-pregnant adolescent girls (10-14 years old)
Reporting domain for dietary intake	National & geopolitical region	National	National	No data collected
Reporting domain for micronutrient biomarker/ anthropometry	National & geopolitical region	National & geopolitical region	National	National
Outcomes disaggregated by urban and rural areas	National	National	National	National

*Dietary data is presented separately for infants and young children aged 6–23 months and children aged 24–59 months.

Sampling method

The NFCMS is a cross-sectional population-based survey with the sample stratified by geopolitical zone. Sampling within each region follows a two-stage random selection strategy. In the first stage, EAs were selected adopting principles of Probability Proportional to Size (PPS) using systematic sampling. Sixty-five (65) EAs within each region were selected. In the second stage, eligible respondents were randomly selected within the sampled EAs.

The sample size estimates for non-pregnant WRA (15-49 years old) and children (6-59 months old) were calculated for key micronutrient biomarker indicators. The sample size calculations for these two sampling groups were based on the combination of an estimated prevalence, required absolute precision (margin of error), and a 95 percent level of confidence, for producing estimates at the geopolitical level, using the following formula:

$$n = \frac{z^2 * p(1-p)(deff)}{d^2}$$

Where:

n is the calculated sample size

z is the statistic that defines the level of confidence required

p is an estimate of the key indicator to be measured by the survey in the population group of interest, for example, the prevalence of iron deficiency among WRA, expressed as a proportion of that population

d is the desired level of precision, or the margin of error to be obtained. Margin of error for a geopolitical region used is ± x 5 percentage points.

As statistically computed, z = 1.96, which is the z-statistic for the 95 percent confidence level.

If the expected estimate of the key indicator (p) was unknown, the value of 0.5 (or 50 percent) was used because it produces the largest sample size (for a given value of d). For all estimates of sample size, a design effect of 2 was used to account for the sample design, which is the value often used when there is little information from which to make a more informed decision. The calculated sample sizes were further inflated to account for non-response rate by 20 percent (**Table 3**).

To interpret retinol concentrations, the MRDR test was conducted on a sub-sample of respondents. This required the collection of a second venous blood sample – pregnant WRA (aged 15-49 years). A second dietary recall sample and MRDR were randomly selected from respondents of the first dietary recall and biomarker with the numbers varying by population groups. A second 24-hour recall was collected on a non-consecutive day for a randomly selected sub-sample of respondents who completed the first 24-hour dietary recall. The number of repeats corresponded to 38 percent of the sample of children (aged 6-59 months), 25 percent of the sample of non-pregnant WRA, and 33 percent of the sample of pregnant WRA. These data are needed to remove the within-person variation from the data and simulate "usual" intake distributions for the sample.

Table 3. Adjusted sample size per EA, geopolitical zone, and at national level by sampling target group1

Sampling target population	Respondents selected per EA	Sample size per geopolitical zone	Total sample size at national level
Non-pregnant WRA (15-49 years old)	16	1040	6240
Children (6-59 months old)	16	1040	6240
Pregnant women (15–49 years old)	3	195	1170
Non-pregnant adolescent girls (10-14 years old)	3	195	1170
Total	38	2470	14 820

Questionnaires and sample collection

Five questionnaires, excluding the Household Listing Form, were developed for the NFCMS 2021: (1) household; (2) non-pregnant WRA; (3) pregnant WRA; (4) children aged 6–59 months; and (5) adolescent girls aged 10–14 yrs. To help guide the development of questionnaires, the tools and protocols used for the standard Demographic and Health Survey (DHS-7) were adopted. The review process for the questionnaires involved: identifying and justifying information required; defining the priority indicator; providing rationale for why this survey is the right place to measure the indicator; what questions will elicit the information needed for the indicator; and how will the information be reported. For the selection of indicators and questions, the following principles were used as a guide:

- if there is no clearly defined indicator, we cannot include questions in the survey;
- indicator definitions and questions should be consistent with national and global standard definitions and questions;

- use standard procedures, questions, and response questions whenever possible;
- indicators and questions already used in Nigeria survey reports, such as the NDHS and LSMS surveys, should be included, where possible;
- from global guidance or tools such as IYCF revised in 2021; and
- expert advice.

Comments were solicited from a group of key stakeholders and development partners after which these were presented to the Technical Advisory Committee (TAC) and Steering Committee (SC) for approval before applying for the ethical clearance. After all questionnaires were finalized in English, they were translated into Hausa, Yoruba, and Igbo; and translated back to English. The survey protocol was reviewed and approved by the National Health Research Ethics Committee of Nigeria (NHREC). At implementation, the questionnaires were disaggregated to three based on the components of the NFCMS: HH Questionnaire, Diet Questionnaire, and Anthropometry/ Biomarker Questionnaire.

The HH Listing Form listed all members and visitors of the sample HHs. They are those who live in the HH and/or guests who stayed there last night. Information on relationship to head of HH, sex, and age was collected on each person listed. For children (aged 6-59 months) and WRA, additional information was collected (i.e., date of birth, birth certificate, source of birth certificate for children 6-59 months, and pregnant status for WRA). Data on age and pregnant status were used to identify WRA, adolescent girls, and children (aged 6-59 months) who were eligible for individual interviews.

The HH Questionnaire collected information on general characteristics of the head of HH (i.e., ethnicity, religion, education, and employment). It also collected information on the HHs dwelling unit (source of drinking water; type of toilet facilities; materials used for flooring, external walls, and roofing; ownership of various animals and durable goods; area where members of the HH often wash their hands; main way of refuse disposal, presence of a vegetable garden and fruit trees; HH food insecurity; and HH coping strategies).

The Diet Questionnaire collected information on respondents' identity confirmation (name, age, date of birth, completion of HH Questionnaire), socio-demographic characteristics, consumption of biofortified foods (yellow cassava, OFSP, and orange maize), and fortification coverage for selected food vehicles (vegetable oil, wheat flour, maize flour, semolina, sugar, salt, and bouillon) for children (aged 6-59 months) and WRA. In addition, pregnancy and lactation data were collected among WRA and selected IYCF practices among children (aged 6-59 months only). The Diet Questionnaire was followed by a quantitative interactive 24-hour (i24-hr) dietary recall interview collected using the INDDEX24 mobile application. In addition, fortifiable food samples were collected in a 25 percent sub-sample of WRA during the repeat i24-hr dietary recall and tested for levels of fortification (i.e., iodine in salt, vitamin A in edible oil, vitamin A in sugar, and iron in flours). No dietary data was collected for adolescent girls (aged 10-14 years).

The Anthropometry and Biomarker Questionnaire collected information on respondent identity confirmation, socio-demographic characteristics, anaemia risk and health status, and micronutrient intervention coverage. In addition, height/length and weight measurements were recorded, and biomarker samples (blood, stool, and urine) were collected for children (aged 6-59 months), adolescent girls (aged 10-14 years), and WRA. Information on the laboratory analysis conducted on the biomarker samples for each target group is presented in **Table 4**.

Table 4. Biomarker measurements and analysis method/matrix by target group

Biomarker measurement/ status	Analysis method/ matrix	Children (6-59 months)	Adolescents (10-14 years)	Pregnant women (15-49 years)	Non-Pregnant women (15-49 years)
Malaria	Presence of Plasmodium falciparum malaria parasitemia in venous whole blood sample detected using a rapid diagnostic test kit (RDT)	✓	✓	✓	✓
Helicobacter pylori	Presence of IgG antibodies specific to *Helicobacter pylori* (H. pylori) in venous whole blood sample detected using a rapid qualitative immune assay test RDT	✓	✓	✓	✓
Helminths	Presence of helminth eggs in stool samples detected using microscopy	✓	x	✓	✓
Plasma glucose	Whole venous blood glucose concentration measured using a HemoCue (Hb-301) instrument. Results converted to equivalent plasma values using a constant factor of 1.11.	x	x	x	✓
Glycated haemoglobin (HbA1c)	Whole venous blood sample assessed using a Bio-Rad D10 auto-analyzer	x	x	x	✓
Haemoglobin genotype (blood disorders)	Whole venous blood assessed using high-performance liquid chromatography (HPLC) in a laboratory setting	✓	x	x	✓
Haemoglobin	Anaemia measured from whole venous blood sample using a HemoCue (Hb-201) instrument	✓	✓	✓	✓
Iron status and markers of inflammation	Sandwich Elisa assay for Ferritin, serum transferrin receptors (sTfR), c-reactive protein (CRP), α1-acid glycoprotein (AGP) in serum	✓	✓	✓	✓
	Sandwich Elisa assay for RBP in serum	✓	✓	✓	✓
Vitamin A	Serum retinol and MRDR in serum samples analyzed using HPLC and a standardized method for 3,4-didehydroretinol and retinol	✓ (20% sub-sample)	x	x	✓ (20% sub-sample)
Folate	Microbiological assay for serum folate and Red Blood Cells (RBC) folate from whole venous blood lysate	x	✓	✓	✓
Vitamin B 12	Serum B 12 assessed using Roche E-170 Vitamin B12 "ECLIA"	✓	✓	✓	✓
Vitamin B1	Erythrocyte transketolase (ETK) activity assay of saline- washed Red Blood Cells (RBC)	x	x	x	✓ (20% sub-sample)
Vitamin B2		x	x	x	✓ (20% sub-sample)
Zinc	Serum zinc assessed using Atomic Absorption Spectroscopy (AAS)	✓	✓	x	✓
Iodine	Urinary iodine using ammonium persulfate	x	x	✓	✓

The gold standard to determine vitamin A status is liver biopsy. However, access to this tissue is limited, except under special circumstances. The MRDR test has been validated in animals as a function of liver vitamin A reserves and can be used in infants, children, and women. The MRDR test involves first giving the respondent a single oral dose of vitamin A2 dissolved in an oil and then taking a single blood sample four to six hours later for vitamin A analysis. It is a good indicator of vitamin A liver stores and is less affected by inflammation than serum retinol concentrations.

Anthropometry measurements (length or height, weight, and age) were taken from all children. Height and weight were collected for adolescent girls (aged 10-14 years), and WRA (15-49 years old), except for pregnant women. Standard procedures using the World Health Organization (WHO) methodology were utilized[1]. In addition, the Anthro Survey Analyzer was used to check quality of anthropometry data. The results are shown in **Annex 3**. For children under 24 months, recumbent length was measured to the nearest 0.1 cm using a wooden length board (ShorrBoard brand). The same device was used to measure standing height to the nearest 0.1 cm for children two years and older, adolescent girls (aged 10-14 years), and WRA (aged 15-49 years).

In a few cases among children where length was taken instead of height or vice-versa, the measurement was tared (±0.7 cm)[2] following the WHO recommendations[3] before calculating the height/length-for-age Z-score. Electronic scales (SECA brand) were used to measure the weight of consenting respondents. Children not yet able to stand on their own were weighed while being held by their caregiver using the 'mother-child' tare function on the scale. All measurements were taken with minimal clothing and with participants not wearing shoes.

1 Recommendations for data collection, analysis and reporting on anthropometric indicators in children under 5 years old. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2019. Licence: CC BY-NC-SA 3.0 IGO.
2 As the WHO 2008 guidelines explain, this adjustment should be done since in general height is about 0.7 cm less than length and this difference has been considered in developing the WHO growth standards.
3 WHO 2008. Training course on child growth assessment. WHO Child Growth Standards. https://www.who.int/childgrowth/training/module_b_measuring_growth.pdf

Survey Implementation

Pre-survey activities and Adaptation of INDDEX24 Mobile Application

In preparation for the collection of the quantitative interactive 24-hour (i24-hour) dietary recall data (Gibson and Ferguson 2018), extensive pre-survey work is required to develop the dietary input data required for the tablet application INDDEX24 mobile application (Coates et. al 2017). These methods are well established, validated, and recommended for collecting detailed individual-level food information in the context of national surveys (EFSA J. 2014). The INDDEX24 mobile application was selected for the survey as it was specifically developed for use in large surveys in low income developing countries. It offers the following advantages over paper questionnaire: guides enumerators and respondents through a i24-hour dietary recall interview in a structured manner; contains modifiable instructions to allow adjustments to the interview process; allows for real time data monitoring and checking by on-site supervisors and remote data managers; and provides instant calorie count for foods consumed as a quick data quality check among others.

Advanced preparation for the collection of dietary data were conducted through several workshops. Each training workshop was followed by field work. The following resources were developed and used in the development and adaptation of the INDDEX24 mobile application for Nigeria: (1) a list of foods, recipes, and ingredients (FRIL) that are consumed and are likely to be encountered during i24-hr recalls were collected from WRA and young children in urban and rural areas of each of the six geopolitical zones; (2) a database of standard recipes for selected mixed dishes listed for each geopolitical zone, including ingredients and their proportions; (3) standardized portion size estimation methods (PSEMs) for estimating portion sizes of each item listed in the FRIL; (4) a database on PSEM Conversion Factors (PSEM-CF and edible portion that will translate the quantity of each reported item using the assigned PSEM to the equivalent gram weight for the edible portion; (5) a table of tags and descriptors of items in the FRIL for detailed description needed for improved matching in the INDDEX24 mobile application; and (6) a Nigeria food composition database (FCDB) for each item listed in the FRIL detailing their energy and nutrient content.

In addition, the following pre-survey activities were conducted for the biomarker and anthropometry component: (a) identification of suitable cold stores and engagement of officials from the State Primary Health Care Development Agency (SPHCDA) (b) assessment of cold stores across the 36 states and the Federal Capital Territory, (c) assessment of local laboratories for biomarker analysis; and (d) development of tools for field data management.

Following the completion of the pre-survey activities, a Training of Trainers (ToT) Workshop for zonal coordinators on dietary intake was conducted, this was soon followed by the training of potential field data collectors for all the components (HH listing and questionnaire, dietary intake, anthropometry, and biomarker). In addition, a training was conducted on how to mobilize and sensitize selected communities and respondents about the survey to enhance response. After the training of field teams, a pilot was conducted followed by a debriefing meeting. All data collection tools and procedures were fine-tuned after the pilot, which set the stage for the commencement of training of potential interviewers and supervisors.

Eligibility Criteria, Recruitment of Respondents, and Consent Procedures

Inclusion in the survey was based on being apparently healthy (showing no signs of illness), aged 15-49 years and pregnant women, children (aged aged 6-59 months), non-pregnant adolescent girls aged (10-14 years), willing to participate by giving consent, and residing in the EA. Pregnant girls aged (10-14 years old) were excluded (pregnancy status was based on self-report). The exclusion criteria included difficulty standing (unsteady or chair-bound) for anthropometry, but interviews and specimen collection were included. Individuals who refuse to participate or are unable to give informed consent or assent were excluded.

Participation was voluntary and participants were not paid for being respondents in the survey. Nevertheless, they were given a gift as an incentive. Incentives were given at different occasions during data collection, for example, plates and bowls were given during the pre-training of respondents for the collection of dietary data, results for Hb, H. pylori, malaria, and referral to a primary health care centre; and a plastic bowl after the visit from the biomarker/anthropometry team. In addition, soap was given after the diet interview and again after the repeat interview. Fortified vegetable oil was added as an incentive and was given by the biomarker field teams. Respondents that declined to participate were excluded and not replaced. Participants were informed that all personal information they provide will remain confidential and will only be used to provide for the intended objective.

Upon first contact with the respondent (HH head, non-pregnant WRA, pregnant WRA, or caregiver of minors), a general written consent for all survey procedures for all components of the survey was obtained by the HH team. Additional written consent/assent was obtained for each component of the survey (i.e., biomarker, or anthropometry). Adolescent girls (aged 10-14 years) were asked to agree to the anthropometry and biomarker components after permission was granted by their parent or guardian.

Interviewers used tablets with an electronic informed consent form to collect consents from potential survey participants. All potential participants were given a printed copy of the consent form. If the respondent is illiterate, a witness was requested by the respondent to sign on behalf of the respondent. Consent was recorded by making a mark on the consent form on the tablet and on a printed copy retained by the participant. Consent processes were conducted in different stages. Written consent to participate in the survey was obtained from each respondent. Several consent forms were used for the survey.

Recruitment, training, and selection of field teams

All the field teams for dietary intake, biomarker, and anthropometry, except that of HH listing and HH questionnaire, were recruited using the following process: (1) a job description was developed based on roles and responsibilities agreed upon as indicated in the protocol; (2) advertised in print media and IITA website for a period of two weeks, and applications were received by the Human Resource Office; and (3) a committee was drawn from collaborators and partners in the survey (University of Ibadan, University of Calabar, Oxford Policy Management (OPM), and FMOH, and FMARD) to shortlist suitable candidates that were invited to the training workshops. This process was followed for the zonal coordinators, supervisors, interviewers, anthropometrists, laboratorians, and phlebotomists. A total of 540 field staff (295 males and 245 females) were recruited. For the listing and HH questionnaire, and social mobilization field teams, existing personnel of NBS, NPC, FMARD, and FMOH were recruited.

A ToT workshop on Dietary Intake Component of the NFCMS was conducted in Abuja on 7-18 December 2020. The overall objective was to train potential zonal coordinators and IITA survey team on data collection using specific survey tools (diet questionnaire and i24-hr dietary recall using the INDDEX24 mobile application) to enable them to co-facilitate the training of supervisors and interviewers. The following topics were covered during the training: interviewing techniques/

skills; i24-hr dietary recall methodology; how to collect dietary data using the INDDEX24 mobile application, how to administer the diet questionnaire; standard procedures for field data collection; coordination of field teams; field quality checks and supervision; Field Planning & Monitoring Application (Planfeld); and communication, among others.

Classroom practices were given priority during training after completion of each substantial topic. Participants made two field visits to different communities around Abuja. Each visit was followed by detailed feedback on what went well and what the trainees need to be re-trained on. A total of 18 participants (12 from the zones and 6 Research Associates from IITA) were trained. At the end of the training, based on field and classroom performance, six zonal coordinators were selected, the other six were taken as supervisors, and the remaining six Research Associates became field personnel assisting the zonal coordinator during training of field teams and data collection.

A training workshop on dietary intake assessment for potential field teams was held on 11-29 January 2021 in Abuja. A total of 214 participants (47 supervisors and 167 interviewers) composed of 86 males and 128 females, were pre-selected from all over the country and trained. Seven subject matter experts sourced locally and internationally (Tufts University- International Dietary Data Expansion Project (INDDEX) and FHI360 (Solutions-*Intake* Center for Dietary Assessment) were used as facilitators at the training (physically or virtually). All training sessions were live-streamed and adherence to COVID-19 safety guidelines was enforced. The training methods used included demonstrations, role play, practice time working in pairs, and the provision of daily feedback with corrections. In terms of content, all the aspects of dietary intake data collection, ranging from technical and operational to logistics with field coordination, were adequately covered during the training.

Technically, dietary interviews included the collection of interactive 24-hr data and a series of questions related to diet (e.g. infant, and young child feeding practices, consumption of fortified and biofortified foods). *Intake* and INDDEX prepared training guides/handouts based on their expertise, with inputs from IITA. Alongside training guides, the supportive materials provided included PowerPoint presentations delivered live or pre-recorded, demonstration videos/training guides/handouts on dietary pre-training, use of INDDEX24 mobile Application, interactive 24-hr dietary recall interview, PSEMs and testing dietary scales, and monitoring of playdough density. The playdough is one of the PSEMs used during data collection.

At the end of the training exercise, the participants who will collect data were selected based on classroom performance, completion of the diet questionnaire, and 24-hr recall using INDDEX24 mobile application.

A 10-day training workshop for field supervisors, laboratorians, and phlebotomist for the biomarker and anthropometry component was conducted on 20-30 January 2021 in Abuja. The anthropometrists and interviewers were trained for five days, and the field supervisors, laboratorians, and phlebotomist for 10 days. A total of 224 participants (148 trainers, field supervisors, laboratorians, and phlebotomists; 21 anthropometrists; and 55 interviewers) were trained. Topics covered during the workshop were: introduction to NFCMS; overview of survey field team members' roles and responsibilities; what samples are collected and why; laboratory safety and Good Laboratory Practice (GLP); consent, assent, and confidentiality; urine sample collection and handling; stool sample collection and procedure for helminth assessment; venous blood collection and handling of plasma, serum and RBC; laboratory procedures for rapid malaria, Hb, H. *pyroli*, and plasma glucose; labeling of samples; biohazard waste management; transfer of field forms to the digital platform Computer-Assisted Personal Interviews (CAPI)I and CommCare (an open-source mobile data collection platform that enables non-programmers to build mobile applications for data collection in low-resource communities); field forms, results, and referrals; sample custody and tracking; field anthropometry and biomarker setup, and quality assurance.

For anthropometry, the following topics were covered: introduction to NFCMS; overview of roles and responsibilities; anthropometric data collection; components of anthropometry measurements (age, sex, height/length, and weight); procedure and protocols for anthropometric measurements; interview techniques; obtaining consent; introduction to CAPI and how to complete the questionnaire; and security and COVID-19.

A nine-day training programme for interviewers in the HH Listing and Socio-economic status component of the NFCMS, followed by a pilot study and debriefing meeting, was held in Abuja. Meanwhile, field practice demonstration sessions were held at designated locations within the FCT. The objective of the workshop was to train interviewers (mappers and listers) for the conduct of mapping, listing, and the administration of HH socio-economic questionnaires. The training exercise was held from 18 to 22 January 2021 and was subsequently followed by field practice demonstration exercises held from 23 to 27 January 2021. A total of 124 participants (78 males and 46 females) drawn from members of staff of NBS and NPC were trained.

The information covered during the training included: the importance of HH listing; survey design and methodology, mapping, and HH listing; reading of enumeration area maps and tracing of enumeration area boundaries; listing procedure; how to complete the HH questionnaire; HH food insecurity and coping strategies; data quality control measures; how to synchronize and send completed data to the central server; and roles and responsibilities of field personnel. Trainees were subjected to two short quizzes and an examination to test their knowledge and understanding on the modules taught them during the classroom training sessions. Mock interviews, demonstrations, role playing, discussions, comments, and question and answer sessions were used during the training workshop. A debriefing meeting on the outcome of the pilot survey was also held, which led to some modifications to already-developed questionnaires and menu on the CAPI device.

A two-day ToT Workshop on Mobilization and Sensitization for State Officers from the State Ministry of Health (SMOH), NPC, and State Ministry of Agriculture and Rural Development (SMARD) was held from 27 to 28 January 2021 in Abuja. Participants were nutrition desk officers (focal persons) from SMARD, State Nutrition Officers from the Ministry of Health, and State Mobilization (SM) Officers from NPC. Resource persons were from NPC. Participants were trained on the following topics: community mobilization essentials; preparing community mobilizers (CM); effective mobilization; community entry; introduction to CM tools, IEC material and other documents; community mobilization reporting tools; and reporting CM activities, among others. Three participants were drawn from each state, plus the FCT. A total of 107 persons (55 males and 51 females) participated in the training workshop. Training of mobilizers and sensitizers from each of the selected EAs per state were trained by those trained during the ToT.

A three-day MRDR Survey Training, Planning Meeting and Pilot for selected biomarker component coordinators (6), field supervisors (6), laboratorians (18), and phlebotomists (18) for the NFCMS was held from 2 to 8 August 2021 in Abuja. A total of 48 persons participated in the MRDR training. Participants were trained on the use of CommCare and MRDR Apps; how to conduct the MRDR survey; and age verification. An interactive session was held to discuss the appropriate oily snack, and foods to avoid on the day of dosing. Review of movement plans, logistics plans, and distribution of field supplies was done zone by zone. Practical demonstrations were also carried out to acquaint trainees with installing the MRDR application, updating their tablets, dosing methodology for MRDR survey, etc. Pilot studies were undertaken within the FCT. The challenges encountered during the pilot were deliberated upon during the debriefing session and noted for improvement of the MRDR survey.

Below are the number of persons per component that were used for data collection.

Component/section	Number of team members
NBS-ICT sampling of respondents	36
NBS/NPC HH listing and questionnaire	145
NPC/FMARD/FMOH sensitization and mobilization	485
Anthropometry and Biomarker	156
Dietary intake	184
Total	1006

Pilot Survey

After training all field teams, a pilot survey was conducted that included gathering informed consent, data collection and management, and biomarker sample collection in 18 EAs. Through the latter, the intended number of respondents in each target group per EA were selected, resulting in 671 total respondents. Participants were accordingly informed that they were participating in a pilot survey. The pilot was conducted in selected urban and rural communities (18 EAs) close to the training location and surrounding Abuja. This pilot was conducted mainly to test the tools and implementation, including tablets, communications, social mobilization, forms, interview techniques, questionnaires, quality control tools, anthropometry, phlebotomy, lab techniques, etc. Data collected from these respondents were not included in the survey. Information gathered from the pilot survey was used to modify survey collection instruments and field procedures. All changes in the questionnaire after the pilot were agreed upon by the stakeholders and approved by the TAC and SC before approval by the ethics committee.

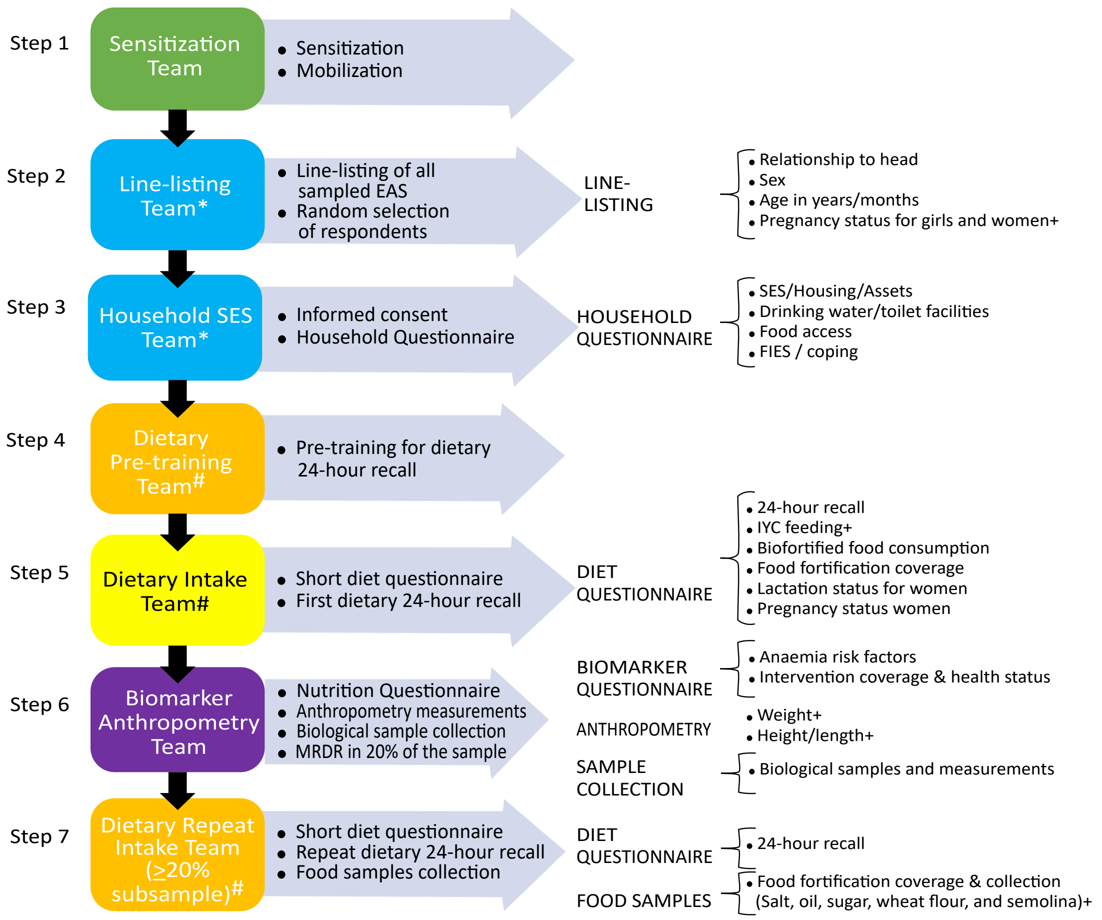
Survey implementation (Field Work)

Sensitization

Social mobilization and sensitization in the areas surveyed was led in each state by a State Mobilizer from the NPC, and assisted by a state subject matter specialist from FMOH and FMARD. The SM worked with the CM in each of the selected EAs. The CM were selected from the Departments of Health and Agriculture in each LGA.

Survey components, order of field operations, and information collected by each component

Given the highly technical nature of the survey, the skills required for the different survey components differ markedly. And as such, separate field teams were recruited to undertake the HH listing, dietary assessment, anthropometry, and the collection and handling of biomarker samples. While there were different teams with specialized proficiency and training dedicated to the different survey components, the different forms were linked by HH ID (from the HH line-listing) enabling subsequent alignment and linking of components during analysis of indicators across the different enumeration tools/components. There was also a higher-level supervision and coordination across these teams that provided oversight for the entire survey data collection process. The field teams, the survey component they are responsible for, and information collected by each component during their visit is summarized in **Figure 2**.



* The line-listing and household SES teams are the same interviewers.
# The dietary pre-training and dietary repeat intake teams are the same interviewers.
+ Only collected for relevant respondents.

Figure 2. Survey components, order of field operations, and information collected by each component

Deployment of field teams and administration of survey questionnaire to selected respondents

Five questionnaires were used to collect information on: (1) HH; (2) non-pregnant and lactating WRA; (3) pregnant WRA; (4) children (aged 6-59 months); and (5) adolescent girls (aged 10-14 years). Each sampled respondent received a minimum of two visits and a maximum of up to five visits. For each component, a maximum of three visits were made if the respondent was not available for the first visit. The teams deployed to the field at different times. The mother or caretaker of adolescent girls (aged 10-14 years) and children (aged 6-59 months) were present during all interviews and sample collections. After the completion of the diet questionnaire, the respondent was invited by the biomarker interviewers to complete the biomarker interview.

Sensitization teams: The sensitization team was deployed on 10 February 2021, a week before the HH listing team. Sensitization was conducted a week before the team entered the community. In addition, a jingle was played via the widely listened radio stations in each of the states a week before the teams commenced data collection and until data collection was completed in the state. The jingle was translated to Hausa, Yoruba, and Igbo and to other languages, as needed. Local guides were also available to the teams in each community.

Line listing team: The line listing teams was deployed on 17 February 21 and continued after a one-week break during Easter holidays. The teams listed all building structures in the selected EAs and all members of a HH. The listing data was then transmitted to a central server for sampling of respondents. The list of sampled respondents was then sent to the HH teams.

Household SES team: The HH listing teams also administered the HH questionnaire after sampling of respondents. The teams deployed on 17 February 21 and continued after a one-week break during Easter holidays. The teams collected information on general characteristics of the head of HHs (i.e., ethnicity, religion, education, and employment). The HH in sample questionnaire also collected information on the HHs' dwelling unit (i.e., source of drinking water; type of toilet facilities; materials used for flooring, external walls, and roofing; ownership of various animals and durable goods; area where members of the HH often wash their hands; main way of refuse disposal, presence of a vegetable garden and fruit trees; HH food insecurity; and HH coping strategies).

Dietary pre-training: After the completion of the HH questionnaire, the sampled respondent was invited to participate in a group dietary pre-training. The interviewers trained the sampled respondents on the process of data collection for the 24-hr dietary recall interview. They also provided all selected respondents with bowls and plates and requested them to serve all foods/drinks for the selected participant (i.e., either the WRA, or child, or pregnant woman).

Dietary intake team: The day after the training was observed as a reference day. The following day, the diet team conducted the diet interview using the short diet questionnaire and first 24-hour dietary recall. For example, if the training of respondents is conducted on Monday, then Tuesday is observed as the reference day, and the diet interview is conducted on Wednesday.

Biomarker and anthropometry teams: The biomarker and anthropometry teams moved together in the same EA with the dietary intake team. Immediately after the dietary interview, the respondent is referred to the biomarker and anthropometry teams. The biomarker team administered the biomarker questionnaire and collected anthropometry measurements, blood, and urine samples.

Dietary repeat intake team: A random sample (25 percent) of non-pregnant WRA and children (6-59 months old) from respondents who completed the 24-hour dietary recall was visited for a repeat 24-hour dietary recall interview and collection of food samples on non-consecutive days.

Phase 1 data collection commenced on 17 February 2021 for the HH listing and questionnaire field teams, while the dietary intake and biomarker/anthropometry field teams commenced on the week of 8-12 March 2021. At the end of Phase 1, a total of 162 EAs were listed, respondents sampled, and HH interviews conducted in 144 EAs. Three of the zones had collected data on dietary intake and biomarker from 27 EAs each.Challenges encountered during Phase 1 data collection included: (1) size of randomly selected EAs resulting in not meeting required number of respondents; (2) coverage rate of less than 80 percent; (3) poor mobilization in sensitization especially, in urban areas; (4) feedback from reviewers of the dietary interviews was not stepped down to the supervisors and interviewers, resulting in same mistakes occurring through the period; and (5) security-related issues.

To address the observed challenges, the following steps were undertaken: (1) sample uptake was increased for the remaining EAs in each zone (**Table 5**) – children (6-59 months old) increased by 5, adolescent (10-14 years) increased by 1, WRA increased by 4, and pregnant women increased by 1); (2) revisited EAs where possible; (3) local mobilizers, supervisors and interviewers were re-trained; (4) scheduled appointments; (5) aimed for maximum visits to each respondent (3x); (6) improved incentives for respondents (sachet fortified vegetable oil); (7) played the jingle once a week before the team enters the state and continue until end of data collection in the state; (8) conducted targeted mobilization; and (9) made sure that local guides were from the community. In addition, refresher training after the Ramadan break was conducted focussing on observed mistakes during data collection.

Table 5. Adjusted sample size per EA for Phase 2 data collection

Sampling target population	Respondents selected per EA in Phase 1	Respondents selected per EA in Phase 2	Total sample size at national level
Non-pregnant WRA (15-49 years old)	16	20	6240
Children (6-59 months old)	16	21	6240
Pregnant women (15-49 years old)	3	4	1170
Non-pregnant adolescent girls (10-14 years old)	3	4	1170
Total	38	49	14 820

Phase 2 data collection commenced immediately after Easter holidays (12 April 2021 for the HH listing and questionnaire field teams and ended 24 June 2021, while the dietary intake and biomarker/anthropometry field teams commenced 17 May 2021 and ended 04 July 2021). At the end of Phase 2 data collection period, the anthropometry and biomarker component had collected data and biological samples from 12 410 individuals (5469 WRA, 5061 children aged 6-59 months, 880 pregnant women, and 1000 adolescent girls). For dietary intake, a total of 11 713 were interviewed (5435 WRA, 5016 children aged 6-59 months, and 893 pregnant women). In addition, a total of 1152 salt samples, 398 sugar, 340 vegetable oil, 91 semolina flour, and 48 wheat were collected.

For biomarker samples, at the end of field work, 5961 urine samples were collected indicating a coverage rate of 86 percent, 10 295 stool samples representing a coverage rate of 75.4 percent, and 11 957 blood samples representing 80.7 percent coverage. More blood samples were collected in the North West zone compared to South East. For the dietary component, from the 364 EAs covered, a total of 11 344 respondents were completely interviewed, which is equivalent to 89 percent national coverage. The North West had the highest coverage at 2081, followed by South West at 1967, SS at 1918, North East at 1857, North Central at 1783, and South East at 1738. No zone had less than 92 percent coverage in complete questionnaire administration based on the number of EAs covered.

For food samples collected from the 20 percent sub-samples of non-pregnant WRA at the dietary intake repeat interview, 2031 food samples were collected nationwide (1153 salt, 338 vegetable oil, 400 sugar, 89 semolina flour, and 51 wheat flour).

A total of 364 EAs were covered out of the 390 samples. Twenty-six (26) EAs were lost to insecurity. Although total coverage was higher for dietary intake compared to biomarker, the minimum coverage rate of 80 percent was met for all survey components, except for the stool sample.

Data quality management and processing

Given the magnitude and complexities of the survey, daily monitoring of data collection was undertaken. Key indicators that were measured daily included:

- completion rates;
- refusals and revisits; and
- data inconsistencies such as:
- duplicate IDs;
  - out-of-range dates and times;
  - outliers for key continuous variables, etc.; and
  - data mismatch (e.g. some biomarker data do not have the corresponding HH data).

A dashboard was designed and used to monitor interviewer's performance completion rate for the various components and tracking the average frequency of revisits.

To ensure data quality control for the dietary intake component, the following actions were undertaken: (1) crosschecking of selected respondents to make sure there are no duplicates or oversampling; (2) summarizing respondents selected in each EA to highlight EAs where there were too few sampled respondents for discussion with the listers; (3) daily monitoring and review of collected data and feedback to zonal coordinators; (4) daily discussion of errors noticed immediately with the supervisors and interviewers; (5) testing of tablets, weighing scales, and play doughs; (6) tracking of interviewers with respect to the time taken to complete an interview since the time taken varies with the number of food items consumed; and (7) conducting random review of collected data in CommCare.

For anthropometry, the following information were reviewed real-time daily during data collection: (1) tracking of consent (Did the respondent/guardian give consent?); (2) checking for data completeness based on the respondent's age, height/length, weight, and relevant comments; (3) logging of errors (Are there any duplicates in the data?); (4) EA summary - done vs. not done (Does the data in the server match what was done in the field?); (5) conducting data quality checks (completeness, sex ratio, age heaping, digit preference for height and weight, implausible z-scores, standard deviation of z-scores, normality of z-scores); (6) tracking performance of equipment and calibrations; and (7) tracking performance of lead anthropometrists and corrective actions. In addition, at least once a week, we interrogated the quality of the anthropometry data through the following questions: (a) do we have all data collected by field teams?; (b) did the right respondent give the correct data?; (c) are ages of children (6-59 months) verified?; and d) are the interviews complete? During data analysis, the Anthro Survey Analyzer was used to check quality of anthropometry data. The results are shown in **Annex 3**.

Collection, testing, and processing of biological specimens are critical parts of the NFCMS. Sample collection, processing, transport, and storage were done with great care so that the laboratory results are accurate, valid, and accurately reflect the micronutrient status of the survey participants. All team members followed universal precautions, which are procedures that must be followed by all team members to prevent exposure to HIV, hepatitis, and other infectious agents that are encountered during all collection, processing, and handling of biological specimens. Proper cold chain logistics were followed throughout the survey. The cold chain followed biological samples from the initial collection until the sample is analyzed. All biomarker team members were trained on cold chain logistic and management to preserve sample quality.

Sampling weights, non-response adjustment, and data analysis

Sampling Weights

The frame used for the sampling of clusters for the survey was derived from the EA list that was developed and maintained by the NPC and used in the last census (2006) in Nigeria. It covers the entire geographic area of Nigeria, and the EA are mutually exclusive and exhaustive of the entire landmass of the country. It is the most comprehensive small area demarcation that guarantees every cluster of being included in a survey with a known probability of inclusion. The 65 EAs for each geographic zone were selected with PPS, using the estimated population of the individual EA as their Measure of Size (MOS).

The data collected was weighted appropriately for each target group to account for the probability of selection of the sample at each stage in the sampling process. The weights applied were adjusted for non-response by target group.

Base weights

Due to the non-proportional allocation of the samples across the six geopolitical zones and target groups, as well as differences in non-responses across sampling units (EA, listed target groups) and indicator level (i.e., anthropometry, malaria, haemoglobin, diet questionnaire etc.), sampling weights are needed for any analysis of the NFCMS data. This will ensure the representativeness of the survey results at the national and domain levels.

The first stage of sampling probabilities for each selected PSU (EA) in the h-th stratum (geopolitical zone) are as follows:

Sampling Probability	1st stage
$\pi_{1h\alpha} =$	$a_h * \frac{MOS_{h\alpha}}{\sum MOS_{h\alpha}}$

$MOS_{h\alpha}$ = measure of size (MOS) of *α-th* EA (PSU) of the *h-th* geopolitical zone (stratum) Estimated PSU population size from the 2006 census frame
a_h = number of EAs (PSU) to be selected in the *h-th* geopolitical zone (stratum). These are given in Table 5.
= total estimated population size of the *h-th* geopolitical zone (stratum)

The NPC provided the sampling frame with all the information needed to enable the calculation of the first stage sampling probabilities.

The second stage sampling probabilities was computed separately for each target group. For a target group (please note that another subscript to refer to the specific target group has not been added for simplicity), the probability of selection are as follows:

Sampling Probability	2nd stage
$\pi_{2h\alpha} =$	$\frac{b_{h\alpha}}{N_{h\alpha}}$

$b_{h\alpha}$ = number of sampled individuals in the target group in the α-th EA (PSU) of the h-th geopolitical zone (stratum). This will be 16 for WRA and children (aged 6–59 months), and 3 for non-pregnant adolescent girls and pregnant women.

$N_{h\alpha}$ = total number of eligible individuals in the *α-th* EA (PSU) of the *h-th* geopolitical zone (stratum).

The final selection probability ($\pi_{h\alpha}$) for individuals within a target group in the *α-th* PSU (EA) of the *h-th* stratum (geopolitical zone) is given by multiplying the first and second stage selection probabilities - $\pi_{1h\alpha}$ and $\pi_{2h\alpha}$ as follows:

$$\pi_{h\alpha} = \pi_{1h\alpha} \text{x}\, \pi_{2h\alpha}$$

The final base sampling weight ($w_{h\alpha}$) is the inverse of the final selection probability, given by:

$$w_{h\alpha} = 1/\pi_{h\alpha}.$$

This weight was applied to each participant in a specific target population in the *α-th* PSU (EA) of *the h-th* stratum (geopolitical zone).

Based on this description, the following information needed to calculate the base weights were obtained:

1) First stage
    a. Number of PSU (EAs) selected in each zone
    b. Measure of size (MOS) (e.g. estimated population size of each selected EA)
    c. Total sum of MOS (i.e., the final cumulative MOS) for the entire population of EAs in each zone
2) Second stage
    a. Total number of eligible individuals per target group in each selected EA
    b. Number of eligible individuals selected in each target group per selected EA
    c. Number of selected individuals in each target group per EA completing the survey

The data obtained were carefully documented, maintained electronically, and retained for use at the time of data analysis. This includes sampling unit identifiers (zonal code, state code, EA code, and respondent ID) used for merging with the survey data.

Non-response adjustment

At the inception of the sampling design, the issue of insecurity and other matters that may hinder access to some clusters were taken into consideration. While the calculated design was to use 60 clusters per zone for the prevailing security and access issues, the number of clusters to be sampled was boosted to 65 from 60 for each zone. This will serve as the reporting domain. A total of 26 out of the 390 EAs (or 6.67 percent) were not accessed, and distributed as follows (NC-6, NE-10, NW-4, SE-1, SS-3, and SW- 2). The highest inaccessible was from NE with 10 EAs; 8 of these are from Borno state and 2 from Yobe State. In NC zone, the six that were not accessed are three each from Benue and Niger states. In NW, four were not accessed (1 from Kebbi, 2 form Sokoto, and 1 from Zamfara states). SE has one EA not accessed (Anambra state). From SS, two EAs were not accessed (one from Rivers and one from Cross river states). The two EAs not covered in SW are one each from Ogun and Lagos states. All these EAs were not covered due to security concerns, except the one in Lagos where the local community refused to participate in the survey despite several advocacy from different stakeholders. The EA was abandoned after several advocacy visits.

It is noteworthy that that the cluster coverage rate in NE stood at 85 percent. Thus, 15 percent of the cluster were not covered and 80 percent of these uncovered are from Borno state only. Borno, by 2021 projected population, represent 20 percent of the population of the entire NE combined. The survey was designed to have the least level of analysis at zonal level; thus, the 85 percent coverage achieved could be a good representation of the zone. Moreover, from other similar studies, such as DHS, Borno is not known to exhibit high levels of differential from the other states in the zone. Only 5 out of 13 proportionally allocated to Borno by population size were covered and an attempt to make state level inferences using the covered clusters form Borno may yield to a high-level bias and low-level precision of such result.

The adjustment for the non-response at cluster level was done by state and urbanicity (rural or urban). For example, if in the design y*,* rural clusters were sampled in a state and only x was accessible, the cluster response rate is calculated as Cij, for the ith state and jth urbanicity.

Where Cij = Xw/Yw; Xw=sum of sampling weights of the x accessible clusters; and Yw= sum of sampling weights of all the sampled clusters (base Weight) for the ith state and jth urbanicity. i = 1,2,3 ………… 37 and j = 1,2. The cluster non-response adjustment factor is the inverse of Cij (that is, 1/Cij).

The base weights were adjusted to account for non-response bias by using a weighting class adjustment. This was done by dividing the original sample into *T* mutually exclusive and non-overlapping subsets, called adjustment cells (indexed by *T* within which members are assumed to have similar values*)* for the response variable of interest and all response probabilities are presumed to be equal. The weighting class adjustment is done by computing the response rate for each adjustment cell and using it to adjust the base weights for participants in the cell.

The response rate for cell *t* is given by

$$r_{ti} = \frac{\sum w_i \text{ (sum of base weights for actual respondents in the adjustment cell } t)}{\sum w_i \text{ (sum of base weights for all selected participants in the adjustment cell } t)}$$

The non-response adjustment factors are obtained as the inverse of these response rates,

$$f_{ti}^{NR} = \frac{1}{r_{ti}}$$

Finally, the non-response adjusted weight was then obtained by multiplying the base weight for each participant *i* in the weighting class *t* by the corresponding adjustment factor as follows:

$$w_{ti}^{NR} = w_{ti} f_{ti}^{NR}$$

Table 6 gives the response rates and corresponding adjustment factors calculated.

Table 6. Example of response rates, corresponding adjustment factors, and final non-response adjusted weight for each weighting class in years for WRA

Weighting class		Weighted response rate (%)	Adjustment factors (Inverse of weighted response rate)	Final non-response adjusted weight
Rural	15–24 y	84	1.19	99.96
	25–34 y	42	2.38	99.96
	35–49 y	90	1.11	99.90
Urban	15–24 y	92	1.09	100.28
	25–34 y	60	1.67	100.20
	35–49 y	75	1.33	99.75

Table 7 lists the variables to be considered for forming the adjustment cells for each target group.

Table 7. Variables to be considered for forming the adjustment cells for each target group

Sampling target groups	Variables considered for forming adjustment cells	Categories
Non-pregnant WRA (aged 15-49 years)	Age Urbanicity	15-24, 25-34, 35-49 y Rural, urban
Children (aged 6-59 months)	Age Urbanicity	6-11, 12-23, 24-59 mo Rural, urban
Pregnant women (aged 15-49 years)	Age Urbanicity	15-24, 25-34, 35-49 y Rural, urban
Adolescent girls (aged 10-14 years)	Urbanicity	Rural, urban

It should be noted that further disaggregating the weighting classes used for the non-response adjustment by the reporting domain of the target groups (i.e., for WRA and children) was not conducted. This was discussed extensively, and it was generally agreed to uphold the calculation of non-response as indicated in the protocol (**Table 7**). This specifies that the adjustment should take into consideration urbanicity (rural/urban), age group for each of the target groups at the national level, and apply to each cell nationwide, assuming that each of the cell (e.g. children 6 to12 months, from rural or WRA-age-15-23-urban or WRA-age-24-34-rural) are likely to be more homogeneous even at the national level. The response rate was calculated and applied at the individual modules (i.e., malaria test, diet, genotype, etc.) as presented in **Annex 1**. Further breaking this to zonal level might be unstable. Although calibration of weights to population estimates is a standard step in weight calculation for population surveys, this was not conducted due to lack of projections of population estimates for the target groups.

Data analyses

There are four components of the dataset: HH, Dietary, Anthropometry, and Biomarker. Sampling weights and non-response adjustment factors were applied and merged with final survey data. The HH ID and Personal ID were the unique link to various data sets.

Out of 86 314 persons listed, 34 469 were the target population in 9107 HHs. Hence, total number of HH questionnaires completed was 9107. All the HHs gave consent to the survey, thereby, yielding a response rate of 100 percent. The HHs in sample data were mainly processed and analyzed using SPSS statistical software (version 21). A section of the analysis (food security) was done using "R" statistical package. Various NFCMS indicators were produced and cross-tabulated with nominal variables such as place of residence (urban/rural), type of HH (sex of HH head), level of education of HH head, as well as the wealth quintile group of the HH. In all cases, reports are provided at national level and at geopolitical zonal level.

Table 8. Reporting domain and disaggregation level of household in sample component

National	Residence	Household type	Education of household head	Geopolitical zone	Wealth quintile
	Rural	Male-headed	None	North Central	Poor
	Urban	Female-headed	Primary	North East	Second
			Secondary	North West	Middle
			Technical / Vocational cert.	South East	Fourth
			Higher / University/ College	South South	Richest
			Others (Specify)	South West	
			Missing		

Of the 12 805 individuals sampled for the diet component, 11 713 completed the diet questionnaire. The final sample used for analysis is 11 255 respondents (5281 non-pregnant women aged 15-49 years, 1006 pregnant women aged 15-49 years, and 4968 children aged 6-59 months). Non-pregnant WRA were subdivided by lactation status, which was defined as having breastfed a child aged <12 months the previous day or night. Children aged 6-59 months were subdivided by age groups (6-23 months and 24-59 months) to account for potential breastfeeding in the younger children.

All diet data were analyzed using the SAS statistical software (v9.4). Frequencies and Chi-square tests were obtained using SAS Procedure Surveyfreq using the survey design variables for EA and geopolitical zone, with the final sample weights adjusted for non-response. For all target groups, data are presented by urbanicity (urban vs. rural). For non-pregnant women (aged 15-49 years), data are presented per geopolitical zone (North Central, North East, North West, South East, South South, South West) and by wealth quintile. For children (aged 6-23 and 24-59 months), data are presented by sex (male vs. female). The total number of respondents for each analysis used as the denominator for percentages are reported in the tables.

The survey's micronutrient component has essentially two parts – the anthropometry and the biomarker aspects of the study. Data collection, analysis, and reporting of these aspects of the survey follow international standards.[4] [5]

As presented in **Annex 2**, the **Anthropometry** aspect included 4912 children (aged 6-59 months),1006 adolescent girls, and 5239 WRA, totalling 11 157 respondents out of the 12 873 individuals sampled for the NFCMS. A total of 31 individuals were excluded from the analysis due to lack of signed consent.

The **Biomarker** aspect included the biomarker questionnaire and biological measurement.

a) **Biomarker questionnaire**: The biomarker questionnaire collected information on intervention coverage, self-reported morbidity, and anaemia risk factors that targeted 4916 children (6-59 months), 1002 adolescent girls, 5239 WRA, and 863 pregnant women. A total of 12 020 respondents out of the 12 873 individuals were sampled for the NFCMS. Fourteen (14) individuals were excluded from the analysis due to lack of signed consent (n=11) and ineligible interviews (n=3). Details of the questionnaire are also summarized in **Annex 12**.

b) **Biological samples and measurements:** During the survey, whole venous blood, urine, and stool samples were collected from various target groups in the field. The preliminary report presents measurements from the field and local labs. **Annex 2** summarizes the measurements included in the preliminary report, and **Table 9** shows the number of respondents against those sampled.

To highlight insights from data in the analysis, children were subdivided by age groups (6-11 months, 12-23 months, 24-35 months, 36-47 months, and 48-59 months). Data for adolescent girls was assessed per age (10,11,12,13, and 14 years), as well as for pregnant and non-pregnant women (15-19 years, 20-29 years, 30-39 years, and 40-49 years).

4 Recommendations for data collection, analysis and reporting on anthropometric indicators in children under 5 years old. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2019. Licence: CC BY-NC-SA 3.0 IGO.
5 Centers for Disease Control and Prevention, World Health Organization, Nutrition International, UNICEF. Micronutrient survey manual. Geneva: World Health Organization; 2020. Licence: CC BY-NCSA 3.0 IGO.

Table 9. Number of respondents against those sampled

Respondent (number sampled)	Malaria	Plasma glucose	H. pylori	Helminths	HbA1c	Haemoglobin	Haemoglobin genotype
Children (aged 6-59 months); (5576)	4678	No	4672	4240	No	4674	4548
Adolescents (aged 10-14 years); (1206)	996	No	984	No	No	999	No
Women of Reproductive Age, (aged 15-49 years); (6091)	5159	5109	5161	4669	5309	5272	5137
Pregnant women (aged 15-49 years); (1138)	959	No	959	846	No	847	No
Total (n/N) Respondents/ Number samples	11 792/ 14 011	5109/ 6091	11 776/ 14 011	9755/ 12 805	5309/ 6091	11 792/ 14 011	9658/ 11 667

The anthropometry indices were built using the Stata Software (Version 14.0) "zanthro" command available from the WHO[6]. A summary of the data quality assessment from the Anthro Survey Analyzer is presented in **Annex 3.** All biomarker data were analyzed using Stata statistical Software (Version 16). Frequencies and proportions were obtained using two-way tabulations. To adjust for the survey design, variables cluster (enumeration area), strata (regional zone), and weight were specified using the syntax below:

```
svyset EA_Code [pw = component_weight], strata(zone)
```

where EA_code is the unique ID that identified the enumeration area, component weight refers to the standardized weight by biomarker component and zone is the geopolitical zone in the country.

For children (aged 6-59 months), data were grouped by age, sex, residence, zone, wealth quintile, and caregiver's education. For adolescent girls (aged 10-14 years), data were grouped by age, residence, and wealth quintile. For WRA (aged 15-49 years), data were grouped by age, residence, zone, wealth quintile, and educational attainment. For pregnant women, data were grouped by age, residence, wealth quintile, and educational attainment. Differences across groups were assessed using Chi-square tests where significance was determined at 5 percent level. The total number of respondents for each analysis was used as the denominator for percentages reported in the tables. The data tables have accompanying notes for clarification as needed.

6 Vidmar, S. I., Cole, T. J., & Pan, H. (2013). Standardizing Anthropometric Measures in Children and Adolescents with Functions for Egen: Update. The Stata Journal: Promoting Communications on Statistics and Stata, 13(2), 366–378. https://doi.org/10.1177/1536867X1301300211

Household in sample key findings

The results presented are for those HHs with sampled respondents. There was a comprehensive listing of all HHs conducted in 390 EAs to produce the sampling frame for the survey, which included children under five years, pregnant women, non-pregnant WRA, and non-pregnant adolescent girls. The exercise involved listing all HH members living in the residential building structures in the selected EAs. A total of 86 314 individuals were listed from 18 791 HHs. From this, a sample of 9107 HHs was selected for inclusion in the sample and included a total of 34 469 individuals from the four target groups. The main respondents in each of the HHs gave consent to the survey, thereby yielding a response rate of 100 percent. The results are presented as frequency distribution tables or as means with confidence intervals (95 percent CI).

Total number of households and persons listed in the selected EAs by type of building structure

Table 10 presents the number of HHs and persons listed by use of building structures. Other HHs listed were contained in building structures for both residential and commercial purposes.

Table 10. Total number of households and persons listed in the selected EAs by type of building structure

	Number of Households Listed		Number of Persons Listed	
	N	%	N	%
National	18 791	100.0	86 314	100.0
Residential only	17 675	94.1	81 628	94.6
Residential/commercial	1026	5.5	4291	5.0
Residential/Religious	68	0.4	311	0.4
Residential/Institutional	22	0.1	84	0.1

Distribution of Sampled children

Table 11 presents the distribution of the individual children (aged 6-59 months) in the sampled HHs. It is noteworthy that almost the same proportion of males and females were sampled across the children age groups as male and female children constitutes about 50 percent in each category.

Table 11. Distribution of children aged 6-59 months in listed households

Characteristics	6-23 months		24-59 months		Total	
	N	%	N	%	N	%
National	**3527**	**100.0**	**7019**	**100.0**	**10 546**	**100.0**
Sex						
Male	1757	49.8	3527	50.2	5284	50.1
Female	1770	50.2	3492	49.8	5262	49.9
Residence						
Urban	1406	39.9	2807	40.0	4213	39.9
Rural	2121	60.1	4212	60.0	6350	60.1
Geopolitical Zone						
North Central	517	14.7	1081	15.4	1,598	15.2
North East	889	25.2	1601	22.8	2,490	23.6
North West	850	24.1	1783	25.4	2,633	25.0
South East	327	9.3	711	10.1	1,038	9.8
South-South	482	13.7	964	13.7	1,446	13.7
South West	462	13.1	879	12.5	1,341	12.7

The percentage of listed HHs in the urban areas varied from 27.3 percent in North West to 83.1 percent in the South West. For the target population, the percentage from urban areas varied from 38.6 percent (pregnant women) to 48.9 percent (non-pregnant WRA)

Distribution of sampled non-pregnant women and women of reproductive age

The distribution of non-pregnant women of non-reproductive age in listed HHs shows that a little above half of the sampled respondents were found in the rural areas (**Table 12**). The distribution of sampled non-pregnant WRA were virtually close in all the geopolitical zones, except South East. However, greater proportion of pregnant WRA were more distributed in the rural areas.

Table 12. Distribution of non-pregnant and pregnant WRA in listed households

Characteristics	Non-Pregnant WRA		Pregnant WRA	
	N	%	N	%
National	18 781	100.0	**2,040**	**100.0**
Residence				
Urban	9185	48.9	787	38.6
Rural	9596	51.1	1253	61.4
Geopolitical Zone				
North Central	3160	16.8	298	14.6
North East	3604	19.2	483	23.7
North West	3823	20.4	517	25.3
South East	2177	11.6	191	9.4
South-South	3065	16.3	293	14.4
South West	2952	15.7	258	12.6

Distribution of Sampled Adolescents

Table 13 presents the distribution of the adolescents in the sample HHs. About 53 percent of the sampled adolescents were from rural areas. North West and North East have close to one-fourth of sample adolescents. On a general note, about 60 percent of the listed adolescents were in the north geopolitical zones.

Table 13. Distribution of Adolescents

Characteristics	Adolescents	
	N	%
National	**3102**	**100.0**
Residence		
Urban	1457	47.0
Rural	1645	53.0
Geopolitical Zone		
North Central	461	14.9
North East	703	22.7
North West	702	22.6
South East	349	11.3
South-South	462	14.9
South West	425	13.7

Distribution of children aged 6-59 months

Table 14 presents the distribution of sampled children (aged 6-59 months). The table shows that the children were evenly distributed by sex.

Table 14. Distribution of sampled children (aged 6-59 months) in listed households

Characteristics	Children aged 6-59 Months	
	N	%
National	**10 546**	**100.0**
Sex		
Male	5284	50.1
Female	5262	49.9
Residence		
Urban	4213	39.9
Rural	6333	60.1
Geopolitical Zone		
North Central	1598	15.2
North East	2490	23.6
North West	2633	25.0
South East	1038	9.8
South-South	1446	13.7
South West	1341	12.7

Sex Distribution of household heads

Table 15 presents sex distribution by age. About 89 percent of the HHs were male-headed. Results also show that male-headed HHs in the rural area is higher than in the urban areas.

Table 15. Distribution of Households in Sample by Sex of Head of Household

Characteristics	Households in Sample	Male-headed	Female-headed
	N	%	%
National	9107	89.4	10.6
Residence			
Urban	3990	88.2	11.8
Rural	5117	90.3	9.7
Level of Education			
None	1562	86.8	13.2
Primary	2150	85.2	14.8
Secondary	3421	91.2	8.8
Technical /Voc certificate	376	92.7	7.3
Higher/University/College	1169	92.4	7.6
Others (Specify)	380	97.2	2.8
Missing	48	97.8	2.2
Geopolitical Zone			
North Central	1390	84.4	15.6
North East	1458	92.8	7.2
North West	1687	95.0	5.0
South East	1328	84.3	15.7
South-South	1591	85.0	15.0
South West	1653	89.4	10.6

Female-headed households

Table 16 presents sex distribution of HHs in sample by level of education of head of HH. The result reveals that more than half of female HH heads either had primary or did not have any formal education.

Table 16. Distribution of Household in Sample by Level of Education of Head of Household

Level of school completed by household head	Type of Household		
	Male-headed	Female-headed	All
None	18.7	24.2	19.3
Primary	22.3	32.7	23.4
Secondary	36.3	29.8	35.6
Technical/Vocational certificate	4.3	2.9	4.2
Higher/University/College	13.0	9.1	12.6
Others(Specify)	4.8	1.2	4.4
Missing	0.6	0.1	0.5
Total	100.0	100.0	100.0

Table 17 presents distribution of HHs in sample by Wealth Quintile Index. The results show that about half (51.4 percent) of female-headed HHs were in the middle and fourth quintiles, unlike the male-headed HHs, which were almost evenly distributed.

Table 17. Percentage Distribution of Households by Wealth Index Quintile[7]

Wealth Index Quintiles	Type of Household		
	Male-headed	Female-headed	Overall
Poorest	20.4	14.7	20.0
Second	20.3	15.9	20.0
Middle	19.6	25.0	20.0
Fourth	19.5	26.4	20.0
Richest	20.2	18.0	20.0
Total	100.0	100.0	100.0

Income-generating activities of household heads

As reported by Carletto et al. (2007), income-generating activities include a full range of agricultural and non-agricultural activities carried out by rural HHs. This allows an understanding of the relationship between the various economic activities that take place in the rural and urban spaces, and of their implications for economic growth, poverty reduction and food security. About 94 percent of HH heads were engaged in various income-generating activities. The proportion of HH heads engaged was almost the same in urban (93.9 percent) and rural areas (94.1 percent). Male HH head were more engaged compared with their female counterparts. Also, majority of HHs were into income-generating activities, irrespective of educational levels. Except for SS, the proportion of HH heads that were engaged were over 90 percent in all the geopolitical zones **Table 18**).

7 Refer to Wealth Index (Wealth Quintiles) on page 31

Table 18. Percentage of head of households with income-generating activities

Disaggregation	Total Households in Sample (N)	%
National	9107	94.0
Residence		
Urban	3990	93.9
Rural	5117	94.1
Household Type		
Male-headed	8090	94.9
Female-headed	1017	85.9
Level of Education		
None	1562	90.9
Primary	2150	93.9
Secondary	3421	95.4
Technical /Voc certificate	376	95.3
Higher/University/College	1169	93.8
Others (Specify)	380	96.4
Missing	48	84.3
Geopolitical Zone		
North Central	1390	94.1
North East	1458	98.1
North West	1687	94.0
South East	1328	90.5
South-South	1591	88.4
South West	1653	97.0

Table 19 presents the distribution of income-generating activities by type in the six geopolitical zones. Results obtained indicate that nationally, the agricultural sector took the lead with 36.8 percent, while sales and related activities followed with 16.3 percent. Service-related activities constituted 12.6 percent of the economic activities engaged in. The pattern of distribution was, however, different among the geopolitical zones. Engagement in agricultural sector was higher in northern zones as compared to the south **(Table 19)**.

Table 19. Percentage distribution by main work of head of household for income

Main work of household head for income	Geopolitical Zone						
	North Central	North East	North West	South East	South South	South West	**National**
Agricultural, Animal Husbandry, and Forestry Workers; Fishermen; and Hunters	48.8	52.9	42.0	29.1	28.7	19.9	36.8
Sales and Related Workers	6.9	14.2	22.9	19.4	14.5	16.0	16.3
Service Workers	10.2	12.5	8.9	13.6	15.4	16.7	12.6
Professional, Technical, and Related Workers	6.2	3.5	4.1	7.1	4.5	15.2	6.9
Not working and didn’t work in last 12 months	5.9	1.9	5.7	9.4	11.3	3.0	5.8
Transportation and Material Moving Workers	3.7	2.3	4.7	6.9	6.2	7.1	5.2
Others(Specify)	6.7	1.9	1.2	4.1	5.4	10.4	4.9
Production, Construction, and Extraction Workers	3.2	2.2	1.8	4.7	5.3	4.5	3.4
Office and Administrative Support Workers	3.2	3.1	4.4	0.8	3.3	2.4	3.1
Administrative and Managerial Workers	3.7	4.1	2.8	1.8	2.3	1.2	2.6
Installations, Maintenance, and Repair Workers	1.6	1.4	1.3	2.9	2.7	3.6	2.2
Missing	0.0	0.0	0.4	0.1	0.3	0.1	0.2
Total	100	100	100	100	100	100	100

Wealth Index (Wealth Quintiles)

The Wealth Index, presented as quintiles was constructed using the asset approach, whereby all HH possessions are included, as much as possible. These quintiles are derived from a series of questions about HH construction materials, water sources and sanitation access, and ownership of various items, which form a wealth index score. The wealth index quintiles divide the population into five equally large groups, based on their wealth rank. The five broad categories are poor, second, middle, fourth, and richest quintiles.

Results shown in **Table 20** indicate that about two-third of the listed HHs in rural areas were in the poor and second quintile categories. However, about 64 percent of the HHs in urban area were in the fourth and richest quintile categories. Similarly, HHs in the North East and North West have higher proportions of HHs in poor quintile categories compared with HHs in the southern part of the country.

Table 20. Household Wealth Index

Disaggregation	Total Households in Sample (N)	Percentage				
		Poor	Second	Middle	Fourth	Richest
National	9107	20.0	20.0	20.0	20.0	20.0
Residence						
Urban	3990	2.7	6.8	18.6	30.8	41.0
Rural	5117	30.9	28.3	20.8	13.2	6.8
Geopolitical Zone						
North Central	1390	17.4	20.4	25.6	20.7	16.0
North East	1458	38.4	20.1	16.8	13.2	11.5
North West	1687	29.1	32.5	18.2	11.3	8.8
South East	1328	8.3	9.8	24.5	23.9	33.5
South-South	1591	4.2	11.8	21.5	29.5	33.0
South West	1653	4.8	9.0	18.1	32.9	35.2

Weights were applied based on number of households in sample and household size.

Water

Households' drinking water from an improved water source

Improved water sources include piped water, tube-well, borehole, and protected well. Other sources are rainwater, protected spring, and bottled water. **Table 21** presents proportion of HHs' drinking water from water piped into dwelling unit or compound. Results show that nationally, 1.1 percent of HHs had water piped into dwelling unit or compound. The results indicate that the proportion for the urban areas (1.8 percent) was three times more than the HHs in the rural areas (0.6 percent). It is noteworthy that most of the HHs that had water piped into dwelling unit or compound had HH heads with higher educational attainment. However, the proportion was ridiculously low in all the zones; as low as 0.2 percent in the South East zone. On the other hand, the ratio increased with wealth quintile groups, ranging from 0.2 percent for the poorest to 2.7 percent for the richest quintile.

Table 21. Percentage of household heads for which water was piped into the premises or neighbour

Disaggregation	Total Households in Sample (N)	%
National	9107	1.1
Residence		
Urban	3990	1.8
Rural	5117	0.6
Household Type		
Male-headed	8090	1.1
Female-headed	1017	0.9
Level of Education		
None	1562	0.8
Primary	2150	0.8
Secondary	3421	0.8
Technical /Voc certificate	376	2.2
Higher / University/ College	1169	2.5
Others (Specify)	380	1.1
Missing	48	0.0
Geopolitical Zone		
North Central	1390	1.1
North East	1458	0.9
North West	1687	1.7
South East	1328	0.2
South-South	1591	0.6
South West	1653	1.1
Wealth Quintile		
Poor	1523	0.2
Second	1476	0.6
Middle	1734	0.7
Fourth	2071	0.9
Richest	2303	2.7

Other Sources of water

Other sources of water explored in this study include water from improved sources for which collection time did not exceed 30 minutes for a round-trip (including queuing). Results show that education and wealth status have no major implication in the proportion of HHs that had access to such sources of water.

Households Drinking Water from an Unimproved Water Sources

Unimproved water sources include unimproved well, unprotected spring, water kiosk, tanker truck, and cart with water tank/drum. Other sources are sachet/pure water, river, stream, pond, and lake.

The percentage of HHs that drank water from unimproved sources were smaller compared to those that drank from improved water sources. About 36 percent of HHs drank water from unimproved water sources in the country. A greater proportion (40.2 percent) of HHs in rural area as against 36.1 percent in urban areas were affected. The proportion of female-headed HHs (34.7 percent) was close to that of male-headed HHs (36.1 percent). The percentage varied among the geopolitical zones, ranging from 28.3 percent in South East to 43.3 percent in the North East. The practice of drinking water from unprotected sources was more pronounced among the HHs in the poor and second quintile categories of wealth.

Table 22. Percentage of Houses that Drank from Water Sources from Other Sources

Disaggregation	Total Households in Sample (N)	Water sources not exceeding 30 minutes	Water from unimproved water sources
National	9107	63.6	36.0
Residence			
Urban	3990	69.4	29.8
Rural	5117	59.6	40.2
Household Type			
Male-headed	8090	63.5	36.1
Female-headed	1017	64.4	34.7
Level of Education of HH Head			
None	1562	56.1	43.8
Primary	2150	64.3	35.7
Secondary	3421	67.5	32.2
Technical /Voc certificate	376	68.0	30.4
Higher / University/ College	1169	67.6	30.7
Others (Specify)	380	45.8	54.2
Missing	48	65.3	33.7
Geopolitical Zone			
North Central	1390	60.8	38.4
North East	1458	56.7	43.3
North West	1687	66.1	33.7
South East	1328	71.3	28.5
South-South	1591	65.8	33.7
South West	1653	62.0	37.2
Wealth Quintile			
Poor	1523	44.0	56.0
Second	1476	58.6	41.4
Middle	1734	73.7	26.2
Fourth	2071	75.8	23.7
Richest	2303	63.6	34.8

Distribution of households by source of drinking water

Table 23 presents the distribution of HHs based on main sources of drinking water. At the national level, only about 62.3 percent of the HHs have improved sources of drinking water. The table reveals that the use of piped water was low in the country and across all geopolitical zones. Some degree of sourcing drinking water was observed with public pipe/standpipe (5 percent). Drinking water from this public tap was more common in urban (7.4 percent) than in rural areas (4.4 percent). Also, it is more common in the northern parts of Nigeria than in the southern zones.

The most common main source of drinking water is the borehole (about 43 percent). The use is both prevalent in rural and urban areas among the male-headed and female-headed HHs, as well as educated and none-educated HHs. However, it is more common in the southern zones of the country. The use of protected well was also used among the HHs (12 percent). It was used by both male-headed and female-headed HHs and found among HHs with no or little education. Protected well was more prevalent in North Central, North West and South West.

Unprotected well was the most common source of drinking water among the unprotected sources. About 12 percent of HHs practiced the use of unprotected well for drinking water. Its use was prevalent in rural (19.2 percent) than in the urban areas (1.7 percent). Sachet water, known as *pure water* in Nigeria, was also commonly used. In the country, about 10.7 percent of HHs drink sachet water. Its prevalence was higher in urban (23.2 percent) than in rural areas (2.1 percent).

It is also most common in the southern part of the country: South East (14 percent); South South (15 percent); and South West, the most prevalent zone (32 percent).

River, stream, pond, and lake constitute the other sources of drinking water. About 10 percent employed this source for drinking water in Nigeria. HHs that used this source were mainly found in rural areas (17.1 percent). It was employed by both male-headed and female-headed HHs who had primary (14.6 percent) or no formal education (13.6 percent). Analysis by zones shows that use of water from river, pond, and lake were more prevalent among HHs in North Central (23.6 percent) and in South South (15.8 percent).

Table 23. Percent distribution of household according to main source of drinking water

	Main Source of Drinking Water																	Total	% using improved sources	% using unimproved sources	No of households
	Improved sources									Unimproved sources											
	Piped water																				
	Into dwelling	Into yard/plot	To neighbour	Public tap/ stand-pipe	Tube-well/ borehole	Protected well	Protected spring	Rainwater collection	Bottled water	Unprotected well	Unprotected spring	Tanker truck	Cart with tank/ drum	Water Kiosk	Sachet/Pure water	River/ stream, pond/ lake/ dam/canal/irrigation	Other				
	(01)	(02)	(03)	(04)	(05)	(06)	(08)	(10)	(14)	(07)	(09)	(11)	(12)	(13)	(15)	(16)	(98)				
Total	0.4	0.5	0.2	5.6	42.6	12.0	0.2	0.4	0.5	12.1	1.1	1.0	0.8	1.3	10.7	10.8	0.0	100	62.3	37.7	9,107
Residence																					
Urban	0.8	0.6	0.4	7.4	46.3	10.6	0.1	0.2	0.9	1.7	0.4	1.7	1.1	2.9	23.2	1.6	0.0	100	67.4	32.6	3,990
Rural	0.1	0.3	0.1	4.4	39.9	12.9	0.2	0.6	0.1	19.2	1.6	0.4	0.6	0.2	2.1	17.1	0.0	100	58.7	41.3	5,117
Household Type																					
Male-headed	0.4	0.5	0.2	5.7	42.4	12.0	0.2	0.5	0.4	12.9	1.1	0.9	0.8	1.3	10.5	10.3	0.0	100	62.2	37.8	8,090
Female-headed	0.0	0.5	0.4	4.9	44.2	11.9	0.1	0.3	0.9	4.6	1.5	1.5	0.7	1.3	12.5	14.8	0.0	100	63.1	36.9	1,017
Education of HH head																					
None	0.3	0.3	0.2	5.3	34.2	13.2	0.0	0.5	0.1	23.1	2.4	0.3	1.7	2.3	2.4	13.6	0.0	100	54.2	45.8	1,562
Primary	0.1	0.4	0.3	4.2	43.0	13.7	0.2	0.5	0.0	12.2	1.8	1.1	0.7	0.8	6.3	14.6	0.0	100	62.5	37.5	2,150
Secondary	0.3	0.2	0.3	5.9	46.6	12.2	0.2	0.3	0.3	5.0	0.5	1.2	0.4	1.2	15.1	10.4	0.0	100	66.3	33.7	3,421
Tech /Voc certificate	1.8	0.2	0.2	7.6	45.8	9.0	0.3	0.7	1.6	10.3	0.0	1.4	1.0	0.5	15.0	4.6	0.0	100	67.3	32.7	376
Higher /Univ/College	1.0	1.5	0.1	6.7	46.6	8.8	0.0	0.6	2.0	3.0	0.3	1.1	1.0	1.2	21.3	4.7	0.0	100	67.2	32.8	1,169
Others	0.0	1.1	0.0	7.3	29.3	6.7	0.4	0.0	0.0	48.0	0.2	0.6	0.3	0.9	0.1	5.0	0.0	100	44.8	55.2	380
Missing	0.0	0.0	0.0	8.4	39.4	17.4	0.0	0.0	1.0	7.1	0.0	0.0	0.0	1.2	20.1	5.4	0.0	100	66.3	33.7	48

Percent distribution of household according to main source of drinking water (continued)

	Main Source of Drinking Water																	Total	% using improved sources	% using unimproved sources	No of households
	Improved sources									Unimproved sources											
	Piped water																				
	Into dwelling	Into yard/plot	To neighbor	Public tap/ stand-pipe	Tube-well/ borehole	Protected well	Protected spring	Rainwater collection	Bottled water	Unprotected well	Unprotected spring	Tanker truck	Cart with tank/ drum	Water Kiosk	Sachet/Pure water	River/ stream, pond/ lake/ dam/canal/irrigation	Other				
	(01)	(02)	(03)	(04)	(05)	(06)	(08)	(10)	(14)	(07)	(09)	(11)	(12)	(13)	(15)	(16)	(98)				
Total	0.4	0.5	0.2	5.6	42.6	12.0	0.2	0.4	0.5	12.1	1.1	1.0	0.8	1.3	10.7	10.8	0.0	100	62.3	37.7	9,107
Geopolitical Zone																					
North Central	0.5	0.3	0.2	5.0	33.9	19.0	0.4	0.1	0.8	8.0	2.0	0.6	0.6	0.0	4.8	23.6	0.0	100	60.3	39.7	1,390
North East	0.6	0.3	0.1	11.8	35.7	4.6	0.0	0.1	0.1	16.8	1.6	1.3	2.3	7.7	4.7	12.4	0.0	100	53.1	46.9	1,458
North West	0.4	1.1	0.2	6.9	40.5	14.4	0.1	0.0	0.2	29.4	0.5	1.2	1.3	0.5	2.3	0.9	0.0	100	63.7	36.3	1,687
South East	0.0	0.2	0.0	1.0	61.4	1.8	0.4	2.8	0.2	1.1	3.7	3.3	0.3	0.0	12.8	11.0	0.0	100	67.9	32.1	1,328
South South	0.1	0.3	0.2	3.8	58.1	2.6	0.0	0.6	0.5	3.2	0.4	0.0	0.0	0.0	14.3	15.8	0.0	100	66.3	33.7	1,591
South West	0.5	0.2	0.5	3.7	35.1	21.4	0.1	0.2	0.9	1.7	0.2	0.2	0.0	0.0	26.2	9.2	0.0	100	62.5	37.5	1,653
Wealth Quintile																					
Poor	0.1	0.0	0.1	4.4	26.6	11.1	0.1	0.5	0.0	29.8	2.5	0.0	1.1	0.5	0.1	23.1	0.0	100	42.9	57.1	1,523
Second	0.0	0.5	0.1	5.7	36.2	14.6	0.2	0.5	0.0	21.5	2.0	0.1	0.7	1.6	0.6	15.7	0.0	100	57.8	42.2	1,476
Middle	0.3	0.4	0.1	7.2	47.2	15.9	0.2	0.6	0.0	8.5	0.9	0.9	1.0	1.8	4.1	10.9	0.0	100	71.9	28.1	1,734
Fourth	0.3	0.3	0.3	6.0	54.6	11.3	0.2	0.4	0.4	3.3	0.5	1.7	0.7	1.3	13.0	5.8	0.0	100	73.8	26.2	2,071
Richest	1.1	1.1	0.5	4.8	45.8	7.6	0.1	0.2	1.7	0.7	0.0	1.8	0.6	1.0	32.2	0.9	0.0	100	62.8	37.2	2,303

Sanitation

Sanitation refers to public health conditions in relation to clean drinking water and treatment, and disposal of human excreta and sewage. In this study, sanitation is measured by the proportions of HHs that did not share toilets, shared toilets, used unimproved toilets or involved in open defecation.

At the national level, only about 26.5 percent of the HHs have improved private toilets, which were not shared with other HHs. About 35 percent of HHs were found in urban areas, while 20.6 percent in the rural areas. The proportion was also higher in the male-headed HHs (26.8 percent) than that of female-headed HHs (23.3 percent). Expectedly, the proportion of HHs using unshared improved toilets increased with the level of education of the HH head. Among the geopolitical zones, South East had the highest proportion (40.7 percent) while North West had the least (23.2 percent). It is also noteworthy that a great percentage used private toilets in the North East (34%). Furthermore, the proportion of HHs using unshared improved toilets increased with the level of wealth quintile group of the HHs. It ranged from 9.1 percent among the poor to 49.1 percent among the richest quintile.

At the national level, 28.5 percent of the HHs used improved toilets that were shared with at least one other HH. This was practiced more in urban (44 percent) than in rural areas (17.9 percent). It is more common in the South West (48.5 percent) and South South (43.2 percent) than in the other geopolitical zones. It is noteworthy that sharing improved toilets was prevalent among the fourth quintile group.

The use of unimproved toilets and open defecation were more common in rural areas than urban areas. Use of unimproved toilets and open defecation were pronounced among uneducated HH heads. Usage of unimproved toilets was highest in North West (40.0 percent) while the use of open defecation was highest in North Central (44 percent). The practice of open defecation was more prevalent among the poor and second quintile categories (See **Table 24**).

Table 24. Use of Sanitation facilities

Disaggregation	Total Households in Sample (N)	% Households Toilets not shared	% Households Toilets shared	% Households Unimproved toilets	% Households Not using toilet facilities
National	9107	26.5	28.5	21.0	23.5
Residence					
Urban	3990	35.0	44.0	12.9	7.4
Rural	5117	20.6	17.9	26.5	34.5
Household Type					
Male-headed	8090	26.8	28.2	21.3	23.0
Female-headed	1017	23.3	31.4	17.7	27.0
Level of Education of Head					
None	1562	18.5	17.2	25.7	38.3
Primary	2150	22.4	24.6	22.2	30.1
Secondary	3421	25.9	37.6	16.6	19.3
Technical /Voc certificate	376	31.7	36.8	19.0	10.7
Higher / University/ College	1169	50.2	30.9	12.5	6.0
Others (Specify)	380	16.4	10.0	56.5	17.1
Missing	48	16.5	34.6	8.7	37.6
Geopolitical Zone					
North Central	1390	19.0	22.0	13.8	43.9
North East	1458	33.5	18.4	20.9	27.1
North West	1687	23.2	21.9	40.0	14.0
South East	1328	40.7	22.0	8.5	28.6
South-South	1591	30.5	33.2	20.6	15.1
South West	1653	20.6	48.5	8.4	22.0
Wealth Quintile					
Poor	1523	9.1	8.0	30.5	52.1
Second	1476	18.1	13.8	33.4	34.1
Middle	1734	24.1	29.6	22.1	23.9
Fourth	2071	28.0	45.5	14.0	11.5
Richest	2303	49.1	41.1	7.9	1.3

Food insecurity

Food insecurity is a fundamental element of HHs' economic and social living conditions, contributing in a fundamental way to the overall well-being of the HHs' members. What we call food insecurity is a condition of limited or uncertain regular access to adequate food. A focus on HH food insecurity within the NFCMS is justified by the ample existing literature demonstrating that living in food insecure HHs increases the risk of some forms of malnutrition (i.e., stunting in children, micronutrient deficiencies or obesity in adults).

In this report, food insecurity is measured with Food Insecurity Experience Scale (FIES) (*https://www.fao.org/in-action/voices-of-the-hungry/fies/en/)*. It allows estimating the probability that over the 12 months preceding the survey, members of the HH may have experienced various degrees of food insecurity. The measure is obtained by analysing data on self-reported occurrence of conditions (i.e., members of the HH having to skip a meal or eat less than they thought they should, running out of food in the HH, feeling hungry but not able to eat because there was not enough money or other resources for food insufficient food quantity). Using the Rasch Model, the qualitative answers (yes or no) given to the questions included in the FIES module are first tested for validity and then converted in quantitative measures on a continuous scale of severity (Cafiero et. al., 2018).

In reporting results, reference is typically made in two categories: moderate food insecurity and severe food insecurity. Moderate food insecurity is revealed by the reporting of experiences associated with reduced quality of food consumption, as well as reduced quantity (e.g. portion sizes are reduced or meals are skipped). Severe food insecurity is revealed by such experiences as feeling hungry but not being able to procure food or not eating for an entire day due to lack of money or other resources. HHs having experienced moderate food insecurity have almost certainly compromised the quality of the food they eat, and likely reduced the normal quantities of food consumed. Severe food insecurity implies having almost certainly reduced the quantity of food consumed and, occasionally, having run out of food in the HH, felt hungry and, at the most extreme, gone for entire days without eating.

Data Validation

Prior to compilation of results, FIES data collected in the NFCMS have been subject to validation by testing their adherence to the restrictions imposed by the Rasch measurement model to confirm that they can be used to generate valid measures of the severity of food insecurity in the surveyed population. Results confirm that the eight questions included in the standard FIES module can be used to create a proper measurement scale in this application in Nigeria: All items reveal an infit statistics value lower than 1.2 (**Table 25**). Also, the residuals (obtained as the difference between the actual response given by each HH to each item and the response that would be expected given the estimated model's parameters) show no sign of a possible additional dimension being captured by the data (**Figure 3**). Furthermore, the resulting food insecurity measurement scale compares well with the global FIES reference scale; thus, allowing for robust calibration of classifications against the thresholds set up, at the global level, to define moderate and severe food insecurity (**Figure 4**).

Table 25. Results of estimating the Rasch Model on the FIES data collected in the NFCMS of Nigeria 2020

Item:	Severity	SE.	Infit
Worry_insuff_food	-2.18	0.06	0.99
Ate_unhealty_food	-2.27	0.06	1.02
Ate_few_food	-1.75	0.05	1.03
Skipped_meal	-0.27	0.04	0.92
Ate_less	-1.03	0.04	0.85
Ranout_food	1.50	0.04	0.98
Hungry	1.43	0.04	0.89
No_food_whole_day	4.56	0.06	1.03

Note: All infit values are below the threshold value of 1.2, indicating that all eight items can be used to form a valid measurement scale possessing desirable properties that ensure invariance measurement.

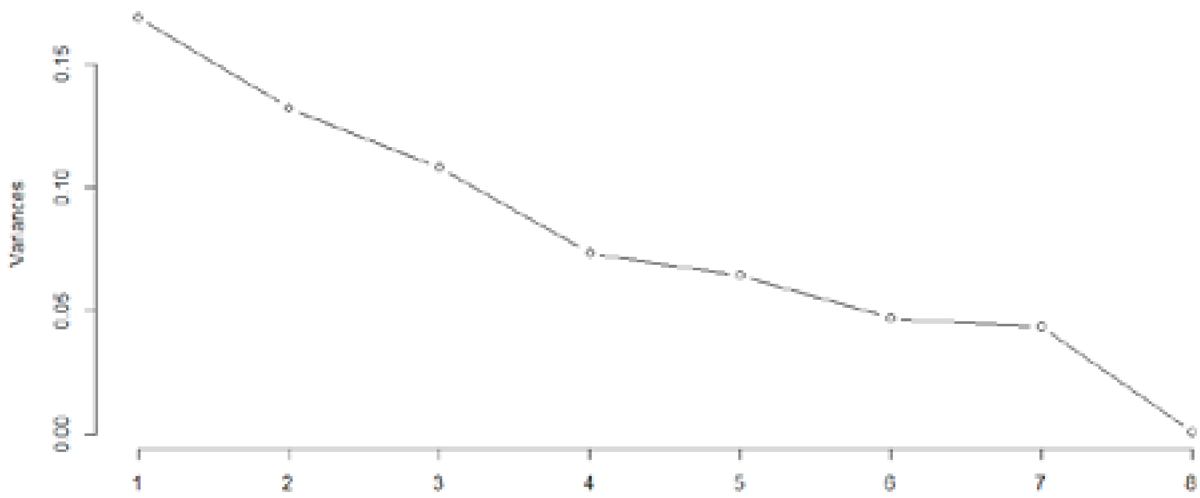


Figure 3. Screen plot of the principal components' analysis conducted on the residuals obtained after estimating the Rasch Model

Note: The chart shows the percentage of variance captured by the eight principal components obtained from the residuals, ranked in order of decreasing variance. The linear shape of the chart confirms that no principal components dominate in terms of explained variance, and that no residual structure can be detected in the residuals. Therefore, the data contribute to measurement of the single latent trait, interpreted as the severity of food insecurity.

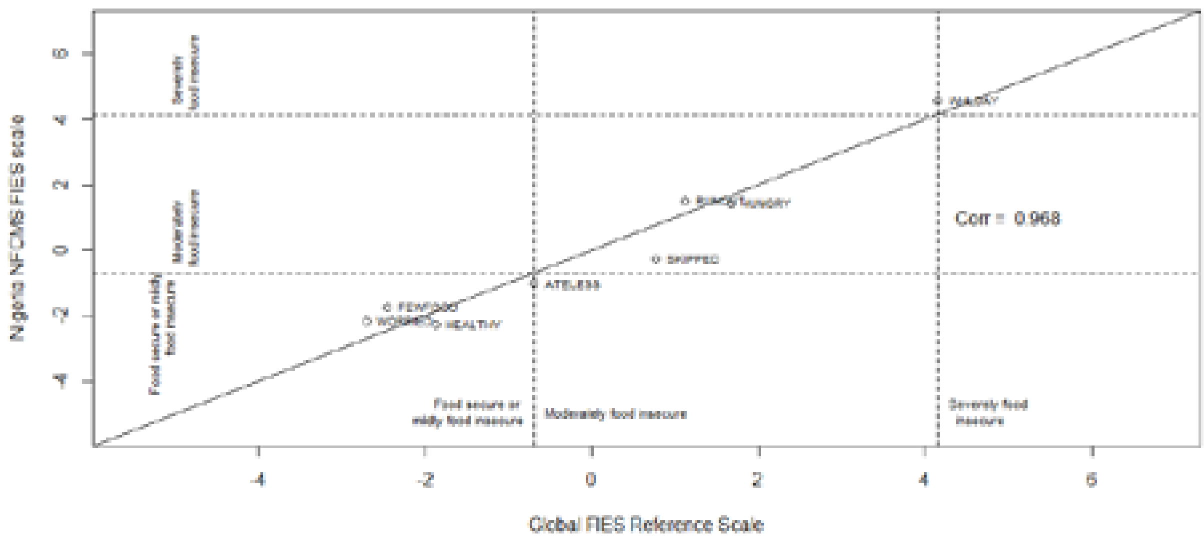


Figure 4. Calibration of the FIES measurement scale obtained with the data collected in the NFCMS, Nigeria, and the Global FIES Reference Scale

Note: The chart shows the alignment of the severity levels associated with the eight FIES items as obtained from the FIES data collected in Nigeria (vertical axis) against those of the Global FIES reference scale (horizontal axis). Using all eight items as anchoring points, the resulting correlation between the two scales is 96.8 percent.

Results Moderate Food Insecurity

Tables 26 presents estimates of the percentage of HHs heads that reported their HHs having experienced food insecurity. The estimate is obtained as the average of the probability of being classified as either "moderately" plus "severely" food insecure, computed over the entire sample.

Table 26. Percentage of households in the sample experiencing food Insecurity

	Total No of HH in Sample	Moderate + severe			Severe		
		%	95% CI		%	95% CI	
National	9107	78.7	78.3	79.1	22.2	21.9	22.5
Residence							
Rural	3990	78.3	77.7	78.8	22.9	22.5	23.3
Urban	5117	79.0	78.5	79.5	21.6	21.3	22.0
Household type							
Male-headed	8090	78.4	78.0	78.8	22.0	21.7	22.3
Female-headed	1017	81.0	79.9	82.0	23.8	23.0	24.6
Education of HH head							
None	1562	78.2	77.4	79.1	22.4	21.7	23.1
Primary	2150	83.2	82.5	83.8	24.8	24.2	25.3
Secondary	3421	80.7	80.1	81.3	22.6	22.2	23.1
Technical / Vocational cert.	376	68.9	66.9	71.0	18.4	17.1	19.8
Higher / University/ College	1169	67.6	66.4	68.8	17.6	16.9	18.4
Others (Specify)	380	82.3	80.7	83.9	21.3	19.9	22.7
Missing	48	74.7	69.8	79.6	17.2	13.7	20.7
Geopolitical zone							
North Central	1390	73.2	72.1	74.2	19.6	18.9	20.2
North East	1458	85.1	84.3	85.8	25.2	24.5	26.0
North West	1687	67.5	66.5	68.5	18.1	17.5	18.7
South East	1328	79.8	78.9	80.8	23.8	23.1	24.5
South South	1591	85.5	84.8	86.2	22.3	21.7	22.9
South West	1653	81.7	80.9	82.5	24.5	23.8	25.2
Wealth quintile							
Poor	1523	81.5	80.7	82.4	23.5	22.8	24.2
Second	1476	80.8	80.0	81.7	24.0	23.3	24.7
Middle	1734	83.1	82.4	83.9	24.4	23.8	25.0
Fourth	2071	82.0	81.3	82.7	24.0	23.4	24.6
Richest	2303	69.1	68.3	69.9	16.9	16.4	17.4

Results show that 79 percent of the sample HHs would be classified as food insecure (57 percent are moderately food insecure, while 22 percent are severely food in secure). There was a little difference in the proportions between the urban (78.3 percent) and rural areas (79.0 percent). Also, a little higher proportion was noticed among the female- headed HHs (81.0 percent) than the male-headed HHs (78.4.0 percent). H*owever*, the same cannot be said of the pattern with regards to the education of the head of HH where the proportion of food insecurity reduced with higher education.

With regards to moderate and severe food insecurity, HHs in North West (67 percent) fared relatively better, while HHs in North East and South South were worst hit with 85.1 and 85.5 percent, respectively. Though the difference was not much, the percentage of HHs categorized as moderately or severely food insecure reduced with wealth quintile position with the richest, having the lowest with 69.1 percent.

The pattern of distribution of HHs that were severely food insecure was almost the same with those that were moderately or severely food insecure. Nationally, about 22 percent of the 79 percent moderately or severely food insecure were severely food insecure. They belong to the 23.5 percent among the poor wealth quintile group and 16.9 percent among the richest.

Coping Strategies in the last seven days

In addition to the FIES question, respondents were also asked whether they had enough food or enough money to buy food seven days before the survey. This question is normally used to collect data to inform the so-called "reduced Coping Strategy Index" (r-CSI), an indicator typically used in the context of repeated surveys conducted for rapid, emergency food security assessments. The results shown in **Table 27** indicate that about 41.5 percent of the HHs reported not having food or money to buy food seven days prior the survey.

Table 27. Percentage of Households that did not Have Food or Money to Buy Food in Preceding seven Days

Disaggregation	Total Households in Sample (N)	%
National	9107	41.5
Residence		
Urban	3990	40.6
Rural	5117	42.1
Household Type		
Male-headed	8090	41.1
Female-headed	1017	45.2
Level of Education of Head		
None	1562	37.6
Primary	2150	47.3
Secondary	3421	44.0
Technical /Voc certificate	376	33.4
Higher / University/ College	1169	31.0
Others (Specify)	380	45.9
Missing	48	37.3
Geopolitical Zone		
North Central	1390	27.6
North East	1458	39.9
North West	1687	34.7
South East	1328	52.3
South South	1591	62.5
South West	1653	39.8
Wealth Quintile		
Poor	1821	43.6
Second	1821	43.3
Middle	1822	42.4
Fourth	1820	45.9
Richest	1820	33.0

The disaggregation by place of residence (urban/rural) and by sex of the HH head confirms the results already commented as derived from the FIES scale. That is, there is a slightly higher percentage of HHs reporting difficulties in buying or obtaining food in the rural areas, and among women-headed HHs (even though differences are very small).

Also consistent with the FIES-based results, difficulties are reported by a significantly lower percentage of HHs when the HH head has a higher education or when the HH belongs to the highest wealth quintile.

The only partly contrasting results concerns the disaggregation by geopolitical zone. Though North Central and North West are confirmed areas with the lowest incidence of reported food access problems, HH from the North East and the South West regions seem to have experienced significantly less difficulty than HHs in the South East and the South South when referring to problems experienced during the seven days prior to the survey. These results may point to a slightly better recent situation in the North East and South West zones as compared to the entire past year, while the situation continued to be problematic in the South East and South South.

Food security and coping strategies

The Coping Strategies Index (CSI) is one of the tools used for rapid food insecurity assessments in emergency contexts. It is quick and easy to administer, straight-forward to analyze, and rapid enough to provide real-time information. It aims at recording the things that people do when they cannot access enough food and the adjustments HHs make in their consumption and livelihoods when they do not have enough food or money. Coping can be in terms of consumption changes, expenditure reduction, and income expansion. It is an appropriate tool for measuring food security during emergency situations when other methods are not practical or timely.

The index is obtained by counting coping strategies that are not equal in severity; thus, needs to be weighted differently, depending on how severe they are by the analysts. In building the Reduced Coping Strategies Index (rCSI), the frequency in which a given strategy is reported during the last seven days is multiplied by a weight that reflects the severity of individual behaviors. Finally, the totals are added. The Coping Strategy Index is a score that ranges from 0 to 56; smaller numbers reflect better food security than larger numbers. A high score means an extensive use of negative coping strategies; hence, increased food insecurity.

Factors consider for Coping strategies	Severity weight
Number of days in a week - Rely on less preferred and less expensive foods	1
Number of days in a week - Borrow food, or rely on help from a friend or relative?	2
Number of days in a week - Limit portion size at mealtimes	1
Number of days in a week - Restrict consumption by adults in order for small children to eat	3
Number of days in a week - Reduce number of meals eaten in a day	1

The HHs are classified into three categories:

a. households with CSI = 0 – 3: None/Minimal food insecurity
b. households with CSI = 4 – 18: Stressed food consumption
c. households with CSI ≥ 19: Crisis food consumption

Table 28 presents the average rCSI score in the country, disaggregated by residence, HH type, education, geopolitical zone, and wealth level. The national Coping Strategies Index Score was 18.2. There was little difference in the index score obtained for rural (17.9) and urban areas (18.7), indicating that almost equal proportion of HHs were food insecure across place of residence. Also, there was no significant difference for male- and female-headed HHs. There was no specific pattern to compare the north with the south as the index ranged from 17.4 for South-South and 19.9 for North Central. Though, the richest quintile had the lowest index of 16.9, the difference between the poorest quintile (18.1) was not significant.

Table 28. Coping Strategies Index Score

Disaggregation	Households in Sample (Not Having Food or Money to Buy Food in Preceding 7 Days)	Index Score	CI	
National	3944	18.2	18.2	18.2
Residence				
Urban	1672	18.7	18.7	18.7
Rural	2272	17.9	17.9	17.9
Household Type				
Male-headed	3473	18.2	18.1	18.2
Female-headed	471	18.6	18.6	18.6
Education of Head of HH				
None	610	17.9	17.9	18.0
Primary	1058	18.7	18.7	18.7
Secondary	1570	18.0	18.0	18.0
Technical / Vocational certificate	137	18.9	18.9	19.0
Higher / University/ College	374	17.1	17.1	17.1
Others	175	19.0	18.9	19.0
Missing	20	22.7	22.6	22.8
Geopolitical Zone				
North Central	392	19.9	19.9	19.9
North East	600	16.7	16.6	16.7
North West	574	17.5	17.5	17.6
South East	698	18.9	18.9	18.9
South-South	998	17.4	17.3	17.4
South West	682	19.8	19.7	19.8
Wealth Quintile				
Poor	810	18.1	18.1	18.1
Second	830	18.8	18.7	18.8
Middle	873	19.1	19.1	19.1
Fourth	816	18.1	18.1	18.1
Richest	613	16.9	16.9	16.9

Households by Coping Index Group

Table 29 presents the distribution of HHs based on coping index groups. The HHs were grouped into three different categories: (1) none or minimal food insecurity; (2) stressed food consumption; and (3) crisis food consumption. The result shows that very small proportion (3.4 percent) of HHs belonged to the group of "none or minimal food insecurity". About 54 percent of the HHS belonged to the "stressed food consumption", while 42 percent were found in the "crisis food consumption" group. This ratio was almost equal across other nominal variables (i.e., place of residence, sex, and education of head of HH). Though relatively very small percentage belonged to the "none or minimal food insecurity" group across the zones, the pattern varied from one geopolitical zone to the other.

Table 29. Percentage Distribution of Households by Coping Index Group

Disaggregation	Households in Sample (Not Having Food or Money to Buy Food in Preceding seven Days)	None or Minimal food insecurity	Stressed food consumption	Crisis food consumption
National	3944	3.4	54.3	42.3
Residence				
Urban	1672	3.2	52.8	44.0
Rural	2272	3.5	55.3	41.1
Household Type				
Male-headed	3473	3.4	54.2	42.4
Female-headed	471	3.3	55.3	41.4
Education of Head of HH				
None	613	3.6	55.8	40.7
Primary	1061	3.1	52.7	44.2
Secondary	1571	3.1	56.1	40.8
Technical / Vocational certificate	137	.9	52.6	46.6
Higher / University/ College	379	6.2	53.2	40.6
Others	163	3.2	48.4	48.4
Missing	20	3.9	40.0	56.1
Geopolitical Zone				
North Central	392	3.5	48.7	47.8
North East	600	5.9	57.3	36.7
North West	574	5.3	51.5	43.3
South East	698	1.2	56.7	42.1
South-South	998	2.5	59.2	38.3
South West	682	2.0	50.6	47.4
Wealth Quintile				
Poor	810	3.4	55.3	41.3
Second	830	4.0	47.8	48.2
Middle	873	3.3	51.0	45.7
Fourth	816	2.7	56.8	40.5
Richest	613	3.8	60.8	35.4

Production of animal source foods

Production of animal source foods by HHs is expected to engender ready access to nutritious food products needed for growth and development; thereby, reducing food insecurity. Similarly, HHs that own livestock, rear small animals, or farm fish, or engage in fishing are expected to be more food secured than others. The HHs were asked if they own any livestock, herds, other farm animals or poultry. The response was used to determine the proportion of HHs that were involved in the production of animal source foods.

Generally, the percentage of HHs involved in the production of animal sourced food was very low at 11.3 percent and disaggregated as follows: 6.4 percent own any livestock, herds, other farm animals, or poultry; 1 percent raise rabbit, guinea pigs, grass cutters, snails, fish, or other small animals; 1.5 percent raise fish; and 5 percent catch/harvest fish from the wild). The proportion of animal production in the rural areas (13.9 percent) was almost double than that of urban areas (7.5 percent) **(Table 30)**. The low proportion was observed among male-headed (11.8 percent) and female-headed (7.2 percent) HHs. It is noteworthy that similar low proportion of HHs produced animal source food irrespective of education, wealth strata, and across different geopolitical zones. Among the geopolitical zones, South West recorded the lowest proportion.

Table 30. Percentage of households that Produce animal sourced foods

Disaggregation	Total Households in Sample (N)	%
National	9107	11.3
Residence		
Urban	3990	7.5
Rural	5117	13.9
Household Type		
Male-headed	8090	11.8
Female-headed	1017	7.2
Level of Education of Head		
None	1562	11.2
Primary	2150	13.6
Secondary	3421	10.3
Technical /Voc certificate	376	6.7
Higher / University/ College	1169	11.0
Others (Specify)	380	13.3
Missing	48	1.9
Geopolitical Zone		
North Central	1390	10.6
North East	1458	12.6
North West	1687	11.8
South East	1328	15.3
South-South	1591	13.8
South West	1653	6.3
Wealth Quintile		
Poor	1821	12.3
Second	1821	14.2
Middle	1822	13.3
Fourth	1820	9.7
Richest	1820	7.6

Production of vegetables

Globally, home gardens have been documented as an important supplemental source contributing to food and nutritional security and livelihoods. Home gardening refers to the cultivation of a small portion of land, which may be around the HH or within walking distance from the family home (Odebode, 2006). The most fundamental benefit of home gardens stems from their direct contributions to HH food security by increasing availability, accessibility, and utilization of food products. Therefore, HHs that have a vegetable garden that they use for their own consumption are expected to be more food secured than others. Overall, the result indicates that almost 3 out of 10 sample HHs (29.2 percent) have land for vegetable gardening (**Table 31**). A higher proportion (38.3 percent) of HHs in rural areas had access to land for gardening compared to only 16.1 percent in urban areas. However, almost the same proportion (29 percent) of male- and female-headed HHs had access. Among the zones, more HHs in South East had land for gardening (67.9 percent).

Table 31. Percentage of households in sample that have land for gardening

Disaggregation	Total Households in Sample (N)	%
National	9107	29.2
Residence		
Urban	3990	16.1
Rural	5117	38.3
Household Type		
Male-headed	8090	29.3
Female-headed	1017	29.0
Level of Education of Head		
None	1562	20.1
Primary	2150	38.8
Secondary	3421	30.4
Technical /Voc certificate	376	27.2
Higher / University/ College	1169	24.7
Others (Specify)	380	25.3
Missing	48	14.6
Geopolitical Zone		
North Central	1390	25.5
North East	1458	13.8
North West	1687	21.3
South East	1328	67.9
South-South	1591	41.1
South West	1653	24.7
Wealth Quintile		
Poor	1821	25.6
Second	1821	32.7
Middle	1822	36.3
Fourth	1820	29.1
Richest	1820	23.1

Access to land and trees or bushes that bear fruits

The presence of fruit-bearing trees or bushes for their own consumption is expected to aid HH access to food products that give minerals and vitamins for increased food security. **Table 32** presents percentage of HHs that have fruit-bearing trees or bushes for their own consumption.

Results obtained for HHs that have fruit-bearing tress or bushes indicated that 31 percent of the sample HHs had trees or bushes that produced fruits. Expectedly the proportion was higher in the rural areas (40.7 percent) compared with those in the urban areas (17.0 percent). Among the geopolitical zones, higher proportion of HHs were found in the South East (56.0 percent) and South South (43.6 percent). South West recorded low percentage (26.4 percent) but North East and North West recorded the lowest with 21.1 and 18.1 percent, respectively. However, with exception of the richest quintile group, the proportion of HHs that had fruit-bearing trees or bushes were mostly evenly distributed among other wealth quintile group.

Table 32. Percentage of households in sample that have trees or bushes that produced fruits

Disaggregation	Total Households in Sample (N)	%
National	9107	31.0
Residence		
Urban	3990	17.0
Rural	5117	40.7
Household Type		
Male-headed	8090	31.0
Female-headed	1017	31.0
Level of Education of Head		
None	1562	22.9
Primary	2150	40.6
Secondary	3421	32.4
Technical /Voc certificate	376	32.0
Higher / University/ College	1169	25.1
Others (Specify)	380	20.7
Missing	48	29.6
Geopolitical Zone		
North Central	1390	38.5
North East	1458	21.1
North West	1687	18.8
South East	1328	56.0
South-South	1591	43.6
South West	1653	26.4
Wealth Quintile		
Poor	1821	31.8
Second	1821	34.4
Middle	1822	36.3
Fourth	1820	30.3
Richest	1820	23.5

Financial Inclusion

Financial inclusion emphasizes that HHs have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings and credit – made available and accessible in a responsible and sustainable manner. One good measure of financial inclusion is having accounts with bank or financial institution. It is expected that HHs that have access to credit or financial institutions will have more financial resources to procure nutritious foods when compared to other HHs that do not.

Table 33 presents the percentage of HHs having accounts with banks or financial institutions. The results indicated that about six out of 10 HHs in Nigeria were financially inclusive. This means that about 60 percent of HHs had at least one member has an account with a bank or other financial institution. However, more of these HHs were found in urban centres (81 percent) than in rural areas (44 percent).

Education seemed to play a key role in the proportion of HHs that had accounts with banks or financial institutions as majority had some degree of education. However, HHs in southern parts of the country had more accounts in banks than their northern counterparts. Moreover, possessing accounts with banks was higher with rich categories of HHs than their poor counterparts.

Table 33. Percentage of Households that Have Accounts with Financial Institution

Disaggregation	Total Households in Sample (N)	%
National	9107	59.1
Residence		
Urban	3990	81.5
Rural	5117	43.6
Household Type		
Male-headed	8090	58.7
Female-headed	1017	62.2
Level of Education of Head		
None	1562	22.3
Primary	2150	49.7
Secondary	3421	75.1
Technical /Voc certificate	376	83.9
Higher / University/ College	1169	94.6
Others (Specify)	380	17.1
Missing	48	50.5
Geopolitical Zone		
North Central	1390	60.7
North East	1458	47.7
North West	1687	32.8
South East	1328	74.8
South-South	1591	76.1
South West	1653	78.9
Wealth Quintile		
Poor	1821	11.1
Second	1821	33.0
Middle	1822	62.2
Fourth	1820	83.6
Richest	1820	95.7

Dietary Intake

Overview of dietary intake data presented in this report

This chapter presents preliminary findings of the data collected from the diet questionnaire on the following parameters: pregnancy and lactation status for women of reproductive age (WRA), select indicators of Infant & Young Child Feeding (IYCF) practices, coverage of biofortified foods, and fortification coverage (selected food vehicle consumption, source, branding and fortification status) (**Table 34**). In addition, the fortification status of food samples collected from the homes of a sub-sample of non-pregnant WRA are included in this report.

Table 34. Key sections of the diet questionnaire and results reported

Sections	Results reported in this preliminary report
Pregnancy and lactation status of women of reproductive age (WRA)	-Pregnancy status -Pregnancy trimester -Lactation status -Lactation stage in months
Infant & Young Child Feeding (IYCF) Practices	-Ever breastfed, 6-23 months[1] -Continued breastfeeding, 12–23 months[2] -Bottle feeding, 6-23 months[3]
Biofortification coverage	-Consumption of selected biofortified foods (i.e., yellow cassava, orange-fleshed sweet potato & orange maize) in the past 30 days -Frequency of consumption of selected biofortified foods in the past 30 days
Fortification coverage	-Consumption of selected food vehicles[4] (i.e., vegetable oil, wheat flour, maize flour, semolina flour, sugar, salt, and bouillon) -Consumption of selected purchased food vehicles and branded food vehicles as proxy to fortifiable food vehicles - Types, sources, and brands of selected food vehicles used -Consumption of selected food vehicles labelled as fortified and selected food vehicles assumed to be fortified (using secondary data from GAIN[5]). -Fortification status of selected food samples collected from the homes of a sub-sample of non-pregnant WRA.

1 Ever breastfed is defined as the "percentage of children born in the last 24 months who were ever breastfed". The WHO IYCF indicator includes children born in the last 24 months, whether living or dead. The NFCMS survey only includes live children aged 6-23 mo.
2 Continued breastfeeding is defined as the percentage of children 12–23 months of age who were fed breast milk during the previous day.
3 Bottle feeding is defined as the percentage of children 0–23 months of age who were fed from a bottle with a nipple during the previous day. The WHO IYCF indicator includes children born in the last 24 months, whether living or dead. The NFCMS survey only includes live children aged 6-23 mo.
4 Food vehicle refers to the food that is selected for the addition of one or more nutrients.
5. Assumed fortification status based on data previously collected by GAIN.

Most of the diet indicators included in the 2021 Nigerian NFCMS, precisely usual intakes of foods and nutrients, nutrient adequacy of the diet and infant and young child feeding practices, will be derived from quantitative 24-hour dietary recall data (with repeat interviews in a sub-sample). Since these data are currently being processed and analyzed, these findings are not presented in this preliminary report.

Characteristics of Respondents for the Dietary Intake

The diet component of this survey targeted non-pregnant WRA (aged 15-49 years), pregnant WRA, and children (aged 6-59 months). The final sample for analysis comprised 4968 children, 5281 non-pregnant women, and 1006 pregnant WRA. The characteristics of the respondents of the diet questionnaire are shown in **Table 35**.

The respondents include 1654 and 3314 children aged 6-23 months and 24-59 months, respectively. Boys and girls in both age groups have a ratio of almost 1:1. Over half of the women (58 percent of non-pregnant and 83 percent of pregnant women) were between 20 and 39 years. Twenty-two (22) percent of the non-pregnant women and 10 percent pregnant women were teenagers (aged 15-19 years).

In all the groups, except non-pregnant women, about one-third of the respondents had no education, 13-15 percent had primary education, and 25-32 percent had completed senior secondary school. Less than 10 percent of both groups of children's respondents reported having education beyond senior secondary.

In all the respondent groups, except non-pregnant women, about two-thirds were from the rural areas, while the rest were from the urban sector.

Table 35. Characteristics of Respondents for the Diet Component

	Children 6-23 months		Children 24-59 months		Non-Pregnant Women of Reproductive 15-49 y		Pregnant women 15-49 y	
	N[1]	% [95% CI] [2]	N[1]	% [95% CI] [2]	N[1]	% [95% CI] [2]	N[1]	% [95% CI] [2]
Gender								
Male	1654	**46.8** [43.5, 50.1]	3314	**50.9** [48.8, 53.1]	Not applicable			
Female		**53.2** [49.9, 56.5]		**49.1** [46.9, 51.2]				
Age								
15-19 years	Not applicable				5281	**22.4** [20.6, 24.1]	1006	**9.7** [7.3, 12.1]
20-29 years						**32.6** [31.0, 34.3]		**51.1** [46.6, 55.7]
30-39 years						**25.5** [24.0, 27.0]		**32.3** [27.9, 36.6]
40-49 years						**19.5** [18.2, 20.8]		**6.9** [4.6, 9.2]
Highest level of school completed[3]								
None	1654	**29.7** [25.3, 34.0]	3314	**31.3** [27.8, 34.8]	5281	**22.1** [19.1, 25.1]	1006	**30.8** [25.4, 36.2]
Primary		**14.4** [11.3, 17.6]		**13.1** [11.2, 15.0]		**14.9** [13.4, 16.4]		**14.1** [11.1, 17.1]
Junior secondary		**8.6** [6.7, 10.5]		**7.1** [5.9, 8.3]		**10.8** [9.6, 12.0]		**9.5** [7.4, 11.5]
Senior secondary		**25.5** [22.5, 28.5]		**24.5** [21.4, 27.6]		**31.8** [28.9, 34.7]		**24.5** [20.7, 28.3]
Technical/vocational certificate[5]		**1.2** [0.5, 1.8]		**1.4** [0.9, 1.9]		**1.8** [1.3, 2.3]		**0.9** [0.4, 1.4]
Higher / university/ college		**8.1** [5.8, 10.4]		**7.7** [6.0, 9.4]		**18.3** [16.1, 20.5]		**19.9** [15.8, 23.9]
Non-formal education		**12.6** [9.6, 15.5]		**14.1** [11.0, 17.3]		**0.0** [0.0, 0.1]		**0.1** [0.0, 0.2]
Residence[4]								
Urban	1654	**38.5** [30.8, 46.2]	3314	**37.0** [29.9, 44.0]	5281	**46.5** [39.8, 53.3]	1006	**36.9** [29.3, 44.4]
Rural		**61.5** [53.8, 69.2]		**63.0** [56.0, 70.1]		**53.5** [46.7, 60.2]		**63.1** [55.6, 70.7]
Wealth quintile[4]								
Lowest	1648	**25.2** [20.7, 29.6]	3301	**25.6** [21.6,29.6]	5259	**20.7** [17.0,24.3]	1002	**25.9** [19.7, 32.1]
Second		**25.8** [21.7, 29.9]		**26.1** [22.5,29.8]		**23.4** [20.4,26.4]		**26.4** [22.0, 30.8]
Middle		**17.4** [15.1, 19.7]		**18.6** [16.0,21.2]		**20.2** [17.8,22.6]		**18.0** [14.1, 21.9]
Fourth		**17.1** [14.2, 19.9]		**15.6** [13.1,18.0]		**18.1** [15.8,20.3]		**17.3** [13.0, 21.6]
Highest		**14.5** [10.6, 18.4]		**14.1** [11.0,17.2]		**17.7** [14.8,20.6]		**12.4** [9.6, 15.2]

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 For children, these data pertain to the respondent (i.e., the sampled child's caregiver). There were no responses for 29 caregivers of 24-59 m old children, 9 non-pregnant women, and 2 pregnant women.
4 These data pertain to the household of the sampled respondent
5 Technical/vocational certificate are professional or vocational training attended with certificate at post-secondary education.
Differences across groups were not tested statistically.

Pregnancy Stage and Lactation status

This section describes the self-reported pregnancy stages of all pregnant women respondents. Pregnancy stage was assessed because energy and nutrient requirements for pregnant women vary by stage. The details of this population, in terms of their energy and nutrient intakes and adequacy, will be presented in the 24-hour recall report.

The pregnancy stages reported by the respondents were categorized in trimesters: first (0-3 months); second (4-6 months); and third (7-9 months), as shown in **Figure 5**. Nationally, about 20 percent of the sampled pregnant women were in the first trimester of pregnancy, 25 percent were in the second trimester, and 30 percent were in the third trimester. Twenty-five (25) percent of the women do not know the stage of their pregnancy or were not willing to tell, possibly for cultural reasons. Similar patterns were observed in urban and rural areas.

Pregnancy Stage by Trimester

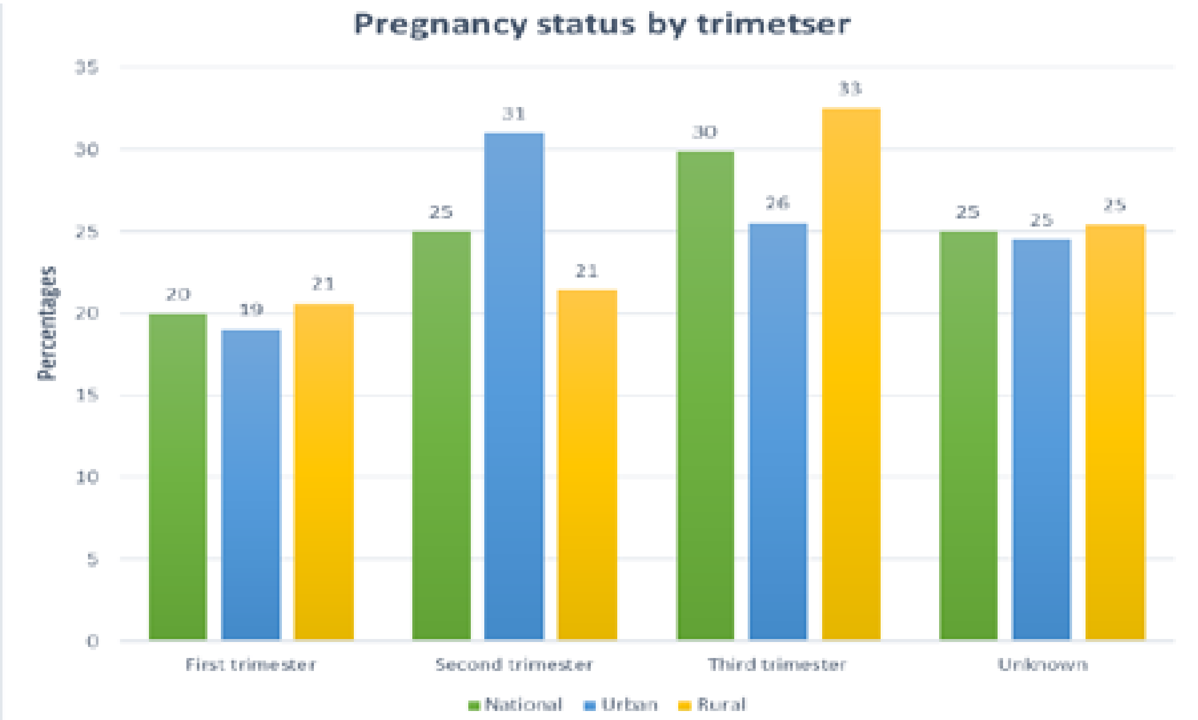


Figure 5. Pregnancy Stage by Trimester
Among pregnant women 15-49y (unweighted sample size = 1006)
Data are weighted to account for survey design and non-response

Lactation Status of WRA

All women, regardless of their pregnancy status or whether they had young children, were asked whether they breastfed a child the previous day or night prior to the interview. Lactation status was assessed because energy and nutrient requirements for women increase during lactation. The details of this population, in terms of their energy and nutrient intakes and adequacy, will be presented in the 24-hour recall report.

Table 36 shows the percentage of WRA who reported having breastfed a child the previous day or night. Nationally, about 24 percent of the non-pregnant women and 10 percent of the pregnant women reported breastfeeding a child. Almost 29 percent of non-pregnant women from the rural sector and 18 percent from the urban section reported breastfeeding a child. The proportion of women who breastfed ranged between 14 and 17 percent in the southern zones, and between 19 and 36 percent in the northern zones. Differences in breastfeeding rates likely reflect demographics and of whether the respondent woman has an infant or a young child.

Table 36. WRA who reported having breastfed a child during the previous day or night

	Sample size (N)[1]	Breastfed a child yesterday during the day or night[2] % [95% CI][3]
National		
Pregnant women (aged 15-49 years)	1006	**9.9** [7.7, 12.1]
Non-pregnant women (aged 15-49 years)	5281	**23.9** [21.8, 26.1]
Residence, non-pregnant women (aged 15-49 years)		
Urban	2156	**18.0** [14.6, 21.4]
Rural	3125	**29.1** [26.3, 31.9]
Zonal, non-pregnant women (aged 15-49 years)		
North Central	857	**19.4** [15.3, 23.6]
North East	830	**26.2** [21.4, 31.0]
North West	944	**35.7** [30.2, 41.2]
South East	855	**14.9** [11.8, 18.1]
South South	888	**14.4** [12.1, 16.7]
South West	907	**17.1** [12.5, 21.6]

[1] Unweighted sample size
[2] Age of the child was not asked.
[3] Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.

Energy requirements for lactation vary by breastfeeding stage. **Table 37** shows the age of the child being breastfed among non-pregnant women who breastfed a child the day and night before the interview. About 25 and 34 percent breastfed children aged less than 6 months and 6-12 months, respectively, while more than 40 percent breastfed a child in the second year of life. Similar patterns were observed in urban and rural areas.

Table 37. Lactating status among non-pregnant WRA who breastfed a child yesterday

	Sample size (N)[1]	Lactating stage in months (among non-pregnant women who breastfed a child yesterday during the day or night)[2]		
		<6 months	6-11.9 months	≥ 12 months
		% [95% CI]	% [95% CI]	% [95% CI]
Residence				
Urban	334	**28.6** [24.0, 33.1]	**42.1** [36.8, 47.5]	**29.3** [23.6, 35.0]
Rural	831	**22.4** [17.9, 27.0]	**29.3** [25.3, 33.2]	**48.3** [43.6, 53.0]
Zonal				
North Central	184	**29.1** [19.0, 39.1]	**33.6** [26.3, 40.9]	**37.3** [27.1, 47.6]
North East	233	**24.7** [19.5, 29.9]	**36.3** [29.3, 43.4]	**39.0** [29.0, 48.9]
North West	342	**20.9** [14.6, 27.2]	**28.8** [23.3, 34.3]	**50.3** [43.7, 56.9]
South East	131	**36.1** [28.1, 44.1]	**39.6** [30.8, 48.5]	**24.3** [15.2, 33.3]
South South	134	**28.2** [17.4, 38.9]	**42.0** [30.6, 53.4]	**29.8** [19.8, 39.9]
South West	141	**26.2** [19.2, 33.2]	**40.0** [31.2, 48.8]	**33.8** [24.9, 42.7]
National	1152	**24.9** [21.5, 28.2]	**34.1** [30.6, 37.5]	**41.0** [37.2, 44.9]

1 Unweighted sample size for women who breastfeed a child yesterday during the day or night
2 Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.

Infant and Young Child Feeding Practices

This survey was designed to assess IYCF practices for children (aged 6-23 months) using the 2021 WHO/UNICEF indicators (WHO/UNICEF 2021) (as summarized in **Table 38**). Since children under six months were not included in the survey, indicators that relate to this age group cannot be reported (e.g. early initiation of breastfeeding and exclusive breastfeeding under six months). Although some data required to assess the WHO/UNICEF IYCF indicators was collected using the diet questionnaire, most data was collected using quantitative 24-hour dietary recall data (with repeat interviews in a sub-sample). Since these data are currently being processed and analyzed, these findings are not presented in this preliminary report.

The findings in this preliminary report include rates of ever breastfeeding, continued breastfeeding, and bottle-feeding practices among children (aged 6-23 months). Data are presented for the age groups that these indicators relate to and are disaggregated into the age groups recommended by the WHO/UNICEF (as shown in **Table 38**). One limitation of this survey is that the children sampled are aged 6-23 months, while the WHO/UNICEF indicators of ever breastfeeding and bottle feeding are intended for children starting at 0 month. As such, these findings are not directly comparable to other surveys.

The diet questionnaire was also designed to assess the diet of children aged 24-59 months. Although beyond the range of the WHO indicators, data for the indicators ever breastfeeding, continued breastfeeding, and bottle-feeding practices are presented for all age groups for which data was collected in the survey in **Annex 4**.

Table 38. IYCF indicators reported for infants and young children aged 6-23 month

WHO Indicator	Definition	WHO age group for indicator	NFCMS	
			Age group	Data collection tool
Breastfeeding indicators				
Ever breastfed	Percentage of children born in the last 24 months who were ever breastfed	Children born in the last 24 months	Children 6-23 months of age	Diet questionnaire
Early initiation of breastfeeding	Percentage of children born in the last 24 months who were put to the breast within one hour of birth	Children born in the last 24 months	Not within the scope of this survey	
Exclusively breastfed for the first two days after birth	Percentage of children born in the last 24 months who were fed exclusively with breast milk for the first two days after birth	Children born in the last 24 months	Not within the scope of this survey	
Exclusive breastfeeding under six months	Percentage of infants (0-5 months old) who were fed exclusively with breast milk during the previous day	Infants 0-5 months of age	Not within the scope of this survey	
Mixed milk feeding under six months	Percentage of infants 0–5 months old who were fed formula and/or animal milk in addition to breast milk during the previous day	Infants 0-5 months of age	Not within the scope of this survey	
Continued breastfeeding 12-23 months	Percentage of children (aged 12–23 months) who were fed breast milk during the previous day	Children 12-23 months of age (12-15, 16-19 and 20-23 months)	Children 12-23 months of age	Diet questionnaire
Complementary feeding indicators				
Introduction of solid, semisolid or soft foods 6-8 months	Percentage of infants (aged 6-8 months) who consumed solid, semi-solid or soft foods during the previous day	Infants 6-8 months of age	Children 6-8 months of age (if sample size allows)	24-hour recall data
Minimum dietary diversity 6-23 months	Percentage of children (aged 6-23 months) who consumed foods and beverages from at least five out of eight defined food groups during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data
Minimum meal frequency 6-23 months	Percentage of children (aged 6-23 months) who consumed solid, semi-solid or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data
Minimum milk feeding frequency for non-breastfed children 6-23 months	Percentage of non-breastfed children (aged 6-23 months) who consumed at least two milk feeds during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data
Minimum acceptable diet 6-23 months	Percentage of children (aged 6-23 months) who consumed a minimum acceptable diet during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data

Table 38. IYCF indicators reported for infants and young children aged 6-23 month (continued).

Egg and/or flesh food consumption 6-23 months	Percentage of children (aged 6-23 months) who consumed egg and/or flesh food during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data
Sweet beverage consumption 6-23 months	Percentage of children (aged 6-23 months) who consumed a sweet beverage during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data
Unhealthy food consumption 6-23 months	Percentage of children (aged 6-23 months) who consumed selected sentinel unhealthy foods during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data
Zero vegetable or fruit consumption 6-23 months	Percentage of children (aged 6-23 months) who did not consume any vegetables or fruits during the previous day	Children 6-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	24-hour recall data
Other indicators				
Bottle feeding 0-23 months	Percentage of children (aged 0-23 months) who were fed from a bottle with a nipple during the previous day	Children 0-23 months of age (6-11, 12-17 and 18-23 months)	Children 6-23 months of age	Diet questionnaire
Infant feeding area graphs	Percentage of infants (aged 0-5 months) who were fed exclusively with breast milk, breast milk and water only, breast milk and non-milk liquids, breast milk and animal milk/formula, breast milk and complementary foods, and not breastfed during the previous day	Infants 0-5 months of age	Not within the scope of this survey	

1 These are also presented for children aged 24-59 months (see Annex 4).
2 Taken from: Indicators for assessing infant and young child feeding practices: definitions and measurement methods. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2021. Licence: CC BYNC-SA 3.0 IGO; https://creativecommons.org/licenses/by-nc-sa/3.0/igo.

Characteristics of Respondent for the Sampled Children

For most of these children (90-96 percent), the respondent was the child's mother (**Table 39**). Over 40 percent of the respondents were between 20 and 39 years of age for both groups of children. Less than 10 percent of the respondents were either teenage or elderly caregivers.

Table 39. Characteristics of respondents for the sampled children

	Children aged 6-23 months		Children aged 24-59 months	
	N[1]	% [95% CI]	N[1]	% [95% CI]
Relationship of the respondent to the sampled child				
Mother	1654	**95.7** [94.5, 96.8]	3293	**89.8** [88.3, 91.3]
Father		**0.8** [0.3, 1.3]		**1.8** [1.1, 2.4]
Other family member		**3.5** [2.5, 4.6]		**8.4** [7.1, 9.8]
Other		-		**0.0** [0.0, 0.1]
Gender of the respondent				
Female	1654	**94.6** [93.0, 96.2]	3293	**91.8** [90.1, 93.5]
Male		**5.4** [3.8, 7.0]		**8.2** [6.5, 9.9]
Age of the respondent				
15-19 y	1654	**8.4** [6.1, 10.7]	3293	**4.6** [3.6, 5.7]
20-29 y		**51.9** [48.4, 55.3]		**42.2** [39.5, 44.9]
30-39 y		**31.2** [28.3, 34.0]		**36.4** [33.8, 38.9]
40-49 y		**5.7** [4.3, 7.1]		**10.2** [8.8, 11.6]
50-59 y		**0.8** [0.2, 1.4]		**1.9** [1.3, 2.4]
60 y or older		**2.1** [1.0, 3.1]		**4.8** [3.4, 6.1]

1 Unweighted sample size
2 Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.

Ever Breastfed

Breastfeeding is recommended for all infants worldwide, except in very few cases, for those with specific medical conditions (WHO/UNICEF 2021). In this survey, almost all (97 percent) children aged 6-23 months were reportedly ever breastfed (**Table 40**). Similar patterns were observed in urban and rural areas, and for girls and boys.

Table 40. Percentage of children who were ever breastfed

	Children aged 6-11 months		Children aged 12-17 months		Children aged 18-23 months		Children aged 6-23 months	
	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]
Residence		(*P*=0.364)		(*P*=0.902)		(*P*=0.301)		(*P*=0.350)
Urban	240	**99.6** [99.0, 100.0]	232	**97.9** [95.9, 99.8]	230	**89.4** [81.5, 97.4]	702	**95.7** [93.3, 98.0]
Rural	269	**99.0** [97.9, 100.0]	372	**97.7** [95.9, 99.6]	311	**94.2** [89.9, 98.6]	952	**97.0** [95.5, 98.5]
Sex		(*P*=0.765)		(*P*=0.200)		(*P*=0.141)		(*P*=0.091)
Male	235	**99.4** [98.4, 100.0]	286	**96.8** [94.5, 99.1]	257	**88.7** [82.0, 95.5]	778	**95.1** [92.8, 97.4]
Female	274	**99.2** [98.1, 100.0]	318	**98.7** [97.0, 100.0]	284	**95.3** [90.2, 100.0]	876	**97.8** [96.0, 99.5]
National	509	**99.3** [98.6, 100.0]	604	**97.8** [96.4, 99.2]	541	**92.3** [88.2, 96.4]	1654	**96.5** [95.2, 97.8]

1 Unweighted sample size
2 Data are weighted to account for survey design and non-response.
Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).

Continued Breastfeeding

The WHO Global Strategy for IYCF recommends that children continue to be breastfed for two years or beyond (WHO/UNICEF 2021). As shown in **Table 41**, 58 percent of children (aged 12-23 months) received continued breastfeeding. As expected, the practice of continued breastfeeding generally decreased with age, with 84 percent of children aged 12-15 months, 55 percent of children aged 16-19 months, and 27 percent of children aged 20-23 months still being breastfed. For children aged 12-15 and 16-19 months, similar patterns were observed in urban and rural areas. For children aged 12-23 months, 48 and 64 percent of children in urban and rural areas, respectively, were breastfed the previous day or night ($p<0.05$). Similar patterns were observed for boys and girls.

Table 41. Percentage of children with continued breastfeeding

	Children aged 12-15 months		Children aged 16–19 months		Children aged 20–23 months		Children aged 12–23 months	
	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]
Residence		(*P* = 0.008)**		(*P* = 0.186)		(*P* = 0.105)		(*P* = 0.002)**
Urban	160	**75.0** [66.3, 83.8]	162	**47.7** [30.9, 64.5]	140	**20.3** [9.8, 30.7]	462	**47.8** [38.4, 57.1]
Rural	272	**88.2** [84.0, 92.5]	215	**60.3** [51.8, 68.7]	196	**31.3** [22.7, 39.9]	683	**64.0** [59.5, 68.5]
Sex		(*P* = 0.819)		(*P* = 0.105)		(*P* = 0.589)		(*P*=0.229)
Male	205	**83.7** [78.4, 89.1]	180	**49.4** [38.6, 60.2]	158	**24.7** [14.4, 35.0]	543	**55.7** [49.3, 62.0]
Female	227	**84.6** [79.3, 89.8]	197	**60.2 [**50.5, 69.8]	178	**28.8** [19.2, 38.4]	602	**60.0** [55.4, 64.7]
National	432	**84.2** [80.3, 88.1]	377	**55.0** [47.0, 63.0]	336	**26.9** [20.3, 33.5]	1145	**58.0** [53.8, 62.2]

1 Continued breastfeeding is defined as the percentage of children (aged 12-23 months) who were breastfed during the previous day.
2 Unweighted sample size.
3 Data are weighted to account for survey design and non-response.
Differences between groups were compared using Chi-square test (*signifies $P<0.05$, **signifies $P<0.01$, ***signifies $P<0.001$).

Bottle Feeding

The WHO guiding principles recommend avoiding the use of feeding bottles because they are difficult to keep clean and represent a particularly important route for the transmission of pathogens. In addition, bottle feeding may interfere with optimal suckling, as such cup feeding is preferable (WHO/UNICEF 2021). As shown in **Table 42**, 20 percent of children (aged 6-23 months) used the feeding bottle with a nipple the day before the interview. The use of feeding bottle with a nipple was found to decrease with the age (28, 18, and 14 percent for children aged 6-11 months, 12-17 months, and 18-23 months, respectively). No difference was found in the use of feeding bottle with a nipple between rural and urban residence or between girls and boys for children 6-23 months.

Table 42. Percentage of children fed from a bottle with a nipple

	Children aged 6-11 months		Children aged 12-17 months		Children aged 18-23 months		Children aged 6-23 months	
	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]	N[1]	% [95% CI][2]
Residence		(*P* = 0.271)		(*P* = 0.816)		(*P* = 0.203)		(*P* = 0.949)
Urban	240	**31.4** [24.2, 38.6]	232	**17.0** [9.9, 24.0]	230	**10.8** [5.6, 16.0]	702	**19.8** [14.7, 24.9]
Rural	268	**26.0** [19.6, 32.4]	369	**18.1** [12.0, 24.2]	311	**15.6** [10.3, 20.8]	948	**19.6** [16.1, 23.1]
Sex		(*P* = 0.387)		(*P* = 0.656)		(*P* = 0.964)		(*P* = 0.746)
Male	234	**25.5** [18.3, 32.8]	286	**18.6** [12.4, 24.8]	257	**13.7** [7.9, 19.6]	777	**19.2** [15.3, 23.0]
Female	274	**30.7** [22.8, 38.6]	315	**16.9** [11.4, 22.5]	284	**13.5** [8.0, 19.1]	873	**20.1** [15.9, 24.4]
National	508	**28.3** [23.4, 33.2]	601	**17.7** [13.1, 22.4]	541	**13.6** [9.8, 17.5]	1650	**19.7** [16.8, 22.6]

1 Bottle feeding is defined as the percentage of children 0–23 months of age who were fed from a bottle with a nipple during the previous day
2 Unweighted sample size.
3 Data are weighted to account for survey design and non-response.
Differences between groups were compared using Chi-square test (*signifies $P<0.05$, ** signifies $P<0.01$, ***signifies $P<0.001$).

Biofortification coverage

Biofortification is a process of breeding staple crops to have higher levels of essential nutrients either through selective conventional breeding or genetic modifications. Biofortification of staple crops represents a major strategy to tackle micronutrient deficiency and enhance the availability of micronutrients among people with poor diets (Meenakshi et al., 2019). The focus of biofortification research is vitamin A, iron, and zinc deficiencies, which are of public health significance. In Nigeria, the staple crops of focus are cassava, maize, and sweet potato biofortified with pro-vitamin A, as well as millet and sorghum with iron and zinc through selective conventional breeding. This survey looks at three Nigerian staple crops that are biofortified with vitamin A, (yellow cassava, orange-fleshed sweet potato, and orange maize).

The survey was designed to assess coverage and usual intakes of selected biofortified foods. The diet questionnaire was used to assess consumption in the last 30 days, whereas quantitative 24-hour dietary recall data (with repeat interviews in a sub-sample) will be used to estimate usual intakes. Since 24-hour dietary recall data are currently being processed and analysed, its findings are not presented in this preliminary report.

Therefore, this section presents coverage of the three biofortified crops that were assessed in the survey. Coverage in this survey is defined as the proportion of respondents that consumed the biofortified crops and/or foods made from them in the previous 30 days. The key indicators used in the survey are shown in **Table 43.**

The results for non-pregnant women (aged 15-49 years) are presented in the body of the report, while those for all survey target groups are presented in **Annex 5**.

Table 43. Biofortification indicators reported in the NFCMS

NFCMS survey Indicator definition	NFCMS Data collection tool		
	Data collection tool	Survey question	Included in the preliminary report
Proportion of respondents who consumed biofortified foods (orange maize, orange sweet potato, yellow cassava) in the last 30 days	Diet questionnaire	In the last 30 days, did you eat [food] or any food products made from it?	Yes
Proportion of respondents who consumed biofortified foods (orange maize, orange sweet potato, yellow cassava) at least once a day in the last 30 days	Diet questionnaire	In the last 30 days, how many days did you eat [food] or any food products made from it?	Yes

As shown in **Figure 6**, few respondents reported having consumed biofortified crops, or any products made from them in the past 30 days. Only 3, 5, and 13 percent of the respondents consumed yellow cassava, orange-fleshed sweet potato orange maize, respectively.

Although this was not confirmed by the survey, the higher consumption of orange maize could be explained by better consumer acceptance because of the similarity to the conventional non-biofortified maize that consumers are familiar with. This is unlike cassava and sweetpotato, with completely different colour traits between biofortified and non-biofortified (white) varieties. Differences may also relate to differences in the availability of the biofortified varieties. Efforts need to be made on consumer acceptance and availability of these crops, otherwise, the expected impact of biofortified crops on micronutrient deficiency may not be achieved.

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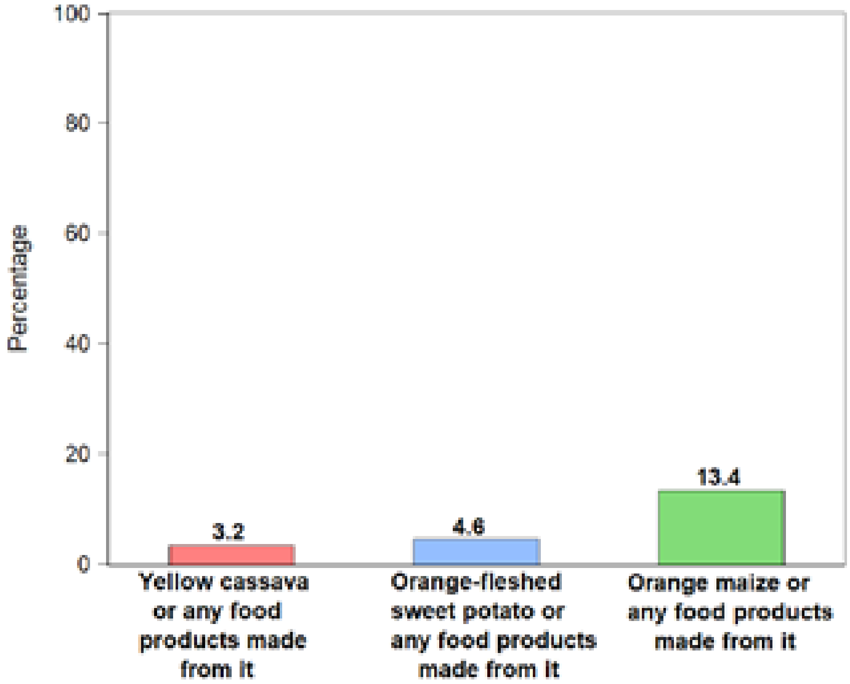


Figure 6. Percentage of respondents that consumed selected biofortified foods the previous 30 days
Among non-pregnant women (aged 15-49 years) (unweighted sample size responding was 5273 for yellow cassava, 5275 for orange-fleshed sweet potato, and 5264 for orange maize).
Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.

Yellow Cassava

As shown in **Figure 7**, only three percent of the respondents consumed yellow cassava (or any food products made from it) in the past 30 days of the interview. Although consumption of yellow cassava was found to be low across the country, significant differences were observed by zones ($p<0.05$). Only one percent of the respondents in North West and seven percent in North East reported having consumed yellow cassava.

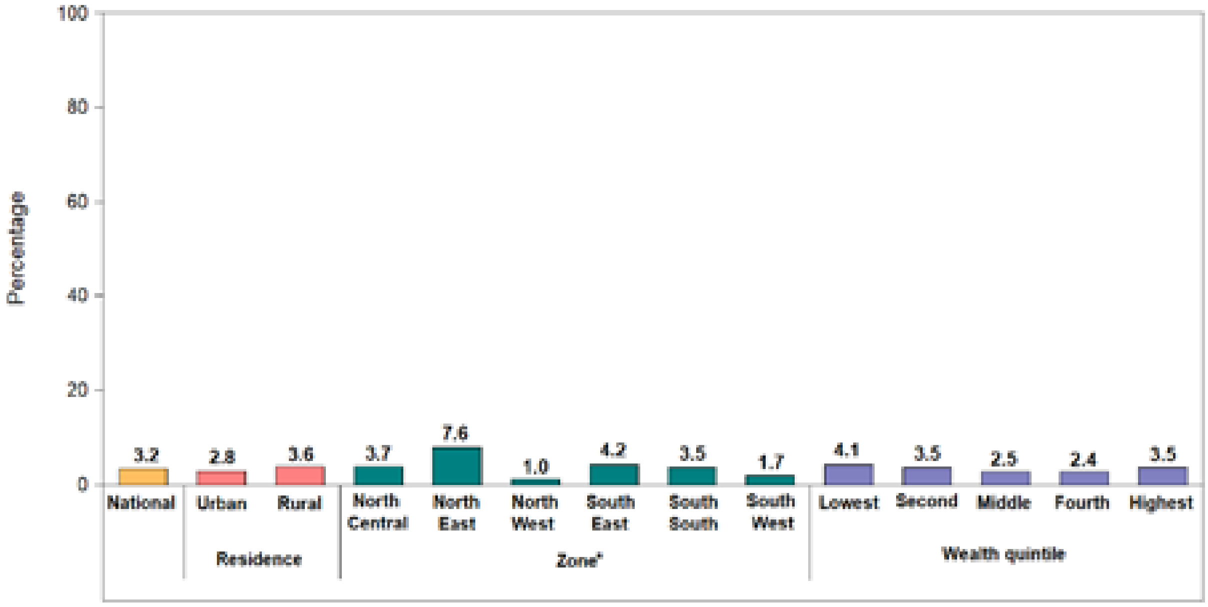


Figure 7. Percentage of respondents that consumed yellow cassava (or any food products made from it) the previous 30 days at national level and by residence, zone, and wealth quintile
Among non-pregnant women (15-49 years) (unweighted sample size = 5273 respondents)
Data for wealth quintile missing for 22 WRA because HH data was not collected.
Data are weighted to account for survey design and non-response.
*Signifies variable differs across groups ($p<0.05$) using Chi-square test.

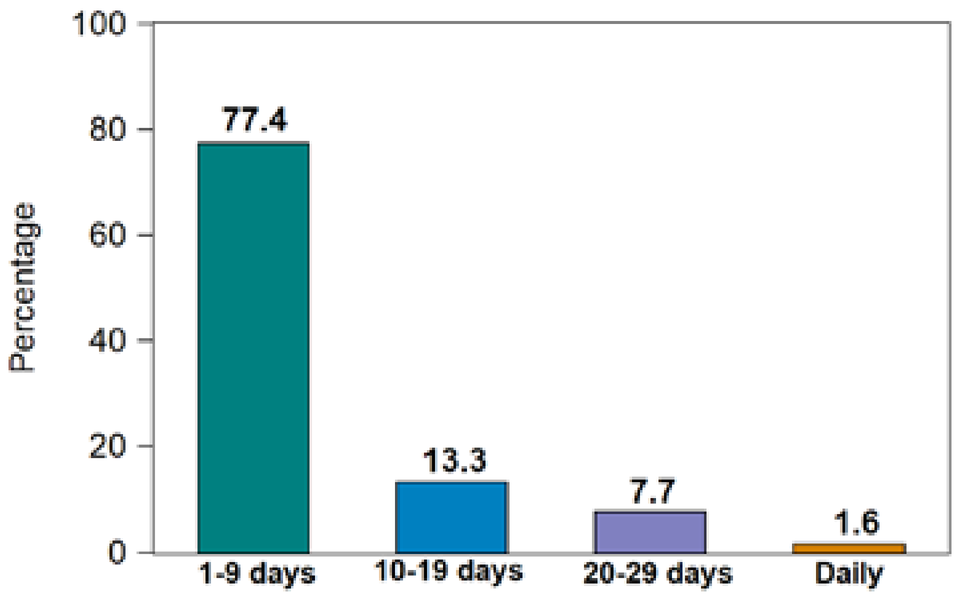


Figure 8. Frequency of consumption of yellow cassava (or any food products made from it) in the previous 30 days among consumers
Among non-pregnant women aged 15-49 years who consumed yellow cassava (or any food products made from it) in the previous 30 days (unweighted sample size for women = 188)
Data are weighted to account for survey design and non-response.

Among the respondents who reported having consumed yellow cassava, the vast majority (77 percent) reported consuming it for one to nine days in the past 30 days, whereas less than two percent consumed it daily (**Figure 8**). As a result of the low frequency of consumption, the impact of biofortified yellow cassava consumption on micronutrient deficiency in Nigeria is likely to be limited.

Orange-fleshed sweet potato

As shown in **Figure 9**, only five percent of the respondents consumed orange-fleshed sweet potato or any food products made from it in the past 30 days of the interview. Consumption was low irrespective of residence and wealth quintile. Although consumption was found to be low across zones, significant differences were observed ($p<0.05$). In the North East, 16 percent of respondents reported consuming orange-fleshed sweet potato, whereas only two percent of respondents in all other zones reported being consumers. The relatively higher percentage reported in the North East is likely due to food aids from government and development organizations in response to insurgence in the zone. Also, Working to Improve Nutrition in Northern Nigeria (WINNN), in collaboration with International Potato Centre (CIP) implemented nutrition sensitive kitchen garden intervention in the North East (Yobe) and West (Jigawa) in which WRA were given orange maize and sweet potato to plant in their kitchen gardens. The nutrition division of the FMARD also deployed orange-fleshed sweet potato to the zone in response to the emergence food insecurity from the insurgence.

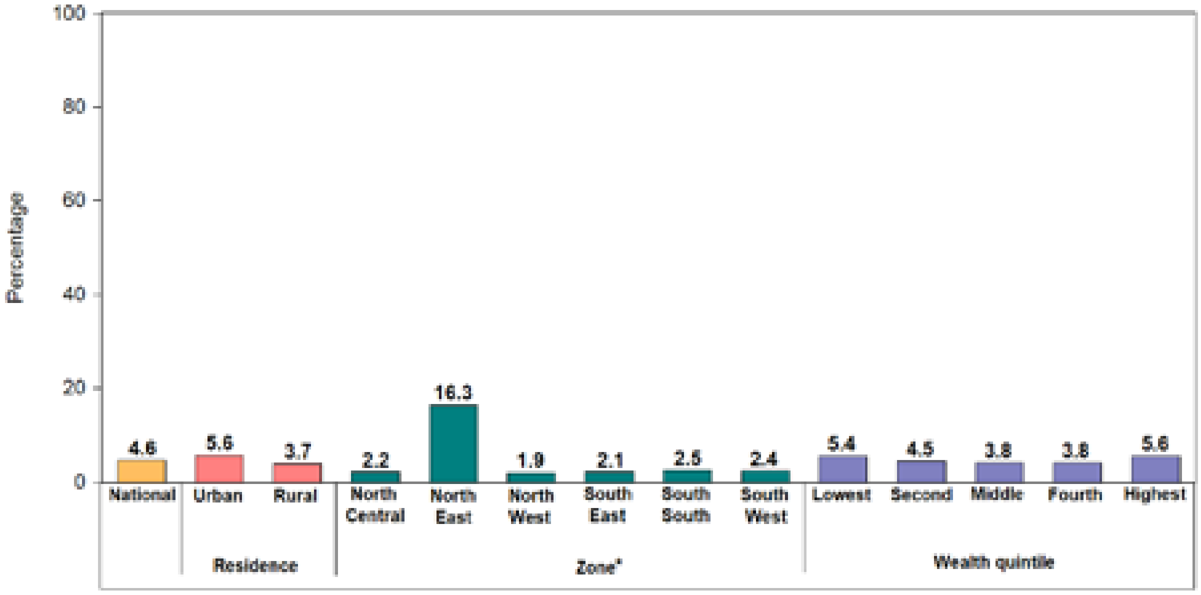


Figure 9. Percentage of Respondents that Consumed Orange-Fleshed Sweet Potatoes (or any food products made from it) in the Previous 30 Days at National Level and by Residence, Zone and Wealth Quintile
Among non-pregnant women (aged 15-49) years (unweighted sample size = 5275 respondents)
Data for wealth quintile missing for 22 WRA because HH data was not collected.
Data are weighted to account for survey design and non-response.
*Signifies variable differs across groups ($p<0.05$) using Chi-square test.

Among the respondents who reported having consumed orange-fleshed sweet potato, the vast majority (84 percent) reported consuming it in one to nine days in the past 30 days, whereas no one (0%) consumed it daily (**Figure 10**). As a result of the low frequency of consumption, the contribution of biofortified orange-fleshed sweet potato to reduction of micronutrient deficiency in Nigeria is likely to be limited.

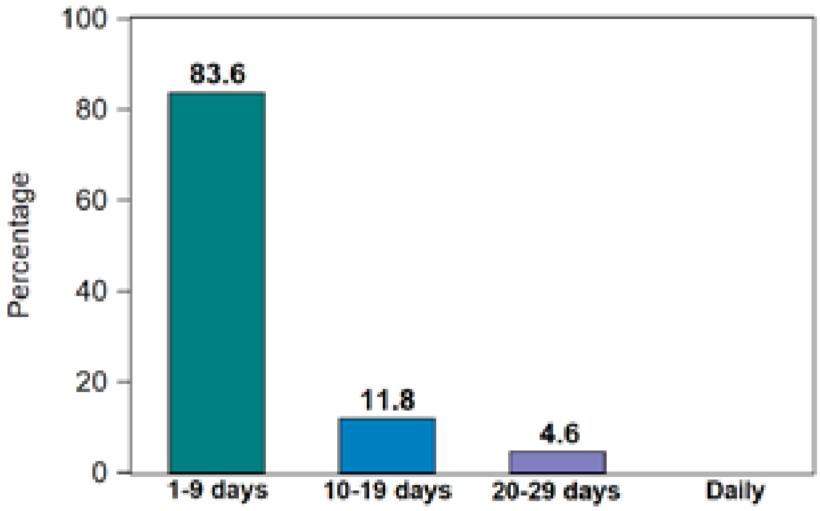


Figure 10. Frequency of consumption of orange-fleshed sweet potato (or any food products made from it) in the previous 30 days among consumers
Among non-pregnant women (aged 5-49 years) who consumed orange-fleshed sweet potato (or any food products made from it) the previous 30 days (unweighted sample size for women = 222)
Data are weighted to account for survey design and non-response

Orange Maize

As shown in **Figure 11**, 13 percent of the respondents consumed orange maize, or any food products made from it in the past 30 days of the interview. Consumption was low irrespective of residence and wealth quintile. Although consumption was found to be low across zones, significant differences were observed ($p<0.05$). In the North East, 38 percent of respondents consumed orange maize, whereas consumption ranged between 4 and 14 percent in the other zones. This, again, could be due to government and development organization food support to the zone in response to the insurgency.

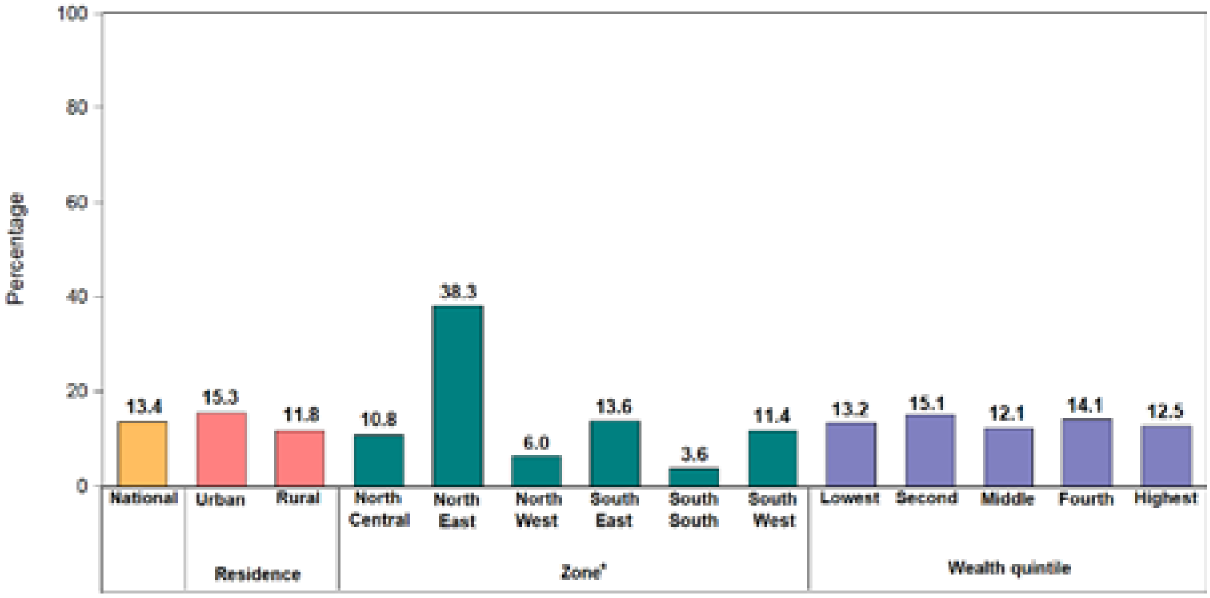


Figure 11. Percentage of respondents that consumed orange maize (or any food products made from it) in the previous 30 days at national level and by residence, zone, and wealth quintile
Among non-pregnant women (aged 15-49 years) (unweighted sample size = 5275 respondents)
Data for wealth quintile missing for 32 WRA because HH data was not collected.
Data are weighted to account for survey design and non-response.
*Signifies variable differs across groups ($p<0.05$) using Chi-square test.

Among the respondents who reported having consumed orange maize, 56 percent reported consuming it in one to nine days in the past 30 days, whereas 16 percent reported consuming it daily (**Figure 12**). Maize is a staple in Nigeria, especially in the North East, where it is consumed in many forms. With the nutritional benefit of the crop, it has the potential to contribute to the national goal of reducing vitamin A deficiency in Nigeria if consumer awareness and acceptance can be strengthened.

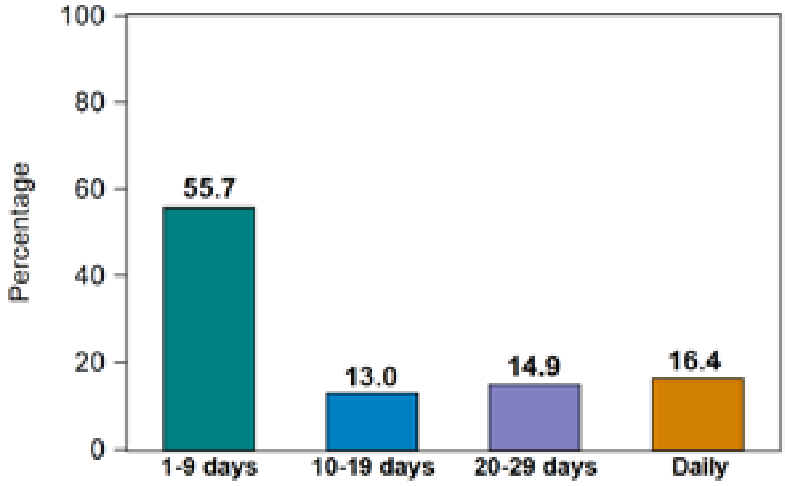


Figure 12. Frequency of consumption of orange maize (or any food products made from it) in the previous 30 days among consumers
Among non-pregnant women (aged 15-49 years) who consumed orange maize (or any food products made from it) the previous 30 days (unweighted sample size for women = 663)
Data are weighted to account for survey design and non-response

Fortification Coverage

Food fortification is the practice of adding micronutrient(s) to commonly consumed foods during processing to increase their nutritional value. It is carried out at large-scale and endorsed by governments as a public health policy that aims to reduce micronutrient deficiencies within a population. In Nigeria, mandatory fortification of salt with iodine began in 1993, while that of sugar, margarine and edible oil with vitamin A and all flours (wheat, maize, cassava, and semolina) with multiple micronutrients, (vitamin A, iron and zinc) started 2002 (Standard Organizations of Nigeria, 2000a, 2000b, 2000c, 2010, 2015a, 2015b). In addition, voluntary fortification of some other food vehicles is gaining popularity e.g., bouillon.

Below are terms used in the NFCMS 2021 as defined by Friesen et al, (2019):

- **Food vehicle**: Refers to the food that is selected for the addition of one or more nutrients; it is usually a staple food or condiment that is widely consumed in any form.
- **Fortifiable food vehicle:** Refers to a food vehicle that is industrially processed and therefore amenable to large-scale food fortification.
- **Fortified food vehicle:** Refers to a food vehicle that has been confirmed by laboratory analyses to contain the added micronutrient(s) (in any amount).

For the 2021 Nigerian NFCMS, the definitions for fortifiable food vehicles and fortified foods were adapted to the context of Nigeria.

- **Fortifiable food vehicles:** Two proxies were used to assess the coverage of fortifiable food vehicles:
  - food vehicle that was purchased (i.e., not homemade)
  - food vehicle that was branded (i.e., commercially produced)

There are limitations in the use of these proxy indicators. Defining fortifiable as purchased has the limitation that in Nigeria not all purchased foods are produced by large-scale industries. For instance, vegetable oil is produced both at large and cottage level, but the production at the cottage level does not provide an opportunity for fortification. This variable is therefore an overestimation of the true coverage.

Defining fortifiable as branded has the limitation that this information is not always available. When the brand of the food vehicle is unknown, it is not possible to determine whether the food is fortifiable. This variable is therefore an underestimation of the true coverage.

- **Fortified foods:** Two proxies were used to assess the coverage of fortified foods:
  - food vehicle that is labelled as fortified based on information provided by the brand manufacturer was used (i.e., fortification logo or statement on the label of the package of the branded product)
  - food vehicle that is fortified (in any amount) based on linking the reported brand used by household of the sampled respondent to a fortification status (fortified or not fortified) based on micronutrient content from laboratory analysis of multiple food samples for the given brand using secondary data from the 2021 Global Alliance for Improved Nutrition (GAIN) market assessment of fortified food vehicles. This was done for all food except bouillon, which was not included in the market assessment as it is not currently required to be fortified in Nigeria.

There are limitations in the use of these proxy indicators. When the brand of the food vehicle is unknown, it is not possible to examine the label or link the data to the GAIN database. Also, the label information and database information may not reflect the true fortification status. A brand previously fortified may no longer be fortified, or vice versa. Also, there are micronutrient losses during transportation, shelf storage, retail display, etc. between market and homes.

The findings in this preliminary report are coverage of seven food vehicles assessed in the NFCMS, namely vegetable oil, wheat flour, maize flour, semolina flour, sugar, salt, and bouillon. Respondents were asked if their households use any of the food vehicles to prepare food at home. Coverage is defined as the proportion of respondents whose households consumed the food vehicle. The indicators used in the 2021 Nigerian NFCMS are summarized in **Table 44.** In addition, descriptive data are presented for types, sources, and brands of food vehicles consumed in the household. The results for non-pregnant women aged 15-49 y are presented in the body of the report (n=5381), while those for all survey target groups are presented in **Annex 6**.

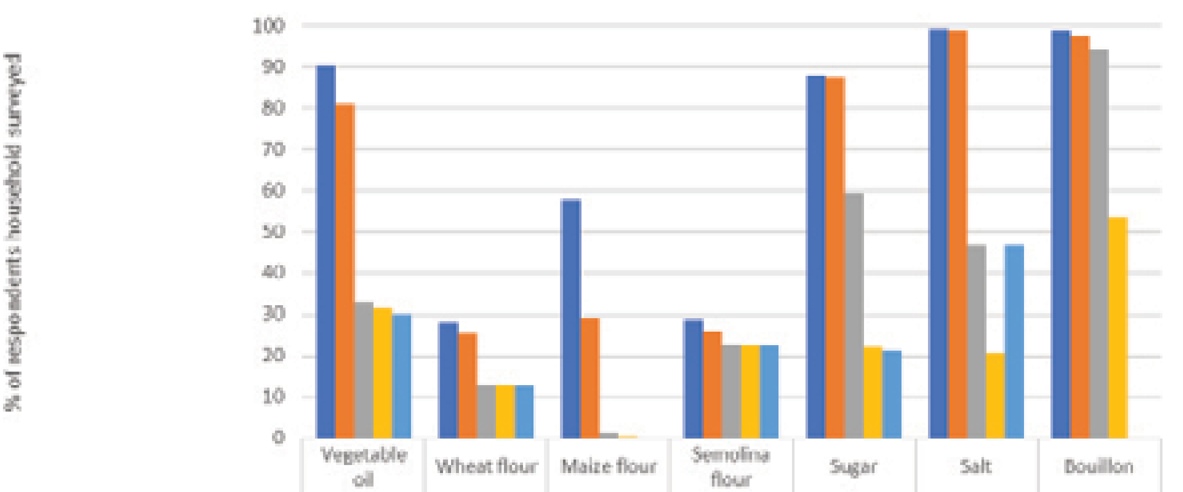
Table 44. Fortification coverage indicators reported in the NFCMS using data collected in the diet questionnaire

NFCMS survey Indicator definition	Survey question	Data analysis	Food vehicles included
Proportion of respondents in each target group (non-pregnant women, pregnant women and children) whose households consumed the **food vehicle**	Does your household use [food vehicle] to prepare foods at home?	The following response categories were created: -consumed food vehicle -did not consume food vehicle	vegetable oil, wheat flour, maize flour, semolina flour, sugar, salt, and bouillon
Proportion of respondents in each target group (non-pregnant women, pregnant women and children) whose households consumed the **purchased food vehicle** (this is a proxy for fortifiable)	-The last time your household got [food vehicle], how did you get it?	The following response categories were created: - purchased - homemade - donations/gifted - unknown	vegetable oil, wheat flour, maize flour, semolina flour, sugar, salt, and bouillon
Proportion of respondents in each target group (non-pregnant women, pregnant women and children) whose households consumed the **branded food vehicle** (this is a proxy for fortifiable)	-The last time your household got [food vehicle], what was the brand?	The following response categories were created: - branded - unbranded - unknown	vegetable oil, wheat flour, maize flour, semolina flour, sugar, salt, and bouillon
Proportion of respondents in each target group (non-pregnant women, pregnant women and children) whose households consumed the **food vehicle that was labeled as fortified** (this is a proxy for fortified)		- The brand name reported was linked to label information (visual inspection of fortification logo or statement on food label)	vegetable oil, wheat flour, maize flour, semolina flour, sugar, salt, and bouillon
Proportion of respondents in each target group (non-pregnant women, pregnant women and children) whose households consumed the **food vehicle that was confirmed to be fortified** (this is a proxy for fortified)		- The brand name reported was linked to secondary data on fortification status from GAIN 2021 market assessments - Data were disaggregated as fortified below minimum standard range of fortification and fortified at or above standard.	vegetable oil, wheat flour, maize flour, semolina flour, sugar, and salt

In addition to the variables derived from the diet questionnaire, samples for vegetable oil, wheat flour, semolina flour, sugar and salt were collected from a sub-sample of non-pregnant women. These samples were analyzed in the laboratory and the finding are presented here.

Overview of coverage and fortification indicators among non-pregnant WRA

Figure 13 shows the overview of the fortification coverage indicators of the seven selected food vehicles.



	Vegetable oil	Wheat flour	Maize flour	Semolina flour	Sugar	Salt	Bouillon
Consumed foods	90.3	28.2	57.4	28.7	88.2	99.2	98.9
Purchased foods	80.7	25.3	29.2	26.2	87.3	99	97.5
Branded foods	32.9	12.9	1.2	22.8	59.4	46.6	94.3
Foods labelled as fortified	31.4	12.9	0.5	22.7	22.2	20.8	53.5
*Foods fortified (in any amount)	30.3	12.7	0	22.7	21.3	46.7	

Figure 13. Coverage of Selected Food Vehicles among Households of the sampled Non-Pregnant Women at National Level
Among non-pregnant women (aged 15-49 years) (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.
Data is missing for 22 non-pregnant women.
*Based on linking reported brand to secondary data from GAIN Market assessment 2021 on fortification status (i.e., fortified or not fortified) by brand based on analysis of multiple food samples per brand.

A high proportion of households of sampled non-pregnant women of reproductive age (WRA) consumed vegetable oil (90 percent), sugar (88 percent), salt (99 percent), and bouillon (99 percent) in any form. Fewer households of sampled non-pregnant WRA consumed flours in any form (57 percent for maize flour, 29 percent for semolina flour, and 28 percent for wheat flour). The proportion of households of sampled non-pregnant women of reproductive age that consumed foods that were obtained through purchases (as opposed to for example gifts or food aid) were similar to those consuming the food in any form for most food vehicles, except for maize flour (57 percent of household consumed it, but only 29 percent purchased it).

The proportion of respondents whose households consumed these foods in a branded form (which was used as a proxy for commercially processed and thus amenable to large-scale fortification) was considerably lower for most foods, i.e., vegetable oil (33 percent), sugar (22 percent), wheat flour (13 percent) maize flour (<1 percent), semolina flour (23 percent), salt (47 percent), except for bouillon, which remained high (96 percent). That said, the same proportion of households that consumed branded foods also consumed foods labelled as fortified and confirmed to be fortified (in any amount) based on linking the report brand to secondary market data on fortification quality. This suggests that most foods that are labelled as fortified are in fact fortified. For bouillon, the drop in the proportion of women from households that consumed bouillon that was branded and labelled as fortified, is likely because fortification is currently on voluntary basis and therefore only some brands are fortifying and labelling their products as such as a means of increasing market competitiveness.

Where there is high coverage of foods that are purchased and branded, there is an opportunity for large-scale fortification to reach a high proportion of the population and where a sharp decline is observed between purchased and branded for most foods (except bouillon), it may be due to either a high proportion of non-pregnant women reported their households consumed unknown and/or unbranded food vehicles (sugar, vegetable oil, salt)or a high proportion of them obtained food vehicle(s) from small/cottage-scale production (maize flour and vegetable oil) with no brands.

Vegetable oil

Figure 14 presents the coverage indicators for vegetable oil nationally among households of the sampled non-pregnant WRA (15-49 years old). There was a high proportion of households of the sampled non-pregnant women that consumed vegetable oil in any form (90%) and purchased it (81 percent). At the same, only about one-third of households of the sampled women of reproductive age consumed vegetable oil that was branded, labelled as fortified and fortified (in any amount). However, the result for these latter three indicators may be underestimated as about 25% of women could not report the brand of the consumed vegetable oil.

These results reveal that fortification of vegetable oil is currently reaching at least 31 percent of households of the sampled respondents and has the potential to reach up to around 60 percent of households if all the branded oil is fortified. However, while 33 percent of women come from households that consumed branded vegetable oil (and 26 percent were unknown), 25 percent consumed unbranded oil and thus would not be reached with large-scale food fortification.

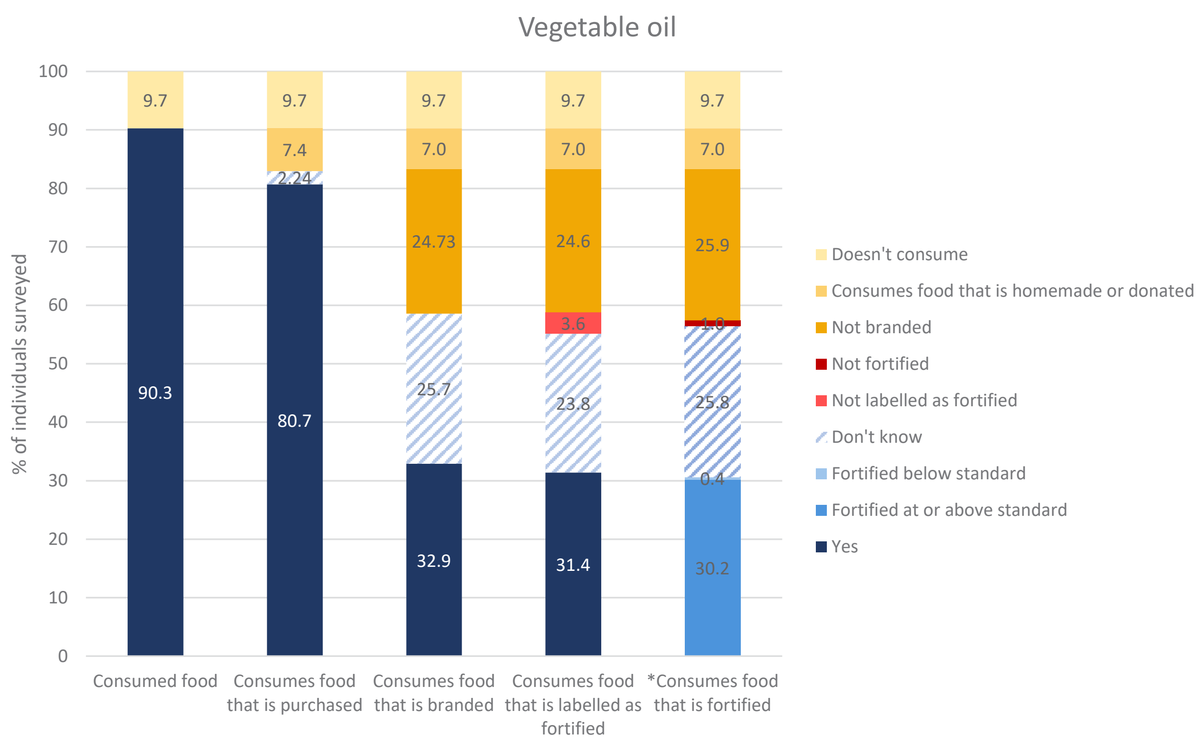


Figure 14. Percentage of Non-Pregnant Women Whose Households Consumed Vegetable Oil (purchased, branded, labelled as fortified and fortified) at National Level
Among non-pregnant women aged 15-49 years (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.
Data for bouillon is missing for 22 non-pregnant women.
*Based on linking reported brand to secondary data from GAIN Market assessment 2021 on fortification status by brand

Unbranded vegetable oil could originate from small-scale processors (cottage industries) that take their products to the open market (e.g., unrefined groundnut oil) for sale; this type of oil is truly unbranded. This practice is common with groundnut oil, which is commonly processed by women at cottage-level. According to FAO, 2003 (Mustapha and Suleiman, 2006), the locally processed groundnut oil is about 25 percent of the total vegetable oil produced in Nigeria.

Unbranded vegetable oil could also come from downsized and repackaged branded vegetable oil, whose identity would have been lost at the point of purchase. Nigeria has the common practice of downsizing and repackaging vegetable oil from barrels/drums into smaller local measures that low-income earners can afford. When this is done, the brand identity of the oil is lost. These oils may be branded originally, but at the time of purchase, the brand is not disclosed to the consumer.

Furthermore, the similarity in the proportion of women from households that consumed food that is branded, labelled as fortified and fortified are indicators that most of the producers of vegetable oils that are branded are infact labelling and fortifying their products.

Across residence sectors and zones, even though the proportion of households of the selected respondents that consumed vegetable oil was found high nationally, the proportion was higher among urban dwellers compared to rural (96 percent vs. 85 percent) with the same trend found for the proportion of households of the selected respondents that consumed vegetable oil that is purchased, branded, labelled as fortified and fortified (**Table 45**). Contrarily, the proportion of households of the sampled respondents that consumed unbranded vegetable oil was slightly higher in rural areas compared to urban (28 percent vs. 21 percent) This may be explained by the fact that this type of oil is often cheaper and therefore may be more affordable in rural areas.

Within the zones, the proportion of households of the sampled non-pregnant women of reproductive age that consumed vegetable oil were higher in South South and South West (92 percent) and north central (91 percent) zones compared to other zones (88 percent each). The proportion of households of the sampled respondents that consumed unbranded vegetable oil was higher in the northern zones (16-54 percent), especially North central (54 percent) compared to the southern zones (12-29 percent). This is likely because groundnut oil, which is a very common type of oil made at cottage-scale, is produced more widely in the north and unbranded.

Also, groundnut is the base crop grown more in the north (FAO, 2003 in Mustapha and Suleiman, 2006). This may account for lower proportion of households of the sampled respondents that consumed the branded vegetable oil in the north (12-21 percent) compared to those in the south (57-65 percent). Higher proportion of women's households consuming unknown brands was also found, especially in the northern zones (11-52 percent), which could be traced to the practice of downsizing and repackaging vegetable oil that are cheaper and more affordable by the low-income earners. In general, a higher proportion of households of the respondents that consumed unbranded and unknown oil was found in the northern zones (65 percent North central, 56 percent North East, and 68 percent North West) compared to the southern zones (South East 23 percent, South-South 26 percent and South West 32 percent) (**Table 45)**. The same trend was found with wealth quintile as consumption of branded vegetable oil is more in the rich than the poor HHs.

With the high percentages of unknown and unbranded vegetable oil, fortification status of vegetable oil consumed in these HHs could not be truly assessed. This could be a challenge in the evaluation of the impact of fortification programme in Nigeria.

Table 45. Percentage of Non-Pregnant Women of Reproductive Age (WRA) whose Households Consumed Vegetable Oil (purchased, branded, labelled as fortified and fortified) by Residence, Zone, and Wealth Quintile

	N[1]	Consumed food[2, 3]	Consumed food that is purchased[2, 4]	Consumed food that is branded[2, 4]	Food brand is unknown, or product is unbranded[2, 4, 5]		Consumed food that is labelled as fortified[2, 4]	Consumed food that is fortified[2, 4]		
					Unknown	Unbranded		At standard	Below standard	Not fortified
		% [95%CI]								
National[3]										
Non-pregnant WRA	5281	**90.3** [88.5-92.1]	**80.7** [78.4-83.0]	**32.9** [29.9-35.9]	**25.8** [22.9-28.6]	**24.7** [22.2-27.2]	**31.4** [28.5-34.4]	**30.1** [27.3-32.9]	**0.2** [0.0-0.5]	**0.5** [0.2-0.9]
Residence		P < 0.0001***								
Urban	2156	**96.2** [95.0-97.3]	**87.6** [84.7-90.5]	**48.0** [42.6-53.3]	**21.6** [16.5-26.8]	**21.3** [17.7-24.8]	**46.0** [40.5-51.6]	**44.1** [38.5-49.6]	**0.5** [0.0-1.1]	**1** [0.3-1.7]
Rural	3125	**85.2** [82.3-88.1]	**74.7** [71.3-78.0]	**19.8** [16.7-22.8]	**29.3** [25.0-33.7]	**27.7** [24.2-31.2]	**18.7** [15.7-21.8]	**18.0** [15.0-20.9]	**0**	**0.1** [0.0-0.3]
Zone		P = 0.1722								
North Central	857	**94.3** [91.5-97.1]	**84.5** [79.8, 89.2]	**21.0** [13.1-28.9]	**11.4** [8.6-14.2]	**53.5** [45.7-61.3]	**21.0** [13.1-28.9]	**19.5** [11.7-27.3]	**0**	**0**
North East	830	**87.6** [83.1-92.1]	**68.1** [62.0-74.2]	**15.2** [6.2-24.2]	**38.3** [31.6-45.0]	**18.2** [12.4-24.1]	**15.0** [6.0-24.0]	**12.9** [5.4-20.5]	**0**	**0**
North West	944	**88.7** [84.3-93.1]	**77.0** [71.3-82.6]	**12.5** [7.3-17.8]	**52.3** [46.3-58.3]	**16.1** [12.5-19.7]	**8.8** [4.2-13.4]	**7.5** [3.2-11.7]	**0**	**1.7** [0.6-2.8]
South East	855	**87.9** [83.8-92.0]	**78.5** [73.1-83.8]	**61.1** [53.8-68.4]	**10.6** [6.5-14.7]	**12.3** [9.0-15.7]	**60.0** [52.6-67.4]	**57.7** [50.4-65.0]	**0.1** [0.0-0.2]	**0**
South South	888	**92.4** [87.4-97.3]	**90.6** [85.0-96.1]	**65.1** [56.9-73.3]	**5.9** [4.0-7.8]	**20.4** [15.7-25.0]	**64.5** [56.4-72.6]	**64.3** [56.2-72.5]	**0.1** [0.0-0.2]	**0**
South West	907	**91.6** [87.5-95.7]	**89.1** [85.0-93.1]	**57.4** [50.1-64.7]	**3.5** [2.2-4.9]	**29.0** [23.8-34.2]	**56.6** [49.4-63.7]	**55.4** [48.4-62.4]	**1.3** [0.0-2.8]	**0.1** [0.0-0.4]
Wealth quintile[6]		P < 0.0001***								
Lowest	1081	**80.3** [75.9-84.7	**67.4** [62.4-72.4]	**6.9** [4.5-9.2]	**39.4** [33.3-45.4]	**23.8** [19.9-27.7]	**5.7** [3.5-7.9]	**5.4** [3.2-7.5]	**0.1** [0.0-0.3]	**0.1** [0.0-0.4]
Second	1111	**87.2** [83.7-90.6]	**73.8** [68.9-78.6]	**15.8** [12.5-19.0]	**34.0** [28.5-39.6]	**27.1** [22.2-31.9]	**14.5** [11.3-17.8]	**14.1** [10.9-17.3]	**0.2** [0.0-0.6]	**0.6** [0.0-1.5]
Middle	1100	**93.2** [90.9-95.6]	**82.9** [79.5-86.4]	**37.0** [32.7-41.3]	**21.0** [16.9-25.0]	**27.1** [22.2-32.1]	**35.8** [31.4-40.1]	**33.7** [29.0-38.3]	**0.4** [0.0-1.2]	**0.5** [0.0-1.2]
Fourth	997	**95.6** [93.7-97.5]	**90.3** [87.5-93.1]	**50.1** [45.3-54.9]	**15.8** [12.4-19.1]	**26.9** [22.4-31.4]	**49.0** [44.1-53.8]	**47.2** [42.4-51.9]	**0.4** [0.0-0.9]	**0.3** [0.0-0.7]
Highest	970	**97.4** [96.1-98.7]	**93.0** [90.5-95.4]	**63.2** [57.8-68.6]	**14.6** [8.8-20.3]	**18.0** [14.4-21.5]	**60.6** [54.7-66.5]	**58.1** [52.3-64.0]	**0.1** [0.0-0.2]	**1.1** [0.0-2.3]

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).
4 Differences across groups were not tested statistically
5 When the food brand was unknown or an unbranded product was used, it was not possible to link data to label information.
6 Data is missing for 22 non-pregnant women.

The proportion of households of the sampled non-pregnant women that consumed groundnut oil and palm olein as main type of vegetable oil was 51 percent and 44 percent respectively (**Figure 15**).

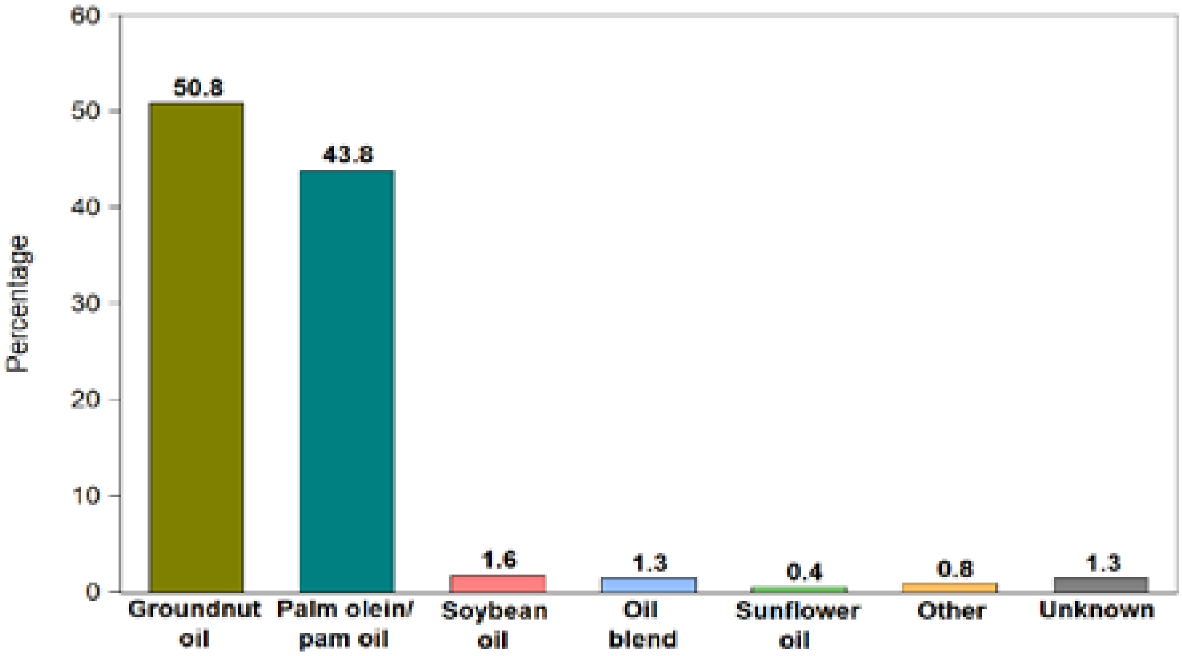


Figure 15. Main type of vegetable oil used in the household among consumers
Among non-pregnant women (aged 15-49 years) who used the food vehicle in the HH (unweighted sample size for women = 4749)
Data are weighted to account for survey design and non-response.
The type was classified as “unknown” when the respondent could not report the type of food vehicle used in the HH.
Oil blend is a mixture of seeds processed into oil (e.g. rapeseed and sunflower).

As shown in **Figure 16,** several brands of oil are available in Nigeria. The proportion of households of the sampled non-pregnant women consumed King's (100 percent vegetable oil) as their main brand of vegetable oil was 22 percent, followed by Power Oil - pure vegetable oil that was reported by 14 percent of the women.

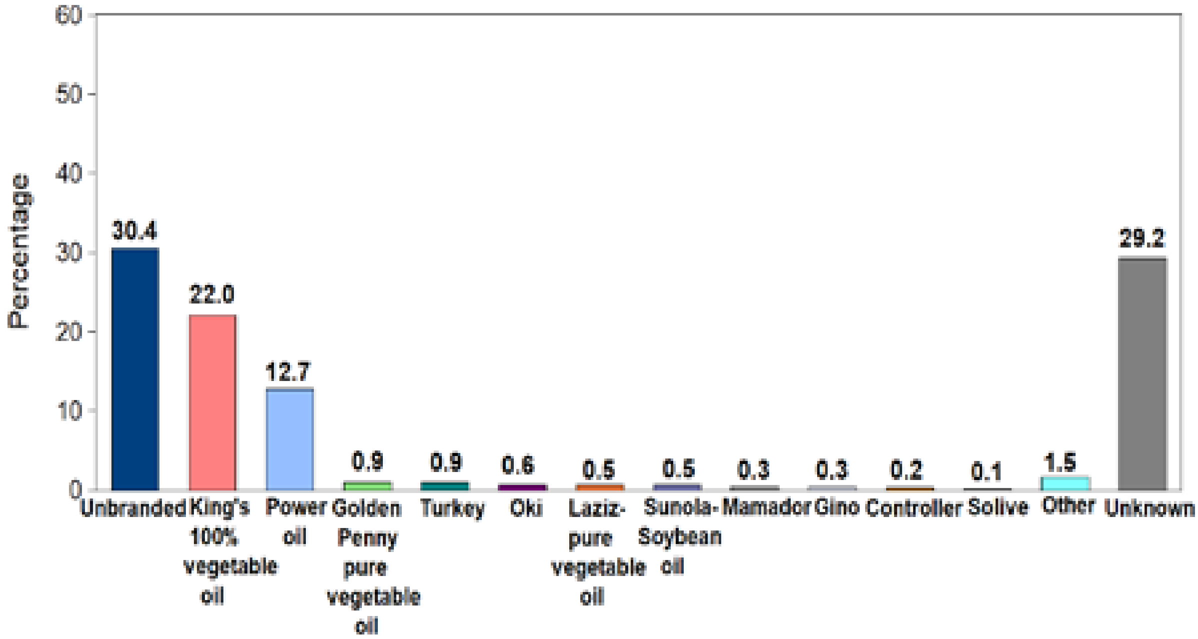


Figure 16. Brand of vegetable oil obtained the last time among consumers
Among non-pregnant women (aged 15-49 years) among respondents who used the food vehicle in the HH and the food vehicle was not "homemade" (unweighted sample size for women = 4320)
Data are weighted to account for survey design and non-response
The brand was classified as "unknown" when the respondent could not report the brand of food vehicle used in the HH.

Wheat Flour

Wheat flour is commonly used in the baking industry to make bread and other food products (e.g. biscuits, doughnuts, cakes, meat pies). According to Femi (2020), wheat flour is consumed everyday as bread, biscuits, cakes. Over five million tons of the product was consumed in 2020. However, in some households especially northern homes, wheat flour is used to make locally produced pasta (*Taliya*), fried pastries, and local foods, such as *alkubus* and *guraza.*[8] This survey assessed the use of wheat flour at home and the results is provided in this preliminary report. Consumption of wheat-based products processed outside the home, usually by vendors is covered in the 24-houre recall section of the questionnaire and the report would be provided in the survey full report.

Figure 17 presents the coverage indicators for wheat flour nationally among non-pregnant WRA (15-49 years old). The proportion of households of the sampled non-pregnant women that consumed wheat flour in any form at home was 28 percent and those that purchased it was 25 percent. At the same time, only 13 percent of the households of the sampled women of reproductive age consumed wheat flour that was branded, labelled as fortified and fortified (in any amount). However, the result for these latter three indicators may be underestimated as 10 percent of the households of the respondents could not report the brand of the consumed wheat flour. Also, the remaining 72 percent that did not use it at home does not mean that the households did not consume wheat flour rather they consumed wheat flour products (i.e., bread, confectionaries) that are vendor processed. The survey result of 24-hour dietary recall will give details of consumption of wheat flour products and contribution of its fortification to nutrient intake.

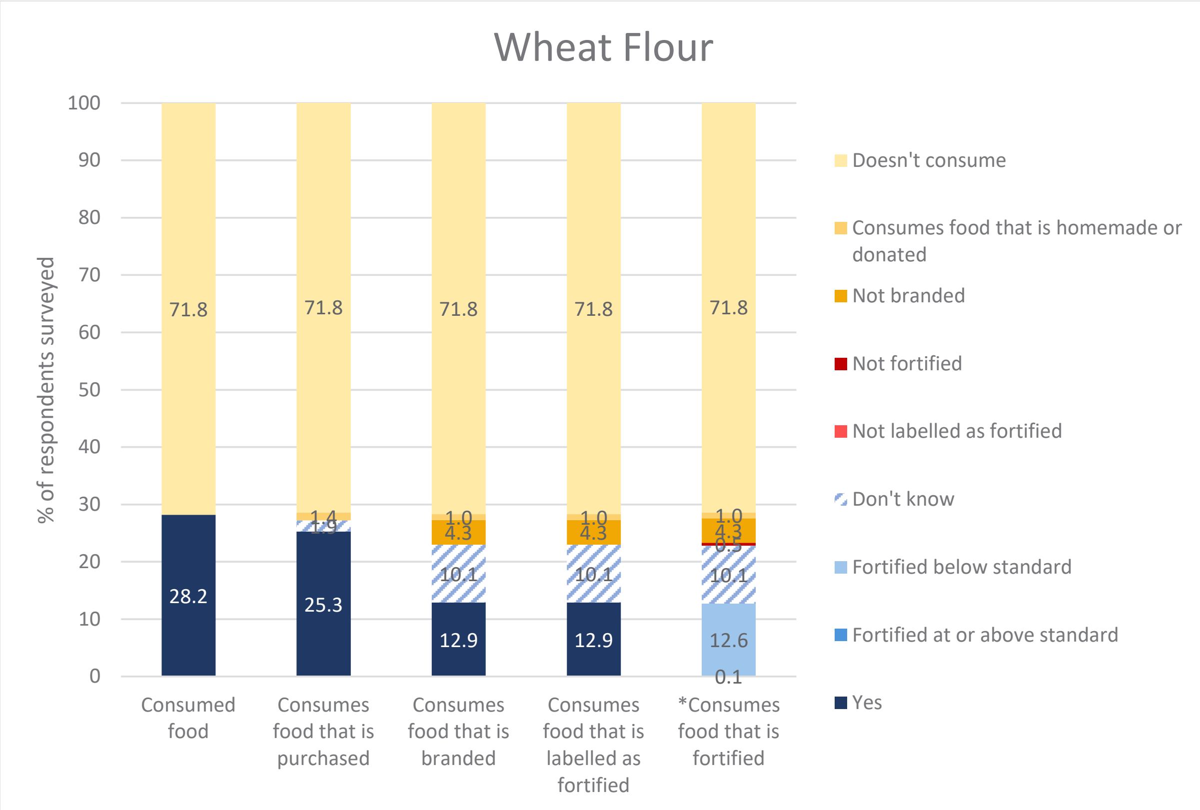


Figure 17. Percentage of Non-Pregnant Women Whose Households Consumed Wheat Flour (purchased, branded, labelled as fortified and fortified) at National Level
Among non-pregnant women (aged 15-49 years) (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response
Unweighted sample size for all respondents
Differences across groups were not tested statistically.
Data is missing for 22 non-pregnant women.
*Based on linking reported brand to secondary data from GAIN Market assessment 2021 on fortification status by brand

These results reveal that fortification of wheat flour is currently reaching at least 13 percent of households of the sampled respondents but has potential to reach up to 28 percent if all the wheat flour consumed at home is known, branded, and fortified. It could also reach much more if wheat flour used in other vendor-prepared forms outside homes (pastries, confectionaries, etc) is fortified. However, while 13 percent of households of the sampled women of reproductive age consumed branded wheat flour (and 10% were unknown), 4 percent consumed unbranded wheat flour and thus could not be reached with large-scale food fortification.

Unknown and unbranded wheat flour could come from two sources. One is likely because of retailers downsizing and repackaging the common 50kg bag into local measures with no brand identity. At the point of sales of the repackaged wheat flour, brand identity is lost, and consumers could not tell which brand they buy and use. Also, in Nigeria, wheat flour is mainly processed at large industrial scale, but also at cottage scale in the north where it is locally grown although in small quantity. These products are usually unrefined and can also be processed at home for local dishes such as *'swallow'*, local pasta *(Taliya), and guraza*. With these findings, only wheat flour with brand information was linked to the fortification secondary data.

Furthermore, the similarity in the proportion of households of the sampled individuals that consumed food that is branded, labelled as fortified and fortified are indicators that most of the producers of wheat flours that are branded are in fact labelling and fortifying their products.

Across residence sector (**Table 46**), the proportion of households of the sampled non-pregnant women that consumed wheat flour was higher (40 percent) in urban than those from the rural (18 percent). The same trend was found for the proportion of households of sampled non-pregnant women that consumed wheat flour that was purchased, branded, labelled as fortified and fortified (**Table 57**). Contrarily, the proportion of households of the non-pregnant women that consumed unbranded wheat flour was higher in the rural than urban.

Within the zones, proportion of households of the sampled non-pregnant women that consumed wheat flour was found highest in the North East (44 percent) and North West (41 percent), followed by South West (29 percent). In the other zones, proportion households of the sampled non-pregnant women that consumed wheat flour was between 9 and 13 percent.

Table 46. Percentage of Non-Pregnant Women Whose Households Consumed Wheat Flour (purchased, branded, labelled as fortified and fortified) by Residence, Zone, and Wealth Quintile

	N[1]	Consumed food[2, 3]	Consumed food that is purchased[2, 4]	Consume food that is branded[2, 4]	Food brand is unknown, or product is unbranded[2, 4, 5]		Consumed food that is labelled as fortified[2, 4]	Consume food that is fortified[2, 4]		
					Unknown	Unbranded		At standard	Below standard	Not fortified
		% [95%CI]								
National[3]										
Non-pregnant women aged 15-49 years	5281	**28.2** [24.3, 32.2]	**25.3** [21.3, 29.3]	**17.2** [14.0, 20.3]	**10.1** [8.5, 11.7]	0	**12.9** [10.1, 15.8]	**0.1** [0.0, 0.2]	**12.6** [9.9, 15.4]	0
Residence		P<0.001***								
Urban	2156	**40.1** [33.5, 46.6]	**36.5** [29.8, 43.2]	**27.2** [21.9, 32.4]	**11.5** [9.2, 13.8]	0	**21.2** [16.3, 26.1]	**0.2** [0.0, 0.4]	**20.6** [15.9, 25.4]	0
Rural	3125	**18.0** [14.6, 21.3]	**15.6** [12.1, 19.0]	**8.5** [6.4, 10.6]	**8.9** [6.6, 11.2]	0	**5.7** [3.9, 7.4]	0	**5.6** [3.9, 7.4]	0
Zone		P<0.001***								
North Central	857	**12.7** [9.1, 16.4]	**8.8** [5.6, 12.1]	**6.8** [4.3, 9.4]	**5.2** [2.0, 8.5]	0	**3.5** [1.7, 5.2]	0	**3.5** [1.7, 5.2]	0
North East	830	**44.3** [34.3, 54.2]	**40.6** [30.8, 50.4]	**25.1** [16.6, 33.6]	**19.1** [14.4, 23.7]	0	**21.5** [14.3, 28.7]	0	**21.5** [14.3, 28.7]	0
North West	944	**40.5** [30.2, 50.8]	**38.6** [27.9, 49.3]	**26.0** [17.6, 34.4]	**13.6** [9.6, 17.5]	0	**21.7** [14.0, 29.5]	0	**21.3** [13.9, 28.8]	0
South East	855	**9.9** [7.2, 12.6]	**7.7** [5.3, 10.0]	**4.7** [2.9, 6.5]	**4.8** [3.2, 6.3]	0	**2.0** [1.1, 3.0]	0	**1.7** [0.9, 2.6]	0
South South	888	**9.2** [5.7, 12.8]	**7.1** [3.9, 10.3]	**6.0** [3.1, 8.9]	**2.5** [1.3, 3.6]	0	**4.8** [2.2, 7.5]	0	**4.7** [2.1, 7.2]	0
South West	907	**28.7** [24.3, 33.0]	**24.6** [20.4, 28.8]	**17.9** [14.7, 21.2]	**8.2** [6.1, 10.3]	0	**9.0** [6.9, 11.1]	**0.6** [0.1, 1.2]	**8.2** [6.2, 10.3]	0
Wealth quintile		P<0.001***								
Lowest	1081	**19.1** [14.3, 24.0]	**17.1** [12.2, 22.0]	**7.6** [5.1, 10.1]	**10.3** [6.7, 13.9]	0	**5.6** [3.6, 7.5]	0	**5.6** [3.6, 7.5]	0
Second	1111	**25.3** [19.5, 31.2]	**24.0** [18.2, 29.8]	**14.4** [9.2, 19.7]	**10.8** [7.8, 3.8]	0	**11.5** [6.8, 16.2]	**0.1** [0.0, 0.3]	**11.4** [6.7, 16.1]	0
Middle	1100	**30.5** [24.6, 36.5]	**26.9** [20.7, 33.2]	**20.1** [14.6, 25.6]	**9.9** [7.3, 12.5]	0	**15.2** [9.8, 20.6]	**0.0** [0.0, 0.1]	**15.2** [9.8, 20.6]	0
Fourth	997	**33.3** [28.2, 38.5]	**28.7** [23.5, 33.9]	**20.8** [16.6, 25.1]	**11.1** [8.4, 13.7]	0	**15.0** [11.1, 19.0]	**0.3** [0.0, 0.7]	**14.2** [10.5, 17.9]	0
Highest	970	**35.3** [28.0, 42.6]	**31.7** [24.3, 39.1]	**25.0** [19.6, 30.4]	**8.4** [4.2, 12.5]	0	**18.7** [14.2, 23.3]	**0.1** [0.0, 0.3]	**18.0** [13.7, 22.4]	0

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).
4 Differences across groups were not tested statistically
5 When the food brand was unknown or an unbranded product was used, it was not possible to link data to label information.
6 Data is missing for 22 non-pregnant women.

The proportion of households of sampled non-pregnant women that consumed all-purpose flour as their main type of flour was 59 percent followed by 16 percent and 15 percent of them that reported refined wheat flour and whole wheat flour respectively (**Figure 18**). Low proportion of households of the sampled non-pregnant women (6 percent) were unable to report the type of wheat flour used in their households.

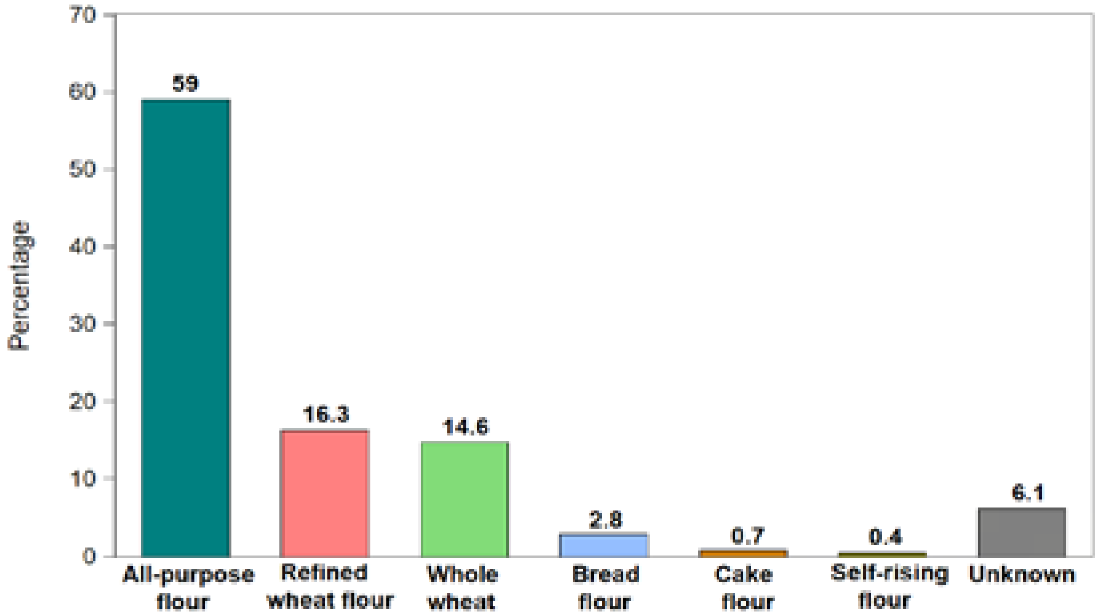


Figure 18. Main types of wheat flour used in the household among consumers
Among non-pregnant women (aged 15-49 years) among respondents who used the food vehicle in the HH (unweighted sample size for women = 1226)
Data are weighted to account for survey design and non-response
The type was classified as "unknown" when the respondent could not report the type of food vehicle used in the household.

The proportion of households of the sampled non-pregnant women that consumed Dangote wheat flour as their main brand was 22 percent while those that reported Bua wheat flour as their main brand was 15 percent (Figure 19).

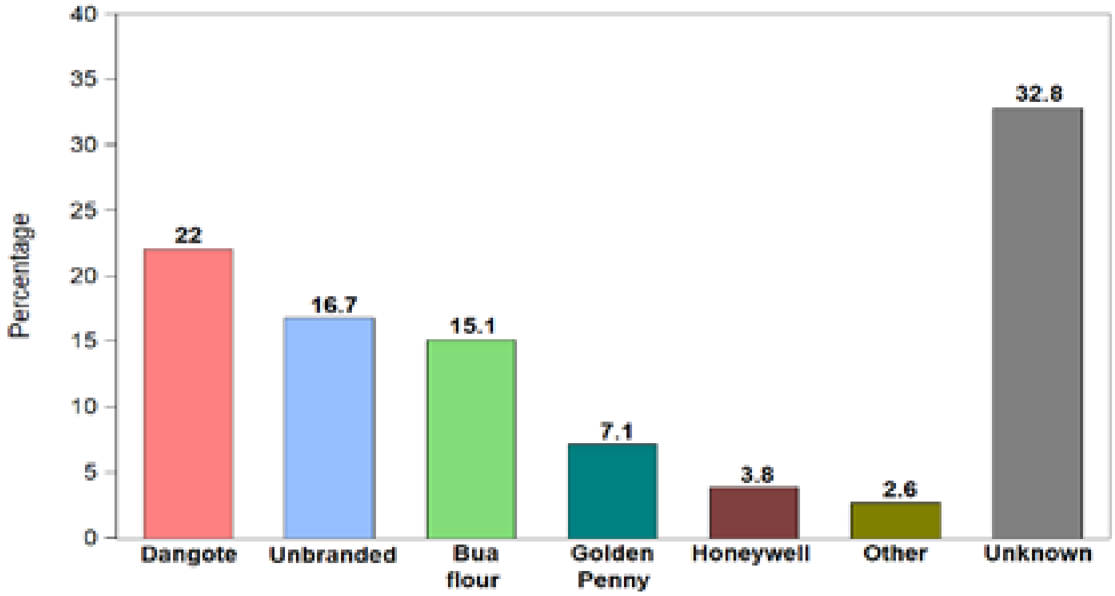


Figure 19. Brand of wheat flour obtained the last time among consumers
Among non-pregnant women (aged 15-49 years) among respondents who used the food vehicle in the HH and the food vehicle was not "homemade" (unweighted sample size for women = 1095)
The brand was classified as "unknown" when the respondent could not report the brand of food vehicle used in the HH.

Maize Flour

Maize is a staple in Nigeria, especially in the north where it is processed for both intermediate and finished diverse local dishes. In intermediate form, maize flour is commonly used in preparing local dishes like *'swallow' tuwo masara*, pap, etc.

Figure 20 presents the coverage indicators for maize flour nationally among non-pregnant WRA (15-49 years old). The proportion of households of the sampled non-pregnant women that consumed maize flour in any form was 57 percent while those that purchased it was 29 percent and homemade 27 percent. At the same time, the proportion of households of the sampled non-pregnant women that consumed branded, labelled as fortified, and fortified at any level was very low, (between 0 and <1 percent) nationally. However, the proportion of households of the sampled respondent that reported that they consumed homemade, unbranded, and unknown was 27 percent, 16 percent and 13 percent respectively thus about all (56%) of the households of the sampled women that consumed maize flour would not be reached with large-scale food fortification with the target micronutrients (vitamin A, iron, and zinc).

Across the residence sector, the proportion of households of the sampled non-pregnant women that consumed maize flour as well as consumed homemade maize flour was higher in rural than urban (Table 47). Also, within the zones, the proportion of households of the sampled individuals that consumed maize flour was higher in the north (80 percent) than in the south (≤20 percent).

Large scale fortification of maize flour seems very low (almost nil) in Nigeria probably because most of the maize flour are processed either at home or small/cottage-scale, which makes them fall out of the large-scale food fortification programme. However, considering high consumption (81-85 percent) in the north, where maize is a staple, other means of reaching the households with fortified maize flour may need to be considered..

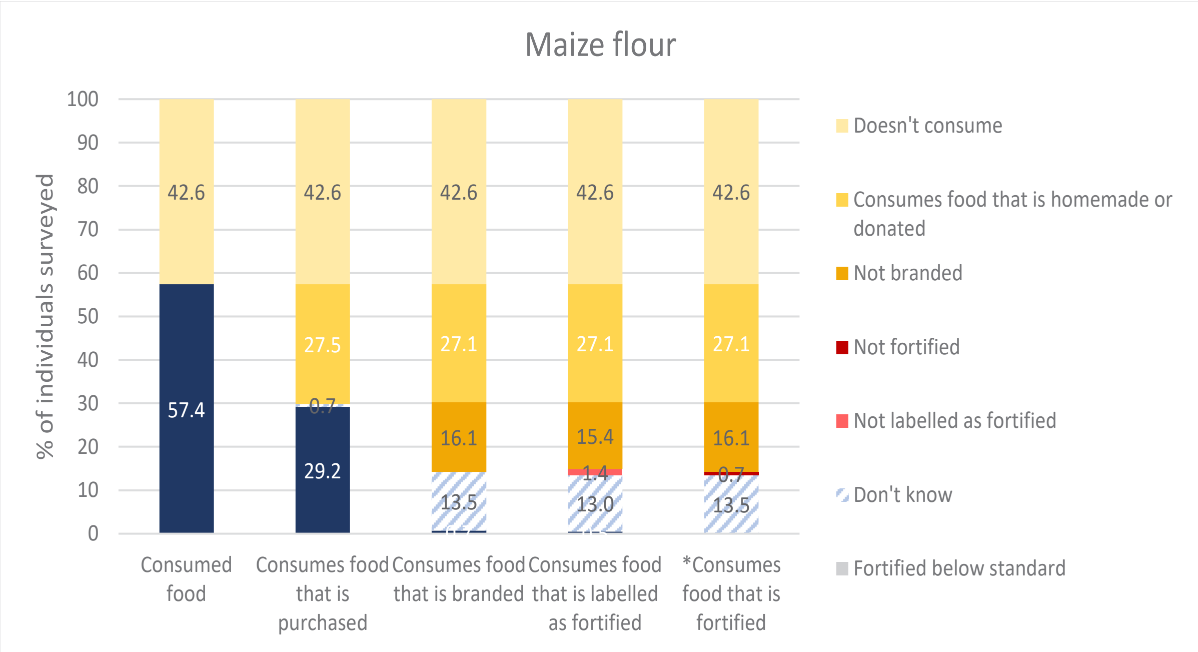


Figure 20. Percentage of Non-Pregnant Women Whose Households Consumed Maize Flour (purchased, branded, labelled as fortified and fortified) at National Level
Among non-pregnant women (aged 15-49 years) (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response.
Unweighted sample size for all respondents
Differences across groups were not tested statistically.
Data is missing for 22 non-pregnant women.
*Based on linking reported brand to secondary data from GAIN Market assessment 2021 on fortification status by brand

Table 47. Percentage of Non-Pregnant Women Whose Households Consumed Maize Flour (purchased, branded, labelled as fortified and fortified) by Residence, Zone, and Wealth Quintile

	N[1]	Consumed food[2,3]	Consumed food that is purchased[2,4]	Consume food that is branded[2,4]	Food brand is unknown, or product is unbranded[2,4,5]		Consumed food that is labelled as fortified[2,4]	Consume food that is fortified[2,4]		
					Unknown	Unbranded		At standard	Below standard	Not fortified
		% [95%CI]								
National[3]										
Non-pregnant women aged 15-49 years	5281	**57.4** [53.8, 61.0]	**29.2** [26.2, 32.3]	**0.7** **[0.0, 1.4]**	**13.4** [11.5, 15.3]	**16.1** [13.7, 18.6]	**0.5** [0.0, 1.1]	0	0.0 [0.0-0.0]	0.7 [0.0-1.3]
Residence		P=0.023*								
Urban	2156	**51.2** [44.6, 57.9]	**30.4** [25.2-35.7]	**1.1** [0.0, 2.5]	**13.6** [10.1, 17.1]	**16.7** [13.8, 19.7]	**0.8** [0.0-2.2]	**0**	**0**	**1.1** [0.0-2.5]
Rural	3125	**62.7** [56.9, 68.5]	**28.2** [24.0-32.4]	**0.4** [0.1, 0.6]	**13.3** [10.7-15.9]	**15.6** [11.7, 19.5]	**0.2** [0.0-0.3]	**0**	**0**	**0.4** [0.1-0.6]
Zone		P<0.001***								
North Central	857	**84.4** [78.6, 90.2]	**40.2** [30.8-49.6]	**0.2** [0.0, 0.4]	**9.0** [3.5-14.5]	**32.1** [22.1, 42.1]	**0.1** [0.0-0.4]	**0**	**0**	**0.0** [0.0-0.1]
North East	830	**81.2** [74.7, 87.8]	**32.3** [25.9-38.8]	**4.0** [0.3, 7.7]	**15.0** [11.4-18.7]	**14.4** [9.6, 19.1]	**2.6** [0.0-6.3]	**0**	**0**	**4.0** [0.3-7.7]
North West	944	**84.8** [80.0, 89.6]	**49.4** [43.3-55.6]	**0**	**30.5** [25.7-35.2]	**20.7** [16.9, 24.5]	**0.0**	**0**	**0**	**0**
South East	855	**17.7** [12.4, 22.9]	**12.4** [8.7-16.1]	**0.1** [0.0, 0.2]	**3.1** [1.3-4.8]	**10.0** [6.4, 13.6]	**0.1** [0.0-0.2]	**0**	**0.1** [0.0-0.2]	**0**
South South	888	**7.0** [4.7, 9.4]	**5.1** [3.0-7.2]	**0**	**1.6** [0.3-2.9]	**3.6** [2.0, 5.3]	**0.0**	**0**	**0**	**0**
South West	907	**20.8** [14.7, 26.8]	**8.8** [5.9-11.7]	**0.0** [0.0, 0.1]	**0.8** [0.1-1.4]	**8.6** [5.8, 11.5]	**0.0**	**0**	**0**	**0.0** [0.0-0.1]
Wealth quintile		P<0.001***								
Lowest	1081	**75.7** [69.5, 81.9]	**32.6** [27.7-37.4]	**1.0** [0.3, 1.8]	**19.3** [15.8-22.9]	**13.3** [9.8, 16.7]	**0.6** [0.0-1.2]	**0**	**0**	**1.0** [0.3-1.8]
Second	1111	**67.4** [60.8, 74.0]	**32.4** [27.0-37.8]	**0.3** [0.0, 0.8]	**13.2** [9.7-16.6]	**20.0** [14.9, 25.1]	**0.3** [0.0-0.7]	**0**	**0**	**0.3** [0.0-0.8]
Middle	1100	**52.5** [45.4, 59.6]	**28.5** [22.0-35.0]	**1.1** [0.0, 2.8]	**12.2** [8.4-16.0]	**15.9** [10.7, 21.1]	**0.9** [0.0-2.5]	**0**	**0**	**1.1** [0.0-2.7]
Fourth	997	**49.6** [43.1, 56.1]	**29.0** [23.6-34.4]	**0.6** [0.0, 1.3]	**10.8** [7.6-14.0]	**19.1** [14.5, 23.8]	**0.3** [0.0-0.9]	**0**	**0**	**0.6** [0.0-1.3]
Highest	970	**36.6** [28.4, 44.8]	**22.3** [16.0, 28.7]	**0.5** [0.0, 1.0]	**11.2** [6.0-16.3]	**11.5** [8.2, 14.7]	**0.2** [0.0-0.5]	**0**	**0.0** [0.0-0.1]	**0.3** 0.0-0.9]

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).
4 Differences across groups were not tested statistically
5 When the food brand was unknown or an unbranded product was used, it was not possible to link data to label information.
6 Data is missing for 22 non-pregnant women.

A high proportion of households of the sampled non-pregnant women (92 percent) consumed white maize as their main type of maize. (**Figure 21**).

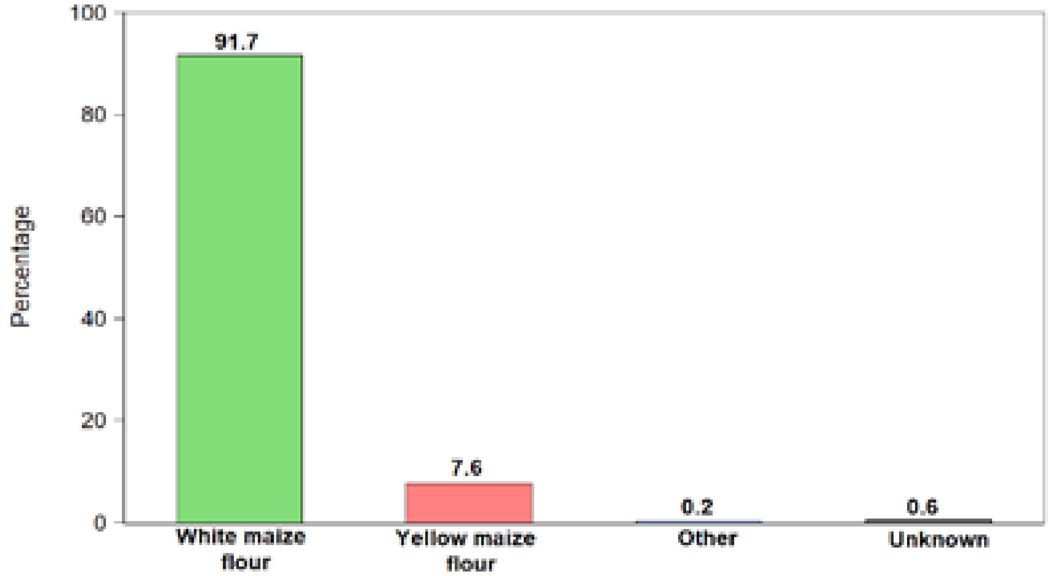


Figure 21. Main type of maize flour used in the household among consumers
Among non-pregnant women (aged 15-49 years) who used the food vehicle in the HH (unweighted sample size for women = 2573)
Data are weighted to account for survey design and non-response.
The type was classified as "unknown" when the respondent could not report the type of food vehicle used in the HH.

As shown in **Figure 22**, very low proportion of households of the sampled non-pregnant women (<2 percent) were able to report the brand of maize flour that they purchased. About 54 percent reported using unbranded maize flour, while 44 percent were unable to report a brand. Maize flour is not commonly produced on large-scale in Nigeria. However, cottage processing, which is unbranded, is widespread. As a result of the lack of information on brands, it will not be possible to link the brand of maize flour to the likely fortification status for almost all the households of the non-pregnant women.

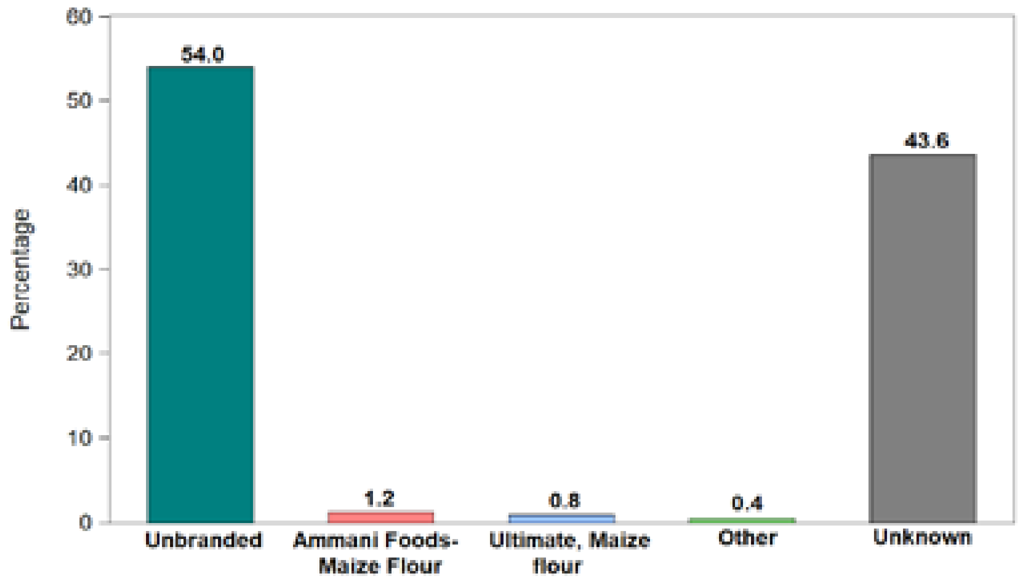


Figure 22. Brand of maize flour obtained the last time among consumers
Among non-pregnant women (aged 15-49 years) among respondents who used the food vehicle in the HH and the food vehicle was not "homemade" (unweighted sample size for women = 1231)
Data are weighted to account for survey design and non-response.
The brand was classified as "unknown" when the respondent could not report the brand of food vehicle used in the HH.

Semolina Flour

Semolina flour is a highly industrialized wheat-based flour in Nigeria, it is commonly prepared as *'swallow'* and consumed with choice soup. 'Swallow' is a commonly used term for common staples (cassava, yam, maize, etc.) cooked into thick 'swallowable' meal, and eaten with choice soup in Nigeria.

Figure 23 presents the coverage indicators for semolina flour nationally among non-pregnant WRA (15-49 years old). The proportion of households of the sampled non-pregnant women that consumed semolina flour in any form at home was 29 percent and those that purchased it was 26 percent. All the same, 23 percent of the households of the sampled individuals consumed semolina flour that was branded, labelled as fortified and fortified (in any amount). Contrarily, the proportion of households of the sampled women of reproductive age that consumed unbranded (<1 percent) and unknown semolina (5 percent) was relatively low. This is likely because all semolina flours are made in factories through an industrialized process on large scale basis with no home- or cottage-level production. Also, they come in 1 or 2 kg-packs that neither needs downsizing nor re-packing, hence there is low percentage of unknown or unbranded products. The few that reported unbranded could be that the respondents did not simply know the brands consumed.

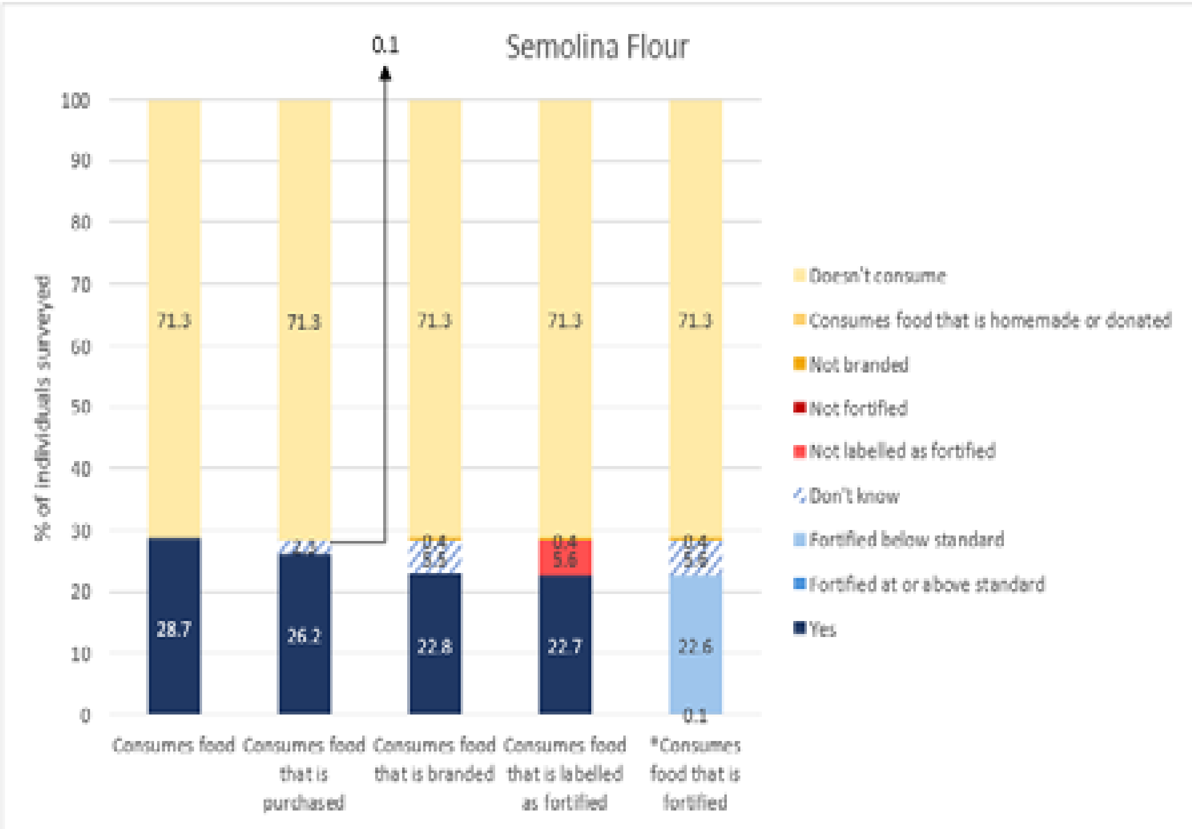


Figure 23. Percentage of Non-Pregnant Women Whose Households Consumed Semolina Flour (purchased, branded, labelled as fortified and fortified) at National Level
Among non-pregnant women (aged 15-49 years) (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response.
Unweighted sample size for all respondents.
Differences across groups were not tested statistically.
Data is missing for 22 non-pregnant women.
*Based on linking reported brand to secondary data from GAIN Market assessment 2021 on fortification status by brand

Furthermore, the similarity in the proportion of households of the sampled women that consumed semolina flour that is branded, labelled as fortified and fortified are indicators that most of the producers of semolina flours that are branded are in fact labelling and fortifying their products.

Across the residence sector, semolina is predominantly an urban dwellers' food as the proportion of households of the sampled non-pregnant women from urban sector that consumed semolina was almost half (49 percent) compared to those from the rural sector, which was12 percent. It is also consumed more in households of the rich (57 percent) than those of the poor (5 percent) (**Table 48**).

Within the zones, the proportion of households of the sampled non-pregnant women that consumed semolina flour was highest (80 percent) in the South West followed by North Central (36 percent), and low in the other zones (10-24 percent). The high percentage in the South West may be because of easy access to the flour in cities, such as Lagos, where semolina meal ('swallow') is readily available in eateries and restaurants. The low coverage in other states could be due to competing 'swallows' prepared from root and tubers (i.e., *fufu* and *gari*).

These results reveal that fortification of semolina is currently reaching 23 percent of households with likely limited potentials to reach more because there are other alternatives to semolina consumption at home. In the north, where the consumption was found low, the common swallow is *Tuwo.* Also, in the south-south and South East, cassava-based swallows like *fufu, Garri* are the most common swallows hence, the people are not likely to consider semolina. In terms of cost and affordability, semolina is more expensive and may not be affordable by all.

Table 48 shows that consumption was found more among the households of the rich and the urban dwellers. Fortification of these alternative swallows (*Tuwo, fufu, garri,* and pounded yam) from other crops may be worth considering, which could come from biofortification of the base crops, especially cassava and maize. These are already in place in Nigeria, but the value chain may need to be strengthened for household reach.

Table 48. Percentage of Non-Pregnant Women Whose Households Consumed Semolina Flour (purchased, branded, labelled as fortified and fortified) by Residence, Zone, and Wealth Quintile

	N[1]	Consumed food[2,3]	Consumed food that is purchased[2,4]	Consume food that is branded[2,4]	Food brand is unknown, or product is unbranded[2,4,5]		Consumed food that is labelled as fortified[2,4]	Consume food that is fortified[2,4]		
					Unknown	Unbranded		At standard	Below standard	Not fortified
		% [95%CI]								
National[3]										
Non-pregnant women aged15- 49 years	5281	**28.7** [25.4, 32.1]	**26.2** [23.2, 29.3]	**22.8** [19.9, 25.7]	**5.5** [4.3, 6.7]	**0.5** [0.2, 0.7]	**22.7** [19.8, 25.6]	**0.1** [0.0, 0.2]	**22.6** [19.7, 25.5]	0
Residence		P<0.001***								
Urban	2156	**48.5** [42.4, 54.6]	**45.2** [39.5, 50.9]	**40.5** [34.8, 46.2]	**7.5** [5.3, 9.6]	**0.5** [0.2, 0.8]	**40.3** [34.6, 46.0]	**0.1** [0.0, 0.2]	**40.2** [34.5, 45.9]	**0**
Rural	3125	**11.5** [8.5, 14.6]	**9.7** [6.9, 12.5]	**7.3** [5.0, 9.6]	**3.7** [2.6, 4.8]	**0.4** [0.1, 0.8]	**7.3** [5.0, 9.6]	**0.1** [0.0, 0.2]	**7.2** [5.0, 9.5]	**0**
Zone		P<0.001***								
North Central	857	**36.4** [28.0, 44.8]	**33.4** [25.0, 41.7]	**26.9** [19.5, 34.3]	**8.0** [4.8, 11.1]	**1.5** [0.3, 2.8]	**26.9** [19.5, 34.3]	**0.1** [0.0, 0.2]	**26.8** [19.5, 34.2]	**0**
North East	830	**17.0** [4.3, 29.7]	**12.7** [3.4, 22.1]	**10.4** [2.3, 18.4]	**6.6** [1.8, 11.5]	**0.0**	**10.4** [2.3, 18.4]	**0**	**10.4** [2.3, 18.4]	**0**
North West	944	**10.3** [5.8, 14.8]	**9.7** [5.4, 14.0]	**8.1** [3.9, 12.3]	**2.0** [0.4, 3.7]	**0.2** [0.0, 0.4]	**7.8** [3.9, 11.8]	**0**	**7.8** [3.9, 11.8]	**0**
South East	855	**23.5** [17.6, 29.4]	**19.2** [13.8, 24.6]	**15.5** [11.6, 19.3]	**7.8** [4.5, 11.1]	**0.2** [0.0, 0.5]	**15.2** [11.4, 19.1]	**1.3** [0.4, 2.3]	**14.1** [10.4, 17.8]	**0**
South South	888	**13.6** [9.2, 18.1]	**10.3** [6.1, 14.4]	**8.5** [4.5, 12.5]	**4.9** [3.3, 6.6]	**0.2** [0.0, 0.5]	**8.5** [4.5, 12.5]	**0**	**8.5** [4.5, 12.5]	**0**
South West	907	**79.5** [71.5, 87.5]	**77.5** [69.3, 85.7]	**71.2** [63.4, 79.1]	**7.4** [4.9, 9.9]	**0.8** [0.1, 1.4]	**71.2** [63.4, 79.1]	**0**	**71.2** [63.3, 79.0]	**0**
Wealth quintile		P<0.001***								
Lowest	1081	**4.7** [2.8, 6.5]	**3.8** [2.1, 5.5]	**2.8** [1.4, 4.2]	**1.8** [0.9, 2.7]	**0.1** [0.0, 0.2]	**2.8** [1.4, 4.2]	**0.0** [0.0, 0.2]	**2.7** [1.4, 4.1]	0
Second	1111	**11.8** [8.4, 15.2]	**10.3** [7.1, 13.5]	**8.1** [5.5, 10.7]	**3.4** [2.1, 4.6]	**0.3** [0.0, 0.6]	**8.1** [5.5, 10.7]	**0** [0.0, 0.1]	**8.1** [5.5, 10.7]	0
Middle	1100	**33.4** [28.8, 37.9]	**31.2** [26.6, 35.7]	**26.0** [21.9, 30.2]	**6.4** [4.5, 8.4]	**0.9** [0.2, 1.5]	**26.0** [21.9, 30.2]	**0.2** [0.0, 0.4]	**25.8** [21.7, 30.0]	0
Fourth	997	**45.7** [40.5, 50.9]	**40.8** [35.6, 46.0]	**36.4** [31.4, 41.3]	**8.6** [5.5, 11.8]	**0.7** [0.0, 1.4]	**36.3** [31.4, 41.2]	**0.1** [0.0, 0.3]	**36.2** [31.3, 41.2]	0
Highest	970	**57.0** [50.9, 63.1]	**53.2** [47.2, 59.3]	**48.3** [41.6, 55.0]	**8.1** [5.1, 11.2]	**0.4** [0.0, 0.9]	**47.8** [41.2, 54.4]	**0.2** [0.0, 0.5]	**47.6** [41.0, 54.2]	0

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).
4 Differences across groups were not tested statistically
5 When the food brand was unknown or an unbranded product was used, it was not possible to link data to label information.
6 Data is missing for 22 non-pregnant women.

The proportion of households of the sampled non-pregnant women that consumed wheat-based type of wheat flour as the main type was over half (65 percent) while wheat-maize based was reported by 27 percent of the women (**Figure 24**). Processing of semolina flour is highly industrialized and there is no cottage-level processing. Thus, there is not much unbranded flour in the market.

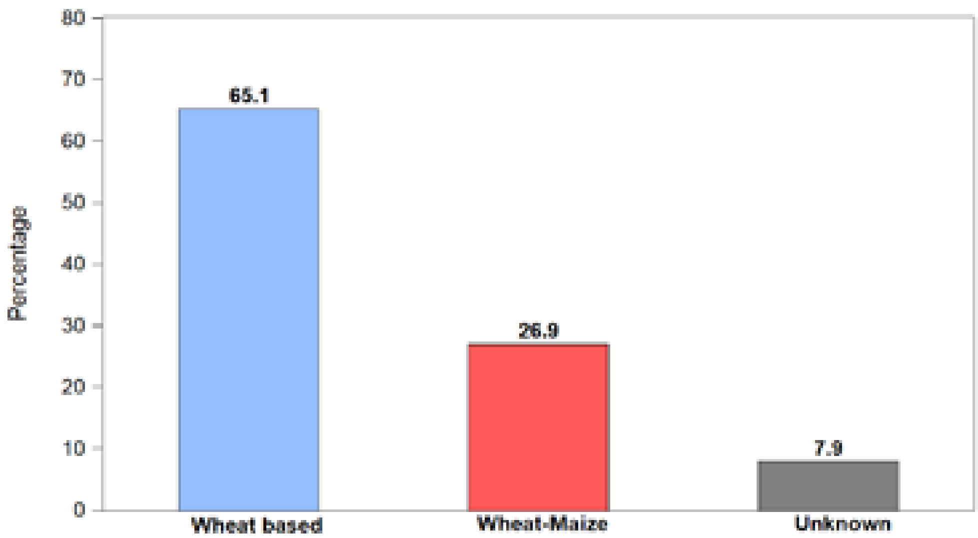


Figure 24. Main type of semolina flour used in the household among consumers
Among non-pregnant women (aged 15-49 years) who used the food vehicle (unweighted sample size for women = 1578)
Data are weighted to account for survey design and non-response
The type was classified as “unknown” when the respondent could not report the type of food vehicle used in the HH.

Over half of the households of the sampled non-pregnant women (55 percent) consumed mainly Golden penny brand of semolina flour (**Figure 25**). This was followed by 13 percent of the women that reported Dangote and Honey well each. Low proportion of households of the sampled non-pregnant women (<1 percent) reported consumption of unbranded semolina. This is likely because semolina flour processing is highly industrialized and packaged in sizes that do not need to be downsized or re-packaged. It gets to the consumers in its original packages with the label.

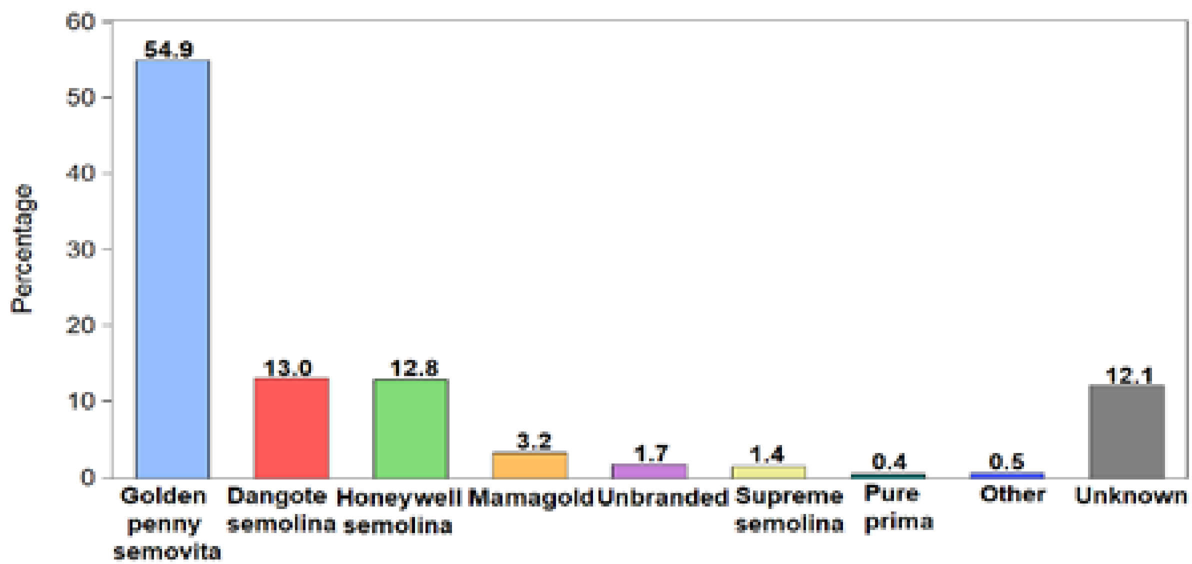


Figure 25. Brand of semolina flour obtained the last time among consumers
Among non-pregnant women (aged 15-49 years) among respondents who used the food vehicle in the HH and the food vehicle was not “homemade” (unweighted sample size for women = 1460)
Data are weighted to account for survey design and non-response
The brand was classified as “unknown” when the respondent could not report the brand of food vehicle used in the HH.

Sugar

Sugar is one of the essential household food items, highly industrialized, and in the list of mandatory fortifiable vehicles in Nigeria.

Figure 26 presents the coverage indicators for sugar nationally among non-pregnant WRA (15-49 years old). There was a high proportion of households of the sampled non-pregnant women that consumed sugar in any form (88 percent) and purchased it (87%). Contrarily, only 22 percent of households of the sampled women consumed sugar that was branded and labelled as fortified while 21 percent fortified (at any level). However, the result for these latter three indicators may be underestimated as over 60% of the women came from households where this information was unknown.

These results reveal that fortification reach with sugar is available for about 22% households of the sampled individuals but has the potential to reach over 80% of households of the sampled individuals if all the consumed sugar brands are known and confirmed fortified. However, while 22 percent of the households of the sampled women consumed branded sugar (and 28% were unknown), 38 percent consumed unbranded sugar and thus their reach with large-scale food fortification could not be assessed.

High percentage of unbranded and unknown brands of sugar is more likely due to re-packaging in local containers and smaller packs that low-income consumers can afford. Sugars are usually branded because they are industrially produced at large scale. However, at the point of sales, brands are unknown due to repackaging without the label. As a result, it is not possible to link the brand of sugar to the fortification status for over 60% of the respondents.

Furthermore, the similarity in the proportion of households of the sampled women that consumed food that is branded, labelled as fortified and fortified are indicators that most of the producers of sugar that are branded are infact labelling and fortifying the products.

Across residence sectors and zones, even though the proportion of households of the sampled women that consumed sugar was found high nationally, the proportion was still higher among urban dwellers compared to rural (92 percent vs. 85 percent) with the same trend found for the proportion of households of the sampled women that consumed sugar that was purchased, branded, labelled as fortified and fortified (**Table 45**). Contrarily, the proportion of households of the sampled women that consumed unknown sugar was higher in rural areas compared to urban (32 percent vs. 23 percent) This may be explained by the fact that rural households are more likely to purchase the down-sized and re-packaged sugar that are cheaper and more affordable.

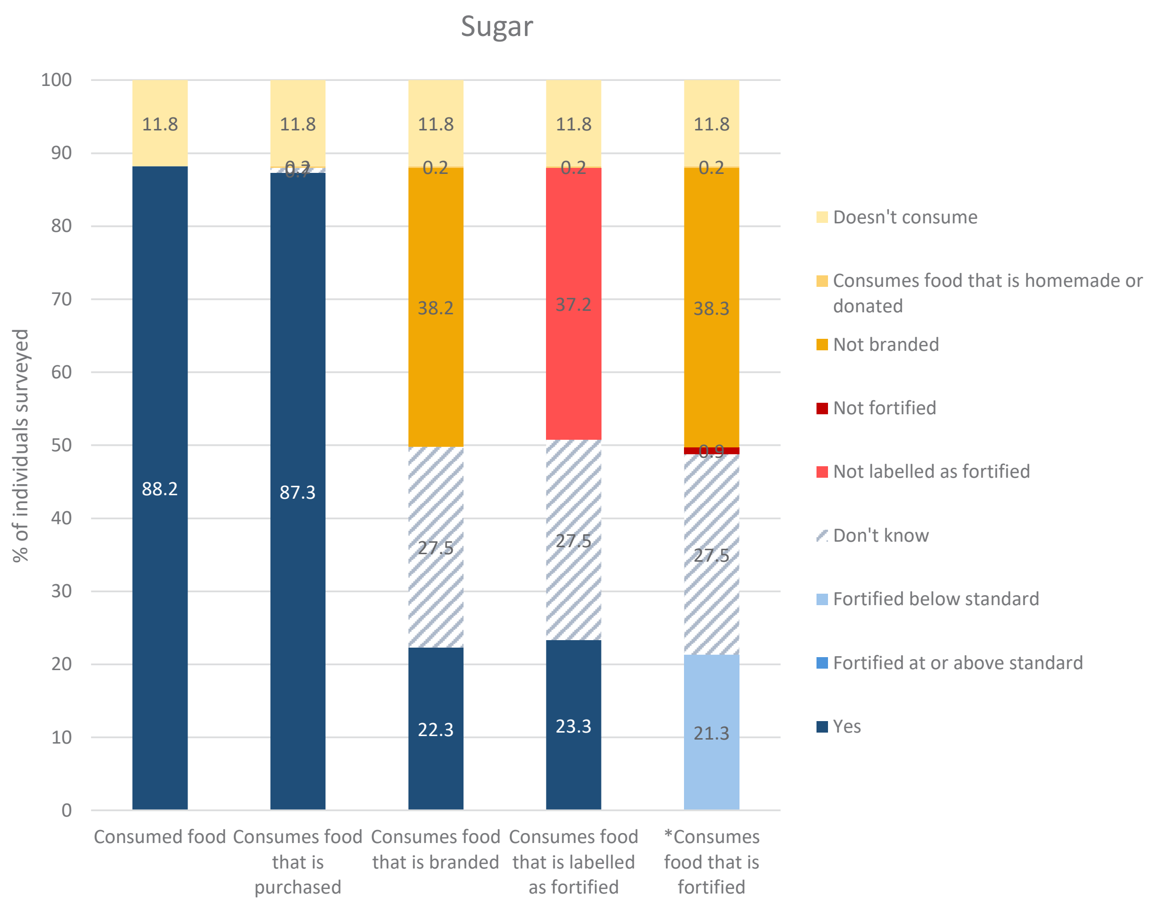


Figure 26. Percentage of Non-Pregnant Women Whose Households Consumed Sugar (purchased, branded, labelled as fortified and fortified) at National Level
Among non-pregnant women (aged 15-49 years) (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response.
Unweighted sample size for all respondents.
Differences across groups were not tested statistically.
Data is missing for 22 non-pregnant women.
*Based on linking reported brand to secondary data from GAIN Market assessment 2021 on fortification status by brand.

Table 49. Percentage of non-Pregnant Women Whose Households Consumed Sugar (purchased, branded, labelled as fortified and fortified) by Residence, Zone, and Wealth Quintile

	N[1]	Consumed food[2, 3]	Consumed food that is purchased[2, 4]	Consume food that is branded[2, 4]	Food brand is unknown, or product is unbranded[2, 4, 5]		Consumed food that is labelled as fortified[2, 4]	Consumed food that is fortified[2, 4]		
					Unknown	Unbranded		At standard	Below standard	Not fortified
		% [95%CI]								
National[3]										
Non-pregnant WRA	5281	88.2 [86.3, 90.2]	87.3 [85.2, 89.3]	22.3 [19.7, 24.9]	27.5 [25.2, 29.7]	38.2 [35.4, 41.1]	22.2 [20.6, 26.0]	0	21.3 [18.7, 23.9]	0.9 [0.5, 1.2]
Residence		P < 0.0001***								
Urban	2156	92.2 [90.3, 94.0]	91.6 [89.7, 93.6]	30.8 [26.9, 34.7]	22.9 [18.9, 26.8]	38.5 [34.3, 42.7]]	30.7 [26.8, 34.6]	0	29.2 [25.2, 33.3]	1.4 [0.8, 2.1]
Rural	3125	84.8 [81.9, 87.8]	83.5 [80.5, 86.5]	14.9 [12.3, 17.5]	31.5 [28.1, 34.9]	38.0 [33.5, 42.6]	14.8 [12.2, 17.4]	0	14.4 [11.9, 17.0]	0.4 [0.1, 0.7]
Zone		P = 0.0008***								
North Central	857	95.8 [93.8, 97.9]	94.9 [92.7, 97.0]	17.2 [10.2, 24.2]	13.4 [9.7, 17.0]	64.7 [56.2, 73.1]	17.9 [10.0, 25.8]	0	17.0 [10.0, 24.0]	0
North East	830	88.0 [83.9, 92.2]	86.3 [82.0, 90.6]	27.0 [20.9, 33.0]	44.8 [39.5, 50.1]	16.1 [11.6, 20.7]	27.0 [20.9, 33.0]	0	26.8 [20.8, 32.8]	0
North West	944	84.0 [78.7, 89.2]	82.4 [76.9, 87.9]	23.1 [16.9, 29.3]	40.9 [36.6, 45.3]	19.6 [16.1, 23.1]	23.1 [16.9, 29.3]	0	23.0 [16.8, 29.2]	0.1 [0.0, 0.4]
South East	855	93.5 [91.5, 95.5]	93.3 [91.3, 95.3]	22.8 [17.0, 28.6]	26.3 [21.4, 31.3]	44.3 [37.1, 51.5]	22.1 [16.7, 27.6]	0	17.9 [13.2, 22.6]	4.4 [2.2, 6.7]
South South	888	90.1 [86.6, 93.6]	90.0 [86.5, 93.5]	19.9 [15.9, 23.9]	24.7 [20.1, 29.3]	45.5 [40.1, 51.0]]	19.9 [15.9, 23.9]	0	18.8 [15.3, 22.3]	1.1 [0.1, 2.1]
South West	907	85.1 [82.0, 88.3]	85.1 [82.0, 88.3]	22.5 [18.1, 27.0]]	2.7 [1.5, 3.9]	59.9 [55.8, 64.0]	22.4 [18.0, 26.8]	0	20.4 [15.8, 25.0]	2.1 [0.7, 3.5]
Wealth quintile[6]		P < 0.001***								
Lowest	1081	78.7 [74.9, 82.5]	77.6 [73.3, 81.9]	12.4 [9.1, 15.7]	40.5 [36.2, 44.8]	25.6 [21.7, 29.5]	12.4 [9.1, 15.7]	0	12.3 [9.0, 15.7]	0.1 [0.0, 0.3]
Second	1111	87.0 [83.3, 90.7]	85.4 [81.5, 89.3]	13.6 [10.6, 16.6]	32.7 [27.2, 38.3]	40.0 [34.1, 45.9]	13.6 [10.6, 16.6]	0	13.6 [10.6, 16.6]	0
Middle	1100	91.9 [89.2, 94.6]	91.1 [88.3, 94.0]	24.9 [20.0, 29.9]	21.8 [18.4, 25.3]	45.1 [39.0, 51.2]	24.8 [19.8, 29.7]	0	23.7 [18.8, 28.6]	1.1 [0.4, 1.8]
Fourth	997	93.8 [91.8, 95.8]	93.0 [90.8, 95.1]	28.0 [24.1, 31.8]	21.7 [18.0, 25.3]	44.1 [39.0, 49.3]	27.8 [23.9, 31.7]	0	26.3 [22.4, 30.2]	1.5 [0.6, 2.4]
Highest	970	91.0 [88.7, 93.4]	90.9 [88.5, 93.2]	36.7 [32.3, 41.1]	17.6 [13.2, 21.9]	36.7 [32.2, 41.3]	36.6 [32.2, 40.9]	0	34.5 [30.1, 39.0]	2.0 [0.7, 3.4]

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).
4 Differences across groups were not tested statistically
5 When the food brand was unknown or an unbranded product was used, it was not possible to link data to label information.
6 Data is missing for 22 non-pregnant women.

A high proportion of households of the sampled non-pregnant women (87 percent) consumed white granulated sugar as their main type of sugar while white cube was reported by 11 percent. (**Figure 27**).

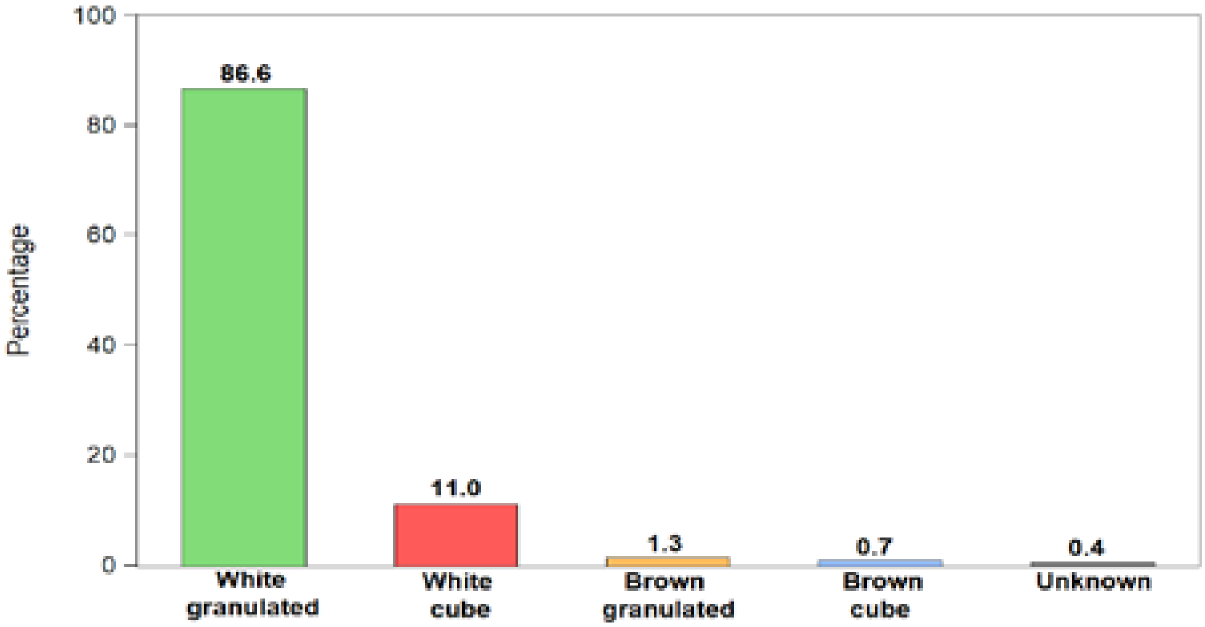


Figure 27. Main type of sugar used in the household among consumers
Among non-pregnant women (aged 15-49 years) who used the food vehicle in the HH (unweighted sample size for women = 4715)
Data are weighted to account for survey design and non-response.
The type was classified as "unknown" when the respondent could not report the type of food vehicle used in the HH.

As shown in **Figure 28,** several brands of sugar are available in Nigeria. However, 20 percent of the households of the sampled women reported consumption of Dangote granulated sugar, as their main brand.

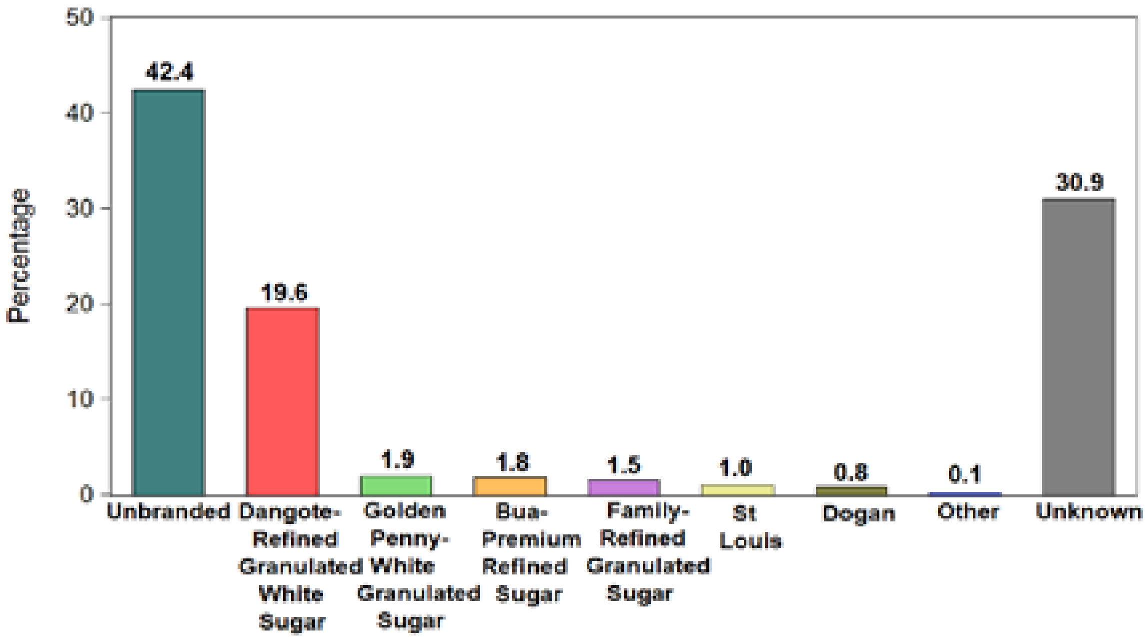


Figure 28. Brand of sugar obtained the last time among consumers
Among non-pregnant women (aged 15-49 years) among respondents who used the food vehicle in the HH and the food vehicle was not "homemade" (unweighted sample size for women = 4696)
Data are weighted to account for survey design and non-response.
The brand was classified as "unknown" when the respondent could not report the brand of food vehicle used in the HH.

Salt

Figure 29 presents the coverage indicators for salt nationally among non-pregnant WRA (15-49 years old). There was a high proportion of households of the sampled non-pregnant women that consumed salt in any form (99%) and purchased it (85%). Contrarily, less than half (47 percent) of the households of the sampled women consumed salt that was branded while 46 percent labelled as fortified and fortified (at any level). However, the result for these latter three indicators may be underestimated as over 50% of the households of the sampled women did not know the information.

These results reveal that fortification reach with salt is available for less than half of households of the sampled women of reproductive age but has the potential to reach over 90% of households if all the consumed salt is known and confirmed fortified. However, while 47 percent of the household of the sampled women of reproductive age that consumed branded salt (and 35% were unknown), 17 percent consumed unbranded salt and thus their reach with large-scale food fortification of salt could not be assessed.

The unknown and unbranded salt could have originated from the practice of downsizing and repackaging in local measures. Salt is usually packed in 50-kg or 25-kg branded bags that are downsized, repacked salt in smaller local measures, which are cheaper and more affordable by low-income households in the rural sector.

Furthermore, the similarity in the proportion of households of the sampled non-pregnant women that consumed food that is branded, labelled as fortified and fortified are indicators that most of the producers of salt that are branded are in fact labelling and fortifying their products.

Across residence sectors and zones, the proportion of households of the sampled non-pregnant women that consumed salt was as high as that found nationally. On the other hand, the proportion of households of the sampled non-pregnant women that consumed branded, labelled as fortified and fortified (at any level) salt was higher in the urban than rural (Table 50). Contrarily, the proportion of households of the sampled non-pregnant women that consumed unknown and unbranded salt was higher in rural areas compared to urban. This may be explained by the fact that this type of salt is often cheaper and therefore may be more affordable in rural areas. Thus, fortification status of over half of the salt consumed could not be assessed.

Salt seems an essential commodity in every HH and an opportunistic vehicle for fortification, which Nigeria taps into in its fortification programme since 1993.

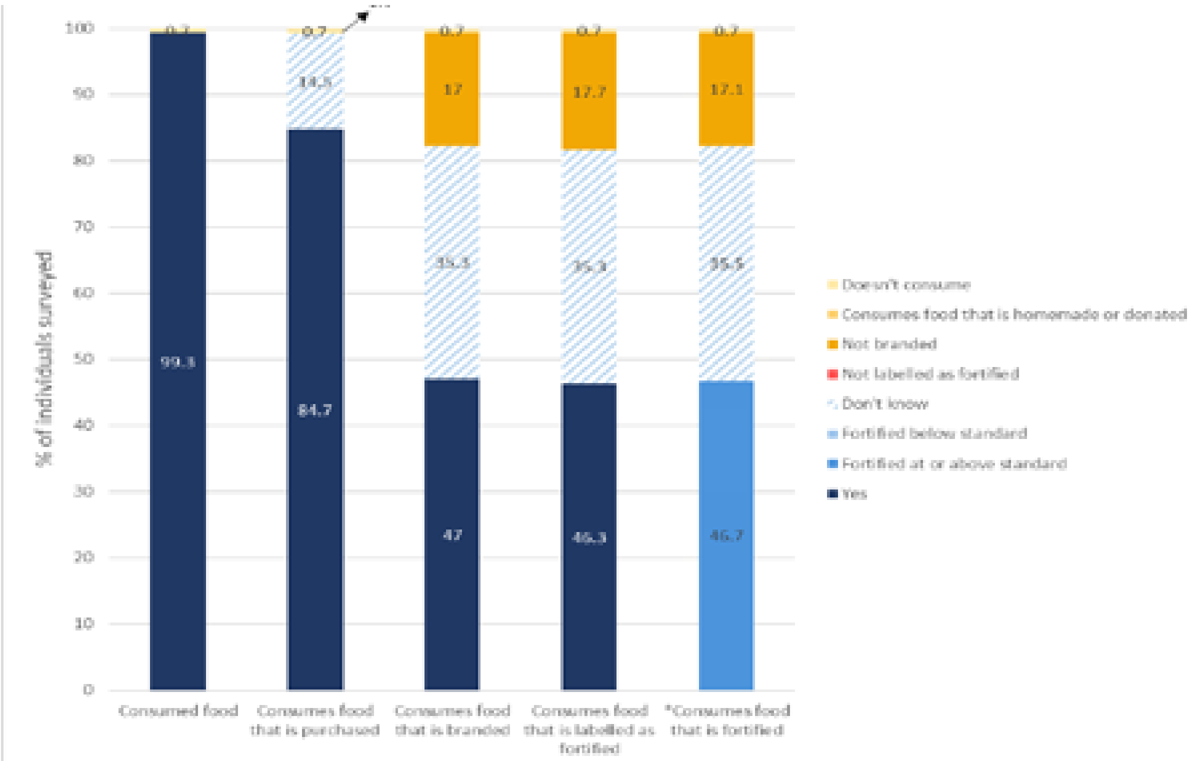


Figure 29. Percentage of Non-Pregnant Women Whose Households Consumed Salt (purchased, branded, labelled as fortified and fortified) at National Level

Among non-pregnant women (15-49 years) (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response.
Unweighted sample size for all respondents
Differences across groups were not tested statistically.
Data is missing for 22 non-pregnant women.
*Based on linking reported brand to secondary data from GAIN Market assessment 2021 on fortification status by brand

Table 50. Percentage of Non-Pregnant Women Whose Households Consumed Salt (purchased, branded, labelled as fortified and fortified) by Residence, Zone, and Wealth Quintile

	N[1]	Consumed food[2, 3]	Consumed food that is purchased[2, 4]	Consumed food that is branded[2, 4]	Food brand is unknown, or product is unbranded[2, 4, 5]		Consumed food that is labelled as fortified[2, 4]	Consumed food that is fortified[2, 4]		
					Unknown	Unbranded		At standard	Below standard	Not fortified
		% [95%CI]								
National[3]										
Non-pregnant women aged 15-49 years	5281	**99.3** [99.0, 99.6]	**84.7** [82.6, 86.7]	**47.0** [43.5, 50.1]	**35.3** [32.1, 38.4]	**17.4** [15.1, 16.7]	**46.3** []42.7, 49.8]	**46.7** [43.2, 50.2]	**0.0** [0.0, 0.0]	**0**
Residence		**P = 0.0175***								
Urban	2156	**98.9** [98.3, 99.5]	**89.6** [87.7, 91.5]	**58.7** [52.3, 65.1]	**25.4** [20.9, 29.9]	**14.8** [11.8, 17.9]	**58.1** [51.8, 64.4]	**58.4** [52.0, 64.8]	**0.0** [0.0, 0.0]	**0**
Rural	3125	**99.7** [99.4, 99.9]	**80.4** [77.3, 83.4]	**36.8** [32.5, 41.1]	**43.9** [39.0, 48.7]	**18.9** [15.8, 22.1]	**36.0** [31.6, 40.3]	**36.5** [32.2, 40.8]	**0**	**0**
Zone										
North Central	857	**99.4** [98.9, 100.0]	**94.3** [92.0, 96.5]	**54.6** [43.6, 65.7]	**17.8** [13.3, 22.3]	**26.9** [18.5, 35.4]	**52.9** [41.8, 64.1]	**54.4** [43.4, 65.4]	**0.0** [0.0, 0.1]	**0**
North East	830	**99.0** [98.1, 100.0]	**83.6** [79.4, 87.9]	**37.5** [29.2, 45.8]	**47.4** [39.8, 54.9]	**14.2** [10.3, 18.1]	**36.2** [27.9, 44.4]	**37.3** [29.0, 45.7]	**0**	**0**
North West	944	**99.0** [98.3, 99.8]	**76.0** [70.8, 81.1]	**20.5** [14.7, 26.3]	**60.6** [53.9, 67.3]	**17.8** [13.8, 21.9]	**20.3** [14.6, 26.1]	**20.3** [14.6, 26.1]	**0**	**0**
South East	855	**99.9** [99.8, 100.0]	**91.9** [89.5, 94.4]	**78.5** [74.2, 82.7]	**15.0** [12.0, 17.9]	**6.5** [3.4, 9.7]	**76.9** [72.0, 81.7]	**76.6** [71.7, 81.5]	**0**	**0**
South South	888	**100.0** [100.0, 100.0]	**89.6** [86.1, 93.1]	**71.4** [64.7, 78.2]	**18.2** [13.3, 23.2]	**10.3** [7.0, 13.7]	**71.2** [64.4, 78.0]	**71.2** [64.4, 78.0]	**0**	**0**
South West	907	**99.2** [98.4, 99.9]	**84.7** [81.4, 88.0]	**61.5** [57.1, 65.8]	**18.2** [14.7, 21.6]	**19.5** [14.7, 24.3]	**61.2** [56.9, 65.6]	**61.4** [57.0, 65.7]	**0**	**0**
Wealth quintile		**P = 0.234**								
Lowest	1081	**99.5** [98.9, 100.0]	**73.2** [69.2, 77.1]	**19.6** [15.4, 23.8]	**61.3** [55.6, 67.1]	**18.5** [14.8, 22.1]	**18.8** [14.7, 22.9]	**19.2** [15.1, 23.4]	**0**	**0**
Second	1111	**99.7** [99.4, 100.0]	**82.5** [78.3, 86.7]	**34.7** [29.1, 40.2]	**43.3** [37.6, 48.9]	**21.7** [17.0, 24.9]	**33.7** [28.1, 39.3]	34.3 [28.8, 39.9]	**0**	**0**
Middle	1100	**99.5** [99.0, 99.9]	**89.7** [86.8, 92.5]	**52.5** [47.0, 58.0]	**26.8** [22.3, 31.4]	**20.1** [15.3, 24.9]	**52.2** [46.7, 57.7]	**52.2** [46.8, 57.7]	**0**	**0**
Fourth	997	**99.4** [98.7, 100.0]	**90.8** [88.4, 93.3]	**62.6** [57.1, 68.1]	**21.3** [17.6, 25.0]	**15.4** [11.8, 19.0]	**61.7** [56.2, 67.2]	**62.4** [56.9, 67.9]	**0**	**0**
Highest	970	**98.5** [97.1, 99.9]	**88.7** [85.8, 91.7]	**72.8** [66.7, 78.8]	**18.5** [13.2, 23.8]	**7.1** [4.4, 9.9]	**72.2** [66.2, 78.2]	**72.4** [66.4, 78.5]	**0.0** [0.0, 0.1]	**0**

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).
4 Differences across groups were not tested statistically
5 When the food brand was unknown or an unbranded product was used, it was not possible to link data to label information.
6 Data is missing for 22 non-pregnant women.

The proportion of households of the sampled non-pregnant women that reported fine table salt as the main type of salt consumed was 66 percent while those whose households consumed coarse cooking salt as their main type of salt was 29 percent. (**Figure 30**).

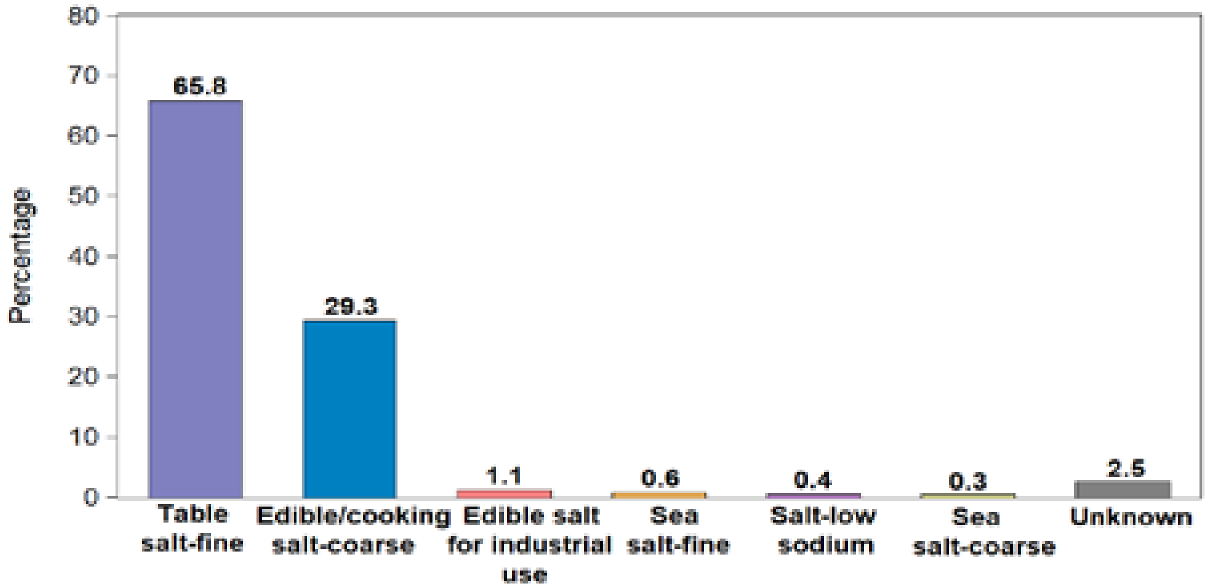


Figure 30. Main types of salt used in the household among consumers
Among non-pregnant women (aged 15-49 years) who used the food vehicle in the HH (unweighted sample size for women = 4715)
Data are weighted to account for survey design and non-response
The type was classified as "unknown" when the respondent could not report the type of food vehicle used in the HH.

The proportion of households of the sampled non-pregnant women that consumed Dangote salt as their main brand of salt was 30 percent and those that consumed Mr. Chef was19 percent (**Figure 31**). However, 20 percent of the households of the sampled non-pregnant women purchased unbranded salt and 25 percent unknown brands. Purchase of unbranded and unknown brands are likely due to re-packaging without label. Also, salt is highly industrialized in production; thus, brands truly exist for them. However, re-packaging denies consumers access to the brand names. As a result of the high use of unbranded and unknown salt, it is not possible to link the brand of salt to the fortification status for almost half of the respondents.

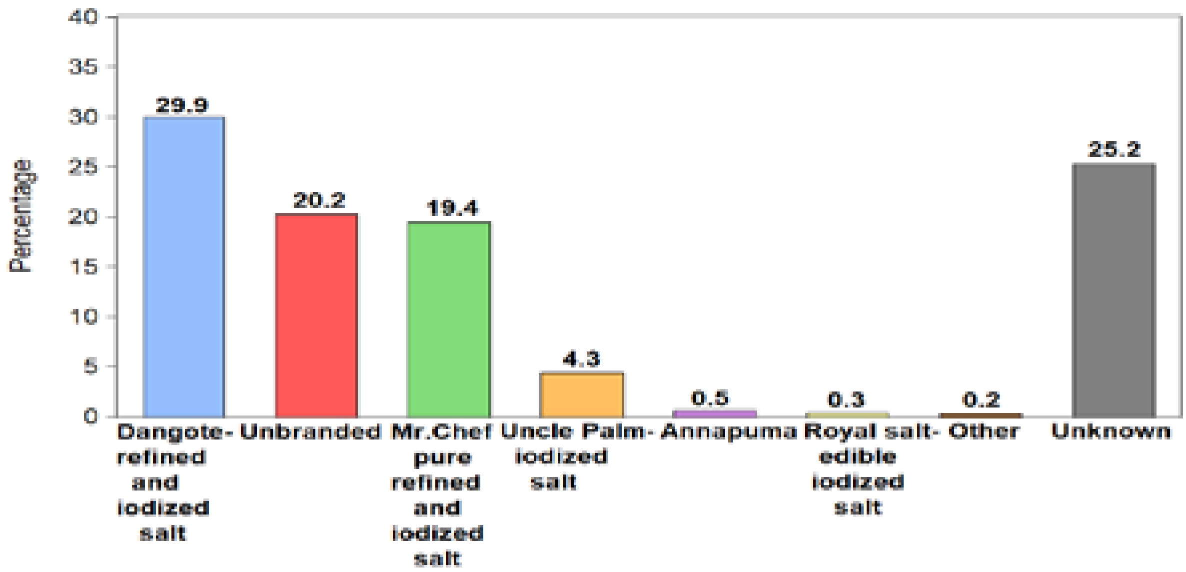


Figure 31. Brands of salt obtained the last time among consumers
Among non-pregnant women (15-49 years) among respondents who used the food vehicle in the HH and the food vehicle was not "homemade" (unweighted sample size for women = 4620)
Data are weighted to account for survey design and non-response.
The brand was classified as "unknown" when the respondent could not report the brand of food vehicle used in the HH.

Bouillon

Bouillons are taste enhancers added to food, to improve their palatability. Commercial bouillons are composed of ingredients such as salt, sugar, flavour enhancers (monosodium glutamate), herbs, spices, pieces of vegetables, dyes and fragrances. (Mejia et al. 2015). Bouillon is primarily used for seasoning soups and stews, and dishes in cube or granular form and commonly used in Nigeria as a flavour enhancer. One of the main ingredients of bouillon is salt, which if iodized, presents a quick reach to households with iodine, a micronutrient of public health significance.

Figure 32 presents the coverage indicators for bouillon nationally among non-pregnant WRA (15-49 years old). There was a high proportion of households of the sampled non-pregnant women that consumed bouillon in any form (98%), purchased it (97%) and consumed branded bouillon (96%). Bouillon processing is industrialized at large scale; thus, there is low percentage of unknown (2%) and unbranded (0%) bouillon products as there is no cottage level production. Additionally, bouillon comes in micro packages that are affordable to all regardless of socio-economic status.

Across residence, zones, and wealth quintile, the proportion of households of the sampled non-pregnant women that consumed bouillon is generally high as 100 percent of the households of the sampled individuals consumed and purchased it. (**Table 51**). The high HH consumption of bouillon could make it a suitable target for fortification in Nigeria. Currently, bouillon is voluntarily fortified by few industries in Nigeria. Despite this, 61 percent of the non-pregnant women from households consumed bouillons that are labelled as fortified with iodine and/or iron.

There is no available secondary data to determine bouillon fortification status as it is currently on voluntary basis in Nigeria.

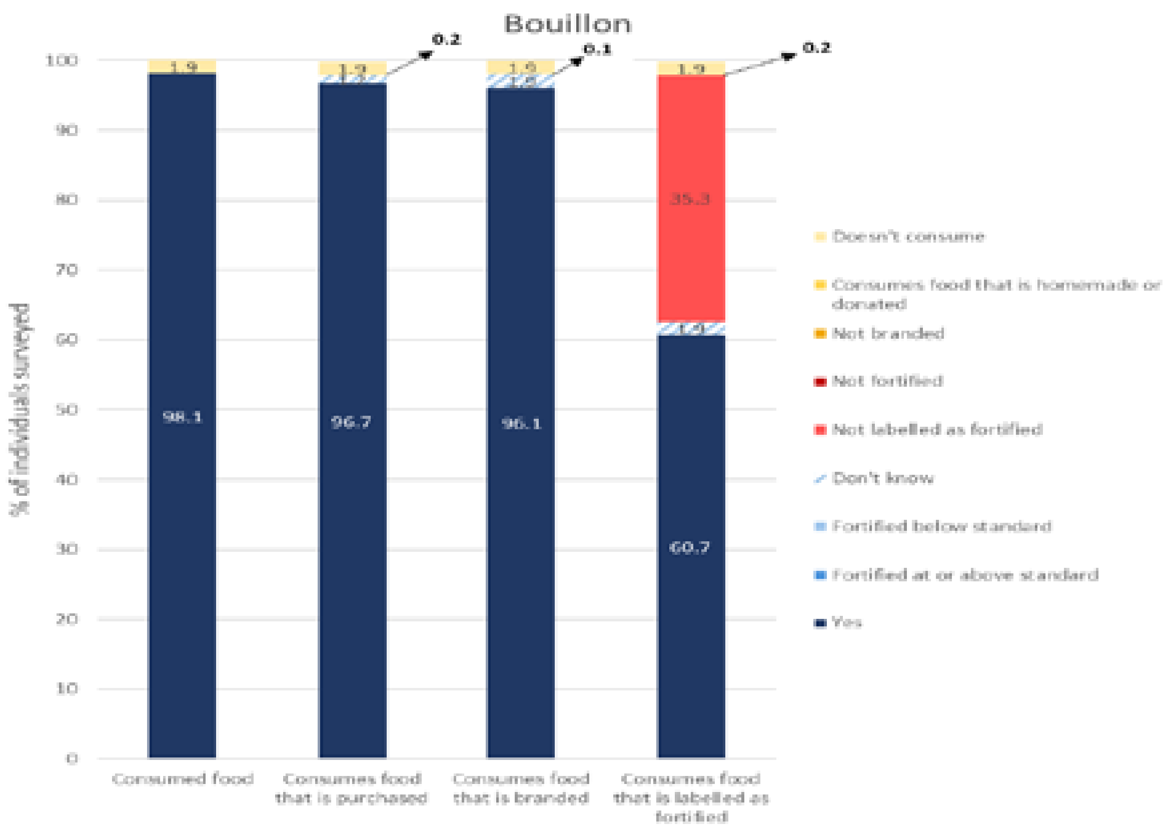


Figure 32. Percentage of Non-Pregnant Women Whose Households Consumed Bouillon (purchased, branded, labelled as fortified and fortified) at National Level

Among non-pregnant women (aged 15-49 years) (unweighted sample size = 5281)
Data are weighted to account for survey design and non-response.
Unweighted sample size for all respondents
Differences across groups were not tested statistically.
Data is missing for 22 non-pregnant women.

Table 51. Percentage of Non-Pregnant Women Whose Households Consumed Bouillon (purchased, branded, and labelled as fortified) by Residence, Zone, and Wealth Quintile

	N[1]	Consumed food[2, 3]	Consumed food that is purchased[2, 4]	Consumed food that is branded[2,4]	Food brand is unknown, or product is unbranded[2, 4]		Consumed food that is labelled as fortified[2, 4]	Consumed food that is fortified
					Unknown	Unbranded		
		% [95%CI]						
National[3]								
Non-pregnant WRA	5281	**98.1** [97.5, 98.8]	**96.7** [95.8, 97.5]	**96.1** [95.2, 97.0]	**1.9** [1.3, 2.4]	**0**	**60.7** [57.2, 64.3]	**No secondary data available**
Residence		P = 0.4351	P=0.431	P=0.186			P=0.0144	
Urban	2156	**98.4** [97.5, 99.3]	**97.3** [96.1, 98.5]	**97.0** [95.8, 98.2]	**1.3** [0.4, 2.21	**0**	**65.8** [61.1, 70.5]	
Rural	3125	**97.9** [96.9, 98.8]	**96.1** [94.9, 97.4]	**95.3** [94.0, 96.6]	**2.4** [1.6, 3.2]	**0**	**56.3** [51.2, 61.5]	
Zone[3]		P=0.0161						
North Central	857	**99.6** [99.1, 100.0]	**99.5** [99.0, 100.0]	**99.1** [98.2, 100.0]	**0.4** [0.0, 1.0]	**0**	**76.9** [71.9, 81.9]	
North East	830	**95.9** [93.5, 98.4]	**95.2** [92.6, 97.8]	**94.7** [92.1, 97.4]	**1.0** [0.2, 1.9]	**0**	**81.9** [77.0, 86.9]	
North West	944	**98.1** [96.7, 99.5]	**94.3** [92.2, 96.4]	**93.8** [91.7, 95.9]	**3.9** [2.3, 5.5]	**0**	49.0 [41.3, 56.7]	
South East	855	**96.8** [94.5, 99.0]	**96.7** [94.4, 99.0]	**96.6** [94.4, 98.9]	**0.1** [0.0, 0.3]	**0**	**77.7** [69.8, 85.5]	
South South	888	**99.8** [99.6, 100.0]	**99.8** [99.6, 100.0]	**99.4** [98.9, 99.9]	**0.4** [0.0, 0.9]	**0**	**64.7** [53.1, 76.2]	
South West	907	**98.2** [97.3, 99.2]	**97.1** [95.8, 98.4]	**95.8** [94.1, 97.4]	**2.4** [1.2, 3.7]	**0**	**34.9** [28.8, 41.1]	
Wealth quintile		P = 0.0441						
Lowest	1081	**96.3** [94.2, 98.4]	**93.9** [91.7, 96.1]	**93.0** [90.7, 95.2]	**2.8** [1.5, 4.2]	**0**	**50.0** [43.3, 56.8]	
Second	1111	**98.1** [96.8, 99.3]	**96.5** [95.0, 98.1]	**96.0** [94.5, 97.6]	**2.0** [1.0, 3.1]	**0**	**57.3** [50.7, 64.0]	
Middle	1100	**99.2** [98.5, 99.8]	**98.3** [97.3, 99.3]	**97.3** [96.0, 98.6]	**1.8** [0.6, 2.9]	**0**	**63.3** [57.4, 69.1]	
Fourth	997	**98.6** [97.8, 99.4]	**97.8** [96.8, 98.9]	**97.5** [96.4, 98.7]	**1.1** [0.2, 1.9]	**0**	**66.0** [61.2, 70.9]	
Highest	970	**98.6** [97.5, 99.7]	**97.0** [94.7, 99.2]	**97.0** [94.8, 99.2]	**1.5** [0.0, 3.6]	**0**	**69.0** [64.1, 74.0]	

1 Unweighted sample size.
2 Data are weighted to account for survey design and non-response.
3 Differences between groups were compared using Chi-square test (*signifies P<0.05, **signifies P<0.01, ***signifies P<0.001).
4 Differences across groups were not tested statistically
5 Data is missing for 22 non-pregnant women.

High proportion of the households of the sampled non-pregnant women (91 percent) consumed cube type of bouillon in their households (**Figure 33**).

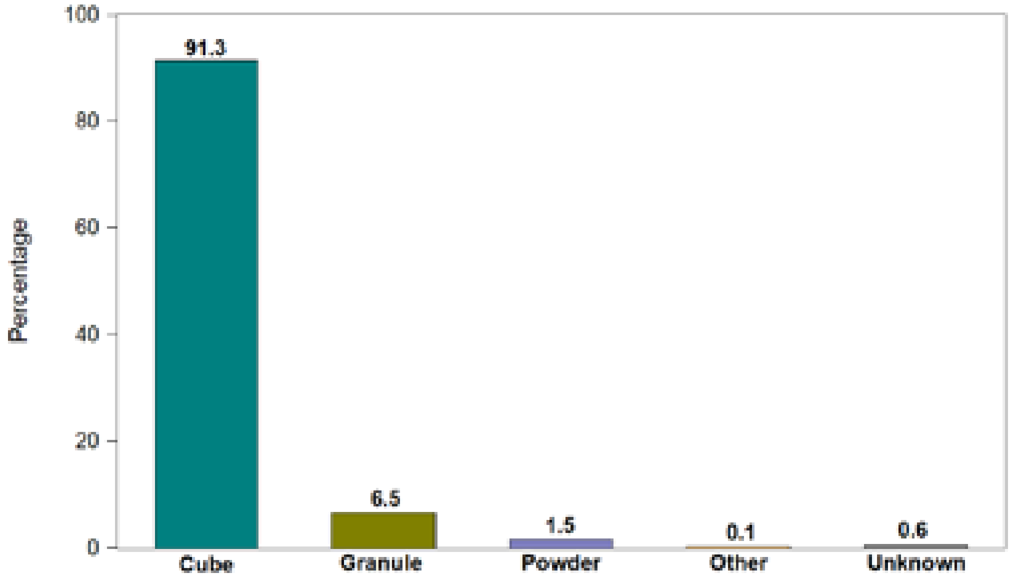


Figure 33. Main types of bouillon used in the household among consumers
Among non-pregnant women (aged 15-49 years) who used the food vehicle in the HH (unweighted sample size for women = 5178)
Data are weighted to account for survey design and non-response.
The type was classified as "unknown" when the respondent could not report the type of food vehicle used in the HH.

More than half (55 percent) of the non-pregnant women stated that their households use Maggi as the main brand of bouillon, followed by Ajinomoto (10 percent), Onga (10 percent), Knorr (8 percent), and Tasty (7 percent) (**Figure 34**). Few women were not able to report the brand of bouillon used in their HHs (<1 percent); thus, unbranded and unknown brands are not an issue in this sector. This is so since they are highly industrialized and available in micro packages that all HHs can afford.

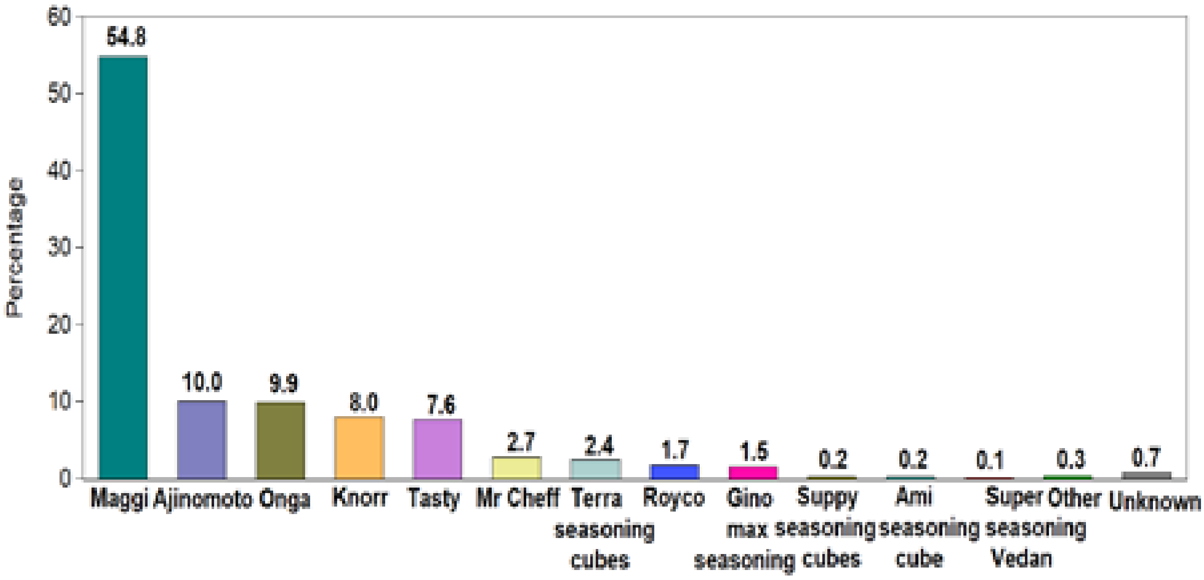


Figure 34. Brand of bouillon obtained the last time among consumers
Among non-pregnant women (aged 15-49 years) among respondents who used the food vehicle in the HHs and the food vehicle was not "homemade" (unweighted sample size for women = 5135)
Data are weighted to account for survey design and non-response.

Overall, based on the available information on the branded vehicles, more HHs consume food vehicles that are fortified below national standard [wheat flour (13 percent); semolina flour (23 percent); and sugar (22 percent) while all the three flours and sugar are zero percent fortified at standard. Salt iodization took a different turn as 47 percent of HHs consumed brands that are iodized at/above national standard.

Fortification Status of the Food Samples Collected from the Respondents' Households

After the data collection, the food samples were processed and analyzed for the parameters shown in **Table 52** to determine the levels of fortification. Salt was analyzed for iodine; vegetable oil and sugar were analyzed for vitamin A; and wheat and semolina flours were analyzed for vitamin A, iron, and zinc.

All food samples produced are at large scale and are expected to be fortified with vitamin A, except salt, according to Nigerian law. Vitamin A supports the immune system and plays an important role in maintaining the epithelial tissue in the body. Severe vitamin A deficiency VAD can cause eye damage and is the leading cause of childhood blindness. VAD also increases the severity of infections, such as measles and diarrhoeal disease, and slows recovery from illness.

In addition to vitamin A fortification, all flours in Nigeria (wheat, semolina, cassava, composite flour) are expected to be fortified with iron and zinc, which are also considered as micronutrients of public health significance. Iron plays an important role in numerous biological systems and iron deficiency is one of the primary causes of anaemia, which has serious health consequences for children (Nigeria: DHS, 2018).

A total of 2031 food samples (salt, sugar, vegetable oil, wheat, and semolina flour) were collected from the homes of sub-sampled non-pregnant WRA at the repeat interview. **Table 52** shows the food samples collected for analysis and parameters analyzed.

Table 52. Food vehicle samples collected and analysed

Food vehicles	*Total collected	Total analysed	Micronutrients analysed
Vegetable oil	338	229	Vitamin A
Sugar	400	273	Vitamin A
Salt	1153	1135	Iodine
Wheat flour	51	38	Vitamin A
		37	Iron
		37	Zinc
Semolina flour	89	81	Vitamin A
		77	Iron
		78	Zinc
Total	2031		

Not all the samples collected were analysed because some quantities were too small for analysis while few missing.

Food sample analysis

All food samples, by parameters, were sent to the selected laboratories in and outside the country after conducting due diligence of the lab in terms of capacity, facility, and accreditation for the analysis of interest. **Annex 7** shows the food samples sent to all the participating laboratories with their quantities and parameters for analysis.

All the food sample results, upon receipt, were compiled by labs, units harmonized, and statistically analyzed using SAS for descriptive values and percentages (Table 54). All results were compared with Nigerian standards (shown below in **Table 53**) to determine levels of fortification, using the following variables:

1. Fortified at or above standard- defined as the proportion of samples whose fortificant content meet the minimum national standard (**Table 53**).
2. Fortified below standard - defined as the proportion of samples whose fortificant content does not meet the minimum national standard (**Table 53**).
3. Not fortified- the fortificant content was too small in quantity to be detected from the analysis. This means the food vehicle was not fortified at all.

Table 53. Minimum National Industrial Requirements (NIS)-Expected Value in the Mandatory Vehicles

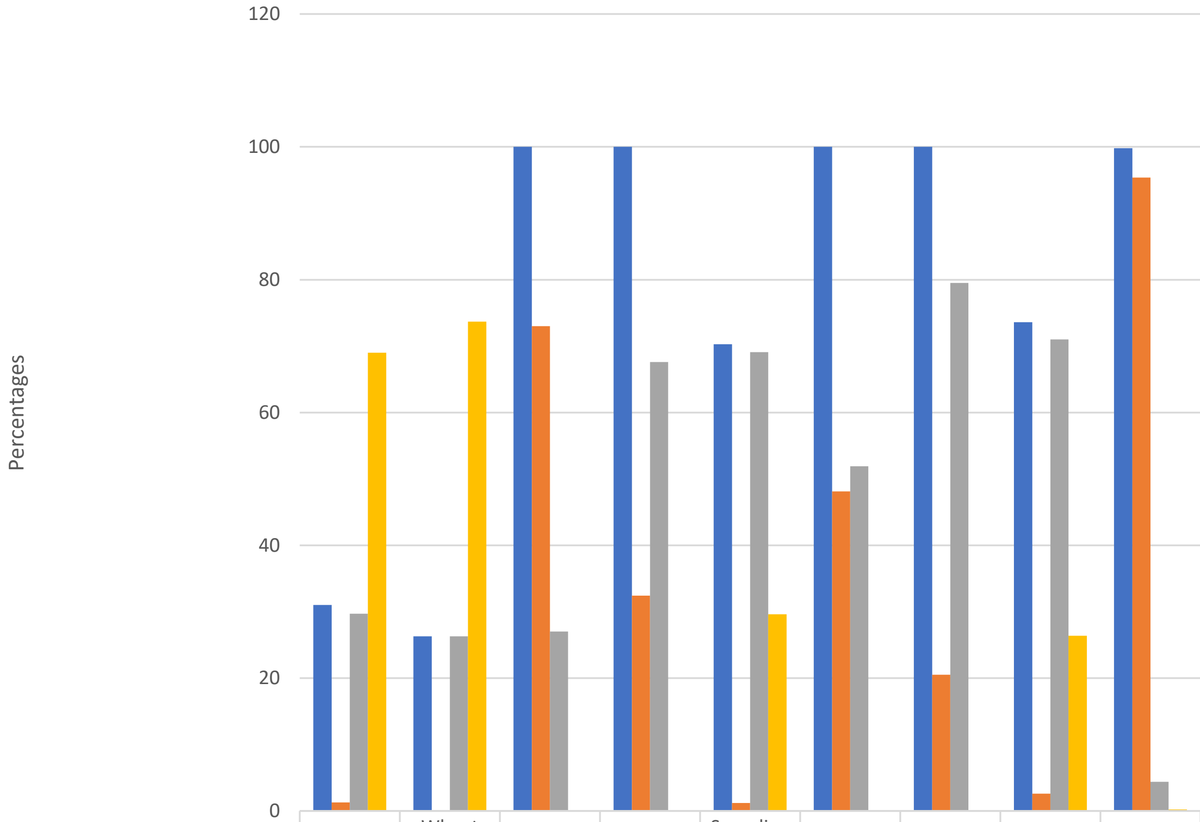
S/N	Food Vehicles	VA (mg retinyl palmitate kg-1))	Iron (mg/kg)	Zinc (mg/kg)	Iodine (mg/Kg)
1	*Wheat flour	2.0	40.0	50.0	
2	*Semolina Wheat flour	2.0	40.0	50.0	
3	*Maize flour	2.0	40.0	50.0	
4	*Whole maize meal	2.0	40.0	50.0	
5	*Composite (Wheat-Cassava) flour	2.0	40.0	50.0	
6	**Vegetable oil	6.0			
7	**Sugar	7.5			
8	Margarine	7.8			
9	***Salt				15ppm

Source: NIS 168 FOOD GRADE (2004)
*Values at all levels-factory, market and HH
**Values for factory level only
***Value for HH level

Fortification status of the food vehicles collected from the households of the selected respondents

Overview of the food sample results

Based on the analysis of food samples that were collected in a sub-sample of households of the sampled non-pregnant WRA and analysed for micronutrient contents, it was revealed that the majority of samples were fortified at any level for vitamin A in sugar (74 percent), iodine in salt (100 percent), iron and zinc in wheat flour (100 percent each) while iron and zinc in semolina flour was also 100 percent (Figure 35). Conversely, about one third was fortified at any level with vitamin A in vegetable oil (31 percent) and vitamin A in wheat flour (26 percent).



	Vegetable oil n= 71	Wheat flour-Vitamin A n= 38	Wheat flour-Iron n=37	Wheat flour-Zinc n=37	Semolina flour-Vitamin A n= 56	Semolina flour-Iron n=77	Semolina flour-Zinc n= 78	Sugar n= 201	Salt n=1133
Fortified at any level	31	26.3	100	100	70.3	100	100	73.6	99.8
Fortified at or above standard	1.3	0	73	32.4	1.2	48.1	20.5	2.6	95.4
Foortified below standard	29.7	26.3	27	67.6	69.1	51.9	79.5	71	4.4
Not fortified	69	73.7	0	0	29.6	0	0	26.4	0.2

Figure 35. Fortification status of food vehicle samples collected from non-pregnant women at the repeat interview

The measured mean amounts of micronutrients (Table 54) in the fortified samples were 2.6 mg/kg vitamin A in vegetable oil, 3.1mg retinyl palmitate/kg vitamin A in sugar, 60 mg/kg iodine in salt, 0.8 mg retinyl palmitate/kg vitamin A, 53.9 mg/kg iron, and 42.2 mg/kg zinc in wheat flour, and 0.8 mg retinyl palmitate/kg vitamin A, 38.6 mg/kg iron, and 36.0 mg/kg zinc in semolina flour.

Table 54. Descriptive statistics of Fortificant contents (at any level) of the Food samples collected from the households of Non-pregnant Women at repeat interview

Food vehicles	Fortificants	N	Mean	Median	SD	Min	Max
Vegetable oil	Vitamin A (mg retinyl palmitate kg-1)	71	2.6	2.4	1.76	0.2	11.3
Wheat flour	Vitamin A (mg retinyl palmitate kg-1)	38	0.8	0.8	0.23	0.4	1.0
Wheat flour	Iron (mg/kg)	37	*53.9	48.9	26.90	19.1	176.0
Wheat flour	Zinc (mg/kg)	37	*42.2	38.9	24.10	4.7	109.4
Semolina flour	Vitamin A (mg retinyl palmitate kg-1)	56	0.8	0.7	0.40	0.2	2.0
Semolina flour	Iron (mg/kg)	77	*38.6	38.1	16.35	8.4	83.2
Semolina flour	Zinc (mg/kg)	78	*36.0	39.4	17.58	2.4	87.0
Sugar	Vitamin A (mg retinyl palmitate kg-1)	201	3.1	2.7	2.20	0.2	13.6
Salt	Iodine (mg/kg)	1133	60.0	53.1	35.02	2.7	251.5

*Intrinsic values inclusive

From the mean contents of the fortificants in the food samples shown in Table 54, all the samples fortified with vitamin A are below the minimum standard. This could be due to losses during food vehicle distribution, from factory to homes, especially during transportation, retail display and handling in open markets, as well as in storage. Vitamin A is photo and thermal sensitive thus the need for further studies on vitamin A retention in the food vehicle value chain to be able to determine where losses lie and fully explore the contribution of large-scale food fortification in the reduction of vitamin A deficiency. However, there is no available minimum standard for the vitamin A in vegetable oil and sugar as household level. This is a limitation in this study as the values used are factory level values. Also, for flours, the iron and zinc values may be over quantified as intrinsic iron and zinc were inclusive. Further study may therefore be necessary to quantify actual fortification levels.

Anthropometry[9]

This chapter[10] reports on the anthropometric status[11, 12, 13] of children (aged 6-59 months), adolescent girls (aged 10-14 years), and Women of Reproductive Age (WRA, aged15-49 years).

Anthropometric measurements are non-invasive, quantitative measurements of the body that provide a valuable assessment of nutrition status in children and adults. Typically, they are used in the pediatric population to evaluate general health status, nutritional adequacy, and growth and developmental pattern. In adults, body measurements can help assess health and dietary status and determine body composition to help determine underlying nutritional status and diagnose obesity.[14] The core measurements of anthropometry in the NFCMS were age, length/height, and weight.

Anthropometry of children (aged 6-59 months)

A key objective of the NFCMS was to assess the prevalence, severity, and distribution of malnutrition in children (aged 6-59 months). In this context, the term malnutrition covers two broad groups of conditions. One is undernutrition, which includes stunting (low length/height-for-age), wasting (low weight-for-length/height), and underweight (low weight-for-age). The other is overweight (weight-for-length/height) and obesity (weight-for-length/height).[15]

Stunting reflects linear growth retardation caused by long-term, insufficient nutrient intake and repeated infections. Wasting results from acute food shortage and illness, causing recent weight loss or failure to gain weight. Underweight is a composite indicator that can indicate wasting, stunting, or both. Thus, it might be challenging to interpret. However, it is still a useful anthropometric indicator to track individual-level changes in growth over time when collected sequentially, such as through a growth monitoring programme.[16] Overweight and its severe form, obesity, are measures of overnutrition, which result from an energy imbalance between calories consumed and calories expended.[17]

In the NFCMS survey, stunting is defined as the percentage of children (aged 6-59 months) with height-for-age Z-score (HAZ) below −2SD (HAZ <−2SD) from the WHO Child Growth Standards median. Severe stunting is defined as the percentage of children with HAZ <−3SD. Wasting is defined as the percentage of children with weight-for-height Z-score (WHZ) <−2SD. Similarly, severe acute malnutrition (SAM) or severe wasting is defined as the percentage of children with WHZ <−3SD. Underweight is defined as the percentage of children with weight-for-age Z-score (WAZ) <−2SD, and severe underweight is defined as the percentage of children with WAZ <−3SD. Overweight is defined as the percentage of children with weight-for-length/height Z-score (WHZ) above 2SD (WHZ > 2SD) from the WHO Child Growth Standards median, and obesity is defined as the percentage of children with WHZ >3SD.[18]

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9 The premise of the NFCMS aligns with the UNICEF conceptual framework of determinants of undernutrition (2013*). Individual nutritional status measured by indicators such as those of anthropometry and micronutrient biomarkers is determined by two immediate factors - high quality diets and optimal health. Three underlying factors influence these: access to sufficient, safe, and nutritious food; adequate care practices for especially women and children; and access to health services including healthy environments, water, and sanitation. Finally, at a basic level, political, economic, and institutional determinants underpin all of these factors.

*UNICEF (United Nations Children's Fund). 2013. Improving Child Nutrition: The Achievable Imperative for Global Progress. New York: UNICEF.

10 For scope of preliminary report for the anthropometry component, see Annex 2.

11 The anthropometry indices were built using the Stata Software (version 14.0) using the command "zanthro". Vidmar, S. I., Cole, T. J., & Pan, H. (2013). Standardizing Anthropometric Measures in Children and Adolescents with Functions for Egen: Update. The Stata Journal: Promoting Communications on Statistics and Stata, 13(2), 366–378. https://doi.org/10.1177/1536867X1301300211

12 See Annex 3 for a summary of the data quality assessment from Anthro Survey Analyzer.

13 See Annex 12 for anthropometry questionnaire – CommCare version.

14 Fryar CD, Gu Q, Ogden CL, Flegal KM. Anthropometric Reference Data for Children and Adults: United States, 2011-2014. Vital Health Stat 3. 2016;(39):1-46.

Following WHO and UNICEF (2019) guidelines,[19] the following implausible values were removed from the analysis: HAZ larger than |6| SD, WHZ larger than |5| SD, and WAZ smaller than -6 and larger than 5 SD. The calculation of WAZ also excluded values of length outside of the ranges 45-110 cm and values of height outside the ranges 65-120 cm. Also, seven height measurements - from children under nine months - were excluded from the analysis.[10]

The prevalence of stunting (33.3 percent), wasting (11.6 percent), underweight (25.3 percent), and being overweight (1.5 percent) in children (6-59 months) is summarized in **Figure 36**. The prevalence of child stunting of 33.3 percent means that one out of every three children (aged 6-59 months) in Nigeria was too short compared to a healthy, well-nourished child of the same age and sex. According to global benchmarks using the 'novel approach,'[10, 20] this level of stunting in children is very high (≥30 percent). The prevalence of wasting or global acute malnutrition of 11.6 percent (children were too thin for their height) is classified as high (10-<15 percent), according to global benchmarks using the 'novel approach.'[10, 11] While the overweight prevalence in children of 1.5 percent is classified as very low (<2.5%) using the 'novel approach.'[10, 11]

Table 55 presents the malnutrition status of children (aged 6-59 months) as measured by anthropometric indices, stratified by age category, sex, residence, zone, wealth quintile, caregiver's education, type of toilet facility, and source of drinking water.

- **Stunting**: There was a statistically significant difference in the *prevalence of stunting in children (6-59 months)* between the age groups ($P < 0.001$), residence ($P < 0.001$), zones ($P < 0.001$), wealth quintile ($P < 0.001$), caregiver's educational attainment ($P < 0.001$) and type of toilet facility ($P < 0.001$). The prevalence of stunting was lowest in the 6-11-months old age category (16.3 percent) and more than double at 39.9 percent in children in the 24-35-months old age category. The prevalence was higher among children residing in rural (39.6 percent) than in urban areas (20.6 percent). The prevalence was highest in the North West zone (47.9 percent). The prevalence of stunting was highest among children in the lowest quintile (49.1 percent) and in children whose caregivers had no educational attainment (47.1 percent). It was lowest in children whose households used improved toilet facilities (15.1 percent).
- **Wasting**: There was a statistically significant difference in the *prevalence of wasting in children (6-59 months)* between the age groups ($P < 0.001$), zones ($P = 0.002$) and source of drinking water ($P = 0.012$). The prevalence of wasting was highest in the 6-11-months old age category (26.1 percent). It was also highest in children in the North East zone (17.2 percent). On the other hand, it was lower in children whose households had improved source of drinking water (10.5 percent) than those with unimproved source (14.6 percent).
- **Underweight**: There was a statistically significant difference in the *prevalence of underweight in children (aged 6-59 months)* between sex ($P = 0.035$), residence ($P < 0.001$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), caregiver's educational attainment ($P < 0.001$), source of drinking water ($P < 0.001$), and type of toilet facility ($P < 0.001$). The prevalence of underweight was higher in males (27 percent) than in females (23.6 percent). It was higher in children residing in rural (29.2 percent) than in urban (17.4 percent) areas. The prevalence of underweight was highest in the North West zone (35.5 percent), in children in the lowest wealth quintile (37.8 percent), and in children whose caregivers had no educational attainment (35.4 percent).

15 World Health Organization (WHO). What is malnutrition? (http://www.who.int/features/qa/malnutrition/en/)

16 https://www.who.int/data/nutrition/nlis/info/malnutrition-in-children

17 https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

18 Sinha RK, Dua R, Bijalwan V, Rohatgi S, Kumar P. Determinants of Stunting, Wasting, and Underweight in Five High-Burden Pockets of Four Indian States. Indian J Community Med. 2018;43(4):279-283. doi:10.4103/ijcm.IJCM_151_18

19 WHO, UNICEF (2019) Recommendations for data collection, analysis, and reporting on anthropometric indicators in children under 5 years old.

20 de Onis M, Borghi E, Arimond M, et al. Prevalence thresholds for wasting, overweight and stunting in children under 5 years. Public Health Nutr. 2019;22(1):175-179. doi:10.1017/S1368980018002434

- The prevalence was higher in children whose households had an unimproved (31.5 percent) versus improved (23.1 percent) source of drinking water. The prevalence was lowest in children whose households had improved toilet facility (14.7 percent).
- **Overweight**: There was no significant variation in the *prevalence of overweight in children (aged 6-59 months)* across the background characteristics.

Table 56 presents the severe malnutrition status of children (aged 6-59 months) stratified by age category, sex, residence, zone, wealth quintile, caregiver's education, type of toilet facility, and source of drinking water.

- **Severe stunting**: The prevalence of severe stunting in children (aged 6-59 months) nationally was 16.7 percent. There was a statistically significant difference in the p*revalence of severe stunting in children (aged 6-59 months)* between the age groups ($P < 0.001$), residence ($P < 0.001$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), caregiver's educational attainment ($P < 0.001$), source of drinking water ($P < 0.001$), and type of toilet facility ($P < 0.001$). The prevalence of severe stunting was lowest in the 6-11-months old age category (6.8 percent). It was higher among children residing in rural (20.8 percent) than in urban (8.4%) areas. It was highest in children in the North West zone (27.3 percent), children in the lowest wealth quintile (29.3 percent), and children whose caregivers had no education (27.9 percent). It was higher in children whose households had unimproved (21.0%) than improved (15.1 percent) source of drinking water. The prevalence of severe stunting was lowest in children whose households have improved toilet facility (6.3 percent).
- **Severe wasting**: Overall, the prevalence of severe wasting in children (aged 6-59 months) was three percent. There was a statistically significant difference in the *prevalence of severe wasting in children (aged 6-59 months)* between the age groups ($P < 0.001$) and zone ($P < 0.001$). The prevalence of severe wasting was highest in the 6-11-months old age category (7.2 percent). It was also highest in children in the North East zone (6.3 percent).
- **Severe underweight**: Overall, the prevalence of severe underweight in children (aged 6-59 months) was 9.2 percent. There was a statistically significant difference in the *prevalence of severe underweight in children (aged 6-58 months)* between the age groups ($P = 0.036$), residence ($P < 0.001$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), caregiver's educational attainment ($P < 0.001$), source of drinking water ($P = 0.005$), and type of toilet facility ($P = 0.002$). The prevalence of severe underweight was highest in the 6-11-months old age category (11.8 percent). It was higher among children residing in rural (11.0 percent) than in urban (5.5 percent) areas. It was highest in children in the North West zone (13.6 percent), children in the lowest wealth quintile (15.4 percent), and children whose caregivers had no educational attainment (15.2 percent). It was higher in children whose households had unimproved source of drinking water (12.2 percent) than those with improved source of drinking water (8.1 percent). The prevalence of severe underweight was lowest in children whose households have improved toilet facility (5.2 percent).
- **Obesity**: Overall, the prevalence of obesity in children (6-59 months old) was 0.6 percent. There was a statistically significant difference in the *prevalence of obesity in children (6-59 months old)* between the zones ($P = 0.019$). The prevalence was highest in the South East zone (1.7 percent).

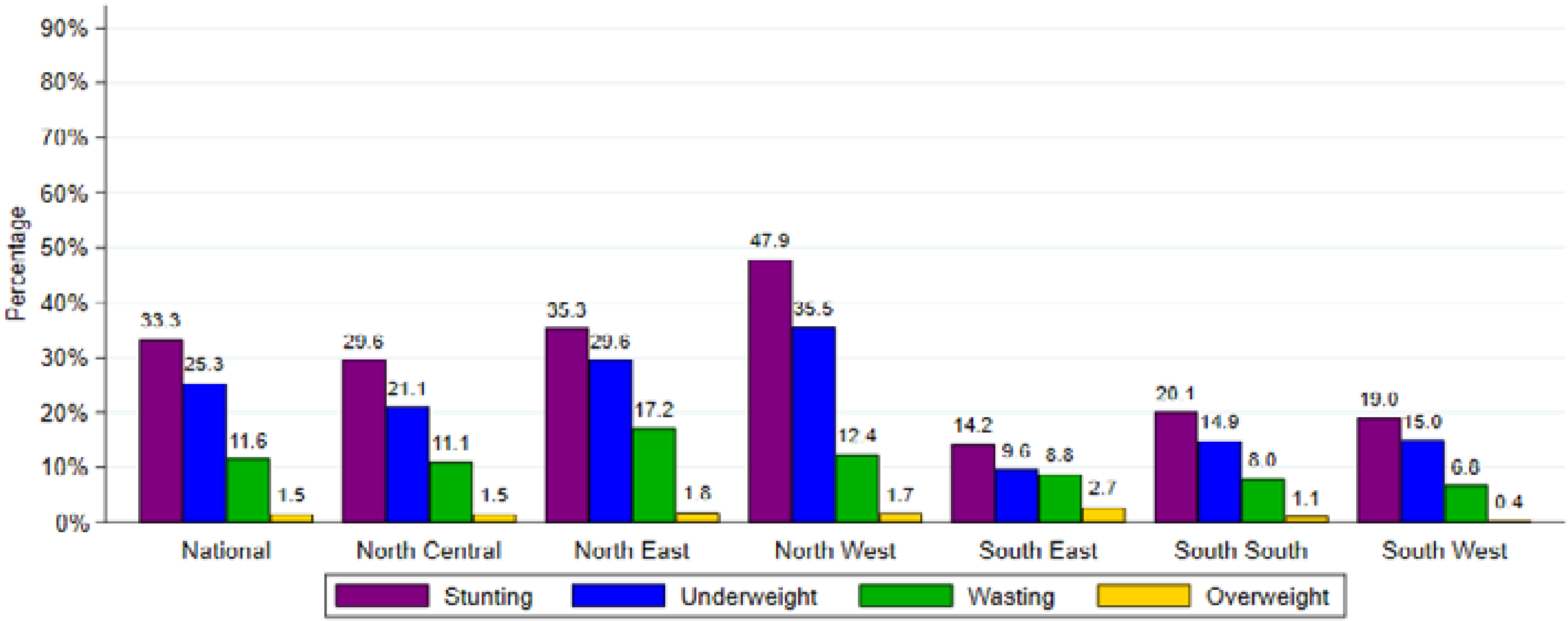

Figure 36. Anthropometric status for children (aged 6-59 months), Nigeria 2021
Number of children (aged 6-59 months) who responded nationally: (n= 4912)
Number of children (aged 6-59 months) who responded by zone: NC (n= 771); NE (n= 883); NW (n= 905); SE (n= 716); SS (n= 833); SW (n= 854)
Using 2006 WHO Child Growth Standards:
Stunting, (low length/height-for-age), is defined as height-for-age Z-score (HAZ) <−2SD
Wasting, (low weight-for length/height), is defined as weight-for-height Z-score (WHZ) <−2SD
Underweight, (low weight-for-age), is defined as weight-for-age Z-score (WAZ) <−2SD
Overweight, (weight-for-length/height), is defined as weight-for-length/height Z-score (WHZ) > 2SD

Table 55. Malnutrition status of children (aged 6-59 months), Nigeria 2021

Background characteristics	Stunting[1]		Wasting[2]		Underweight[3]		Overweight[4]	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* < 0.000***)		(*P* < 0.000***)		(*P* = 0.338)		(*P* = 0.406)
6-11 months	502	16.3 [12.4,21.3]	503	26.1 [20.2,33.1]	517	25.4 [19.7,32.0]	503	1.5 [0.7,3.2]
12-23 months	1132	31.2 [27.2,35.5]	1139	17.5 [14.3,21.4]	1146	26.9 [23.3,30.9]	1139	1.7 [1.0,2.8]
24-35 months	1214	39.9 [35.6,44.3]	1221	10.0 [7.5,13.3]	1221	27.4 [23.8,31.4]	1221	1.7 [0.9,3.0]
36-47 months	1183	36.4 [31.7,41.4]	1180	5.4 [3.7,7.9]	1186	23.5 [20.0,27.5]	1180	1.6 [1.0,2.7]
48-59 months	824	32.7 [27.9,37.9]	820	5.5 [3.8,7.7]	825	22.5 [18.6,27.0]	820	0.6 [0.3,1.5]
Sex		(*P* = 0.418)		(*P* = 0.426)		(*P* = 0.035*)		(*P* = 0.590)
Male	2428	34.2 [30.4,38.2]	2432	12.1 [10.5,13.9]	2456	27.0 [24.4,29.7]	2432	1.4 [0.9,2.1]
Female	2427	32.4 [29.3,35.7]	2431	11 [9.0,13.5]	2439	23.6 [21.1,26.4]	2431	1.6 [1.1,2.4]
Residence		(*P* < 0.000***)		(*P* = 0.998)		(*P* < 0.000***)		(*P* = 0.588)
Urban	1990	20.6 [16.9,24.8]	1997	11.6 [9.1,14.6]	2005	17.4 [14.6,20.5]	1997	1.3 [0.8,2.2]
Rural	2865	39.6 [36.3,42.9]	2866	11.6 [9.8,13.6]	2890	29.2 [26.6,32.0]	2866	1.6 [1.1,2.2]
Zone		(*P* < 0.000***)		(*P* = 0.002**)		(*P* < 0.000***)		(*P* = 0.125)
North Central	761	29.6 [22.9,37.3]	765	11.1 [6.5,18.3]	768	21.1 [14.8,29.2]	765	1.5 [0.8,2.7]
North East	818	35.3 [27.6,43.8]	818	17.2 [14.0,20.9]	829	29.6 [24.4,35.3]	818	1.8 [1.0,3.2]
North West	892	47.9 [42.7,53.1]	890	12.4 [10.0,15.2]	899	35.5 [31.6,39.6]	890	1.7 [1.0,3.0]
South East	705	14.2 [11.4,17.7]	709	8.8 [6.7,11.3]	714	9.6 [7.5,12.4]	709	2.7 [1.3,5.7]
South South	826	20.1 [16.2,24.6]	827	8.0 [5.8,10.8]	831	14.9 [12.1,18.2]	827	1.1 [0.5,2.3]
South West	853	19.0 [15.7,22.7]	854	6.8 [5.0,9.1]	854	15.0 [12.8,17.5]	854	0.4 [0.1,1.1]
Wealth quintile[5]		(*P* < 0.000***)		(*P* = 0.373)		(*P* < 0.000***)		(*P* = 0.329)
Lowest	1041	49.1 [44.3,53.9]	1031	13.2 [10.5,16.5]	1043	37.8 [33.1,42.7]	1031	2.1 [1.3,3.4]
Second	1001	41.0 [36.9,45.2]	1008	10.4 [8.2,13.2]	1016	28.8 [24.8,33.1]	1008	1.6 [0.9,2.6]
Middle	957	27.9 [23.9,32.2]	966	10.6 [8.0,14.0]	972	18.9 [15.2,23.2]	966	1.0 [0.5,2.0]
Fourth	955	21.6 [18.3,25.2]	957	10.5 [8.0,13.7]	960	18.2 [15.6,21.0]	957	1.1 [0.5,2.2]
Highest	880	11.8 [9.2,15.1]	880	13.3 [9.7,18.0]	883	13.4 [10.8,16.6]	880	1.4 [0.8,2.6]
Caregiver's educational attainment[5]		(*P* < 0.000***)		(*P* = 0.217)		(*P* < 0.000***)		(*P* = 0.393)
None	1296	47.1 [43.3,51.0]	1295	13.4 [11.1,15.9]	1306	35.4 [31.9,39.1]	1295	1.6 [1.0,2.6]
Primary	757	28.9 [24.7,33.5]	756	12.7 [8.9,17.9]	763	21.6 [17.4,26.5]	756	1.3 [0.6,2.7]
Secondary	1984	20.5 [17.6,23.8]	1992	10.3 [8.4,12.7]	1997	16.5 [13.7,19.7]	1992	0.9 [0.5,1.6]
Tertiary	512	14.8 [11.2,19.2]	516	9.4 [5.7,15.3]	518	14.3 [10.9,18.5]	516	1.6 [0.7,3.2]
Source of drinking water[5]		(*P* = 0.513)		(*P* = 0.012*)		(*P* < 0.000***)		(*P* = 0.735)
Improved	3613	32.9 [30.0,36.1]	3618	10.5 [8.9,12.3]	3636	23.1 [20.8,25.6]	3618	1.5 [1.1,2.1]
Unimproved	1222	34.7 [30.0,39.7]	1225	14.6 [11.7,18.0]	1239	31.5 [27.7,35.5]	1225	1.4 [0.8,2.4]
Type of toilet facility[5]		(*P* < 0.000***)		(*P* = 0.242)		(*P* < 0.000***)		(*P* = 0.973)
Improved facility	1481	15.1 [12.7,17.8]	1480	11.5 [8.1,16.1]	1488	14.7 [12.2,17.5]	1480	1.4 [0.8,2.4]
Unimproved facility	2098	40.5 [36.8,44.4]	2111	12.6 [10.9,14.5]	2123	30.6 [27.8,33.5]	2111	1.5 [1.0,2.4]
Open defecation	1256	36.5 [32.2,41.0]	1252	9.3 [7.3,11.7]	1264	24.6 [19.9,29.9]	1252	1.4 [0.9,2.3]
National	**4855[6]**	**33.3 [30.6,36.2]**	**4863[7]**	**11.6 [10.1,13.2]**	**4895[8]**	**25.3 [23.2,27.5]**	**4863[9]**	**1.5 [1.1,2.0]**

Table 55. Malnutrition status of children (aged 6-59 months), Nigeria 2021 (continued)

Using 2006 WHO Child Growth Standards:

[1]Stunting, (low length/height-for-age), is defined as height-for-age Z-score (HAZ) <−2SD

[2]Wasting, (low weight-for-length/height), is defined as weight-for-height Z-score (WHZ) <−2SD

[3]Underweight, (low weight-for-age), is defined as weight-for-age Z-score (WAZ) <−2SD

[4]Overweight, (weight-for-length/height), is defined as weight-for-length/height Z-score (WHZ) > 2SD

Data are weighted to account for survey design and non-response

N, number of respondents in the sub-group (unweighted)

CI, Confidence Interval

Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).

Number of children 6-59 months who responded nationally: (n= 4912).

Number of children 6-59 months who responded by zone: NC (n= 771); NE (n= 833); NW (n= 905); SE (n= 716); SS (n= 833); SW (n= 854)

[5]Less than (n = 4912) due to relatively fewer respondents for the household and dietary intake questionnaires

[6]Less than (n = 4912) due to missing data in implausible values or incomplete data

[7]Less than (n = 4912) due to missing data in implausible values or incomplete data

[8]Less than (n = 4912) due to missing data in implausible values or incomplete data

[9]Less than (n = 4912) due to missing data in implausible values or incomplete data

Table 56. Severe malnutrition status of children (aged 6-59 months), Nigeria 2021

Background characteristics	Severe Stunting[1]		Severe Wasting[2]		Severe Underweight[3]		Obesity[4]	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* < 0.000***)		(*P* < 0.000***)		(*P* = 0.036*)		(*P* = 0.572)
6-11 months	502	6.8 [4.2,10.8]	503	7.2 [3.7,13.9]	517	11.8 [8.1,17.0]	503	0.9 [0.4,2.2]
12-23 months	1132	14.0 [11.4,17.2]	1139	4.7 [3.4,6.7]	1146	9.8 [7.5,12.7]	1139	0.7 [0.4,1.5]
24-35 months	1214	20.6 [16.6,25.3]	1221	3.3 [2.1,5.2]	1221	11.0 [8.7,13.9]	1221	0.7 [0.2,2.1]
36-47 months	1183	19.7 [16.3,23.6]	1180	1.0 [0.5,1.9]	1186	6.3 [4.7,8.5]	1180	0.3 [0.1,0.9]
48-59 months	824	16.4 [13.0,20.4]	820	0.5 [0.2,1.6]	825	8.0 [5.7,11.1]	820	0.4 [0.1,1.3]
Sex		(*P* = 0.578)		(*P* = 0.719)		(*P* = 0.787)		(*P* = 0.511)
Male	2428	17.1 [14.7,19.9]	2432	3.2 [2.3,4.4]	2456	9.3 [7.8,11.2]	2432	0.6 [0.3,1.3]
Female	2427	16.2 [13.6,19.2]	2431	2.9 [1.9,4.3]	2439	9.0 [7.4,10.9]	2431	0.5 [0.3,0.9]
Residence		(*P* < 0.000***)		(*P* = 0.469)		(*P* < 0.000***)		(*P* = 0.776)
Urban	1990	8.4 [6.4,10.9]	1997	3.4 [2.2,5.3]	2005	5.5 [4.1,7.3]	1997	0.6 [0.3,1.3]
Rural	2865	20.8 [18.0,23.8]	2866	2.8 [2.0,3.9]	2890	11.0 [9.4,12.8]	2866	0.5 [0.3,1.1]
Zone		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)		(*P* = 0.019*)
North Central	761	14.4 [9.8,20.7]	765	4.0 [2.1,7.3]	768	8.4 [5.4,12.9]	765	0.3 [0.1,0.9]
North East	818	18.0 [13.4,23.7]	818	6.3 [4.4,8.8]	829	11.9 [9.1,15.5]	818	0.7 [0.3,1.7]
North West	892	27.3 [22.5,32.7]	890	2.2 [1.3,3.7]	899	13.6 [11.1,16.5]	890	0.8 [0.3,1.9]
South East	705	5.4 [3.7,7.8]	709	1.7 [1.0,3.1]	714	2.5 [1.4,4.2]	709	1.7 [0.9,3.5]
South South	826	6.5 [4.2,9.8]	827	1.8 [1.0,3.2]	831	4.5 [2.8,7.0]	827	0.1 [0.0,0.6]
South West	853	5.3 [3.8,7.5]	854	1.2 [0.6,2.3]	854	2.4 [1.5,4.0]	854	0.1 [0.0,0.7]
Wealth quintile[5]		(*P* < 0.000***)		(*P* = 0.740)		(*P* < 0.000***)		(*P* = 0.611)
Lowest	1041	29.3 [25.3,33.7]	1031	3.3 [2.2,4.7]	1043	15.4 [12.5,18.8]	1031	0.8 [0.3,2.0]
Second	1001	20.1 [16.7,24.0]	1008	2.8 [1.6,4.9]	1016	10.4 [8.1,13.2]	1008	0.3 [0.1,1.0]
Middle	957	12.5 [9.7,16.1]	966	3.4 [1.7,6.4]	972	7.4 [5.4,10.1]	966	0.5 [0.2,1.4]
Fourth	955	7.8 [5.8,10.5]	957	2.2 [1.2,3.8]	960	3.8 [2.5,5.8]	957	0.5 [0.2,1.3]
Highest	880	3.3 [1.7,6.1]	880	3.7 [2.2,6.2]	883	4.5 [2.8,7.1]	880	0.8 [0.4,1.8]
Caregiver's educational attainment[5]		(*P* < 0.000***)		(*P* = 0.086)		(*P* < 0.000***)		(*P* = 0.608)
None	1296	27.9 [24.5,31.6]	1295	4.0 [2.8,5.6]	1306	15.2 [12.6,18.1]	1295	0.5 [0.2,1.1]
Primary	757	13.9 [10.9,17.5]	756	4.2 [2.1,8.1]	763	7.5 [5.0,11.1]	756	0.2 [0.0,0.8]
Secondary	1984	7.1 [5.3,9.4]	1992	1.8 [1.1,3.0]	1997	3.7 [2.6,5.1]	1992	0.4 [0.2,0.9]
Tertiary	512	5.5 [3.0,9.8]	516	3.8 [2.0,7.4]	518	3.5 [1.8,6.8]	516	0.3 [0.1,1.1]
Source of drinking water[5]		(*P* = 0.003**)		(*P* = 0.169)		(*P* = 0.005**)		(*P* = 0.937)
Improved	3613	15.1 [13.0,17.6]	3618	2.7 [1.9,3.8]	3636	8.1 [6.9,9.5]	3618	0.6 [0.3,1.0]
Unimproved	1222	21.0 [17.5,25.0]	1225	3.9 [2.6,5.7]	1239	12.2 [9.6,15.3]	1225	0.6 [0.2,1.4]
Type of toilet facility[5]		(*P* < 0.000***)		(*P* = 0.362)		(*P* = 0.002**)		(*P* = 0.536)
Improved facility	1481	6.3 [4.8,8.3]	1480	3.6 [1.9,6.6]	1488	5.2 [3.4,7.7]	1480	0.8 [0.4,1.4]
Unimproved facility	2098	20.9 [17.8,24.3]	2111	3.2 [2.3,4.4]	2123	11.1 [9.5,13.0]	2111	0.6 [0.3,1.3]
Open defecation	1256	18.1 [14.6,22.3]	1252	2.0 [1.3,3.2]	1264	9.0 [6.6,12.2]	1252	0.4 [0.2,0.9]
National	**4855[6]**	**16.7 [14.6,19.0]**	**4863[6]**	**3.0 [2.3,3.9]**	**4895[6]**	**9.2 [8.0,10.5]**	**4863[6]**	**0.6 [0.3,0.9]**

Table 56. Severe malnutrition status of children (aged 6-59 months), Nigeria 2021 (continued)

Using 2006 WHO Child Growth Standards:

[1]Severe stunting, (low length/height-for-age), is defined as height-for-age Z-score (HAZ) <−3SD

[2]Severe wasting (low weight-for-length/height) is defined as weight-for-height Z-score (WHZ) <−3SD

[3]Severe underweight, (low weight-for-age), is defined as weight-for-age Z-score (WAZ) <−3SD

[4]Obesity, (weight-for-length/height), is defined as weight-for-length/height Z-score (WHZ) > 3SD

Data are weighted to account for survey design and non-response

N, number of respondents in the sub-group (unweighted)

CI, Confidence Interval

Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).

Number of children 6-59 months who responded nationally: (n= 4912).

Number of children 6-59 months who responded by zone: NC (n= 771); NE (n= 833); NW (n= 905); SE (n= 716); SS (n= 833); SW (n= 854)

[5]Less than (n = 4912) due to relatively fewer respondents for the household and dietary intake questionnaires

[6]Less than (n = 4912) due to missing data in implausible values or incomplete data

Anthropometry of adolescent girls (aged 10-14 years)

Adolescent growth and nutrition have been largely overlooked in national studies on food consumption and nutrition status. The NFCMS Is a landmark study in establishing the nutrition status of adolescent girls in Nigeria.

BMI-for-age z-scores and height-for-age z-scores were calculated using the respondents' height, weight, and age. Stunting or short stature among adolescent girls (10-14 years) is defined as height-for-age Z-score (HAZ) <−2SD. Underweight/thinness among adolescent girls (10-14 years) is defined as a BMI-for-age Z-scores (BAZ) <-2SD. Normal weight among adolescent girls (10-14 years) is defined as (-2SD≤BAZ≤1). Overweight among adolescent girls (10-14 years) is defined as 1SD<BAZ≤2SD. Obesity among adolescent girls is defined as BAZ>2SD. According to recommended practice,[21,22] BMI-for-age Z-scores outside |5| SD and BMI values <12 and >50 was considered implausible and excluded from the analysis.

The prevalence of thinness, normal weight, overweight, and obesity among adolescent girls (10-14 years) is summarized in **Figure 37**. At the national level, the prevalence of adolescent girls with normal weight was 80.7 percent; that is, most adolescent girls in Nigeria had an expected body weight compared to a healthy adolescent girl of the same age. The prevalence of adolescent girls with thinness was 15.1 percent, overweight was 3.1 percent, and obesity was 1.1 percent.

Table 57 presents the prevalence of stunting, thinness, normal weight, overweight, and obesity among adolescent girls (aged 10-14 years) stratified by age, residence, wealth quintile, type of toilet facility, and source of drinking water.

- **Stunting**: The prevalence of stunting among adolescent girls (aged 10-14 years) was 21.3 percent. There was a statistically significant difference in the *prevalence of stunting among adolescent girls (10-14 years old)* between residence (P = 0.004), wealth quintiles (P = 0.009), and toilet facility (P < 0.001). The prevalence of stunting was higher among adolescent girls residing in rural (25.2 percent) than in urban areas (14.5 percent). It was highest in adolescent girls in the lowest wealth quintile (30.8 percent) and lowest in adolescent girls in households with improved toilet facility (9.5 percent).
- **Thinness**: There was a statistically significant difference in the *prevalence of thinness in adolescent girls* between the zones (P = 0.046), with the highest prevalence among adolescent girls in the North West zone (20.6 percent).
- **Normal weight**: There was no significant variation in the prevalence of normal weight in adolescent girls (10-14 years old) across the background characteristics.
- **Overweight**: There was a statistically significant difference in the *prevalence of overweight among adolescent girls (aged 10-14 years old)* between the wealth quintile (P = 0.005) and toilet facility (P < 0.001). The prevalence of overweight was highest among adolescent girls in the highest wealth quintile (4.1 percent) and adolescent girls in households with improved toilet facility (6.3 percent).
- **Obesity**: There was a statistically significant difference in the *prevalence of obesity in adolescent girls* with toilet facility (P = 0.034). The prevalence was highest among adolescent girls in households with improved toilet facility (2.5 percent).

[21] de Onis, M., A. W. Onyango, E. Borghi, A. Siyam, C. Nishida, and J. Siekmann. 2007. "Development of a WHO Growth Reference for School-Aged Children and Adolescents." Bulletin of the World Health Organization 85 (9): 660-7.
[22] Pullum, Thomas W. 2008. An Assessment of the Quality of Data on Health and Nutrition in the DHS Surveys, 1993-2003. Methodological Reports No. 6. Calverton, Maryland, USA: Macro International Inc.

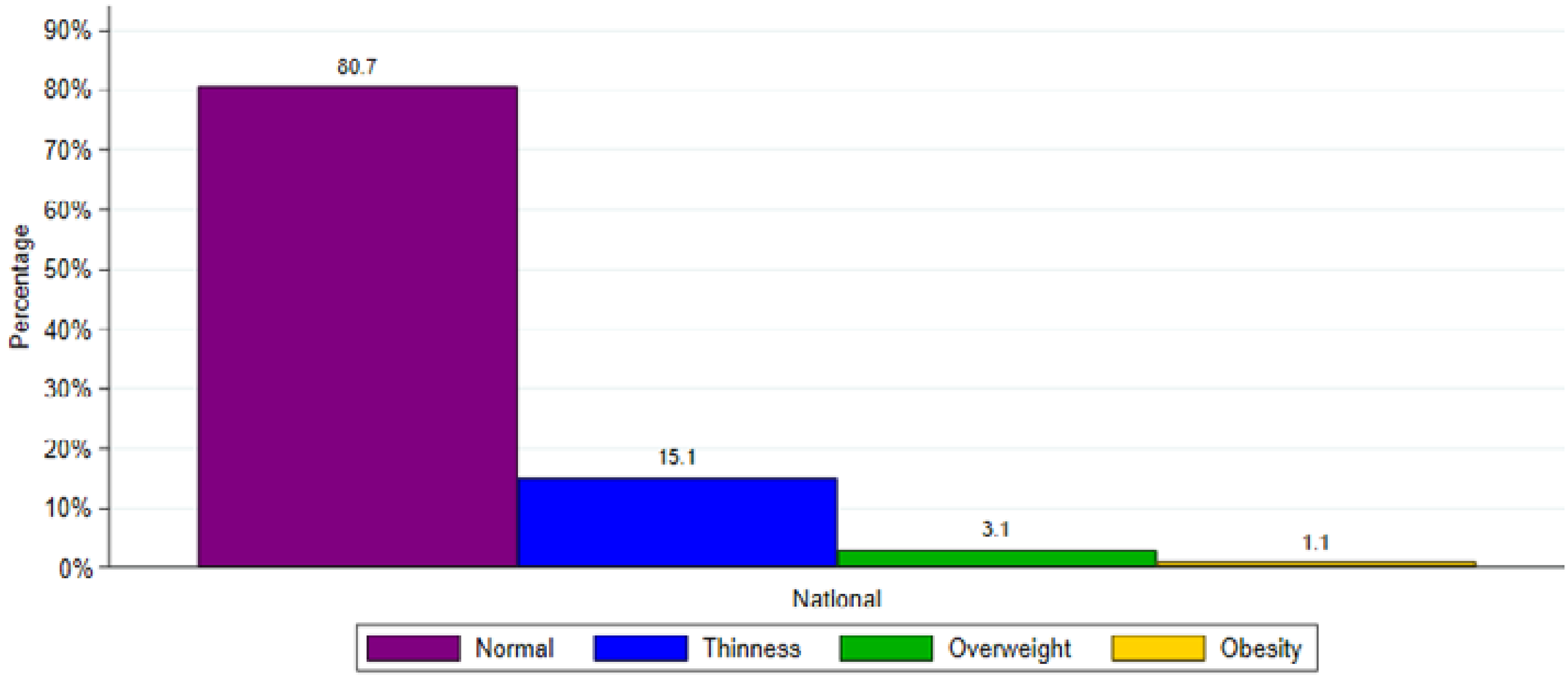

Figure 37. Prevalence of thinness, normal weight, overweight, and obesity among adolescent girls (aged 10-14 years), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of adolescent girls who responded nationally: (n=1006)
Stunting or short stature among adolescent girls (10-14 years) is defined as height-for-age Z-score (HAZ) <−2SD.
Underweight/thinness among adolescent girls (10-14 years) is defined as a BMI-for-age Z-scores (BAZ) <-2SD.
Normal weight among adolescent girls is defined as (-2SD≤BAZ≤1).
Overweight among adolescent girls (10-14 years) is defined as 1SD<BAZ≤2SD.
Obesity among adolescent girls is defined as BAZ>2SD.
Reference: https://www.who.int/tools/growth-reference-data-for-5to19-years/indicators/bmi-for-age

Table 57. Prevalence of stunting, thinness, normal weight, overweight, and obesity in adolescent girls (aged 10-14 years), Nigeria 2021

Background characteristics	Stunting[1*]		Thinness[2*]		Normal[3*]		Overweight[4*]		Obesity[5*]	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* = 0.440)		(*P* = 0.221)		(*P* = 0.126)		(*P* = 0.627)		(*P* = 0.083)
10 years	262	19.6 [13.7,27.3]	261	12.6 [7.7,19.9]	261	82.3 [75.2,87.7]	261	2.6 [1.2,5.3]	261	2.5 [1,5.9]
11 years	156	18.4 [11.3,28.6]	155	13.1 [8.1,20.3]	155	83.2 [75.8,88.7]	155	3.5 [1.7,7.2]	155	0.2 [0,1.4]
12 years	192	28 [19.6,38.4]	193	13.9 [8.5,21.7]	193	82.9 [75.2,88.6]	193	2.9 [1.4,6.1]	193	0.3 [0.1,1.3]
13 years	191	22.4 [14.6,32.8]	192	22.2 [15.5,30.9]	192	72.2 [63.4,79.6]	192	4.4 [2.3,8.3]	192	1.2 [0.3,4.2]
14 years	194	17.6 [10.6,27.8]	194	14.1 [8.4,22.9]	194	83 [73.9,89.4]	194	2.1 [1,4.3]	194	0.8 [0.1,5.1]
Residence		(*P* = 0.004**)		(*P* = 0.648)		(*P* = 0.629)		(*P* = 0.052)		(*P* = 0.145)
Urban	417	14.5 [10.6,19.6]	416	14.2 [10.5,18.8]	416	79.7 [74.6,83.9]	416	4.4 [2.8,6.8]	416	1.8 [0.8,4.3]
Rural	578	25.2 [20.3,30.9]	579	15.6 [11.4,21.1]	579	81.3 [75.9,85.8]	579	2.3 [1.5,3.6]	579	0.7 [0.3,1.9]
Zone		(*P* < 0.000***)		(*P* = 0.046*)		(*P* = 0.614)		(*P* = 0.001**)		(*P* = 0.170)
North Central	148	16.2 [9.5,26.3]	148	17.6 [8.9,31.6]	148	78.6 [65.6,87.6]	148	3.7 [1.6,8.5]	148	0.1 [0,1]
North East	164	22.2 [16.1,29.9]	166	16.9 [11.4,24.3]	166	81.3 [73.4,87.3]	166	0.5 [0.1,2.4]	166	1.2 [0.3,4.2]
North West	157	35.8 [26.2,46.6]	156	20.6 [13.3,30.5]	156	77.1 [67.2,84.7]	156	1.3 [0.4,3.9]	156	1.1 [0.3,4.3]
South East	172	6.8 [3.3,13.3]	171	6.8 [3.3,13.3]	171	84.4 [76,90.2]	171	8.5 [5,14.2]	171	0.3 [0,2.1]
South South	179	10.4 [6,17.4]	179	6.5 [3.6,11.2]	179	84.8 [78,89.8]	179	5.6 [3,10.3]	179	3.1 [1,9]
South West	175	15.1 [10.4,21.3]	175	12.2 [7.5,19.3]	175	83 [75.7,88.5]	175	4.1 [2,8]	175	0.6 [0.1,4.5]
Wealth quintile[6]		(*P* = 0.009**)		(*P* = 0.543)		(*P* = 0.577)		(*P* = 0.005**)		(*P* = 0.070)
Lowest	210	30.8 [21.6,41.8]	213	14.7 [9.7,21.8]	213	83 [75.9,88.3]	213	1.4 [0.5,3.7]	213	0.8 [0.2,4]
Second	190	24.4 [17.8,32.4]	188	15.4 [9.7,23.6]	188	82.5 [74.4,88.4]	188	2.1 [0.8,5.1]	188	0 [0,0]
Middle	205	21.3 [12.7,33.5]	205	20.3 [10.8,34.7]	205	77.3 [63.4,87]	205	1.9 [0.7,4.8]	205	0.6 [0.2,1.8]
Fourth	193	14.3 [8.2,23.8]	193	11 [6.7,17.6]	193	82.9 [75.7,88.3]	193	4.2 [2.1,8.3]	193	1.9 [0.5,6.1]
Highest	193	9.2 [5.3,15.7]	192	13.7 [8.3,21.9]	192	75.9 [67.4,82.8]	192	7.2 [4.4,11.6]	192	3.1 [1.1,8.5]
Source of drinking water[6]		(*P* = 0.895)		(*P* = 0.663)		(*P* = 0.976)		(*P* = 0.350)		(*P* = 0.675)
Improved	753	21.1 [16.9,25.9]	755	15.6 [11.8,20.2]	755	80.6 [75.9,84.6]	755	2.8 [1.9,4.1]	755	1 [0.5,2.1]
Unimproved	238	21.6 [15.4,29.5]	236	14 [9.3,20.5]	236	80.7 [74,86.1]	236	3.9 [2.2,6.7]	236	1.4 [0.4,5.2]
Type of toilet facility[6]		(*P* < 0.000***)		(*P* = 0.058)		(*P* = 0.524)		(*P* < 0.000***)		(*P* = 0.034*)
Improved	312	9.5 [5.2,16.7]	311	10 [6.3,15.6]	311	81.2 [75.3,86]	311	6.3 [4,9.7]	311	2.5 [1,5.8]
Unimproved	422	27.5 [22.2,33.5]	422	18.5 [13.8,24.3]	422	79.1 [73.4,84]	422	1.5 [0.8,2.7]	422	0.8 [0.3,2.3]
Open defecation	257	20.3 [14.3,28]	258	13.2 [7.9,21.2]	258	83.7 [76,89.3]	258	2.9 [1.4,5.7]	258	0.2 [0,1.4]
National	**995[7]**	**21.3 [17.8,25.3]**	**995[8]**	**15.1 [12,18.8]**	**995[9]**	**80.7 [76.9,84]**	**995[10]**	**3.1 [2.2,4.2]**	**995[11]**	**1.1 [0.6,2.2]**

Table 57. Prevalence of stunting, thinness, normal weight, overweight, and obesity in adolescent girls (aged 10-14 years), Nigeria 2021 (continued)

[1]Stunting or short stature among adolescent girls (aged 10-14 years) is defined as height-for-age Z-score (HAZ) <−2SD.
[2]Underweight/thinness among adolescent girls (aged 10-14 years) is defined as a BMI-for-age Z-scores (BAZ) <-2SD.
[3]Normal weight among adolescent girls is defined as (-2SD≤BAZ≤1).
[4]Overweight among adolescent girls (aged 10-14 years) is defined as 1SD<BAZ≤2SD.
[5]Obesity among adolescent girls is defined as BAZ>2SD.
*Reference: https://www.who.int/tools/growth-reference-data-for-5to19-years/indicators/bmi-for-age.
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of adolescent girls who responded nationally: (n=999).
[6]Less than (n = 999) due to relatively fewer respondents for the household questionnaires
[7]Less than (n = 999) due to missing data in implausible values or incomplete data
[8]Less than (n = 999) due to missing data in implausible values or incomplete data
[9]Less than (n = 999) due to missing data in implausible values or incomplete data
[10]Less than (n = 999) due to missing data in implausible values or incomplete data
[11]Less than (n = 999) due to missing data in implausible values or incomplete data

Anthropometry of WRA (aged 15-49 years)

The height, weight, and body composition of women prior to conception have important implications on the subsequent health of the mother during pregnancy, delivery, and post-partum, and for the development of children both pre-and postnatal[23]. Information on anthropometry of non-pregnant WRA is especially important in low and low-middle income countries (LMIC), where millions of women of childbearing age have anthropometric evidence of an adverse environment, including recent or/and long-term undernutrition (thinness) and where the rate of increase in overweight and obesity may now exceed that in more affluent countries.[24]

The WHO[25] defines thinness as being below the healthy weight range. Thinness in WRA affects women and increases the risk of an intergenerational cycle of malnutrition and child mortality. Thinness can be defined as a body mass index (BMI) of <18.5 kg/m^2 for WRA ≥20 years and as BMI-for-age Z-scores (BAZ) <-2SD in WRA <20 years.

WHO defines overweight and obesity as abnormal or excessive fat accumulation that may impair health. Overweight and obesity can be defined as 25≤BMI<30 kg/m^2, and obesity as a BMI ≥30 kg/m^2 for WRA ≥20 years. For WRA <20 years old, overweight is defined as 1SD<BAZ≤2, and obesity is defined as BAZ>2SD.

Normal weight is defined as -2SD≤BAZ≤1 for WRA<20 years and 18.5≤BMI<25 kg/m^2 for WRA ≥20 years.

The prevalence of thinness, normal weight, overweight, and obesity among WRA (aged 15-49 years) nationally and by the zones are summarized in **Figure 38**. About 63 percent of WRA had normal weight. Overall, the prevalence of thinness, overweight, and obesity among WRA was 14.1, 14.8, and 8.2 percent, respectively.

Table 58 presents the prevalence of thinness, normal weight, overweight, and obesity among WRA (15-49 years) stratified by age category, residence, zone, wealth quintile, educational attainment, source of drinking water, and type of toilet facility.

- **Thinness**: There was a statistically significant difference in the *prevalence of thinness among WRA* among the age groups (P < 0.001), residence (P = 0.002), zones (P < 0.001), wealth quintile (P < 0.001), educational attainment (P < 0.001), source of drinking water (P = 0.009), and type of toilet facility (P < 0.001). The prevalence of thinness was lowest in the 15-19-years old age category (9.9 percent). It was higher among WRA residing in rural (16.0 percent) versus urban (11.1 percent) areas. It was highest among WRA in the North West zone (21.6 percent). The prevalence of thinness was lowest in women in the highest wealth quintile (6.4 percent), women who had attained tertiary education (8.7 percent), and WRA in households with improved toilet facility (7.3 percent). It was higher among WRA in households with unimproved (16.9 percent) versus improved (13.1 percent) source of drinking water.
- **Normal weight**: There was a statistically significant difference in the *prevalence of normal weight among WRA* among the age groups (P < 0.001), residence (P < 0.001), zone (P = 0.029), wealth quintile (P < 0.001), educational attainment (P < 0.001), type of toilet facility (P < 0.001), and source of drinking water (P = 0.004). The prevalence of normal weight was

23 Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, et al. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet. 2008;371(9608):243–60.
24 Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013;382(9890) :427–51.
25 https://www.who.int/news-room/fact-sheets/detail/malnutrition

lowest in the 20-29-years old age category (4.0 percent). It was higher among WRA residing in rural (65.9 percent) versus urban (58.4 percent) areas. It was highest among WRA in the North Central zone (66.6 percent). The prevalence of normal weight was lowest in women in the highest wealth quintile (53.6 percent), women who had attained tertiary education (50.9 percent), and WRA in households with improved toilet facility (57.6 percent). It was higher among WRA in households with improved (64.4 percent) versus unimproved (58.9 percent) source of drinking water.

- **Overweight**: There was a statistically significant difference in the *prevalence of overweight among WRA* among the age groups ($P < 0.001$), residence ($P < 0.001$), zone ($P = 0.029$), wealth quintile ($P < 0.001$), educational attainment (P < 0.001), and type of toilet facility ($P < 0.001$). The prevalence of overweight was lowest in the 15-19-years old age category (4.1 percent). It was higher among WRA residing in urban (17.9 percent) versus rural (12.8 percent) areas. It was highest among WRA in the SE zone (21.2 percent). The prevalence of overweight was highest in women in the highest wealth quintile (22.0 percent), women who had attained tertiary education (23.0 percent), and WRA in households with improved toilet facility (20.9 percent).
- **Obesity**: There was a statistically significant difference in the *prevalence of obesity among WRA* among the age groups ($P < 0.001$), residence ($P < 0.001$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), educational attainment (P < 0.001), and type of toilet facility (P < 0.001). The prevalence of obesity was highest in the 40-49-years old age category (15.5 percent). It was higher among WRA residing in urban (12.6 percent) compared to rural (5.2 percent) areas. It was highest among WRA in the South East zone (15.5 percent). The prevalence of obesity was highest in women in the highest wealth quintile (18.0 percent), women who had attained tertiary education (17.5 percent), and WRA in households with improved toilet facility (14.3 percent).

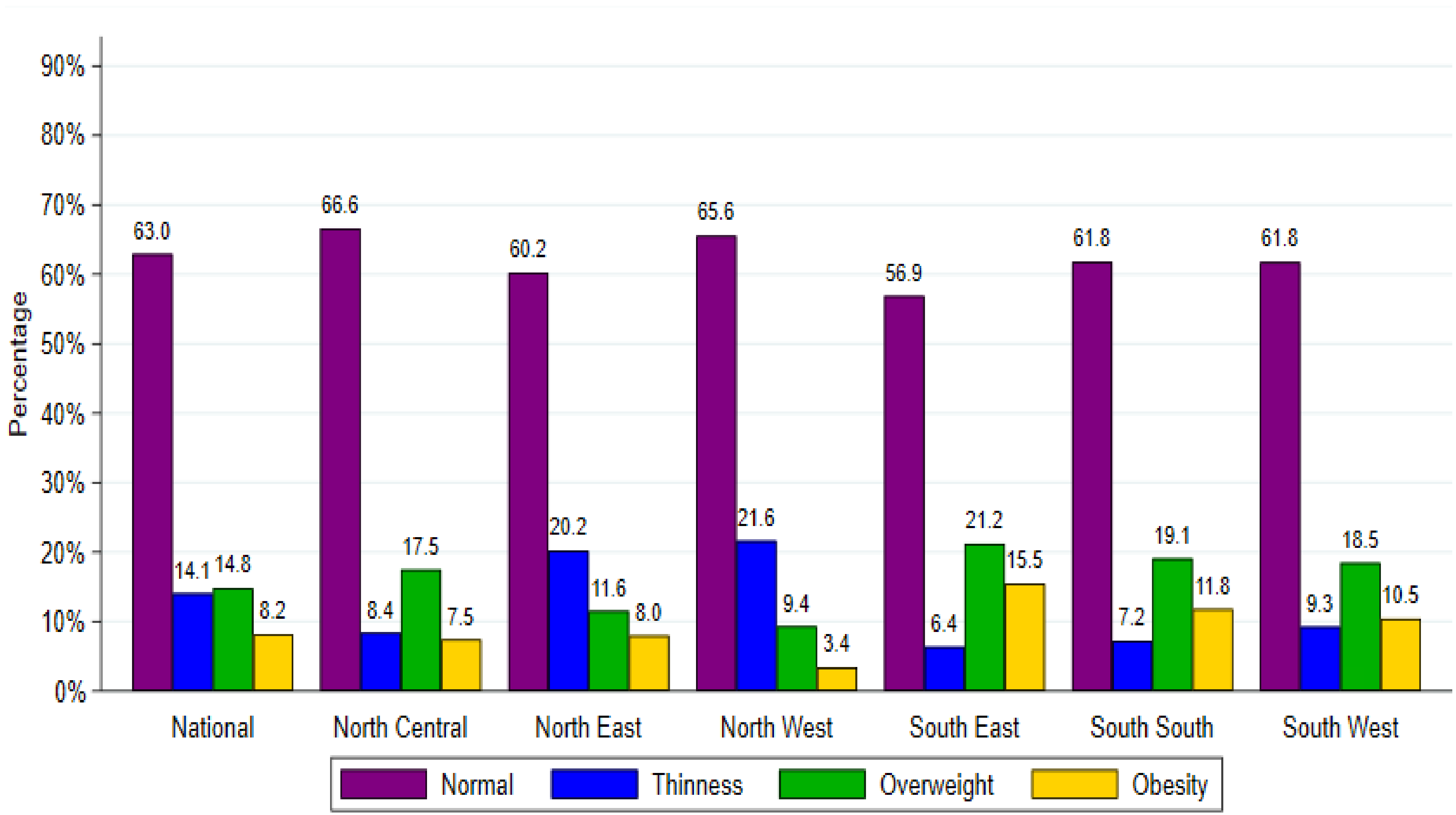

Figure 38. Prevalence of thinness, normal weight, overweight, and obesity among WRA (aged 15-49 years), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of women of reproductive age who responded nationally: (n= 5351)
Number of women of reproductive age who responded by zone: NC (n= 861), NE (n= 839), NW (n= 908), SE (n= 871), SS (n= 861), SW (n= 899)
For WRA <20 years old, thinness is defined as BAZ<-2SD, normal weight is defined as -2SD≤BAZ≤1, overweight is defined as 1SD<BAZ≤2, and obesity is defined as BAZ>2SD
For WRA ≥20 years, thinness is defined as BMI<18.5 kg/m^2, normal weight as BMI 18.5-24.9 kg/m^2, overweight is defined as BMI 25-29.9 kg/m^2, and obesity defined as ≥ 30 kg/m

Table 58. Prevalence of thinness, normal weight, overweight, and obesity in WRA (aged 15-49 years), Nigeria 2021

Background characteristics	Thinness[1]		Normal[2]		Overweight[3]		Obesity[4]	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)
15-19 years	1149	9.9 [7.6,12.8]	1149	84.4 [81.7,86.8]	1149	4.1 [2.9,5.8]	1149	1.6 [0.8,3.0]
20-29 years	1653	11.3 [15.9,21.0]	1653	4.0 [60.5,66.2]	1653	13.2 [11.3,15.3]	1653	5.2 [4.0,6.6]
30-39 years	1503	16.9 [11.6,16.6]	1503	9.6 [50.9,57.7]	1503	19.6 [16.9,22.6]	1503	12.1 [9.6,15.3]
40-49 years	1030	20.7 [9.6,15.0]	1030	13.0 [45.1,52.3]	1030	23.8 [20.7,27.1]	1030	15.5 [13.0,18.4]
Residence		(*P* = 0.002**)		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)
Urban	2160	11.1 [9.1,13.3]	2160	58.4 [56.1,60.6]	2160	17.9 [15.9,20.2]	2160	12.6 [10.8,14.7]
Rural	3175	16.0 [14.1,18.1]	3175	65.9 [63.6,68.2]	3175	12.8 [11.1,14.7]	3175	5.2 [4.2,6.4]
Zone		(*P* < 0.000***)		(*P* = 0.029*)		(*P* < 0.000***)		(*P* < 0.000***)
North Central	877	8.4 [5.7,12.2]	877	66.6 [63.1,70.0]	877	17.5 [14.9,20.5]	877	7.5 [5.5,10.1]
North East	863	20.2 [15.7,25.6]	863	60.2 [56.3,64.0]	863	11.6 [9.3,14.3]	863	8.0 [5.2,12.1]
North West	929	21.6 [19.0,24.6]	929	65.6 [61.8,69.1]	929	9.4 [7.0,12.4]	929	3.4 [2.2,5.4]
South East	879	6.4 [4.5,8.9]	879	56.9 [52.4,61.3]	879	21.2 [18.0,24.9]	879	15.5 [12.2,19.4]
South South	880	7.2 [5.5,9.4]	880	61.8 [56.7,66.6]	880	19.1 [15.5,23.4]	880	11.8 [9.3,15.0]
South West	907	9.3 [7.4,11.6]	907	61.8 [57.8,65.5]	907	18.5 [15.4,22.0]	907	10.5 [8.0,13.6]
Wealth quintile[5]		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)
Lowest	1119	25.6 [21.9,29.6]	1119	63.9 [59.7,67.8]	1119	7.8 [6.0,10.2]	1119	2.7 [1.7,4.4]
Second	1137	14.2 [11.9,16.9]	1137	70.1 [66.7,73.2]	1137	11.7 [9.6,14.2]	1137	4.0 [2.8,5.6]
Middle	1105	13.6 [10.7,17.1]	1105	60.9 [57.1,64.6]	1105	16.5 [13.6,19.8]	1105	9.1 [7.0,11.6]
Fourth	1003	8.5 [6.5,11.0]	1003	64.3 [60.4,68.0]	1003	17.8 [15.1,21.0]	1003	9.4 [7.5,11.8]
Highest	949	6.4 [4.7,8.8]	949	53.6 [49.8,57.3]	949	22.0 [18.8,25.6]	949	18.0 [15.3,21.0]
Educational attainment[5]		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)
None	1262	23.1 [20.2,26.2]	1262	63.5 [60.4,66.5]	1262	9.8 [7.8,12.2]	1262	3.6 [2.5,5.1]
Primary	854	12.2 [9.7,15.2]	854	59.0 [54.4,63.5]	854	18.3 [15.2,21.8]	854	10.5 [8.2,13.5]
Secondary	2416	9.5 [7.9,11.4]	2416	66.4 [63.8,68.9]	2416	15.8 [14.0,17.7]	2416	8.3 [6.7,10.2]
Tertiary	539	8.7 [5.9,12.6]	539	50.9 [45.0,56.6]	539	23.0 [19.4,27.1]	539	17.5 [14.0,21.6]
Source of drinking water[5]		(*P* = 0.009**)		(*P* = 0.004**)		(*P* = 0.756)		(*P* = 0.223)
Improved	4007	13.1 [11.6,14.7]	4007	64.4 [62.5,66.3]	4007	14.6 [13.2,16.3]	4007	7.8 [6.7,9.2]
Unimproved	1307	16.9 [14.3,19.9]	1307	58.9 [55.5,62.2]	1307	15.1 [12.7,17.8]	1307	9.1 [7.4,11.3]
Type of toilet facility[5]		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)		(*P* < 0.000***)
Improved	1598	7.3 [5.8,9.1]	1598	57.6 [54.5,60.6]	1598	20.9 [18.5,23.5]	1598	14.3 [12.4,16.4]
Unimproved	2284	17.6 [15.6,19.9]	2284	63.9 [61.6,66.1]	2284	12.5 [10.8,14.4]	2284	5.9 [4.7,7.5]
Open defecation	1432	14.9 [11.9,18.4]	1432	68.6 [65.4,71.7]	1432	11.6 [9.6,14.1]	1432	4.9 [3.7,6.5]
National	**5335[6]**	**14.1 [12.7,15.5]**	**5335[7]**	**63.0 [61.2,64.7]**	**5335[8]**	**14.8 [13.5,16.2]**	**5335[9]**	**8.2 [7.1,9.3]**

Table 58. Prevalence of thinness, normal weight, overweight, and obesity in WRA (aged 15-49 years), Nigeria 2021 (continued)

For WRA <20 years old, [1]thin is defined as BAZ<-2SD, [2]normal weight is defined as -2SD≤BAZ≤1, [3]overweight is defined as 1SD<BAZ≤2, and [4]obesity is defined as BAZ>2SD
For WRA ≥20 years, [1]thin is defined as BMI<18.5 kg/m^2, [2]normal weight as BMI 18.5-24.9 kg/m^2, [3]overweight is defined as BMI 25-29.9 kg/m^2, and [4]obesity defined as ≥ 30 kg/m^2
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001)
Number of WRA who responded nationally: (n= 5351).
Number of WRA who responded by zone: NC (n= 881), NE (n= 864), NW (n= 930), SE (n= 882), SS (n= 883), SW (n= 911)
[5]Less than (n = 5351) due to relatively fewer respondents for the household and dietary intake questionnaires
[6]Less than (n = 5351) due to missing data in implausible values or incomplete data
[7]Less than (n = 5351) due to missing data in implausible values or incomplete data
[8]Less than (n = 5351) due to missing data in implausible values or incomplete data
[9]Less than (n = 5351) due to missing data in implausible values or incomplete data

Intervention coverage, health status, and anaemia risk factors [26]

This chapter describes the coverage of nutrition-specific interventions and highlights self-reported morbidity and anaemia risk factors among children aged 6-59 months, adolescent girls (10-14 years old), WRA (15-49 years old), and pregnant women (15-49 years old).[27] The results presented are based on a questionnaire[28] administered to the survey respondents and their caregivers in the case of children.

Nutrition-specific interventions, such as vitamin A, multivitamin A and iron supplementation, nutrition counselling of caregivers, and delivery of therapeutic foods, are essential for addressing undernutrition in vulnerable populations.[29] Another intervention to improve nutritional status is deworming treatment. Helminths (commonly referred to as worms) can cause diarrhoea, poor absorption of nutrients, and loss of appetite, increasing vulnerability to micronutrient deficiencies. On the other hand, pica and poor health status exhibited by frequent illness and inflammation are also associated with anaemia.[30]

The Nigeria National Micronutrient Deficiency Control (MNDC) guidelines[31] describe the interventions to address micronutrient deficiencies among children (aged 6-59 months), such as deworming, vitamin A supplementation, use of micronutrient powders for home fortification, etc. Some interventions, including nutrition education of caregivers, are reflected in the National Policy on Food and Nutrition[32] (NFPN), which prioritizes both the health system and food-based approaches to MNDC. An objective of the survey was to assess the coverage of these interventions among children (aged 6-59 months).

Intervention coverage, health status, and anaemia risk factors among children (aged 6-59 months)

Intervention coverage among children (aged 6-59 months)

Figure 39 presents the percentage of children (aged 6-59 months) who took deworming drugs, vitamin A supplementation, iron/micronutrient powder, therapeutic feeds, and whose caregivers received any nutrition counselling. Overall, the use of iron/micronutrient powder (7 percent) and therapeutic feeds (percent) was low. The prevalence among children (aged 6-59 months) receiving a vitamin A capsule in the previous six months was 25 percent nationally, while the percentage of children receiving deworming treatment in the past six months was 28 percent nationally. The percentage of children aged 6-59 months whose caregivers received some form of nutrition counselling in the previous six months was 15 percent nationally.

26 The premise of the NFCMS aligns with the UNICEF conceptual framework of determinants of undernutrition (2013*). Individual nutritional status measured by indicators such as those of anthropometry and micronutrient biomarkers is determined by two immediate factors - high quality diets and optimal health. Three underlying factors influence these: access to sufficient, safe, and nutritious food; adequate care practices for especially women and children; and access to health services including healthy environments, water, and sanitation. Finally, at a basic level, political, economic, and institutional determinants underpin all of these factors.
*UNICEF (United Nations Children's Fund). 2013. Improving Child Nutrition: The Achievable Imperative for Global Progress. New York: UNICEF.
27 For scope of preliminary report for the biomarker component, see Annex 2.
28 See Annex 12 for questionnaire (Q) : Q1. Children 6-59 months; Q2. Adolescent girls (10-14 years) and Women of reproductive age (15-49 years); Q3. Pregnant women (15-49 years)
29 Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, Webb P, Lartey A, Black RE; Lancet Nutrition Interventions Review Group, the Maternal and Child Nutrition Study Group. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? Lancet. 2013 Aug 3;382(9890):452-477. doi: 10.1016/S0140-6736(13)60996-4. Epub 2013 Jun 6. Erratum in: Lancet. 2013 Aug 3;382(9890):396. PMID: 23746776.
30 Julia G. Shaw, Jennifer F. Friedman, «Iron Deficiency Anaemia: Focus on Infectious Diseases in Lesser Developed Countries», Anaemia, vol. 2011, Article ID 260380, 10 pages, 2011. https://doi.org/10.1155/2011/260380
31 Federal Ministry of Health (FMOH). 2013. National guidelines on micronutrients deficiencies control in Nigeria. Abuja: Federal Ministry of Health.
32 Ministry of Budget & National Planning. 2016. National Policy on Food and Nutrition in Nigeria. Abuja: Ministry of Budget and National Planning.

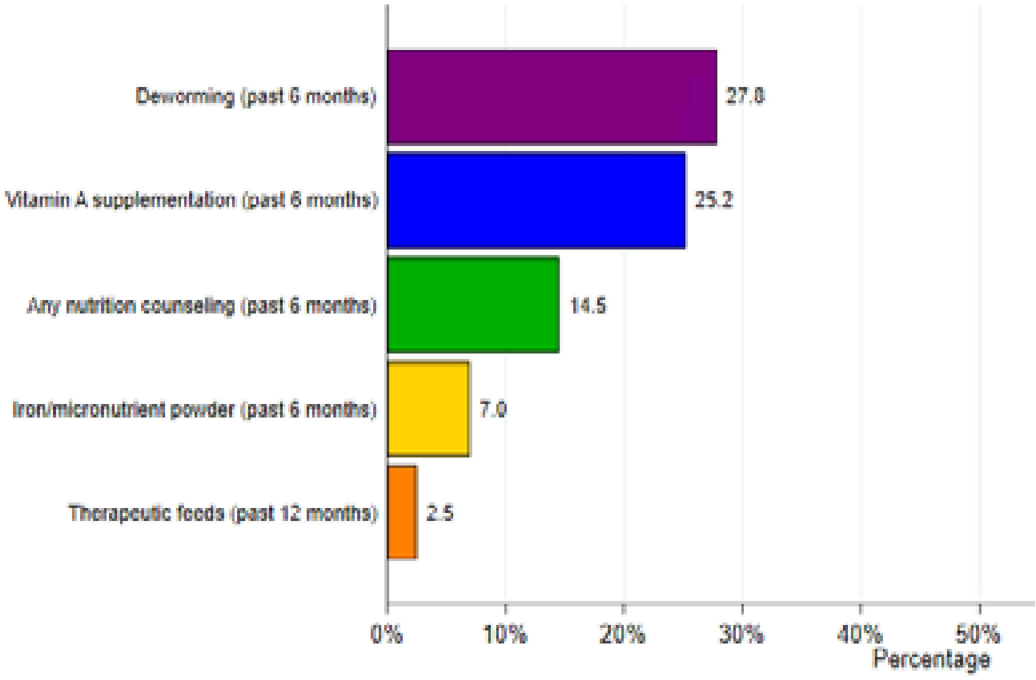

Figure 39. Coverage of nutrition-specific interventions among children (aged 6-59 months), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of children 6-59 months who responded nationally: (n= 4916)

Coverage of vitamin A supplementation among children aged 6-59 months
In countries where vitamin A deficiency (VAD) is a public health problem, the WHO recommends giving children (aged 6-59 months) two consecutive high-dose supplements of vitamin A per year.[33] In Nigeria, vitamin A is delivered routinely to children (aged 6-59 months) as stipulated in the IMCI strategy at frontline health facilities during bi-annual Maternal Neonatal and Child Health Weeks (MNCHW) and National Immunization Plus Days by trained healthcare workers.[34]

Table 59 presents the percentage of children (aged 6-59 months) that received a vitamin A capsule in the last six months, stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status.

There was a statistically significant difference in the *prevalence of children (aged 6-59 months) who received a vitamin A capsule in the last six months* among the age groups ($P = 0.017$), residences ($P < 0.001$), zones ($P < 0.001$), wealth quintiles ($P < 0.001$) and educational attainment of caregiver ($P < 0.001$). The percentage of children (aged 6-59 months) who received a vitamin A capsule in the last six months was highest within the 6-11 months age category (35 percent). It was higher in children residing in urban areas (36 percent) compared to those in the rural areas (20 percent). It was lowest in the North West zone (7 percent) and among children in the lowest wealth quintile (13 percent). It was highest among children whose caregivers had attained tertiary education (41 percent).

Figure 40 presents the source of verification for caregivers' statements on vitamin A supplementation in the last six months in children (aged 6-59 months). Most of the data collected (87 percent) were verified through mothers' recall.

33 Dalmiya, N., & Palmer, A. (2007). Vitamin A supplementation: a decade of progress. UNICEF.
34 Aghaji, A.E., Duke, R. & Aghaji, U.C.W. Inequitable coverage of vitamin A supplementation in Nigeria and implications for childhood blindness. BMC Public Health 19, 282 (2019). https://doi.org/10.1186/s12889-019-6413-1

Table 59. Vitamin A supplementation among children aged 6-59 months, Nigeria 2021

Background characteristics	Received vitamin A capsule in the past six months[1]		
	N	% [95% CI]	*P* value
Age category			
6-11 months	475	34.5 [25.7, 44.4]	(*P* = 0.017 *)
12-23 months	1082	28.8 [24.3, 33.7]	
24-35 months	1129	23.3 [19.0, 28.3]	
36-47 months	1146	21.9 [16.4, 28.5]	
48-59 months	849	22.6 [18.1, 28.0]	
Sex			
Male	2359	24.8 [20.8, 29.2]	(*P* = 0.593)
Female	2322	25.6 [21.7, 30.0]	
Residence			
Urban	1902	35.6 [28.6, 43.3]	(*P* <0.001***)
Rural	2779	20.2 [16.4, 24.7]	
Zone			
North Central	722	41.9 [33.5, 50.8]	(*P* <0.001***)
North East	789	31.7 [20.1, 46.2]	
North West	899	7.7 [4.6, 12.7]	
South East	697	39.6 [34.5, 45.0]	
South South	786	26.4 [21.2, 32.3]	
South West	788	35.9 [31.5, 40.7]	
Wealth quintile[2]			
Lowest	1006	12.6 [9.5, 16.5]	(*P* <0.001***)
Second	983	17.2 [13.5, 21.7]	
Middle	922	31.4 [25.3, 38.2]	
Fourth	905	35.9 [29.9, 42.3]	
Highest	844	43.1 [33.8, 53.0]	
Educational attainment of caregiver[2]			
None	1254	16.6 [12.6, 21.5]	(*P* <0.001***)
Primary	732	23.4 [19.2, 28.3]	
Secondary	1900	37.0 [32.8, 41.3]	
Tertiary	488	40.9 [31.0, 51.6]	
National	**4681[3]**	**25.2 [21.5, 29.3]**	

Data are based on question chs6 of the biomarker questionnaire
chs6. Within the last six months, was (name of child) given a vitamin A dose like this (caregiver shown locally sourced Vitamin A capsule)?
[1]All children are eligible for Vitamin A supplementation
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of children 6-59 months who responded nationally: (n= 4916)
[2]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires
[3]Less than (n = 4916) due to “Don’t know” response

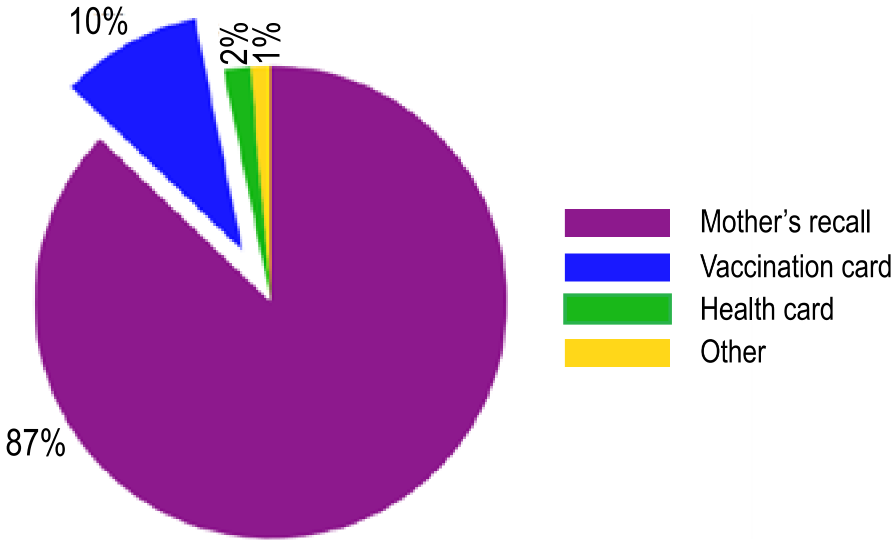

Figure 40. Source of verification among children (6-59 months) who received a Vitamin A dose in the past six months, Nigeria 2021
Question chs7 is linked to question chs6.
chs6. Within the last six months, was (name of child) given a vitamin A dose like this (caregiver shown locally sourced Vitamin A capsule)?
Chs7. Source of verification
Data are weighted to account for survey design and non-response
Number of children 6-59 months who responded nationally: (n= 4916)

Coverage of nutrition counselling and specific key messages

Table 60 presents the percentage of children (aged 6-59 months) whose caregivers received nutrition counselling from a health worker or community volunteer on specific topics. The data are stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status.

1. **Breastfeeding**: Nationally, the prevalence of nutrition counselling from a health worker or community volunteer on breastfeeding among caregivers of children (aged 6-59 months) who received some type of nutrition counselling was 81 percent. There was a statistically significant difference in the *percentage of children whose caregivers received information on breastfeeding* between the age groups ($P < 0.001$) and between the zones ($P = 0.006$). The prevalence was highest within the 6 to 11-month-old age category (95 percent) and lowest in the North Central zone (64 percent).

2. **When to start feeding foods other than breastmilk (e.g., after six months)**: Nationally, the prevalence of nutrition counselling from a health worker or community volunteer on when to start feeding foods other than breastmilk among caregivers of children (aged 6-59 months) was 83 percent. There was a statistically significant difference in the *percentage of children whose caregivers received this information* among the age groups ($P = 0.006$). The prevalence was highest in the 6 to 11-month-old age category (93 percent).

3. **Giving a variety of types of foods**: Nationally, the prevalence of nutrition counselling from a health worker or community volunteer on providing a variety of types of foods among caregivers of children aged 6-59 months was 87 percent. There was no significant variation across the background characteristics.

4. **Giving animal source foods specifically, eggs, milk, meats, or fish**: Nationally, the prevalence of nutrition counselling from a health worker or community volunteer on giving animal source foods, specifically eggs, milk, meats, or fish, among caregivers of children (aged 6-59 months) was 90 percent. There was a statistically significant difference in the *percentage of children whose caregivers received this information* between the sex of the child ($P = 0.011$) and zone ($P = 0.040$). The percentage of children whose caregivers received this information was higher among female (93 percent) as compared to male (86 percent) children. The percentage of children whose caregivers received this information was highest in the North East zone (96 percent).

5. **How often to feed the child**: Nationally, the prevalence of nutrition counselling from a health worker or community volunteer on how often to feed the child among caregivers of children (aged 6-59 months) was 88 percent. There was no significant variation across the background characteristics.
6. **Not feeding sugary drinks (e.g., fizzy drinks)**: Nationally, the prevalence of nutrition counselling from a health worker or community volunteer on not feeding sugary drinks (e.g. fizzy drinks) among caregivers of children (aged 6-59 months) was 76 percent. There was no significant variation across the background characteristics.

Table 60. Coverage of nutrition counselling on specific key messages in the past six months among children (aged 6-59 months) whose caregivers[1] reported receiving some form of nutrition counselling, Nigeria 2021

Background characteristics	Breastfeeding		When to start feeding other foods		Giving a variety of types of foods		Giving animal source foods		How often to feed the child		Not feeding sugary drinks	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age categories		(P < 0.001 ***)		(P = 0.006 **)		(P = 0.970)		(P = 0.756)		(P = 0.589)		(P = 0.461)
6-11 months	128	94.8 [80.2, 98.8]	128	93.1 [79.4, 97.9]	126	86.5 [73.9, 93.6]	125	90.3 [76.7, 96.3]	127	85.1 [72.7, 92.4]	125	81.8 [70.6, 89.4]
12-23 months	227	91.9 [86.0, 95.4]	227	86.7 [77.8, 92.4]	227	86.2 [79.2, 91.1]	224	88.9 [80.3, 94.0]	223	88.3 [81.4, 92.9]	223	73.7 [63.4, 82.0]
24-35 months	157	78.8 [67.8, 86.7]	157	86.2 [75.2, 92.8]	158	89.2 [80.9, 94.1]	155	90.2 [83.0, 94.5]	159	91.6 [84.1, 95.7]	157	74.0 [58.7, 85.1]
36-47 months	138	56.7 [41.9, 70.3]	137	65.9 [47.9, 80.2]	139	87.3 [77.3, 93.2]	138	86.5 [77.1, 92.4]	139	83.8 [71.4, 91.5]	138	71.2 [59.9, 80.4]
48-59 months	83	75.4 [56.9, 87.7]	83	80.5 [61.9, 91.3]	84	87.5 [72.0, 95.1]	84	94.1 [80.3, 98.4]	82	88.7 [76.0, 95.1]	83	82.8 [70.6, 90.6]
Sex		(P = 0.714)		(P = 0.428)		(P = 0.130)		(P = 0.011 *)		(P = 0.076)		(P = 0.557)
Male	364	79.9 [72.6, 85.7]	362	84.4 [77.1, 89.6]	365	84.9 [78.2, 89.8]	361	85.9 [79.5, 90.5]	360	84.6 [77.6, 89.7]	364	74.5 [67.4, 80.5]
Female	369	81.4 [71.2, 88.6]	370	81.5 [70.8, 88.9]	369	89.4 [84.1, 93.1]	365	93.1 [88.3, 96.0]	370	90.4 [85.5, 93.8]	362	76.9 [68.6, 83.5]
Residence		(P = 0.795)		(P = 0.623)		(P = 0.052)		(P = 0.532)		(P = 0.172)		(P = 0.112)
Urban	311	79.5 [62.5, 90.1]	311	80.7 [63.0, 91.2]	311	91.8 [85.7, 95.4]	309	91.1 [82.7, 95.6]	310	90.8 [84.4, 94.7]	308	81.5 [71.8, 88.4]
Rural	422	81.5 [74.9, 86.7]	421	84.3 [77.4, 89.4]	423	84.2 [77.5, 89.1]	417	88.5 [83.1, 92.4]	420	85.5 [79.3, 90.1]	418	71.8 [63.4, 78.9]
Zone		(P = 0.007 **)		(P = 0.289)		(P = 0.561)		(P = 0.040 *)		(P = 0.184)		(P = 0.002 **)
North Central	104	64.4 [54.1, 73.6]	103	82.4 [64.1, 92.5]	311	91.8 [85.7, 95.4]	100	88.2 [80.6, 93.1]	103	86.0 [77.6, 91.6]	101	57.8 [43.1, 71.2]
North East	238	74.8 [56.8, 87.1]	237	79.0 [59.3, 90.7]	423	84.2 [77.5, 89.1]	238	95.8 [90.1, 98.3]	237	93.0 [87.4, 96.2]	237	87.5 [78.9, 92.9]
North West	67	83.5 [67.3, 92.6]	67	79.5 [65.2, 88.9]	311	91.8 [85.7, 95.4]	66	81.8 [65.6, 91.4]	65	84.1 [64.5, 93.9]	67	81.8 [62.9, 92.2]
South East	49	82.5 [68.8, 91.0]	49	89.8 [74.9, 96.3]	423	84.2 [77.5, 89.1]	48	94.1 [78.1, 98.6]	48	92.9 [79.9, 97.7]	48	59.2 [41.7, 74.6]
South South	136	89.8 [81.6, 94.6]	136	81.1 [65.8, 90.5]	311	91.8 [85.7, 95.4]	137	88.5 [80.0, 93.7]	138	79.9 [66.2, 88.9]	136	65.7 [51.4, 77.7]
South West	139	95.5 [90.0, 98.1]	140	95.6 [89.9, 98.2]	423	84.2 [77.5, 89.1]	137	84.8 [70.9, 92.8]	139	87.0 [75.9, 93.4]	137	69.1 [56.6, 79.4]
Wealth quintile[2]		(P = 0.477)		(P = 0.153)		(P = 0.071)		(P = 0.752)		(P = 0.330)		(P = 0.612)
Lowest	139	77.1 [63.4, 86.7]	138	86.2 [73.6, 93.3]	139	79.3 [65.6, 88.6]	139	89.0 [78.8, 94.6]	137	84.2 [71.6, 91.8]	137	78.7 [67.8, 86.6]
Second	153	83.3 [76.0, 88.8]	154	82.0 [74.3, 87.8]	154	85.5 [78.3, 90.6]	150	89.2 [81.8, 93.9]	154	85.0 [77.2, 90.4]	150	71.0 [61.6, 78.9]
Middle	152	85.4 [72.8, 92.7]	151	91.1 [77.5, 96.8]	154	90.0 [83.0, 94.3]	152	85.9 [72.8, 93.3]	152	89.2 [80.5, 94.2]	152	72.2 [58.4, 82.7]
Fourth	167	76.0 [57.0, 88.3]	167	73.6 [55.0, 86.4]	165	89.9 [80.2, 95.1]	163	91.7 [81.6, 96.5]	166	87.8 [80.1, 92.8]	165	77.7 [67.1, 85.5]
Highest	120	84.5 [73.1, 91.6]	120	83.6 [68.5, 92.2]	120	93.4 [84.9, 97.3]	120	92.2 [83.5, 96.5]	119	94.0 [85.7, 97.6]	120	79.4 [64.9, 89.0]
Caregiver's educational attainment[2]		(P = 0.419)		(P = 0.447)		(P = 0.585)		(P = 0.877)		(P = 0.118)		(P = 0.362)
None	162	76.9 [61.9, 87.2]	162	77.8 [62.2, 88.2]	161	86.1 [76.8, 92.1]	161	89.3 [79.8, 94.6]	161	85.1 [74.7, 91.6]	160	76.3 [64.8, 84.9]
Primary	115	86.6 [75.4, 93.2]	113	89.6 [78.3, 95.3]	115	82.6 [68.9, 91.0]	113	87.8 [76.3, 94.2]	114	93.8 [87.4, 97.1]	113	72.5 [63.1, 80.3]
Secondary	327	85.0 [78.1, 90.0]	328	84.5 [77.2, 89.8]	328	88.6 [82.9, 92.6]	322	90.6 [85.5, 94.0]	326	85.7 [78.8, 90.7]	323	74.6 [67.3, 80.7]
Tertiary	85	76.4 [45.8, 92.5]	85	79.1 [45.7, 94.4]	86	90.2 [78.7, 95.8]	86	91.9 [77.4, 97.4]	85	94.2 [86.5, 97.6]	86	85.5 [71.0, 93.5]
National	**733[3]**	**80.7 [73.2, 86.5]**	**732[4]**	**82.9 [74.8, 88.7]**	**734[5]**	**87.2 [82.5, 90.9]**	**726[6]**	**89.6 [85.2, 92.8]**	**730[7]**	**87.7 [83.1, 91.1]**	**726[8]**	**75.7 [69.4, 81.1]**

Table 60. Coverage of nutrition counselling on specific key messages in the past six months among children (aged 6-59 months) whose caregivers[1] reported receiving some form of nutrition counselling, Nigeria 2021 (continued)

The data presented in this table are based on question chs5 of the biomarker questionnaire
The data were collected from respondents who answered yes to question chs4 of the biomarker questionnaire
chs4. In the last six months, has a health worker or community volunteer spoken with you about how to feed [name of child]? chs5. If yes [to chs4], did the health worker or community volunteer speak with you about any of these topics?
[1]This data refers to the primary caregiver of the sampled child, regardless of whether it was the child's mother.
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of children 6-59 months who responded nationally whose caregivers receive nutrition counselling: (n= 738)
[2]Less than (n = 738) due to relatively fewer respondents for the household and dietary intake questionnaires
[3]Less than (n = 738) due to missing data
[4]Less than (n = 738) due to non-response
[5]Less than (n = 738) due to non-response
[6]Less than (n = 738) due to non-response
[7]Less than (n = 738) due to non-response
[8]Less than (n = 738) due to non-response

Use of micronutrient powder or any sprinkles with iron

Table 61 presents the use of micronutrient powder or any sprinkles with iron in the past six months among children (aged 6-59) months stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status. *There was a statistically significant difference in the percentage of children aged 6-59 months* who received sprinkles with iron or some form of micronutrient powder in the past six months between zones (*P* = 0.038) and caregivers' educational attainment (*P* = 0.047). The use of sprinkles with iron or any micronutrient powder in the past six months among children (aged 6-59 months) was lowest in the South East zone (2 percent). It was highest among children whose caregivers had attained tertiary education (9 percent).

Table 61. Use of micronutrient powder or any sprinkles with iron in the past six months among children (aged 6-59 months), Nigeria 2021

Background characteristics	Received supply of micronutrient powder or any sprinkles with iron in the past six months		
	N	% [95% CI]	P value
Age category			
6-11 months	487	5.5 [3.6, 8.2]	(*P* = 0.747)
12-23 months	1117	7.2 [5.0, 10.3]	
24-35 months	1160	7.3 [5.3, 9.9]	
36-47 months	1186	6.6 [4.7, 9.1]	
48-59 months	884	7.7 [5.3, 11.1]	
Sex			
Male	2430	7.7 [6.0, 9.7]	(*P* = 0.124)
Female	2404	6.3 [4.8, 8.2]	
Residence			
Urban	1982	8.7 [6.1, 12.2]	(*P* = 0.132)
Rural	2852	6.2 [4.6, 8.2]	
Zone			
North Central	757	7.8 [5.0, 12.0]	(*P* = 0.038*)
North East	794	8.9 [5.6, 14.0]	
North West	904	4.6 [2.7, 7.7]	
South East	716	2.0 [0.8, 4.6]	
South South	810	8.6 [4.6, 15.4]	
South West	853	10.3 [6.8, 15.4]	
Wealth quintile[1]			
Lowest	1024	5.7 [3.7, 8.7]	(*P* = 0.494)
Second	1011	6.7 [4.7, 9.5]	
Middle	962	7.1 [5.1, 9.9]	
Fourth	946	8.9 [6.2, 12.5]	
Highest	870	7.4 [4.5, 11.8]	
Caregiver's educational attainment[1]			
None	1281	5.3 [3.7, 7.4]	(*P* = 0.047*)
Primary	753	8.1 [5.8, 11.1]	
Secondary	1973	8.2 [6.0, 11.0]	
Tertiary	511	9.4 [5.9, 14.6]	
National	**4834**[2]	**7.0 [5.6, 8.7]**	

Table 61. Use of micronutrient powder or any sprinkles with iron in the past six months among children (aged 6-59 months), Nigeria 2021 (continued)

The data are based on question chs8 of the biomarker questionnaire
chs8. In the last six months, did you receive a supply of sprinkles with iron or any micronutrient powder like this (show sprinkles) to give to [name of child]?
[35]In populations where anaemia is a public health problem, point-of-use fortification of complementary foods with iron-containing micronutrient powders in infants and young children aged 6–59 months is recommended by the WHO to improve iron status and reduce anaemia
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of children 6-59 months who responded nationally: (n= 4916)
[1]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 4916) due to “Don’t Know” response

35 WHO guideline: Use of multiple micronutrient powders for point-of-use fortification of foods consumed by infants and young children aged 6–23 months and children aged 2–12 years. Geneva: World Health. Organization; 2016. Licence: CC BY-NC-SA 3.0 IGO.

Deworming

The Nigeria MNDC guidelines[36] recommend that deworming be done as per the WHO guidelines.

The WHO recommends deworming for all children (12-23 months) and preschool children (1 to 4 years old) to reduce the worm burden of soil-transmitted helminth infection. Where the baseline prevalence for soil-transmitted helminth is more than 50 percent, the WHO recommends[37] bi-annual deworming. Where the prevalence is lower, the recommendation is for annual deworming. The guidelines recommend single dose albendazole (400 mg) or mebendazole (500 mg). For bi-annual deworming, a half-dose of albendazole (i.e., 200 mg) is recommended for children younger than 24 months.

Table 62 presents the percentage of children (aged 6-59 months) who received deworming treatment in the last six months (including and excluding children 6-11 months old), stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status. Although the question was asked across all age categories, only children (12-59 months old) are eligible for deworming. Nationally, the coverage of deworming among children (aged 6-59 months) was 28 percent. Excluding children ineligible for deworming, the national coverage was 29 percent.

Reviewing the data for children (aged 6-59 months), there was a statistically significant difference in the *percentage of children who received deworming drugs* between the age groups ($P < 0.001$), residence ($P < 0.001$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), and caregivers' educational attainment ($P < 0.001$). The percentage of children who received the deworming drug was highest among children in the 48 to 59-month age category (32 percent). It was higher in children residing in urban (41 percent) compared to rural (21 percent) areas. It was lowest among children in the North West zone (8 percent). The percentage of children (aged 6-59 months) who received the deworming drug was highest among children in the highest wealth quintile (52 percent) and children whose caregivers had attained tertiary education (46 percent).

Reviewing the data for children (aged 12-59 months), *there was a statistically significant difference in the percentage of children aged 6-59 months who received deworming drugs* between the age groups ($P < 0.001$), residence ($P = 0.034$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), and caregivers' educational attainment ($P < 0.001$). The percentage of children who received the deworming drug was highest among children in the 48 to 59-month age category (32 percent). It was higher in children residing in urban (44 percent) compared to rural (22 percent) areas. It was lowest among children in the NW zone (8 percent). The percentage of children aged 6-59 months who received the deworming drug was highest among children in the highest wealth quintile (57 percent) and children whose caregivers had attained tertiary education (49 percent).

The information on the 492 children (aged 6 to 11 months) who received (but should not have received) deworming medication is detailed in **Table 63**.

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36 Federal Ministry of Health (FMOH). 2013. National guidelines on micronutrients deficiencies control in Nigeria. Abuja: Federal Ministry of Health.

37 Preventive chemotherapy to control soil-transmitted helminth infections in at-risk population groups. Geneva: World Health Organization; 2017 (http://www.who.int/nutrition/publications/guidelines/deworming/en/).

Table 62. Deworming in the past six months among children (6-59 months), Nigeria 2021

Background characteristics	Children (6-59 months) given any drug for intestinal worms in the last six months		Children (12-59 months) Given any drug for intestinal worms in the last six months	
	N	% [95% CI]	N	% [95% CI]
Age category	(*P* < 0.0000***)		(*P* = 0.034*)	
6-11 months	494	15.9 [12.2, 20.4]	0	. [.,.]
12-23 months	1138	25.3 [21.9, 29.0]	1138	25.3 [21.9, 29.0]
24-35 months	1181	30.0 [26.2, 34.1]	1181	30.0 [26.2, 34.1]
36-47 months	1201	28.7 [25.3, 32.3]	1201	28.7 [25.3, 32.3]
48-59 months	902	32.3 [27.8, 37.1]	902	32.3 [27.8, 37.1]
Sex	(*P* = 0.6419)		(*P* = 0.8690)	
Male	2471	28.0 [25.0, 31.2]	2245	29.0 [25.8, 32.4]
Female	2445	27.2 [24.4, 30.2]	2177	28.7 [25.7, 31.9]
Residence	(*P* < 0.0000***)		(*P* < 0.0000***)	
Urban	2011	41.2 [36.1, 46.5]	1790	44.0 [38.8, 49.3]
Rural	2905	21.0 [18.1, 24.2]	2632	21.7 [18.6, 25.1]
Zone	(*P* < 0.0000***)		(*P* < 0.0000***)	
North Central	771	24.5 [18.7, 31.4]	692	25.8 [19.7, 33.1]
North East	827	23.9 [18.8, 29.8]	751	25.1 [19.4, 32.0]
North West	908	7.8 [4.9, 12.1]	821	8.4 [5.3, 13.1]
South East	716	59.4 [53.2, 65.3]	655	61.6 [55.2, 67.7]
South South	834	59.8 [52.4, 66.9]	744	60.2 [52.3, 67.7]
South West	860	42.5 [37.7, 47.4]	759	46.4 [41.3, 51.7]
Wealth quintile[1]	(*P* < 0.0000***)		(*P* < 0.0000***)	
Lowest	1052	12.8 [9.8, 16.5]	965	13.2 [10.1, 17.1]
Second	1023	18.0 [14.3, 22.3]	931	18.5 [14.7, 23.0]
Middle	975	30.4 [26.7, 34.3]	878	31.3 [27.5, 35.5]
Fourth	959	42.3 [37.1, 47.7]	838	45.2 [39.4, 51.1]
Highest	886	51.9 [44.2, 59.5]	793	56.7 [50.6, 62.6]
Caregiver's educational attainment[1]	(*P* < 0.0000***)		(*P* < 0.0000***)	
None	1311	15.0 [11.9, 18.8]	1200	15.6 [12.2, 19.7]
Primary	764	22.8 [18.9, 27.1]	678	23.8 [19.8, 28.2]
Secondary	2000	43.7 [40.3, 47.2]	1786	46.3 [42.9, 49.8]
Tertiary	519	46.3 [40.8, 52.0]	464	49.1 [43.6, 54.7]
National	**4916**	**27.6 [25.1, 30.2]**	**4422**[2]	**28.9 [26.3, 31.7]**

The data are based on question chs9 of the biomarker questionnaire
chs9. Was [name of child] given any drug for intestinal worms in the last six months?
The question was asked across all age categories
[1]Only children 12-59 months are eligible for deworming
The data are analyzed for children 6-59 months and children 12-59 months
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of children 6-59 months who responded nationally: (n= 4916)
[1]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 4916) due to exclusion of children 6 to 11 months

Table 63. Background characteristics of children (aged 6 to 11 months) who received some form of drug for intestinal worms in the last six months

Background characteristics	Children (6-11 months) given any drug for intestinal worms in the last six months[1]	
Sex	N	% [95% CI]
Male	225	17.7 [12.6, 24.2]
Female	267	14.5 [10.3, 19.9]
Residence		
Urban	221	19.4 [12.0, 29.9]
Rural	271	13.8 [10.0, 18.7]
Zone		
North Central	79	11.8 [5.4, 24.1]
North East	76	13.8 [5.6, 30.3]
North West	87	1.2 [0.3, 5.4]
South East	61	35.0 [22.9, 49.4]
South South	89	57.1 [44.6, 68.7]
South West	100	11.3 [6.2, 19.8]
Wealth quintile		
Lowest	87	8.3 [4.2, 16.1]
Second	92	12.4 [6.8, 21.6]
Middle	97	20.9 [12.6, 32.6]
Fourth	119	21.1 [14.1, 30.2]
Highest	93	19.4 [9.4, 35.6]
Caregiver's educational attainment		
None	111	8.7 [4.5, 16.1]
Primary	85	15.3 [8.8, 25.4]
Secondary	213	21.8 [16.0, 29.0]
Tertiary	55	26.1 [12.9, 45.8]
National	**492**	**15.9 [12.3, 20.4]**

[1]Only children 12-59 months are eligible for deworming
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval

Use of therapeutic feeds: Use of ready-to-use therapeutic feeds/plumpy'nut

Table 64 presents the percentage of children aged 6-59 months who received some form of therapeutic feeds in the past 12 months, and those who received some form of therapeutic feeds the day before the interview stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status.

There was a *statistically significant difference in the percentage of children 6-59 months who received any ready-to-use therapeutic feeds/plumpy'nut in the past 12 months* between the zones (P = 0.002). The prevalence was highest among children in the North East zone (6.2 percent).

There was a *statistically significant difference in the percentage of children aged 6-59 months who received any ready-to-use therapeutic feeds/plumpy'nut a day before the interview* between the age groups (P = 0.042). The prevalence was highest among children in the 6 to 11-month age category (0.8 percent).

Table 64. Use of therapeutic feeds in the past 12 months and the day before the interviews among children aged 6-59 months, Nigeria 2021

Background characteristics	Given any ready to use therapeutic feeds/ plumpy'nut in the last twelve months		Given any ready to use therapeutic feeds/ plumpy'nut yesterday	
	N	% [95% CI]	N	% [95% CI]
Age category	(*P* = 0.395)		(*P*= 0.042*)	
6-11 months	494	1.4 [0.5, 4.1]	494	0.8 [0.3, 2.4]
12-23 months	1138	2.2 [1.3, 3.9]	1138	0.5 [0.2, 1.4]
24-35 months	1181	2.3 [1.3, 3.9]	1181	0.3 [0.1, 0.9]
36-47 months	1201	2.6 [1.5, 4.5]	1201	0.2 [0.0, 1.0]
48-59 months	902	3.5 [1.7, 7.1]	902	0.2 [0.0, 1.5]
Sex	(*P*= 0.538)		(*P*= 0.905)	
Male	2471	2.3 [1.5, 3.6]	2471	0.3 [0.1, 0.7]
Female	2445	2.7 [1.5, 4.8]	2445	0.4 [0.2, 1.0]
Residence	(*P*= 0.920)		(*P*= 0.317)	
Urban	2011	2.6 [1.1, 5.7]	2011	0.5 [0.2, 1.1]
Rural	2905	2.5 [1.4, 4.2]	2905	0.3 [0.1, 0.8]
Zone	(*P*= 0.002**)		(*P*= 0.093)	
North Central	771	1.5 [0.5, 4.4]	771	0.3 [0.1, 1.4]
North East	827	6.2 [2.9, 12.9]	827	0.7 [0.2, 2.3]
North West	908	2.3 [1.1, 4.7]	908	0.2 [0.1, 0.6]
South East	716	0.5 [0.1, 2.4]	716	0.1 [0.0, 0.5]
South South	834	1.7 [0.5, 5.4]	834	0.8 [0.2, 3.8]
South West	860	0.5 [0.2, 1.5]	860	0.0 [0.0, 0.3]
Wealth quintile[1]	(*P*= 0.870)		(*P*= 0.183)	
Lowest	1052	2.9 [1.6, 5.3]	1052	0.0 [., .]
Second	1023	2.0 [0.9, 4.1]	1023	0.5 [0.2, 1.4]
Middle	975	2.5 [1.0, 6.2]	975	0.6 [0.2, 2.3]
Fourth	959	2.7 [1.5, 5.0]	959	0.5 [0.2, 1.4]
Highest	886	2.5 [1.2, 5.1]	886	0.2 [0.1, 0.6]
Caregiver's educational attainment[1]	(*P*= 0.429)		(*P*= 0.179)	
None	1311	3.1 [1.7, 5.5]	1311	0.3 [0.1, 0.8]
Primary	764	1.9 [0.9, 4.2]	764	0.0 [., .]
Secondary	2000	2.0 [1.1, 3.7]	2000	0.5 [0.2, 1.4]
Tertiary	519	2.8 [1.3, 6.0]	519	0.7 [0.2, 2.4]
National	**4916**	**2.5 [1.6, 3.9]**	**4916**	**0.4 [0.2, 0.7]**

The data are based on questions chs20 and chs21 of the biomarker questionnaire
chs20. In the last 12 months, was [name of child] given any ready to use therapeutic feeds/plumpy'nut like (show locally sourced product) because the child was malnourished?
chs21. Did [name of child] consume it yesterday?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001)
Number of children 6-59 months who responded nationally: (n= 4916)
[1]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires

Table 65 presents the percentage of children (aged 6-59 months) who were identified as having wasting, who received any therapeutic feeds in the past 12 months, and those who received some form of therapeutic feeds the day before the interview stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status.

Nationally, 2.8 percent of children with wasting reported receiving therapeutic feeds/plumpy'nut in the past 12 months. There was no significant variation across the background characteristics.

Nationally, 0.6 percent of children with wasting reported receiving therapeutic feeds/plumpy'nut a day before the interview. There was no significant variation across the background characteristics.

Table 65. Use of therapeutic feeds in the past 12 months and the day before the interviews among children with wasting (aged 6-59 months), Nigeria 2021

Background characteristics	Given any ready to use therapeutic feeds/ plumpy'nut in the last twelve months		Given any ready to use therapeutic feeds/ plumpy'nut yesterday	
	N	% [95% CI]	N	% [95% CI]
Age category	(*P* = 0.194)		(*P* = 0.840)	
6-11 months	106	1.0 [0.1, 6.9]	106	1.0 [0.1, 6.9]
12-23 months	192	2.9 [1.0, 7.6]	192	1.0 [0.1, 6.8]
24-35 months	87	3.5 [0.7, 15.4]	87	0.0 [., .]
36-47 months	59	0.0 [., .]	59	0.0 [., .]
48-59 months	57	9.1 [2.3, 30.3]	57	0.0 [., .]
Sex	(*P* = 0.912)		(*P* = 0.606)	
Male	267	2.9 [1.1, 7.3]	267	0.4 [0.1, 2.8]
Female	234	2.7 [0.9, 7.5]	234	0.8 [0.1, 5.4]
Residence	(*P* = 0.810)		(*P* = 0.308)	
Urban	199	2.3 [0.3, 14.1]	199	1.2 [0.2, 7.4]
Rural	302	3.0 [1.3, 7.0]	302	0.3 [0.0, 2.3]
Zone	(*P* = 0.467)		(*P* = 0.818)	
North Central	60	3.5 [0.4, 23.9]	60	0.0 [., .]
North East	122	5.5 [1.9, 15.3]	122	1.3 [0.2, 8.4]
North West	115	2.0 [0.4, 9.0]	115	0.6 [0.1, 4.1]
South East	63	0.0 [., .]	63	0.0 [., .]
South South	72	0.0 [., .]	72	0.0 [., .]
South West	69	0.0 [., .]	69	0.0 [., .]
Wealth quintile[1]	(*P* = 0.121)		(*P* = 0.398)	
Lowest	139	6.3 [2.5, 15.0]	139	0.0 [., .]
Second	101	3.7 [1.2, 11.0]	101	2.6 [0.6, 9.9]
Middle	81	0.0 [., .]	81	0.0 [., .]
Fourth	89	0.0 [., .]	89	0.0 [., .]
Highest	90	0.0 [., .]	90	0.0 [., .]
Caregiver's educational attainment[1]	(*P* = 0.113)		(*P* = 0.595)	
None	165	6.1 [2.6, 13.5]	165	1.4 [0.3, 5.6]
Primary	75	1.9 [0.3, 12.5]	75	0.0 [., .]
Secondary	183	0.0 [., .]	183	0.0 [., .]
Tertiary	44	0.0 [., .]	44	0.0 [., .]
National	**501**	**2.8 [1.2, 6.2]**	**501**	**0.6 [0.1, 2.4]**

The data are based on questions chs20 and chs21 of the biomarker questionnaire
chs20. In the last 12 months, was [name of child] given any ready to use therapeutic feeds/plumpy'nut like (show locally sourced product) because the child was malnourished?
chs21. Did [name of child] consume it yesterday?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001)
Number of children 6-59 months who were identified as having wasting nationally: (n= 501)

Self-reported morbidity prevalence and anaemia risk factors among children (aged 6-59 months)

A key objective of the survey was to assess morbidity as a critical factor associated with anaemia.

Figure 41 presents the prevalence of self-reported morbidity and other anaemia risk factors (reported by caregivers) among children (aged 6-59 months). The prevalence of diarrhoea in the past two weeks among children (6-59 months) was 35 percent. The presence of blood in stool in the past two weeks was reported among 8 percent of children (6-59 months), and those who reported having diarrhoea a day before the interview were 14 percent, nationally. Fever in the past two weeks was reported in 46 percent of children (6-59 months). About 37 percent of children (aged 6-59 months) had cough in the past two weeks, while the prevalence of fast, short, rapid breaths or difficulty breathing at any time in the past two weeks was 13 percent. Pica in the past seven days was reported among 20 percent of children (aged 6-59 months).

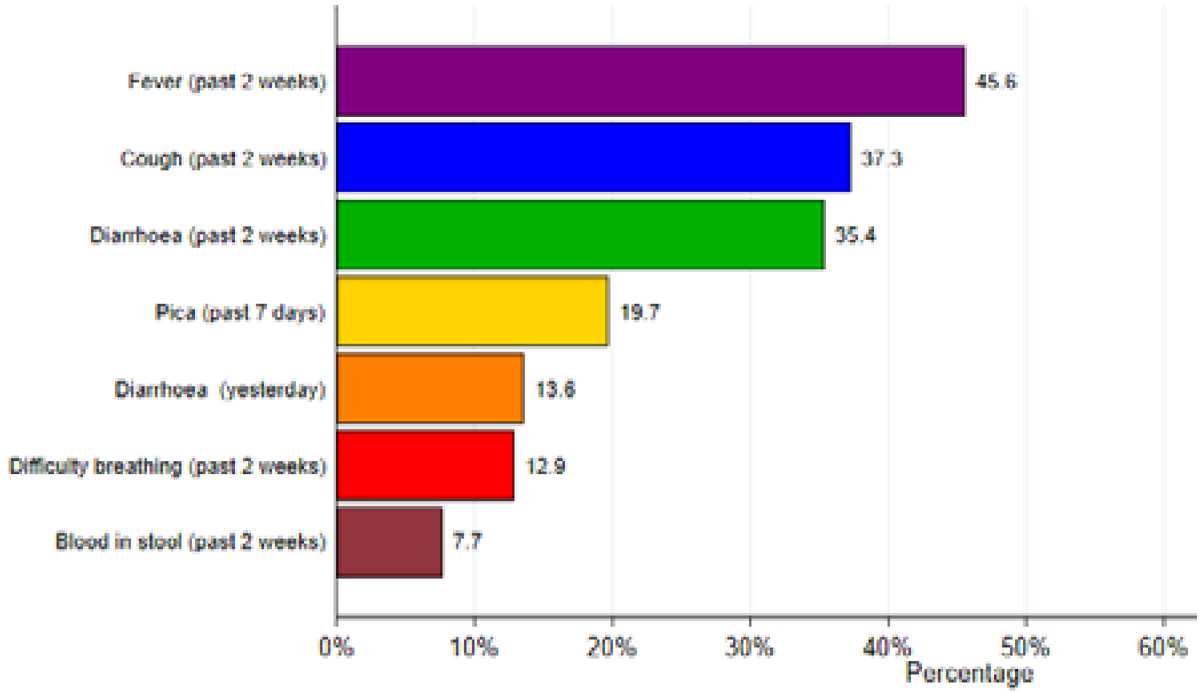

Figure 41. Prevalence of self-reported morbidity (reported by caregiver), and anaemia risk among children (aged 6-59 months), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of children 6-59 months who responded nationally: (n= 4916)

Diarrhoea

Diarrhoea is defined as having three or more loose or watery stools in past 24 hours.

Table 66 presents the prevalence of diarrhoea among children (6-59 months) stratified by age, sex, residence, zone, wealth quintile, caregiver's educational attainment, source of drinking water, and type of toilet facility in the household.

- **Had diarrhoea in the past two weeks**: There was a statistically significant difference in the *percentage of children (6-59 months) who were ill with diarrhoea in the past two weeks before the interview* among the age groups ($P < 0.001$), residence ($P = 0.042$), zone ($P < 0.001$), wealth quintile ($P = 0.001$), and caregivers' educational attainment ($P = 0.001$). The prevalence of diarrhoea in the past two weeks among children (6-59 months) was lowest in the 48-59-months old age category (22 percent). It was higher among children residing in rural (37 percent) compared to urban (32 percent) areas. It was highest in the North East zone (45 percent). The prevalence of diarrhoea in the past two weeks among children (aged 6-59 months) was lowest among children in the highest wealth quintile (27 percent). It was lowest among children whose caregivers had attained tertiary education (27 percent).
- **Had blood in stool in the past two weeks**: There was a statistically significant difference in the *percentage of children (aged 6-59 months) who had experienced blood in stool in the past two weeks* before the interview among residence ($P = 0.001$), zone ($P = 0.015$), wealth quintile ($P = 0.018$) and type of toilet facility ($P = 0.027$). The prevalence of blood in stool in the past two weeks among children (6-59 months) was higher among children residing in rural (9 percent) against urban (5 percent) areas. It was lowest among children in the South West zone (4 percent) , in children in the highest wealth quintile (3 percent), and whose households use improved toilet facility (5 percent).
- **Had diarrhoea yesterday**: There was a statistically significant difference in *the percentage of children (aged 6-59 months) who were ill with diarrhoea a day before the interview* among age groups ($P < 0.001$), sex ($P = 0.008$), zone ($P < 0.001$), wealth quintile ($P = 0.018$), and caregivers' educational attainment ($P = 0.001$). The prevalence of diarrhoea the day before the interview among children (aged 6-59 months) was highest in the 6-11 month age category (24 percent). It was higher in the males (15 percent) than in the female (12 percent). It was highest in the North East zone (19 percent). The prevalence was highest among children in the lowest wealth quintile (18 percent). It was highest among children whose caregivers had no education (17 percent).

Table 66. Prevalence of diarrhoea[1] and blood in stool among children (aged 6-59 months), Nigeria 2021

Background characteristics	Had diarrhoea in the past two weeks		Had blood in stool in the past two weeks		Had diarrhoea yesterday	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category	(*P* < 0.001***)		(*P* = 0.353)		(*P* < 0.001***)	
6-11 months	494	45.5 [39.1, 52.1]	487	8.2 [4.9, 13.4]	492	24.0 [18.9, 29.8]
12-23 months	1133	46.0 [40.8, 51.3]	1125	9.3 [6.9, 12.5]	1133	19.4 [16.0, 23.2]
24-35 months	1177	36.6 [32.8, 40.7]	1169	8.0 [5.8, 11.1]	1176	12.1 [9.6, 15.2]
36-47 months	1191	29.8 [25.8, 34.1]	1177	6.2 [4.5, 8.4]	1191	11.0 [8.3, 14.5]
48-59 months	887	22.3 [18.6, 26.6]	881	7.0 [4.6, 10.4]	894	6.1 [4.0, 9.1]
Sex	(*P* = 0.206)		(*P* = 0.708)		(*P* = 0.008 **)	
Male	2452	36.5 [33.5, 39.6]	2427	7.9 [6.2, 10.0]	2452	15.2 [12.8, 18.0]
Female	2430	34.2 [30.9, 37.7]	2412	7.5 [5.7, 9.8]	2434	11.9 [9.9, 14.3]
Residence	(*P* = 0.042 *)		(*P* = 0.001 **)		(*P*= 0.177)	
Urban	2002	31.6 [27.7, 35.8]	1975	4.5 [3.2, 6.4]	2000	11.5 [8.4, 15.4]
Rural	2880	37.2 [33.8, 40.8]	2864	9.2 [7.2, 11.8]	2886	14.6 [12.2, 17.5]
Zone	(*P* < 0.001***)		(*P* = 0.015*)		(*P* < 0.001***)	
North Central	768	37.6 [31.8, 43.8]	765	9.1 [6.4, 12.7]	768	12.6 [9.2, 16.8]
North East	815	44.7 [38.4, 51.1]	810	9.6 [6.7, 13.6]	822	19.4 [14.6, 25.3]
North West	905	35.9 [30.1, 42.0]	905	9.4 [5.9, 14.4]	906	17.8 [13.7, 22.9]
South East	712	31.2 [26.7, 36.1]	714	4.0 [2.5, 6.5]	714	6.1 [4.3, 8.5]
South South	826	31.1 [26.8, 35.7]	789	4.9 [3.1, 7.6]	818	6.6 [4.8, 9.1]
South West	856	24.9 [21.5, 28.6]	856	3.5 [2.6, 4.6]	858	5.7 [4.3, 7.7]
Wealth quintile[2]	(*P* = 0.001 **)		(*P* = 0.018*)		(*P* = 0.001 ***)	
Lowest	1038	38.7 [33.7, 43.9]	1031	9.9 [7.0, 13.8]	1048	17.9 [14.2, 22.3]
Second	1020	40.1 [35.0, 45.5]	1012	9.0 [6.0, 13.1]	1023	16.9 [13.4, 21.0]
Middle	968	33.6 [29.6, 37.9]	965	7.2 [5.0, 10.2]	963	9.0 [6.6, 12.1]
Fourth	952	31.9 [27.7, 36.4]	948	7.0 [4.1, 11.5]	952	10.2 [7.9, 13.0]
Highest	883	27.1 [22.6, 32.3]	862	2.6 [1.5, 4.3]	879	9.4 [5.4, 15.9]
Caregiver's educational attainment[2]	(*P* = 0.001 **)		(*P* = 0.133)		(*P* = 0.000 ***)	
None	1296	39.5 [35.1, 44.0]	1291	9.2 [7.0, 12.0]	1305	17.4 [14.2, 21.1]
Primary	761	38.9 [33.2, 44.8]	756	9.2 [5.8, 14.3]	760	14.5 [10.7, 19.3]
Secondary	1987	32.8 [30.2, 35.5]	1962	6.9 [5.1, 9.3]	1982	9.2 [7.5, 11.2]
Tertiary	518	27.0 [22.0, 32.7]	510	4.2 [1.8, 9.4]	518	10.2 [6.8, 14.9]
Source of drinking water[2]	(*P* = 0.586)		(*P* = 0.529)		(*P* = 0.794)	
Improved	3625	35.0 [32.2, 38.0]	3593	7.9 [6.3, 9.8]	3627	13.5 [11.3, 16.0]
Unimproved	1237	36.5 [31.9, 41.3]	1226	7.1 [4.8, 10.3]	1239	13.9 [11.3, 17.0]
Type of toilet facility[2]	(*P* = 0.188)		(*P* = 0.027 *)		(*P* = 0.401)	
Improved facility	1492	31.2 [27.4, 35.4]	1475	4.6 [3.0, 7.0]	1488	11.0 [7.9, 15.2]
Unimproved facility	2110	36.9 [33.1, 40.9]	2091	8.1 [6.1, 10.7]	2114	14.6 [11.6, 18.2]
Open defecation	1260	36.4 [30.5, 42.6]	1253	10.1 [6.9, 14.5]	1264	14.0 [10.0, 19.3]
National	**4882[3]**	**35.4 [32.7, 38.1]**	**4839[4]**	**7.7 [6.2, 9.5]**	**4886[5]**	**13.6 [11.6, 15.8]**

The data are based on questions chs11, chs12, and chs13 of the biomarker questionnaire
chs11. Has [name of child] had diarrhoea in the last two weeks?
chs12. Was there any blood in the stools?
chs13. Did [name of child] have diarrhoea yesterday?
[1]Diarrhoea is defined as three or more loose or watery stools in a 24-hour period
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of children (aged 6-59 months) who responded nationally: (n= 4916)
[2]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires
[3]Less than (n = 4916) due to the response "Don't Know"
[4]Less than (n = 4916) due to the response "Don't Know"
[5]Less than (n = 4916) due to the response "Don't Know"

Figure 42 presents the reported diarrhoea treatments for children (aged 6-59 months). **Table 67** looks at three of the most frequently used diarrhoea treatments for children (that are not homemade) reported by caregivers, pooled at the national level. The data are stratified by age, sex, residence, zone, wealth quintile, mother's education, source of drinking water, and type of toilet facility.

- **ORS (Oral Rehydration Salt):** About 39 percent of children received ORS treatment for diarrhoea. There was a statistically significant difference in the *percentage of children with diarrhoea who received ORS treatment* with the type of toilet facility used by the household (P = 0.019). ORS treatment for diarrhoea among children (aged 6-59 months) who had diarrhoea was highest among children in households with improved toilet facility (54 percent).
- **Pill/Syrup antibiotic:** About 28 percent of children received antibiotics treatment for diarrhoea. There was a statistically significant difference in the *percentage of children with diarrhoea who received pill/syrup antibiotics* among the zone (P = 0.015), wealth quintile (P = 0.025), caregivers' educational attainment (P = 0.002), and type of toilet facility (P = 0.005). The use of pill/syrup antibiotics among children (aged 6-59 months) with diarrhoea was lowest in the South South zone (14 percent). It was lowest among children in the fourth wealth quintile (18 percent). It was highest among children whose caregivers had no educational attainment (36 percent) and in households with unimproved toilet facility (33 percent).
- **Antimotility:** About 13 percent of children received antimotility treatment for diarrhoea. There was a statistically significant difference in the *percentage of children with diarrhoea who received antimotility drugs* among sex (P = 0.035), residence (P = 0.001), zone (P < 0.001), and wealth quintile (P = 0.047). The use of pill/syrup antibiotics among children (aged 6-59 months) with diarrhoea was higher in male (16 percent) compared to female (10 percent) children. It was higher among children residing in urban (28 percent) than in rural (7 percent) areas. It was highest in the North East zone (36 percent). It was lowest among children in the lowest wealth quintile (7 percent).

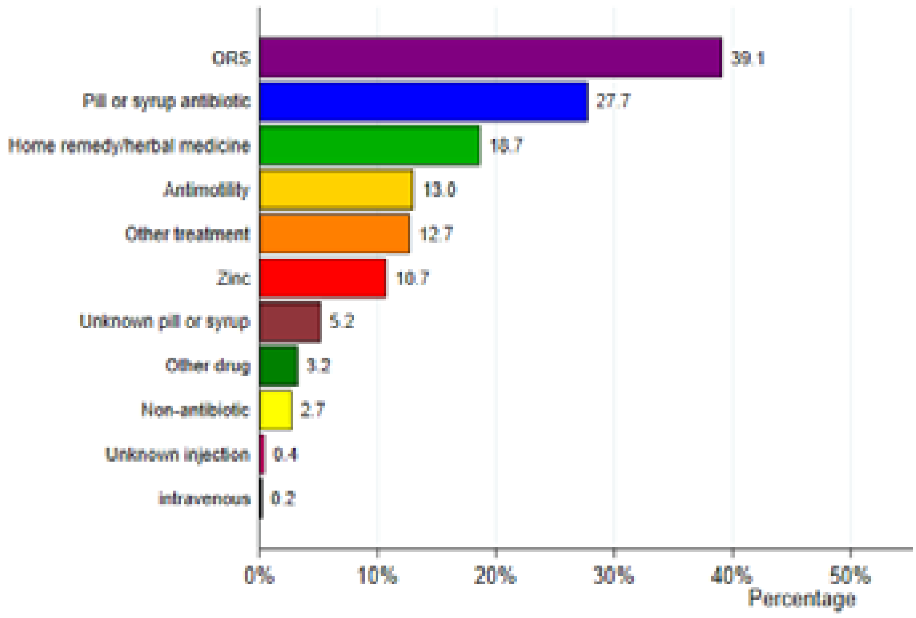

Figure 42. Reported treatments for diarrhoea in children (aged 6-59 months), Nigeria 2021
The data are based on questions chs14 and chs15 of the biomarker questionnaire
chs14. Was [name of child] given any of the following to drink at any time since he/she started having diarrhoea: A fluid made from a special packet called (local name for ORS packet)? A pre-packaged ORS liquid? (Show locally sourced ORS packet)
ORS – Oral Rehydration Salt
chs15. What (else) was given to treat diarrhoea? Data are weighted to account for survey design and non-response
Number of children (aged 6-59 months) who responded nationally: (n= 4916)

Table 67. Most common[1] diarrhoea treatment among children (aged 6-59 months), Nigeria 2021

Background characteristics	ORS		Pill/Syrup Antibiotic		Antimotility	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category	(*P* = 0.273)		(*P* = 0.478)		(*P* = 0.874)	
6-11 months	95	26.3 [17.4, 37.6]	97	21.4 [12.6, 34.0]	97	13.5 [5.7, 28.9]
12-23 months	171	42.2 [31.6, 53.7]	173	24.9 [17.1, 34.8]	173	11.7 [7.3, 18.2]
24-35 months	117	41.4 [29.8, 54.1]	118	31.2 [22.1, 41.9]	118	11.5 [5.2, 23.5]
36-47 months	90	39.8 [26.4, 55.0]	93	27.0 [16.6, 40.8]	93	14.8 [7.2, 28.0]
48-59 months	44	46.2 [30.5, 62.7]	45	37.8 [18.1, 62.6]	45	16.7 [4.7, 45.1]
Sex	(*P* = 0.207)		(*P* = 0.371)		(*P* = 0.035 *)	
Male	285	36.4 [28.4, 45.2]	288	25.6 [19.4, 33.0]	288	15.7 [9.2, 25.7]
Female	232	42.7 [35.5, 50.2]	238	30.4 [22.1, 40.3]	238	9.5 [5.5, 15.9]
Residence	(*P* = 0.148)		(*P* = 0.235)		(*P* = 0.001 **)	
Urban	176	45.5 [37.1, 54.2]	177	22.3 [14.1, 33.4]	177	27.9 [14.6, 46.8]
Rural	341	36.6 [28.7, 45.3]	349	29.8 [23.4, 37.1]	349	7.3 [4.4, 12.0]
Zone	(*P* = 0.113)		(*P* = < 0.0478*)		(*P* < 0.001 ***)	
North Central	84	32.1 [18.7, 49.3]	86	21.1 [13.0, 32.3]	86	11.4 [4.6, 25.6]
North East	150	50.1 [42.2, 57.9]	153	21.7 [13.1, 33.8]	153	36.4 [22.6, 52.8]
North West	135	35.4 [24.4, 48.2]	136	35.7 [25.9, 46.9]	136	0.6 [0.1, 4.2]
South East	48	22.7 [11.6, 39.6]	48	16.8 [7.7, 32.9]	48	15.9 [8.0, 29.3]
South South	51	31.4 [16.2, 52.0]	52	13.9 [5.5, 30.8]	52	11.6 [5.0, 24.8]
South West	49	47.3 [31.3, 63.9]	51	28.1 [15.8, 45.0]	51	3.1 [0.4, 18.9]
Wealth quintile[2]	(*P* = 0.051)		(*P* = 0.025 *)		(*P* = 0.047 *)	
Lowest	142	36.8 [26.4, 48.6]	147	23.4 [13.7, 37.1]	147	7.2 [3.3, 15.1]
Second	146	32.5 [22.5, 44.3]	149	38.7 [29.7, 48.6]	149	11.0 [5.2, 21.9]
Middle	84	36.0 [24.6, 49.3]	85	21.0 [12.2, 33.5]	85	12.2 [6.4, 21.9]
Fourth	89	55.1 [40.9, 68.5]	89	18.3 [10.8, 29.2]	89	20.4 [9.4, 38.8]
Highest	53	52.8 [41.5, 63.9]	53	26.0 [14.8, 41.6]	53	31.1 [11.8, 60.5]
Caregiver's educational attainment[2]	(*P* = 0.122)		(*P* = 0.002 **)		(*P* = 0.056)	
None	183	37.7 [29.1, 47.1]	186	35.5 [26.2, 45.9]	186	9.4 [5.5, 15.6]
Primary	85	25.9 [14.3, 42.3]	90	19.5 [11.2, 31.6]	90	11.7 [3.6, 31.7]
Secondary	172	47.0 [35.4, 59.0]	173	19.2 [12.4, 28.5]	173	24.1 [12.9, 40.7]
Tertiary	37	55.4 [31.0, 77.5]	37	19.8 [9.4, 37.1]	37	27.9 [10.2, 56.9]
Source of drinking water[2]	(*P* = 0.997)		(*P*= 0.733)		(*P* = 0.484)	
Improved	384	39.1 [32.3, 46.4]	390	27.3 [21.0, 34.7]	390	12.0 [7.1, 19.6]
Unimproved	130	39.1 [29.0, 50.4]	133	28.7 [18.6, 41.6]	133	15.3 [7.5, 28.8]
Type of toilet facility[2]	(*P* = 0.019 *)		(*P* = 0.005 **)		(*P* = 0.060)	
Improved facility	112	54.4 [44.5, 63.9]	112	20.1 [12.3, 31.3]	112	26.4 [10.9, 51.3]
Unimproved facility	268	35.8 [27.0, 45.7]	271	33.3 [25.5, 42.0]	271	10.6 [6.1, 17.9]
Open defecation	134	33.8 [25.1, 43.8]	140	20.0 [14.2, 27.5]	140	7.1 [2.4, 19.4]
National	**517[3]**	**39.1 [32.8, 45.8]**	**526[4]**	**27.7 [22.3, 33.9]**	**526[5]**	**13.0 [8.0, 20.5]**

The data are based on questions chs14 and chs15 of the biomarker questionnaire
chs14. Was [name of child] given any of the following to drink at any time since he/she started having diarrhoea: A fluid made from a special packet called (local name for ORS packet)? A pre-packaged ORS liquid? (Show locally sourced ORS packet)
chs15. What (else) was given to treat diarrhoea?
See Figure 42 linked to chs15
[1]Most common treatments are the top three (not homemade) as reported by caregivers, pooled at the national level.
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001)
Number of children (aged 6-59 months) who had diarrhoea who responded nationally: (n= 526)
[2]Less than (n = 526) due to relatively fewer respondents for the household and dietary intake questionnaires
[3]Less than (n = 526) due to response "Don't Know"

Fever and Cough

Table 68 presents the prevalence of fever and cough among children (aged 6-59 months) , stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status.

- **Fever**: There was a statistically significant difference in the *prevalence of fever among children (aged 6-59 months)* in the past two weeks with the zone (*P* = 0.004). The percentage of children (aged 6-58 months) ill with fever in the past two weeks was lowest in the North West (40 percent) and South West (40 percent) zones.

- **Cough**: There was a statistically significant difference in *the prevalence of cough among children (aged 6-59 months) in the past two weeks* among age groups (*P* = 0.019), zone (*P* < 0.001), wealth quintile (*P* = 0.001), and caregivers' educational attainment (*P* < 0.001). The percentage of children (aged 6-58 months) who were ill with cough in the past two weeks was highest in the 12-23 months age category (41 percent). It was lowest among children in the North West zone (24 percent). It was highest among children in the highest wealth quintile (47 percent). It was lowest among children whose caregivers had no educational attainment (31 percent).

- **Fast, short, rapid breaths or difficulty breathing**: There was a statistically significant difference in the *prevalence of fast, short, rapid breaths or difficulty breathing among children (aged 6-59 months) in the past two weeks* among zone (*P* < 0.001), wealth quintile (*P* < 0.001), and caregivers' educational attainment (*P* = 0.035). The percentage of children (aged 6-58 months) who were ill with fast, short, rapid breaths or difficulty breathing in the past two weeks was highest in children in the North East zone (21 percent). It was highest among children in the lowest wealth quintile (19 percent). It was highest in children whose caregivers had no educational attainment (16 percent).

Table 68. Prevalence of fever, cough, and difficulty breathing among children (aged 6-59 months), Nigeria 2021

Background characteristics	Child ill with a fever at any time in the past two weeks		Child had a cough in the past two weeks		Child had fast, short, rapid breaths or difficulty breathing at any time in the past two weeks	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* = 0.059)		(*P* = 0.019 *)		(*P* = 0.585)
6-11 months	491	46.7 [38.0, 55.6]	494	39.6 [32.5, 47.1]	485	11.8 [8.5, 16.3]
12-23 months	1130	49.8 [45.6, 53.9]	1137	41.4 [37.1, 45.8]	1124	13.3 [10.6, 16.6]
24-35 months	1176	47.5 [42.9, 52.1]	1178	38.2 [34.0, 42.6]	1160	14.2 [11.4, 17.5]
36-47 months	1197	43.8 [38.5, 49.3]	1195	36.0 [32.2, 40.1]	1183	13.2 [10.2, 16.8]
48-59 months	896	39.6 [34.2, 45.1]	900	31.4 [27.3, 35.9]	891	10.8 [8.1, 14.2]
Sex		(*P* = 0.302)		(*P* = 0.507)		(*P* = 0.558)
Male	2458	46.6 [43.0, 50.3]	2467	36.7 [33.6, 39.8]	2433	13.3 [11.5, 15.3]
Female	2432	44.5 [40.8, 48.2]	2437	37.9 [34.4, 41.6]	2410	12.5 [10.4, 14.9]
Residence		(*P* = 0.519)		(*P* = 0.097)		(*P* = 0.208)
Urban	2002	44.0 [38.3, 49.9]	2004	40.8 [36.3, 45.4]	1977	11.3 [8.7, 14.5]
Rural	2888	46.3 [42.6, 50.0]	2900	35.6 [32.0, 39.4]	2866	13.6 [11.9, 15.6]
Zone		(*P* = 0.004 **)		(*P* < 0.001 ***)		(*P* < 0.001 ***)
North Central	764	47.7 [43.4, 52.0]	770	45.1 [38.5, 51.8]	757	12.2 [9.3, 15.8]
North East	824	53.0 [45.4, 60.4]	822	45.1 [37.9, 52.5]	818	21.4 [16.8, 26.9]
North West	907	39.8 [32.8, 47.2]	908	23.8 [18.1, 30.6]	908	11.0 [8.6, 14.0]
South East	716	52.5 [46.4, 58.5]	716	50.3 [45.1, 55.5]	715	8.6 [6.4, 11.5]
South South	820	51.4 [45.4, 57.4]	828	44.9 [40.4, 49.5]	785	13.2 [10.0, 17.3]
South West	859	39.6 [36.0, 43.3]	860	39.5 [35.5, 43.6]	860	8.3 [6.0, 11.4]
Wealth quintile[1]		(*P* = 0.817)		(*P* = 0.001 ***)		(*P* < 0.001 ***)
Lowest	1046	45.4 [40.5, 50.4]	1048	34.2 [29.9, 38.9]	1040	18.8 [15.3, 22.9]
Second	1019	46.8 [40.6, 53.2]	1023	31.5 [27.0, 36.5]	1012	10.8 [8.2, 13.9]
Middle	966	45.9 [41.6, 50.1]	970	38.0 [33.0, 43.3]	950	11.3 [8.5, 14.7]
Fourth	953	46.3 [41.5, 51.1]	958	42.2 [38.0, 46.5]	950	10.8 [8.0, 14.6]
Highest	885	42.3 [33.7, 51.5]	884	46.9 [39.4, 54.5]	871	10.1 [7.7, 13.2]
Caregiver's educational attainment[1]		(*P* = 0.735)		(*P* < 0.001 ***)		(*P* = 0.035 *)
None	1304	45.2 [40.4, 50.1]	1308	30.9 [26.7, 35.4]	1299	15.6 [12.3, 19.5]
Primary	757	49.0 [43.3, 54.7]	763	38.4 [33.7, 43.4]	753	9.3 [6.9, 12.5]
Secondary	1990	46.3 [42.8, 49.9]	1993	46.0 [42.3, 49.7]	1962	12.3 [10.4, 14.6]
Tertiary	518	46.6 [38.7, 54.8]	519	44.3 [39.2, 49.6]	509	12.9 [9.6, 17.0]
National	**4890**[2]	**45.6 [42.5, 48.7]**	**4904**[3]	**37.3 [34.5, 40.1]**	**4843**[4]	**12.9 [11.4, 14.5]**

The data are based on questions chs16, chs17, and chs18 of the biomarker questionnaire
chs 16. Has [name of child] been ill with a fever at any time in the last two weeks?
chs 17. Has [name of child] had an illness with a cough at any time in the last two weeks?
chs 18. Has [name of child] had fast, short, rapid breaths or difficulty breathing at any time in the last two weeks?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of children (aged 6-59 months) who responded nationally: (n= 4916)
[1]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 4916) due to the response "Don't Know"
[3]Less than (n = 4916) due to the response "Don't Know"
[4]Less than (n = 4916) due to the response "Don't Know"

Pica

The most common cause of eating non-food items (pica) is specific mineral deficiency such as iron. Pica is a symptom of iron deficiency anaemia and is often linked to a craving for ice, clay, and chalk. It is primarily seen in children and pregnant women.

Table 69 presents the prevalence of pica in the past seven days among children (aged 6-59 months) stratified by age, sex, residence, zone, wealth quintile, and caregiver's education status. There was a statistically significant difference in the *prevalence of pica in the past seven days among children (aged 6-59 months)* between the age groups ($P < 0.001$) and between the zones ($P = 0.005$). The percentage of children (aged 6-59 months) with pica was highest among the 6-to-11-month age category (38 percent). It was lowest in children in the North West zone (14 percent).

Table 69. Prevalence of pica among children (aged 6-59 months), Nigeria 2021

Background characteristics	Ate earth, clay, mud, or soil from any source (e.g., walls of mud houses, the yard, purchased at the market) in the last seven days		
	N	% [95% CI]	*P* value
Age category			
6-11 months	488	38.3 [30.9, 46.3]	(*P* < 0.001 ***)
12-23 months	1105	31.0 [26.8, 35.4]	
24-35 months	1142	16.0 [12.8, 19.6]	
36-47 months	1163	12.6 [10.3, 15.4]	
48-59 months	870	9.9 [7.5, 12.9]	
Sex			
Male	2398	19.5 [16.8, 22.6]	(*P* = 0.793)
Female	2370	19.9 [17.4, 22.7]	
Residence			
Urban	1953	19.3 [15.6, 23.7]	(*P* = 0.811)
Rural	2815	19.9 [17.1, 23.2]	
Zone			
North Central	734	23.9 [17.8, 31.3]	(*P* = 0.005 **)
North East	794	20.6 [15.4, 27.0]	
North West	901	13.9 [10.0, 19.0]	
South East	695	31.4 [26.0, 37.3]	
South South	793	25.0 [16.8, 35.3]	
South West	851	19.3 [15.4, 24.0]	
Wealth quintile[1]			
Lowest	1023	18.8 [15.3, 22.8]	(*P* = 0.910)
Second	1001	19.8 [15.6, 24.7]	
Middle	939	20.9 [17.7, 24.5]	
Fourth	924	20.3 [16.2, 25.1]	
Highest	864	18.7 [13.9, 24.7]	
Caregiver's educational attainment[1]			
None	1274	17.7 [14.8, 21.2]	(*P* = 0.092)
Primary	753	22.3 [16.9, 28.7]	
Secondary	1925	22.9 [19.1, 27.3]	
Tertiary	503	18.1 [13.7, 23.5]	
National	4768[2]	19.7 [17.4, 22.3]	

The data are based on question chs10 of the biomarker questionnaire
chs10. In the last seven days, has [name of child] eaten earth, clay, mud, or soil from any source (e.g., walls of mud houses, the yard, purchased at market)?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of children (aged 6-59 months) who responded nationally: (n= 4916)
[1]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 4916) due to the response "Don't Know"

Intervention coverage, health status, and anaemia risk factors among adolescent girls (aged 10-14 years)

Intervention coverage among adolescent girls (aged 10-14 years)

The MNDC guidelines[38] describe the following interventions to address micronutrient deficiencies among adolescent girls – deworming, iron, and folate supplementation. Some interventions are reflected in the NFPN[39], which prioritizes both the health system and food-based approaches to MNDC. An objective of the survey was to assess the coverage of these interventions among adolescent girls in Nigeria.

Figure 43 presents the coverage of nutrition-related interventions (multivitamin, iron or iron/folic acid tablets, deworming) and their use in the last six months among adolescent girls nationally. It was reported that 25 percent of adolescent girls used deworming treatment. The use of iron/folic acid tablets was reported among 11 percent of adolescent girls, while the use of multivitamins was reported among 9 percent of adolescent girls.

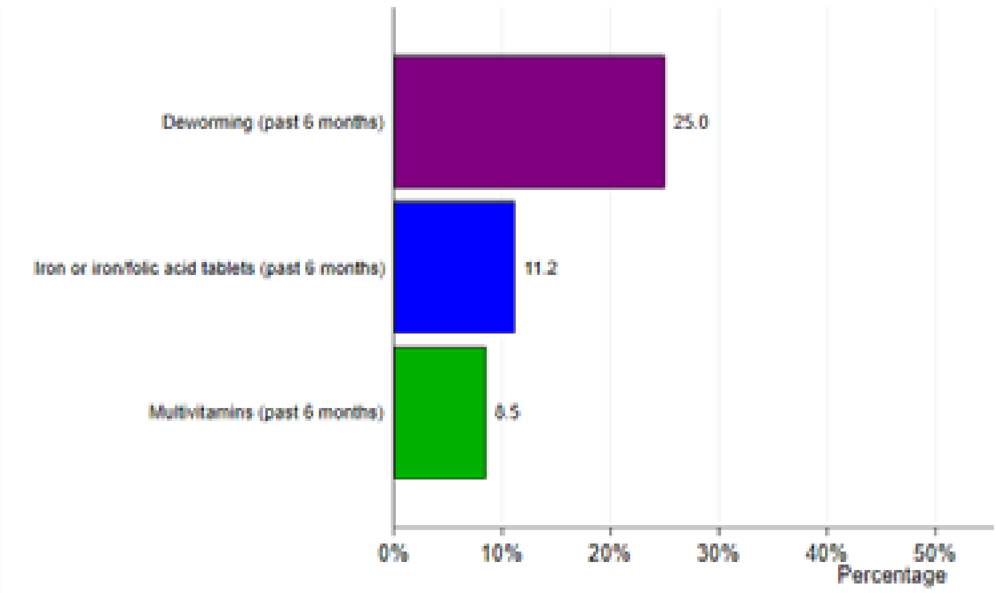

Figure 43. Coverage of nutrition-specific interventions among adolescent girls, Nigeria 2021
Data are weighted to account for survey design and non-response
Number of adolescent girls responding nationally: (n=1002)

Table 70 presents the use of multivitamins, iron or iron/folic acid tablets, and deworming treatment among adolescent girls (aged 10-14 years), stratified by age, residence, and wealth quintile.

a. Use of multivitamins in the past six months: There was a statistically significant difference in the *percentage of adolescent girls who reported use of multivitamins* with the wealth quintile ($P < 0.001$). The use of multivitamins was lowest in respondents in the lowest wealth quintile (0.7 percent).

b. Use of multivitamins in the past seven days: Figure 44 presents the frequency of use of multivitamins in the past seven days among adolescent girls. There was no significant variation in the use of multivitamins, at least once in the past seven days, among adolescent girls across the background characteristics.

38 Federal Ministry of Health (FMOH). 2013. National guidelines on micronutrients deficiencies control in Nigeria. Abuja: Federal Ministry of Health.
39 Ministry of Budget & National Planning. 2016. National Policy on Food and Nutrition in Nigeria. Abuja: Ministry of Budget and National Planning.

c. Use of iron or iron/folic acid tablets in the past six months: There was a statistically significant difference in the *percentage of adolescent girls who reported use of iron or iron/folic acid tablets in the past six months* between residence (*P* = 0.003) and between the wealth quintile (*P* < 0.001). Their use in the past six months was lower in the rural (8 percent) than in urban (16 percent) areas. Their use was lowest among respondents in the lowest wealth quintile (5 percent).

d. Use of iron or iron/folic acid tablets at least once in the past seven days: Figure 45 presents the frequency of use of any iron/folic acid in the past seven days among adolescent girls nationally. There was a statistically significant difference in the *prevalence of iron or iron/folic acid tablet use* between residence (*P* = 0.045). Their use in the past seven days was higher in the urban (9 percent) than in the rural (5 percent) areas.

e Deworming in the past six months: There was a statistically significant difference in the *prevalence of deworming* between residence (*P* = 0.005) and between the wealth quintile (*P* < 0.001). Deworming was higher among adolescent girls residing in urban (32 percent) than in rural (21 percent) areas. Deworming was lowest among adolescent girls in the second wealth quintile (13 percent).

Table 70. Use of multivitamin, iron or iron/folic acid tablets, and deworming treatment among adolescent girls (aged 10-14 years), Nigeria 2021

Background characteristics	Took any multivitamin tablets in the past six months		Took any multivitamin tablets at least once in the past seven days		Took any iron tablets or iron-folic acid in the past six months		Took any iron tablets, or iron-folic acid at least once in the past seven days		Took any drugs for intestinal worms in the past six months	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age		(*P* = 0.138)		(*P*= 0.755)		(*P*= 0.242)		(*P*= 0.391)		(*P*= 0.686)
10 years	265	8.7 [5.2, 14.2]	265	5.7 [2.8, 10.9]	265	11.4 [7.6, 16.6]	265	7.4 [4.5, 11.9]	264	25.6 [19.6, 32.7]
11 years	158	12.0 [5.9, 22.8]	158	5.4 [2.7, 10.7]	158	10.4 [6.5, 16.3]	158	6.2 [3.3, 11.4]	154	29.6 [21.6, 38.9]
12 years	195	6.8 [3.9, 11.8]	195	3.5 [1.6, 7.4]	195	8.7 [5.5, 13.7]	195	5.4 [3.1, 9.2]	194	21.0 [15.2, 28.1]
13 years	195	11.6 [6.7, 19.4]	195	7.2 [3.5, 14.1]	195	15.8 [10.3, 23.3]	195	9.2 [5.0, 16.5]	194	25.0 [17.6, 34.3]
14 years	190	3.7 [1.8, 7.4]	190	1.6 [0.6, 4.4]	190	9.0 [4.9, 16.1]	190	5.5 [2.7, 10.8]	187	25.1 [17.7, 34.3]
Residence		(*P*= 0.067)		(*P*= 0.369)		(*P*= 0.003 **)		(*P*= 0.045 *)		(*P*= 0.005 **)
Urban	421	11.6 [7.3, 18.1]	421	7.3 [3.7, 13.9]	421	16.1 [11.8, 21.7]	421	9.3 [5.9, 14.3]	416	32.1 [26.6, 38.3]
Rural	582	6.6 [4.5, 9.6]	582	3.2 [2.1, 5.0]	582	8.3 [6.0, 11.2]	582	5.4 [3.7, 7.8]	577	20.9 [16.6, 26.1]
Wealth quintile[1]		(*P*< 0.001 ***)		(*P*= 0.468)		(*P*< 0.001 ***)		(*P*= 0.457)		(*P*< 0.001 ***)
Lowest	213	0.7 [0.1, 3.2]	213	0.2 [0.0, 1.2]	213	4.5 [2.3, 8.7]	213	2.0 [0.8, 5.1]	212	15.5 [10.1, 23.1]
Second	191	6.3 [3.7, 10.5]	191	4.5 [2.4, 8.3]	191	8.4 [4.7, 14.6]	191	5.1 [2.5, 9.9]	190	12.9 [8.3, 19.5]
Middle	206	14.7 [8.4, 24.4]	206	6.4 [2.8, 13.7]	206	16.8 [11.4, 24.2]	206	11.1 [6.9, 17.4]	204	20.7 [14.9, 27.9]
Fourth	198	13.1 [8.1, 20.5]	198	8.0 [4.0, 15.5]	198	19.2 [13.2, 27.0]	198	12.1 [7.1, 19.9]	198	45.4 [36.8, 54.3]
Highest	191	11.0 [6.1, 19.0]	191	6.6 [3.4, 12.6]	191	9.4 [5.4, 16.0]	191	5.8 [2.8, 11.7]	185	40.4 [30.9, 50.6]
National	**1003**	**8.5 [6.3, 11.3]**	**1003**	**4.7 [3.1, 7.2]**	**1003**	**11.1 [8.9, 13.7]**	**1003**	**6.8 [5.1, 9.1]**	**993[2]**	**25.0 [21.6, 28.7]**

The data are based on questions wtt2, wtt3, wtt4, wtt5, and wrf2 of the biomarker questionnaire
wtt2. During the last six months, did you take any multivitamin tablets?
wtt3. How many days did you take any of these products in the last seven days? See Figure 44 for more details.
wtt4. During the last six months, did you take any iron/folic acid tablets?
wtt5. How many days did you take any iron/folic acid tablets in last seven days? See Figure 45 for more details.
wrf2. Did you take any drugs for intestinal worms in the past six months?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of adolescent girls who responded nationally: (n=1003)
[1]Less than (n = 1003) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 1003) due to the response of “Don’t Know”

Figure 44 presents the frequency of use of multivitamins in the past seven days among adolescent girls. Among adolescent girls who responded in the affirmative, 37 percent took multivitamins for the entire seven days.

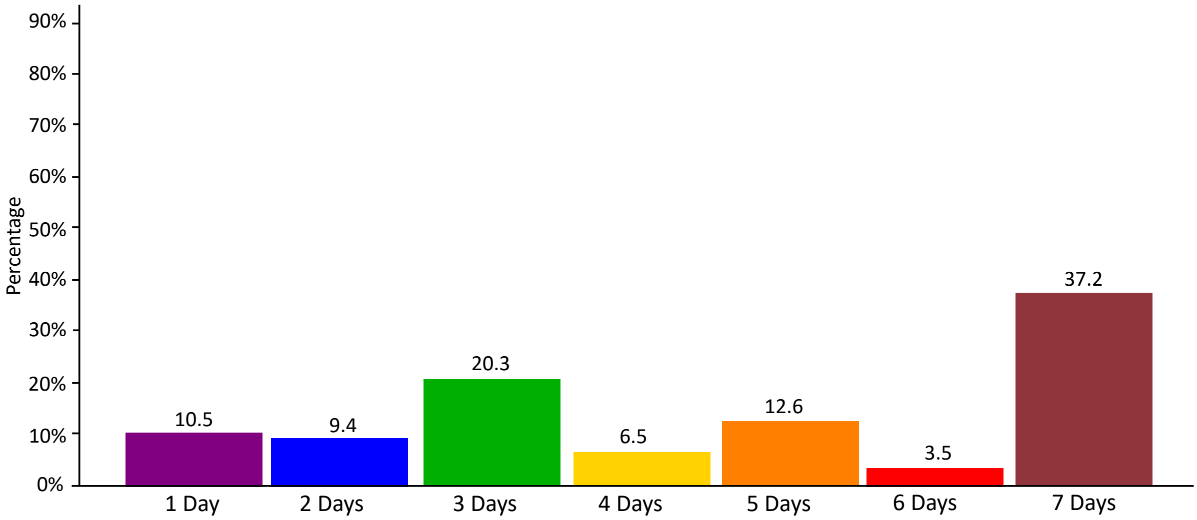

Figure 44. Frequency of use of multivitamins in the past seven days among adolescent girls (aged 10-14 years), Nigeria 2021
Based on question wtt3. How many days did you take any of these products [any multivitamin tablets] in the last seven days?
Data are weighted to account for survey design and non-response
Number of adolescent girls who responded nationally: (n=1003)

Figure 45 presents the frequency of use of some form of iron/folic acid tablets in the past seven days among adolescent girls. Among adolescent girls who responded in the affirmative, 16 percent took iron/folic acid tablets for the entire seven days.

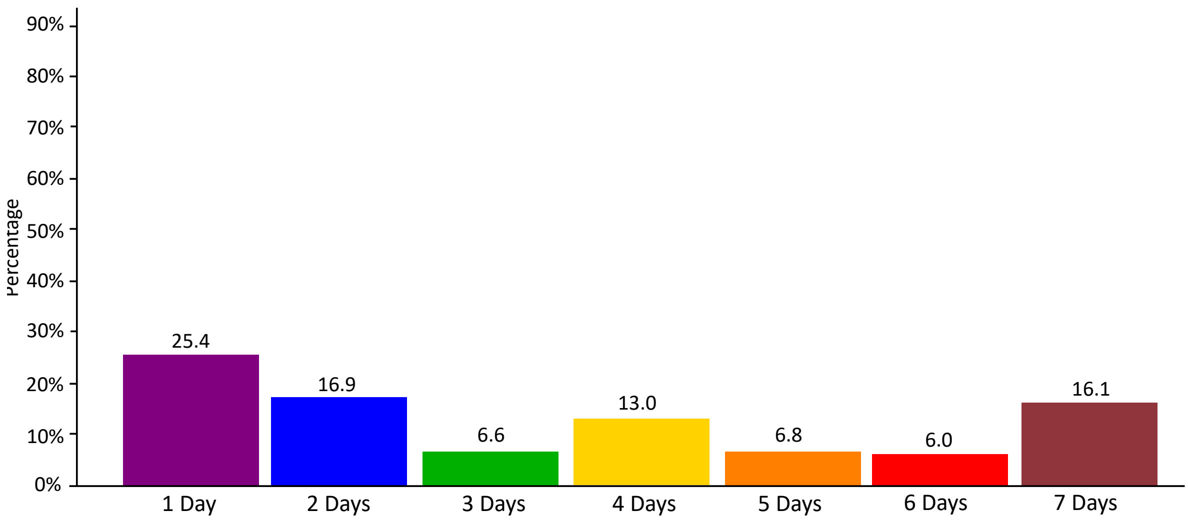

Figure 45. Frequency of use of any iron/folic acid tablets in the past seven days among adolescent girls (aged 10-14 years), Nigeria 2021
Based on question wtt5. How many days did you take any iron/folic acid tablets in last seven days?
Data are weighted to account for survey design and non-response
Number of adolescent girls who responded nationally: (n=1003)

Self-reported morbidity prevalence and anaemia risk factors among adolescent girls (aged 10-14 years)

A key objective of the survey was to assess morbidity as a key factor associated with anaemia.

Figure 46 presents the overall prevalence of self-reported illness (cough, fever, malaria, and diarrhoea) and hospitalization/clinic visits among adolescent girls in the last two weeks. The prevalence of hospitalization was low (6 percent), while that of cough, fever, malaria, and diarrhoea were 32 percent, 29 percent, 20 percent, and 16 percent nationally, respectively.

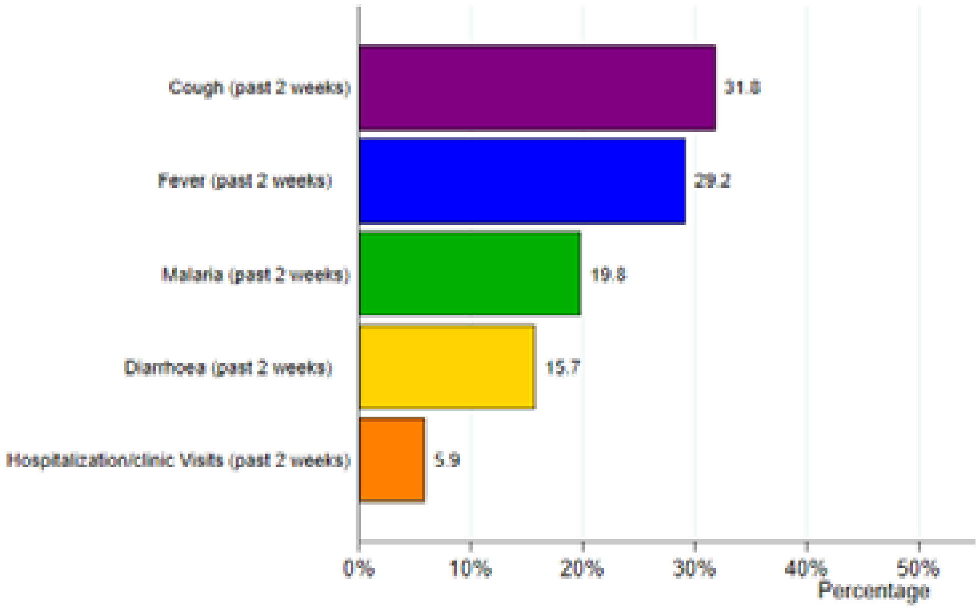

Figure 46. Overall prevalence of self-reported illness and hospitalization/clinic visits in the last two weeks among adolescent girls (aged 10-14 years), Nigeria 2021
Data are weighted to account for survey design and non-response
The number of adolescent girls who responded nationally: (n= 1003)

Table 71 presents the prevalence of self-reported illness (diarrhoea, cough, fever, and malaria) and hospitalization/clinic visits among adolescent girls in the last two weeks stratified by age, residence, and wealth quintile.

a. **Diarrhoea in the past two weeks**: There was no significant variation in the prevalence of diarrhoea in the past two weeks among adolescent girls across the background characteristics.

b. **Cough in the past two weeks**: There was a statistically significant difference in the *prevalence of cough in the past two weeks* with the wealth quintiles (P = 0.006). The prevalence was lowest in adolescent girls in the highest wealth quintile (23 percent).

c. **Difficulty breathing in the past two weeks**: There was a statistically significant difference in the *prevalence of difficulty breathing* with the wealth quintile (P = 0.020). The prevalence was lowest in adolescent girls in the highest wealth quintile (19 percent).

d. **Fever in the past two weeks**: There was no significant variation in the *prevalence of feve*r in the past two weeks among adolescent girls across the background characteristics

e. **Malaria in the past two weeks**: There was no significant variation in the *prevalence of malaria* in the past two weeks among adolescent girls across the background characteristics.

f. **Hospitalization in the past two weeks**: There was no significant variation in the *prevalence of hospitalization* in the past two weeks among adolescent girls across the background characteristics.

Table 71. Prevalence of self-reported illness and hospitalization/clinic visits in the past two weeks among adolescent girls (aged 10-14 years), Nigeria 2021

Background characteristics	Had diarrhoea[1] in the past two weeks		Had a cough in the past two weeks		Had difficulty breathing in the past two weeks		Had a fever in the past two weeks		Had malaria in the past two weeks		Had any hospitalization and /or clinic visits due to illness in the last two weeks	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age		(*P* = 0.268)		(*P* = 0.741)		(*P* = 0.843)		(*P*= 0.234)		(*P* = 0.155)		(*P* = 0.074)
10 years	264	19.9 [14.3, 26.9]	264	33.9 [26.0, 42.9]	85	36.7 [24.3, 51.2]	264	36.0 [28.4, 44.5]	258	24.9 [19.2, 31.8]	265	5.6 [3.1, 9.8]
11 years	158	12.1 [7.1, 20.0]	158	30.1 [22.1, 39.5]	56	27.0 [15.9, 41.8]	158	30.9 [21.5, 42.2]	155	20.6 [13.5, 30.2]	158	9.8 [4.2, 21.3]
12 years	195	11.9 [7.4, 18.8]	195	27.8 [19.9, 37.4]	60	34.2 [19.8, 52.4]	195	25.8 [18.8, 34.4]	191	21.5 [15.0, 29.7]	195	9.1 [4.5, 17.6]
13 years	194	18.0 [11.7, 26.6]	194	30.9 [22.6, 40.7]	55	28.9 [15.9, 46.8]	195	26.9 [19.4, 36.0]	191	15.3 [10.0, 22.7]	195	1.9 [0.8, 4.1]
14 years	190	14.7 [9.9, 21.3]	190	35.5 [27.2, 44.9]	71	36.6 [23.8, 51.5]	189	24.0 [17.0, 32.8]	184	14.6 [9.3, 22.3]	190	3.9 [1.7, 8.6]
Residence		(*P* = 0.604)		(*P* = 0.971)		(*P* = 0.091)		(*P* = 0.231)		(*P* = 0.362)		(*P* = 0.937)
Urban	420	14.7 [10.6, 20.1]	420	31.7 [26.9, 36.9]	124	25.4 [16.1, 37.6]	420	26.3 [21.4, 31.8]	412	17.8 [13.4, 23.3]	421	5.8 [3.4, 9.6]
Rural	581	16.4 [12.7, 20.7]	581	31.9 [26.4, 37.9]	203	37.9 [29.6, 47.0]	581	30.8 [25.9, 36.2]	567	21.0 [16.9, 25.7]	582	6.0 [3.7, 9.4]
Wealth quintile[2]		(*P* = 0.772)		(*P* = 0.006 **)		(*P* = 0.020 *)		(*P* = 0.367)		(*P* = 0.304)		(*P* = 0.496)
Lowest	211	13.1 [8.7, 19.3]	213	28.2 [20.7, 37.0]	65	38.0 [23.2, 55.3]	212	28.0 [20.4, 37.2]	205	18.2 [12.4, 25.9]	213	7.6 [3.7, 14.8]
Second	191	15.8 [10.6, 23.0]	191	27.0 [20.0, 35.3]	63	51.5 [34.7, 68.0]	191	27.9 [21.6, 35.3]	186	15.5 [10.6, 22.0]	191	3.7 [1.6, 8.5]
Middle	206	16.4 [10.8, 23.9]	205	43.9 [34.6, 53.5]	89	33.1 [21.4, 47.4]	205	33.0 [24.9, 42.3]	201	25.6 [18.5, 34.3]	206	8.3 [4.0, 16.6]
Fourth	198	19.1 [12.2, 28.7]	197	37.6 [28.9, 47.2]	60	19.1 [10.1, 33.2]	198	33.6 [25.5, 42.8]	194	21.7 [15.5, 29.6]	198	5.0 [2.4, 10.3]
Highest	191	14.8 [9.2, 23.1]	191	23.4 [16.5, 32.0]	48	18.5 [9.7, 32.5]	191	22.0 [14.9, 31.3]	189	19.7 [13.0, 28.8]	191	4.5 [1.9, 10.1]
National	**1001[3]**	**15.7 [13.0, 19.0]**	**1001[4]**	**31.8 [27.9, 36.0]**	**327[4]**	**33.4 [26.8, 40.6]**	**1001[5]**	**29.2 [25.5, 33.1]**	**979[6]**	**19.8 [16.8, 23.3]**	**1003[7]**	**5.9 [4.1, 8.3]**

The data are based on questions wah1, wah2, wah3, wah5, wah6, and wah7 of the biomarker questionnaire
wah1. Have you been ill with diarrhoea in the past two weeks?
wah2. Have you been ill with a cough or breathing problems in the past two weeks?
wah3. When you had an illness with a cough, did you breathe faster than usual?
wah5. Have you been ill with a fever in the past two weeks?
wah6. Have you been ill with malaria in the past two weeks?
wah7. Have you had any hospitalization in the last two weeks?
1Diarrhoea is defined as three or more loose or watery stools in 24 hours.
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of adolescent girls who responded nationally: (n=1003)
[2]Less than (n = 1003) due to relatively fewer respondents for the household and dietary intake questionnaires
[3]Less than (n = 1003) due to the response “Don’t Know”
[4]Less than (n = 1003) due to the response “Don’t Know”
[5]Less than (n = 1003) due to the response “Don’t Know”
[6]Less than (n = 1003) due to the response “Don’t Know”
[7]Less than (n = 1003) due to the response “Don’t Know”

Other anaemia risk factors among adolescent girls (aged 10-14 years)

Figure 47 presents the overall prevalence of anaemia risk factors (pica and smoking) and diagnosis of anaemia by a healthcare provider in the past six months among adolescent girls. Nationally, the prevalence of self-reported smoking among adolescent girls was low (0.3 percent). The prevalence of pica and clinically diagnosed anaemia among adolescent girls was 9 percent and 4 percent, respectively.

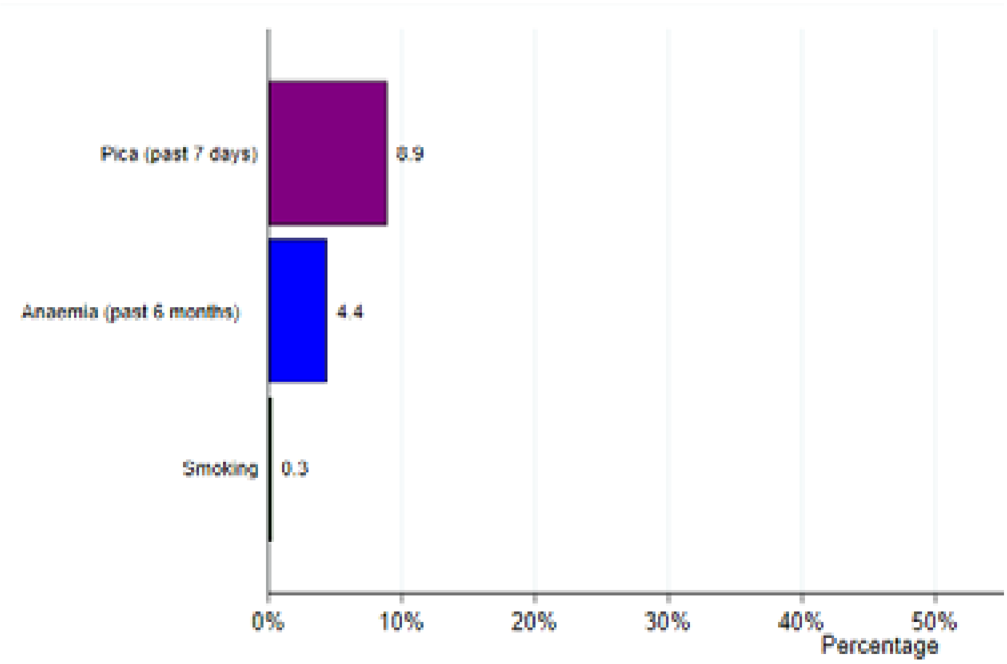

Figure 47. Prevalence of anaemia risk factors (pica and smoking) and diagnosis of anaemia in the past six months among adolescent girls (aged 10-14 years), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of adolescent girls who responded nationally: (n= 1003)

Table 72 presents the prevalence of anaemia risk factors (pica and smoking) and diagnosis of anaemia in the past six months among adolescent girls stratified by age, residence, and wealth quintile.

a. **Pica**: There was no significant variation in the prevalence of pica in the past seven days among adolescent girls across the background characteristics.

b. **Smoking**: There was no significant variation in the prevalence of smoking among adolescent girls across the background characteristics.

c. **Diagnosis of anaemia by a healthcare provider in the past six months**: There was no significant variation across the background characteristics.

Table 72. Prevalence of pica, smoking, and diagnosis of anaemia in the past six months among adolescent girls (aged 10-14 years), Nigeria 2021

Background characteristics	Ate earth, clay, mud, or soil from any source (e.g., walls of mud houses, the yard, purchased at the market) in the last seven days		Smoked tobacco (excluding powder or chew type)		Diagnosed with anaemia (by a healthcare provider) in the past six months	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age		(*P* = 0.893)		(*P* = 0.755)		(*P* 0.678)
10 years	265	8.7 [4.7, 15.6]	265	0.4 [0.1, 2.6]	262	5.4 [2.8, 10.3]
11 years	158	9.7 [4.1, 20.9]	158	0.0 [., .]	155	2.5 [0.8, 7.0]
12 years	195	6.7 [3.2, 13.7]	195	0.5 [0.1, 2.0]	195	3.0 [1.1, 7.5]
13 years	195	10.5 [5.4, 19.4]	195	0.3 [0.0, 1.9]	195	4.5 [1.3, 14.6]
14 years	190	9.4 [5.6, 15.5]	190	0.0 [., .]	187	6.0 [2.4, 14.2]
Residence		(*P* = 0.582)		(*P* = 0.973)		(*P* = 0.444)
Urban	421	10.1 [6.0, 16.4]	421	0.3 [0.1, 1.0]	417	5.5 [2.3, 12.5]
Rural	582	8.3 [5.1, 13.0]	582	0.2 [0.1, 1.0]	577	3.7 [2.2, 6.3]
Wealth quintile[1]		(*P* = 0.821)		(*P* = 0.547)		(*P* = 0.086)
Lowest	213	9.3 [4.5, 18.5]	213	0.2 [0.0, 1.5]	210	2.1 [1.0, 4.5]
Second	191	7.5 [4.0, 13.6]	191	0.7 [0.2, 2.9]	191	6.9 [2.9, 15.4]
Middle	206	7.3 [4.1, 12.8]	206	0.0 [., .]	204	6.6 [3.3, 12.5]
Fourth	198	11.1 [6.1, 19.4]	198	0.2 [0.0, 1.8]	196	4.5 [1.9, 9.9]
Highest	191	8.6 [4.4, 16.3]	191	0.0 [., .]	189	1.5 [0.4, 6.1]
National	**1003[2]**	**8.9 [6.3, 12.5]**	**1003[3]**	**0.3 [0.1, 0.7]**	**994[4]**	**4.4 [2.7, 7.1]**

The data are based on questions wtt1, wah8, and wrf1 of the biomarker questionnaire
wtt1. In the last seven days, have you eaten earth/clay/mud/soil from any source?
wah8. Do you smoke? (Do not include the powder and chew type)
wrf1. Have you been diagnosed with anaemia in the past six months?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies $P<0.05$, ** signifies $P<0.01$, *** signifies $P<0.001$).
Number of adolescent girls who responded nationally: (n=1003)
[1]Less than (n = 1003) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 1003) due to the response “Don’t Know”
[3]Less than (n = 1003) due to the response “Don’t Know”
[4]Less than (n = 1003) due to the response “Don’t Know”

Intervention coverage, health status, and anaemia risk factors among WRA (15-49 years old)

The MNDC guidelines[40] describe the following interventions to address micronutrient deficiencies among WRA – deworming, iron supplementation, and folate supplementation. Some interventions are reflected in the NFPN[41], which prioritizes both the health system and food-based approaches to MNDC. An objective of the survey was to assess the coverage of these interventions among WRA in Nigeria.

Intervention coverage among WRA (aged 15-49 years old)

Figure 48 presents the overall prevalence of nutrition-related interventions (multivitamin, iron or iron/folic acid tablets, deworming) and their use (six months, seven days) among WRA (aged 15-49 years) nationally. The use of deworming treatment in the past six months was reported in 19 percent of WRA. Nationally, 13 percent of WRA took a multivitamin in the past six months. The use of iron/folic acid was 15 percent in the past six months.

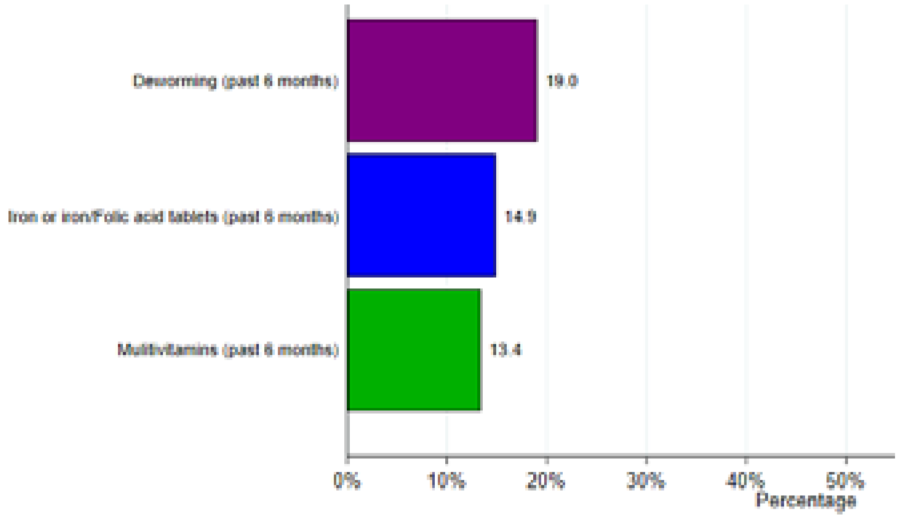

Figure 48. Coverage of nutrition-specific interventions among WRA (aged 15-49 years), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of WRA who responded nationally: (n= 5238)

Table 73 presents the use of multivitamin, iron or iron/folic acid tablets, and deworming treatment among WRA (15-49 months) stratified by age, residence, zone, wealth quintile, and educational attainment.

a. **Use of multivitamin tablets in the past six months**: There was a statistically significant difference in the *percentage of WRA reporting use of multivitamins in the past six months* among age category ($P = 0.013$), zone ($P < 0.001$), and educational attainment ($P < 0.001$). The use of multivitamin tablets in the past six months was lowest in the 15-to-19-year age category (7 percent). It was lowest among respondents in the North West zone (2 percent) and respondents with no educational attainment (6 percent).

b. **Use of multivitamin tablets at least once in the past seven days**: Figure 49 presents the frequency of use of multivitamin tablets in the past seven days among women of reproductive nationally. It was found that eight percent of WRA took multivitamin tablets at least once in the past seven days before the interview. There was a statistically significant difference in the *percentage of WRA reporting the use of multivitamins at least once in the past seven days with* the zones ($P = 0.003$). The use of multivitamin tablets was lowest among respondents in the North West zone (1 percent).

40 Federal Ministry of Health (FMOH). 2013. National guidelines on micronutrients deficiencies control in Nigeria. Abuja: Federal Ministry of Health.
41 Ministry of Budget & National Planning. 2016. National Policy on Food and Nutrition in Nigeria. Abuja: Ministry of Budget and National Planning.

c. **Use of iron or iron/folic acid tablets in the past six months**: There was a statistically significant difference in the *percentage of WRA reporting use of iron or iron/folic acid tablets in the past six months among* the age groups ($P < 0.001$), residence ($P < 0.001$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), and educational attainment ($P < 0.001$). Use of iron or iron/folic acid tablets in the past six months in WRA was lowest in the 15 to 19-year age category (8 percent). It was lower in WRA residing in rural (12 percent) than in the urban (19 percent) areas. It was lowest among respondents in the North West zone (2 percent), among WRA in the lowest wealth quintile (7 percent), and among respondents with no educational attainment (7 percent).

d. **Use of iron or iron/folic acid tablets at least once in the past seven days**: Figure 50 presents the frequency of use of any iron/folic acid in the past seven days among women of reproductive nationally. Nine percent of WRA took iron/folic acid tablets at least once in the past seven days before the interview. There was a statistically significant difference in the *percentage of WRA reporting use of iron or iron/folic acid tablets at least once in the past seven days* between residence ($P = 0.045$). Their use was higher in the urban (10 percent) than in the rural (8 percent) areas.

e. **Deworming**: There was a statistically significant difference in the *percentage of WRA reporting deworming in the past six months* among the age groups ($P < 0.001$), residence ($P < 0.001$), zone ($P < 0.001$), wealth quintile ($P < 0.001$), and educational attainment ($P < 0.001$). Deworming in the past six months among WRA was highest in the 40 to 49 year age category (24 percent). It was higher among WRA residing in urban (24 percent) than in the rural (15 percent) areas. It was lowest among respondents in the North West zone (7 percent), in the lowest wealth quintile (10 percent), and respondents with no educational attainment (9 percent).

Table 73. Use of multivitamin, iron or iron/folic acid tablets, and deworming treatment among WRA (aged 15-49 years), Nigeria 2021

Background characteristics	Took multivitamin tablets in the past six months		Took multivitamin tablets at least once in the past seven days		Took iron tablets, iron-folic acid in the past six months		Took iron tablets, iron-folic acid at least once in the past seven days		Took drugs for intestinal worms in the past six months	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* < 0.001 ***)		(*P* = 0.073)		(*P* < 0.001 ***)		(*P* = 0.391)		(*P* < 0.001 ***)
15-19 years	1125	7.1 [5.4, 9.3]	1125	3.1 [2.2, 4.4]	1125	8.2 [6.3, 10.5]	1125	4.3 [3.2, 5.9]	1119	16.4 [13.5, 19.9]
20-29 years	1609	13.1 [11.2, 15.3]	1609	7.3 [5.7, 9.2]	1609	13.7 [11.7, 15.9]	1609	8.2 [6.5, 10.3]	1597	15.9 [13.5, 18.6]
30-39 years	1485	16.5 [14.0, 19.4]	1485	10.0 [8.1, 12.2]	1485	17.7 [15.1, 20.7]	1485	9.8 [7.9, 12.1]	1473	20.9 [18.3, 23.8]
40-49 years	1019	15.3 [12.1, 19.1]	1019	10.3 [7.9, 13.5]	1019	18.4 [15.5, 21.8]	1019	11.7 [9.4, 14.5]	1012	23.6 [19.8, 27.9]
Residence		(P < 0.016*)		(*P* = 0.176)		(*P* < 0.001 ***)		(*P* = 0.045 *)		(*P* < 0.001 ***)
Urban	2120	16.1 [13.5, 19.1]	2120	8.4 [6.6, 10.7]	2120	18.7 [15.8, 22.1]	2120	10.0 [7.9, 12.5]	2101	24.4 [20.7, 28.5]
Rural	3118	11.2 [9.1, 13.7]	3118	7.3 [5.7, 9.5]	3118	11.7 [9.9, 13.8]	3118	7.6 [6.2, 9.2]	3100	15.2 [13.1, 17.7]
Zone		(*P* < 0.001 ***)		(*P* = 0.003 **)		(*P* < 0.001 ***)		(*P* = 0.103)		(*P* < 0.001 ***)
North Central	858	11.8 [8.4, 16.2]	858	5.5 [3.8, 8.1]	858	16.5 [12.8, 21.0]	858	8.8 [6.3, 12.2]	848	12.6 [10.3, 15.5]
North East	833	8.8 [5.3, 14.4]	833	3.4 [2.1, 5.5]	833	9.5 [7.0, 12.7]	833	5.6 [3.9, 8.0]	822	11.0 [8.5, 14.2]
North West	913	2.7 [1.6, 4.6]	913	1.1 [0.5, 2.2]	913	2.2 [1.1, 4.4]	913	1.0 [0.4, 2.3]	912	7.2 [4.9, 10.6]
South East	870	13.5 [10.9, 16.7]	870	7.1 [5.1, 10.0]	870	20.7 [15.7, 26.9]	870	11.8 [8.2, 16.7]	868	40.5 [34.5, 46.8]
South South	867	21.7 [17.7, 26.4]	867	18.0 [13.9, 23.0]	867	17.2 [13.4, 21.8]	867	14.3 [10.6, 18.8]	861	34.0 [27.1, 41.7]
South West	897	28.0 [23.3, 33.3]	897	16.5 [12.5, 21.5]	897	32.2 [27.9, 36.8]	897	16.9 [13.7, 20.7]	890	29.5 [25.8, 33.5]
Wealth quintile[1]		(*P* < 0.001 ***)		(*P* = 0.387)		(*P* < 0.001 ***)		(*P* = 0.457)		(*P* < 0.001 ***)
Lowest	1088	6.0 [4.3, 8.4]	1088	4.0 [2.7, 5.8]	1088	7.2 [5.3, 9.6]	1088	4.7 [3.3, 6.7]	1077	9.6 [7.3, 12.5]
Second	1122	9.1 [6.9, 11.7]	1122	5.9 [4.2, 8.4]	1122	11.5 [9.2, 14.3]	1122	6.8 [5.0, 9.1]	1118	12.5 [10.1, 15.4]
Middle	1089	14.7 [11.6, 18.5]	1089	7.9 [5.7, 10.9]	1089	18.6 [15.7, 21.9]	1089	11.5 [9.2, 14.1]	1082	17.5 [14.2, 21.3]
Fourth	983	18.5 [15.0, 22.6]	983	10.3 [7.9, 13.3]	983	19.3 [16.0, 23.1]	983	10.3 [7.9, 13.2]	975	27.9 [24.1, 31.9]
Highest	934	19.4 [16.0, 23.3]	934	11.4 [8.8, 14.8]	934	17.6 [14.5, 21.2]	934	9.9 [7.4, 13.1]	927	30.2 [24.6, 36.4]
Educational attainment[1]		(*P* < 0.001 ***)		(*P* = 0.411)		(*P* < 0.001 ***)		(*P* = 0.645)		(*P* < 0.001 ***)
None	1232	5.9 [4.4, 8.1]	1232	3.7 [2.6, 5.1]	1232	7.3 [5.6, 9.5]	1232	4.7 [3.4, 6.3]	1219	9.3 [7.2, 11.9]
Primary	838	16.2 [12.5, 20.7]	838	10.7 [7.5, 15.1]	838	20.8 [17.4, 24.7]	838	12.8 [10.1, 16.1]	832	18.0 [14.9, 21.7]
Secondary	2380	16.3 [14.3, 18.5]	2380	9.0 [7.5, 10.9]	2380	17.3 [15.2, 19.7]	2380	9.7 [8.1, 11.6]	2366	24.8 [21.8, 28.2]
Tertiary	529	20.9 [17.0, 25.5]	529	12.5 [9.3, 16.6]	529	20.5 [16.4, 25.2]	529	11.6 [8.5, 15.5]	526	28.3 [23.4, 33.8]
National	**5238[2]**	**13.2 [11.7, 15.0]**	**5238[3]**	**7.8 [6.6, 9.2]**	**5238[4]**	**14.6 [13.2, 16.3]**	**5238[5]**	**8.6 [7.4, 9.8]**	**5201**	**19.0 [17.1, 21.1]**

Table 73. Use of multivitamin, iron or iron/folic acid tablets, and deworming treatment among WRA (aged 15-49 years), Nigeria 2021 (continued)

The data are based on questions wtt2, wtt3, wtt4, wtt5, and wrf2 of the biomarker questionnaire
wtt2. During the last six months, did you take any multivitamin tablets?
wtt3. How many days did you take any of these products in the last week (seven days)? See Figure 49 for more details.
wtt4. During the last six months, did you take any iron/folic acid tablets?
wtt5. How many days did you take any iron/folic acid tablets in the last seven days? See Figure 50 for more details.
wrf2. Did you take any drugs for intestinal worms in the past six months?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of WRA who responded nationally: (n= 5238)
[1]Less than (n = 5238) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 5238) due to the response “Don’t Know”
[3]Less than (n = 5238) due to the response “Don’t Know”
[4]Less than (n = 5238) due to the response “Don’t Know”
[5]Less than (n = 5238) due to the response “Don’t Know”
[6]Less than (n = 5238) due to the response “Don’t Know”

Figure 49 presents the frequency of use of multivitamins in the past seven days among WRA. Among WRA who responded in the affirmative, 26 percent took multivitamins for the entire seven days.

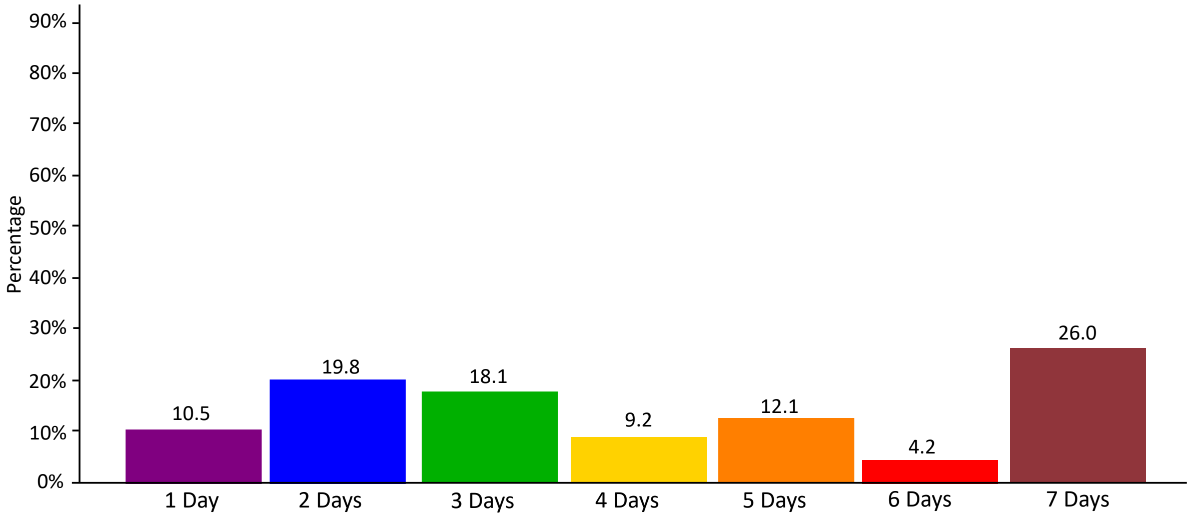

Figure 49. Frequency of use of multivitamins in the past seven days among WRA, Nigeria 2021
Based on question wtt3. How many days did you take any of these products [any multivitamin tablets] in the last seven days?
Data are weighted to account for survey design and non-response
Number of WRA who responded nationally: (n=5238)

Figure 50 presents the frequency of use of any iron/folic acid tablets in the past seven days among WRA. Among WRA who responded in the affirmative, 31 percent took iron/folic acid tablets for the entire seven days.

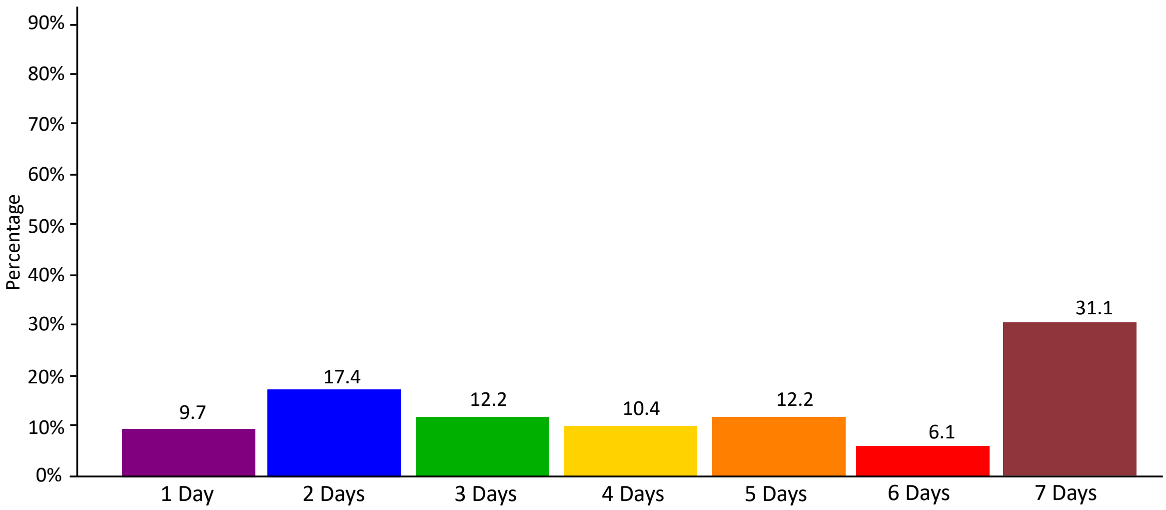

Figure 50. Frequency of use of any iron/folic acid tablets in the past seven days among WRA, Nigeria 2021
Based on question wtt5. How many days did you take any iron/folic acid tablets in the last seven days?
Data are weighted to account for survey design and non-response
Number of WRA who responded nationally: (n=5238)

Self-reported morbidity prevalence among WRA (aged 15-49 years)

A key objective of the survey was to assess morbidity as an important factor associated with anaemia.

Figure 51 presents the overall prevalence of self-reported illness (fever, malaria, cough, and diarrhoea) and hospitalization/clinic visits in the last two weeks among WRA (aged 15-49 years). The prevalence of hospitalization/clinic visits was low (8 percent), while that of fever, malaria, cough, and diarrhoea were 36 percent, 27 percent, 23 percent, and 17 percent nationally, respectively.

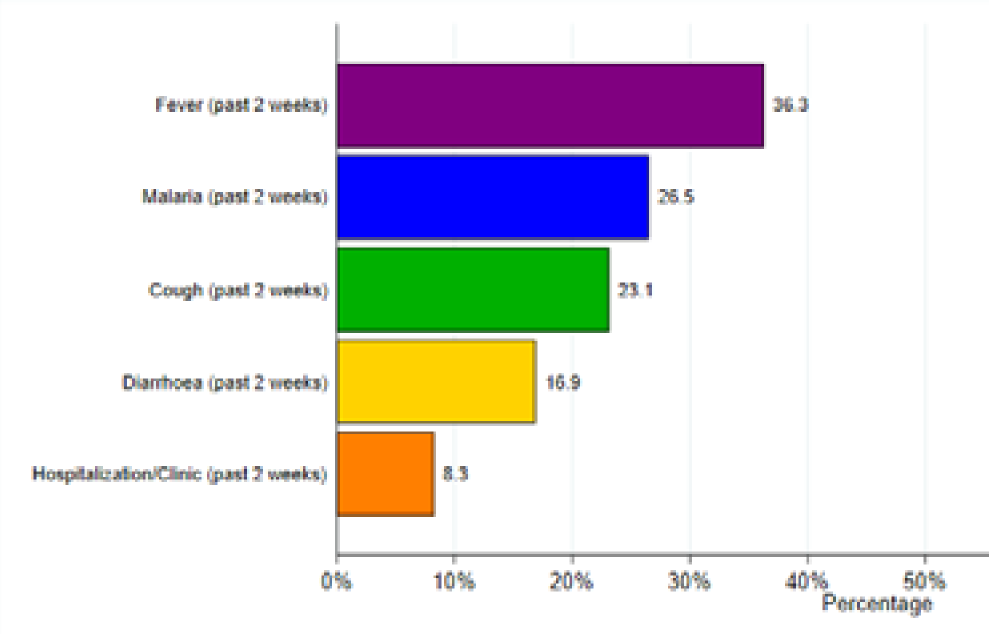

Figure 51. Overall prevalence of self-reported illness and hospitalization/clinic visits in the past two weeks among WRA (aged 15-49 years), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of WRA who responded nationally: (n= 5238)

Table 74 presents the prevalence of self-reported illness (fever, malaria, cough, and diarrhoea) and hospitalization/clinic visits in the past two weeks among WRA (15-49 years) stratified by age, residence, zone, wealth quintile, and educational attainment.

a. **Diarrhoea in the past two weeks**: There was a statistically significant difference in the *prevalence of diarrhoea in the past two weeks among WRA* between zones (P = 0.001). The prevalence of diarrhoea was highest among WRA in the North East zone (23 percent).

b. **Cough in the past two weeks**: There was a statistically significant difference in the *prevalence of cough in the past two weeks among WRA* between zones (P < 0.001). The prevalence of cough was highest among WRA in the North East zone (30 percent).

c. **Fever in the past two weeks**: There was a statistically significant difference in the *prevalence of fever in the past two weeks among WRA* between the age groups (P = 0.002), zone (P < 0.001), wealth quintile (P = 0.003), and educational attainment (P = 0.002). The prevalence of fever was highest in the 40 to 49-year age group (41 percent). It was highest among WRA in the south zone (49 percent), WRA in the lowest wealth quintile (42 percent), and WRA who attained primary education (42 percent).

d. **Malaria in the past two weeks**: There was a statistically significant difference in the *prevalence of malaria in the past two weeks* among WRA between the age groups (P< 0.001), zones (P <

0.001), and educational attainment (*P* = 0.001). The prevalence of malaria was highest in the 40 to 49-year age group (32 percent). It was highest among WRA in the South South zone (51 percent) and lowest among WRA who had attained no education (23 percent).

e. **Hospitalization in the past two weeks**: There was a statistically significant difference in the *prevalence of hospitalization in the past two weeks* among WRA with the zones (*P* < 0.001). The prevalence of hospitalization was highest among WRA in the North East zone (19 percent).

Table 74. Prevalence of self-reported illness and hospitalization/clinic visits in the last two weeks among WRA (aged 15-49 years), Nigeria 2021

Background characteristics	Had diarrhoea[1] in the past two weeks		Had a cough in the past two weeks		Had a fever in the past two weeks		Had malaria in the past two weeks		Had any hospitalization and /or clinic visits due to illness in the last two weeks	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* = 0.559)		(*P* = 0.190)		(*P* = 0.002 **)		(*P* < 0.001 ***)		(*P* = 0.085)
15-19 years	1124	16.0 [13.3, 19.0]	1124	25.7 [22.0, 29.7]	1117	30.7 [26.4, 35.3]	1101	19.9 [16.4, 23.9]	1124	6.0 [3.8, 9.2]
20-29 years	1602	18.2 [15.9, 20.7]	1605	23.4 [21.0, 26.0]	1601	36.1 [32.3, 40.0]	1564	26.0 [23.2, 28.9]	1608	8.2 [6.7, 10.1]
30-39 years	1482	17.0 [14.4, 19.9]	1481	20.9 [18.3, 23.8]	1476	37.3 [33.8, 41.0]	1444	27.8 [24.8, 31.1]	1485	8.4 [6.5, 10.8]
40-49 years	1019	15.9 [13.0, 19.3]	1016	23.1 [19.4, 27.3]	1017	40.8 [36.4, 45.3]	993	32.3 [28.3, 36.6]	1019	10.4 [7.9, 13.5]
Residence		(*P* = 0.771)		(*P* = 0.055)		(*P* = 0.050)		(*P* = 0.672)		(*P* = 0.138)
Urban	2115	17.2 [14.7, 20.0]	2112	20.7 [17.5, 24.3]	2111	32.9 [29.2, 36.7]	2078	25.9 [22.7, 29.4]	2120	9.6 [7.1, 12.8]
Rural	3112	16.7 [14.8, 18.8]	3114	24.8 [22.7, 27.1]	3100	38.7 [34.5, 43.1]	3024	27.0 [23.9, 30.3]	3116	7.3 [6.0, 8.8]
Zone		(*P* = 0.001 **)		(*P* < 0.001 ***)		(*P* < 0.001 ***)		(*P* < 0.001 ***)		(*P* < 0.001 ***)
North Central	858	17.4 [14.5, 20.7]	858	25.3 [21.6, 29.5]	852	42.4 [35.8, 49.3]	815	27.5 [23.1, 32.3]	857	8.8 [6.6, 11.7]
North East	829	23.0 [18.5, 28.2]	831	30.3 [25.3, 35.9]	828	39.5 [34.3, 44.9]	798	21.6 [16.6, 27.6]	832	19.3 [14.5, 25.2]
North West	912	13.2 [10.3, 16.7]	913	18.3 [14.6, 22.8]	911	27.2 [20.3, 35.5]	897	13.7 [10.4, 17.8]	913	4.2 [2.6, 6.6]
South East	869	21.2 [17.7, 25.3]	870	29.0 [25.6, 32.7]	870	42.5 [36.9, 48.3]	867	42.4 [37.6, 47.3]	870	7.2 [5.2, 9.9]
South South	863	16.8 [13.1, 21.2]	859	25.8 [21.0, 31.3]	854	48.9 [43.0, 54.8]	848	51.0 [46.1, 55.9]	867	5.1 [3.4, 7.6]
South West	896	14.8 [11.6, 18.5]	895	17.5 [14.7, 20.6]	896	30.2 [26.1, 34.7]	877	25.0 [21.1, 29.3]	897	6.5 [4.8, 8.8]
Wealth quintile[2]		(*P* = 0.740)		(*P* = 0.562)		(*P* = 0.003 **)		(*P* = 0.399)		(*P* = 0.490)
Lowest	1083	18.2 [14.7, 22.2]	1085	25.4 [22.4, 28.8]	1081	42.2 [36.2, 48.5]	1048	23.4 [19.3, 28.0]	1088	8.5 [6.6, 10.8]
Second	1119	17.5 [14.4, 21.2]	1120	22.6 [19.2, 26.3]	1118	38.7 [34.0, 43.7]	1084	28.7 [24.0, 34.0]	1120	9.1 [6.4, 12.8]
Middle	1087	17.1 [14.1, 20.7]	1088	23.9 [20.1, 28.2]	1078	36.8 [32.2, 41.7]	1064	27.3 [23.3, 31.6]	1089	6.7 [5.1, 8.9]
Fourth	982	16.3 [13.4, 19.6]	980	22.0 [18.6, 25.9]	981	33.6 [29.1, 38.5]	968	27.9 [23.7, 32.6]	983	7.7 [5.3, 11.0]
Highest	934	15.0 [11.9, 18.8]	931	21.5 [17.5, 26.1]	931	28.8 [24.6, 33.4]	916	24.8 [20.5, 29.7]	934	9.4 [7.0, 12.6]
Educational attainment[2]		(*P* = 0.962)		(*P* = 0.074)		(*P* = 0.002 **)		(*P* = 0.001 ***)		(*P* = 0.642)
None	1227	17.3 [14.2, 21.0]	1230	24.1 [20.4, 28.2]	1223	39.3 [34.1, 44.8]	1185	22.6 [19.4, 26.2]	1231	8.1 [6.0, 11.0]
Primary	838	16.4 [13.4, 20.0]	835	22.4 [18.6, 26.8]	830	41.7 [37.3, 46.2]	819	33.6 [29.1, 38.5]	838	7.8 [5.9, 10.2]
Secondary	2374	16.7 [14.5, 19.1]	2377	24.8 [22.3, 27.4]	2371	34.5 [31.6, 37.5]	2330	27.2 [24.4, 30.2]	2379	8.2 [6.3, 10.5]
Tertiary	529	17.3 [13.8, 21.5]	525	17.2 [13.3, 21.9]	528	27.5 [22.6, 33.2]	515	25.9 [21.5, 30.9]	529	10.2 [7.4, 13.9]
National	**5227[3]**	**16.9 [15.4, 18.5]**	**5226[4]**	**23.1 [21.3, 25.1]**	**5211[5]**	**36.3 [33.4, 39.2]**	**5102[6]**	**26.5 [24.4, 28.8]**	**5236**	**8.3 [7.0, 9.8]**

Table 74. Prevalence of self-reported illness and hospitalization/clinic visits in the last two weeks among WRA (aged 15-49 years), Nigeria 2021 (continued)

The data are based on questions wah1, wah2, wah3, wah5, wah6, and wah7 of the biomarker questionnaire
wah1. Have you been ill with diarrhoea in the past two weeks?
wah2. Have you been ill with a cough or breathing problems in the past two weeks?
wah3. When you had an illness with a cough, did you breathe faster than usual?
wah5. Have you been ill with a fever in the past two weeks?
wah6. Have you been ill with malaria in the past two weeks?
wah7. Have you had any hospitalization in the last two weeks?
[1]Diarrhoea is defined as three or more loose or watery stools in 24 hours.
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Sample size for WRA nationally: (n= 5238)
[2]Less than (n = 5238) due to relatively fewer respondents for the household and dietary intake questionnaires
[3]Less than (n = 5238) due to the response "Don't Know"
[4]Less than (n = 5238) due to the response "Don't Know"
[5]Less than (n = 5238) due to the response "Don't Know"
[6]Less than (n = 5238) due to the response "Don't Know"
[7]Less than (n= 5339) due to the response "Don't Know"

Other anaemia risk factor among WRA (aged 15-49 years)

Figure 52 presents the overall prevalence of anaemia risk (pica and smoking) and diagnosis of anaemia by a healthcare provider in the past six months among WRA (aged 15-49 years). Nationally, the prevalence of smoking among WRA was low (0.5 percent). The prevalence of pica and clinically diagnosed anaemia among WRA was 5 and 6 percent, respectively.

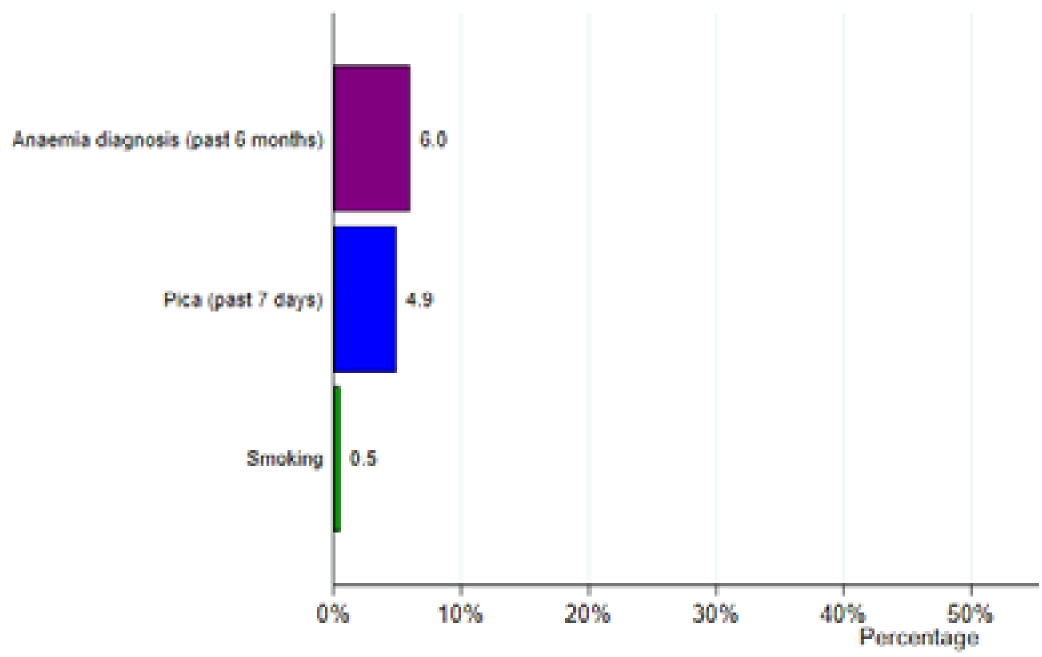

Figure 52. Prevalence of anaemia risk (pica and smoking) and diagnosis of anaemia in the past six months among WRA (aged 15-49 years), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of women of reproductive who responded nationally: (n= 5238)

Table 75 presents the prevalence of anaemia risk (pica and smoking) and diagnosis of anaemia in the past six months among WRA (aged 15-49 years) stratified by age, residence, zone, wealth quintile, and educational attainment.

a. **Pica in the past seven days**: There was a statistically significant difference in the *prevalence of pica in the past seven days among WRA* between the age groups (*P* = 0.013) and residence (*P* < 0.001). The prevalence of pica was highest in the 15 to 19-year age group (7 percent). It was highest in WRA living in the South East zone (14 percent).

b. **Smoking**: There was no significant variation in the prevalence of smoking among WRA across the background characteristics.

c. **Diagnosis of anaemia by a healthcare provider in the last six months**: There was a statistically significant difference in *the prevalence of diagnosis of anaemia by a healthcare provider in the past six months* between residence (*P* = 0.036). The percentage of WRA diagnosed with anaemia by a healthcare provider in the past six months was higher among respondents residing in rural (7 percent) than in urban (5 percent) areas.

Table 75. Prevalence of pica, smoking, and diagnosis of anaemia in the past six months among WRA (15-49 years), Nigeria 2021

Background characteristics	Ate earth, clay, mud, or soil from any source (e.g., walls of mud houses, the yard, purchased at the market) in the past 7 days		Smoked tobacco (excluding powder or chew type)		Diagnosed with anaemia by a healthcare provider in the past six months	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age	(P = 0.013 *)		(*P* = 0.611)		(*P* = 0.166)	
15-19 years	1125	6.9 [5.1, 9.2]	1125	0.7 [0.3, 2.1]	1118	4.8 [3.3, 6.8]
20-29 years	1609	5.4 [3.8, 7.6]	1609	0.5 [0.2, 1.1]	1592	5.3 [4.1, 6.9]
30-39 years	1485	4.2 [3.2, 5.6]	1485	0.4 [0.2, 0.9]	1471	7.0 [5.5, 8.9]
40-49 years	1019	3.0 [2.1, 4.4]	1019	0.5 [0.2, 1.3]	1012	6.9 [4.9, 9.5]
Residence	(*P* = 0.926)		(*P* = 0.453)		(*P* = 0.036 *)	
Urban	2120	5.0 [3.8, 6.5]	2120	0.4 [0.1, 1.0]	2112	4.8 [3.7, 6.1]
Rural	3118	4.9 [3.8, 6.1]	3118	0.6 [0.3, 1.2]	3081	6.8 [5.5, 8.5]
Zone	(*P* < 0.001 ***)		(*P* = 0.474)		(*P* = 0.117)	
North Central	858	4.2 [2.7, 6.4]	858	1.0 [0.4, 2.6]	852	6.1 [4.5, 8.1]
North East	833	6.7 [5.1, 8.8]	833	0.3 [0.1, 1.1]	810	8.1 [5.2, 12.4]
North West	913	5.7 [3.9, 8.3]	913	0.7 [0.2, 2.3]	907	5.1 [3.3, 7.8]
South East	870	14.3 [10.9, 18.6]	870	0.2 [0.0, 0.9]	870	4.7 [3.2, 6.9]
South South	867	1.6 [0.9, 3.0]	867	0.4 [0.2, 1.2]	859	7.8 [5.6, 10.7]
South West	897	1.2 [0.6, 2.5]	897	0.4 [0.1, 1.1]	895	4.5 [3.1, 6.4]
Wealth quintile[1]	(*P* = 0.490)		(*P* = 0.323)		(*P* = 0.149)	
Lowest	1088	5.1 [3.6, 7.4]	1088	0.8 [0.3, 2.2]	1066	7.0 [5.3, 9.3]
Second	1122	4.7 [3.0, 7.2]	1122	0.6 [0.2, 1.4]	1110	7.2 [5.1, 10.0]
Middle	1089	5.9 [4.2, 8.3]	1089	0.4 [0.1, 0.9]	1082	5.7 [4.1, 7.7]
Fourth	983	3.6 [2.5, 5.3]	983	0.1 [0.0, 0.7]	981	4.3 [3.0, 6.2]
Highest	934	5.2 [3.7, 7.1]	934	0.8 [0.3, 2.3]	932	5.3 [3.9, 7.2]
Educational attainment[1]	(*P* = 0.996)		(*P* = 0.577)		(*P* = 0.059)	
None	1232	4.9 [3.4, 7.0]	1232	0.6 [0.2, 2.0]	1205	8.2 [6.0, 11.3]
Primary	838	4.8 [3.4, 6.8]	838	0.6 [0.2, 1.5]	834	5.5 [3.8, 8.0]
Secondary	2380	5.0 [3.9, 6.3]	2380	0.6 [0.3, 1.3]	2372	5.2 [4.2, 6.5]
Tertiary	529	4.7 [2.9, 7.7]	529	0.1 [0.0, 0.5]	528	5.7 [3.6, 8.8]
National	**5238**	**4.9 [4.1, 5.8]**	**5238**	**0.5 [0.3, 0.9]**	**5193**[3]	**6.0 [5.1, 7.1]**

The data are based on questions wtt1, wah8, and wrf1 of the biomarker questionnaire
wtt1. In the last seven days, have you eaten earth/clay/mud/soil from any source?
wah8. Do you smoke? (do not include the powder and chew type)
wrf1. Have you been diagnosed with anaemia in the past six months?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of WRA who responded nationally: (n= 5238)
[2]Less than (n = 5238) due to relatively fewer respondents for the household and dietary intake questionnaires
[5]Less than (n = 5238) due to the response “Don’t Know”

Intervention coverage, health status, and anaemia risk factors among pregnant women (15-49 years old)

The MNDC guidelines[42] describe the following interventions and structures to address micronutrient deficiencies among pregnant women – deworming, antenatal care, and iron/folate supplementation. Some interventions, including nutrition education, are also reflected in the NFPN[43], which prioritizes both the health system and food-based approaches to MNDC. An objective of the survey was to assess the coverage of these interventions among pregnant women in Nigeria.

Intervention coverage among pregnant women (15-49 years old)

Figure 53 presents the overall prevalence of antenatal care, iron/folic acid use, and nutrition counselling among pregnant women (aged 15-49 years). Nationally, 44 percent of pregnant women reported receiving at least one antenatal care visit. Sixty-six (66) percent of pregnant women took iron/folic acid tablets the day before the interview, while 87 percent reported taking iron/folic acid tablets at least once in the past seven days before the interview. Thirty-four percent of pregnant women reported speaking to a health worker or community volunteer about what foods to eat during pregnancy, while 32 percent of women reported talking to a health worker or community volunteer about breastfeeding their newborn.

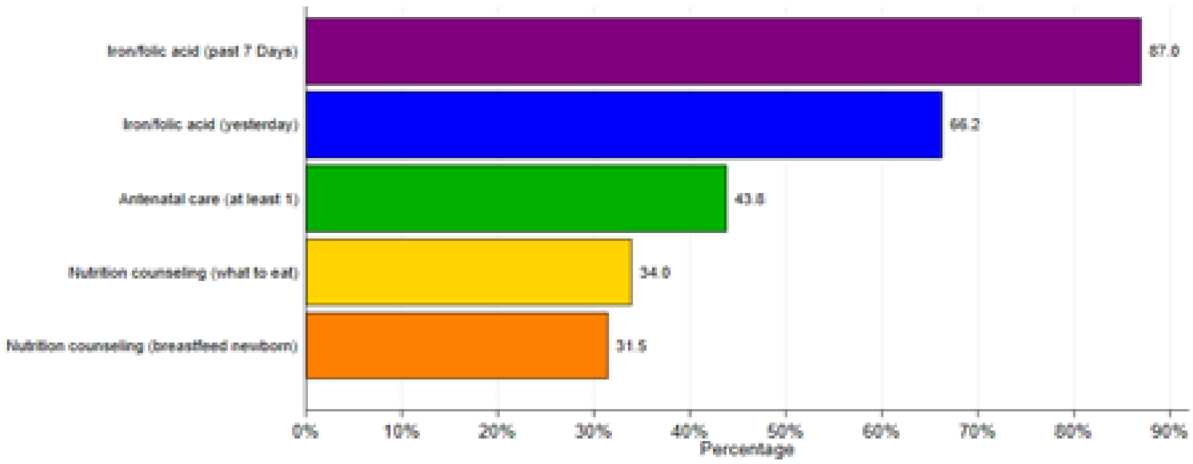

Figure 53. Overall prevalence of any nutrition-related interventions – antenatal care, supplementation, and nutrition counselling - among pregnant women (aged 15-49 years), Nigeria 2021
Data are weighted to account for survey design and non-response
Number of pregnant women who responded nationally: (n= 863)

Antenatal care

Antenatal care (ANC) entails periodic visits by pregnant women to designated health centres staffed and equipped for maternity services. The WHO recommends[44] a minimum of eight ANC contacts: five contacts in the third trimester, one contact in the first trimester, and two contacts in the second trimester (see **Table 76**). These give pregnant women the opportunity for appropriate counselling, micronutrient supplementation (folic acid and iron), medical screening, vaccination, and preventive treatment for malaria, all aimed at ensuring safe pregnancy outcomes. Conditions such as hepatitis (A, B, and C), HIV pregnancy-induced hypertension, and gestational diabetes are usually screened for during ANC visits.

42 Federal Ministry of Health (FMOH). 2013. National guidelines on micronutrients deficiencies control in Nigeria. Abuja: Federal Ministry of Health.
43 Ministry of Budget & National Planning. 2016. National Policy on Food and Nutrition in Nigeria. Abuja: Ministry of Budget and National Planning.
44 World Health Organization (WHO). WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience: Summary. Geneva, Switzerland: WHO; 2018. Licence: CC BY-NC-SA 3.0 IGO.

In addition, ANC visits can result in the early detection of high-risk pregnancies as women with risk factors suggestive of possible obstetric complication(s) are identified through careful review of their medical history and appropriate medical screening. ANC visits allow pregnant women to receive specialized and individualized pregnancy management plan(s) as needed.

Table 76. WHO recommendations on antenatal care for a positive pregnancy experience

WHO ANC recommends a minimum of eight contacts: five contacts in the third trimester, one contact in the first trimester, and two contacts in the second trimester, as detailed below
First trimester
Contact 1: up to 12 weeks
Second trimester
Contact 2: 20 weeks Contact 3: 26 weeks
Third trimester
Contact 4: 30 weeks Contact 5: 34 weeks Contact 6: 36 weeks Contact 7: 38 weeks Contact 8: 40 weeks
Return for delivery at 41 weeks if has not given birth. *Note:* Intermittent preventive treatment of malaria in pregnancy should be started at ≥ 13 weeks.

Table 77 presents the percentage of pregnant women receiving antenatal care stratified by age, residence, wealth quintile, and educational attainment. There was a statistically significant difference in the prevalence of antenatal care among pregnant women between residence (P = 0.004) and the zones (P < 0.001). The percentage of pregnant women seeking antenatal care was higher in urban (53 percent) than in rural (40 percent) areas. It was highest among pregnant women in the highest wealth quintile (59 percent).

Table 77. Prevalence of at least one antenatal care visit among pregnant women, Nigeria 2021

Background characteristics	Had seen a health worker for antenatal care during this pregnancy so far		
	N	% [95% CI]	*P* value
Age			
15-19 years	76	32.0 [19.9, 47.0]	(*P* = 0.155)
20-29 years	451	41.5 [35.5, 47.8]	
30-39 years	293	49.8 [43.0, 56.7]	
40-49 years	43	48.4 [26.7, 70.8]	
Residence			
Urban	352	53.1 [46.4, 59.8]	(*P* = 0.004 **)
Rural	511	39.5 [33.6, 45.6]	
Wealth quintile[1]			
Lowest	184	34.3 [26.9, 42.6]	(*P* < 0.001 ***)
Second	179	32.1 [23.8, 41.8]	
Middle	167	50.9 [38.6, 63.0]	
Fourth	178	56.5 [46.2, 66.3]	
Highest	152	58.9 [49.2, 68.0]	
Educational attainment[1]			
None	203	36.7 [28.1, 46.2]	(*P* = 0.052)
Primary	132	43.6 [31.4, 56.6]	
Secondary	388	49.3 [41.8, 56.7]	
Tertiary	94	57.2 [46.4, 67.3]	
National	**863**	**43.8 [39.1, 48.6]**	

The data are based on question wpw1 of the biomarker questionnaire
wpw1. Have you seen any health worker for antenatal care during this pregnancy?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of pregnant women who responded nationally: (n= 863)
[1]Less than (n = 863) due to relatively fewer respondents for the household and dietary intake questionnaires

Figure 54 presents the reported timing of the first antenatal care visit by month of pregnancy among pregnant women nationally. The WHO recommends the first ANC contact within three months (12 weeks) of conception. Only 38 percent of the respondents met this recommendation, with eight of pregnant women receiving their first ANC contact in their third trimester.

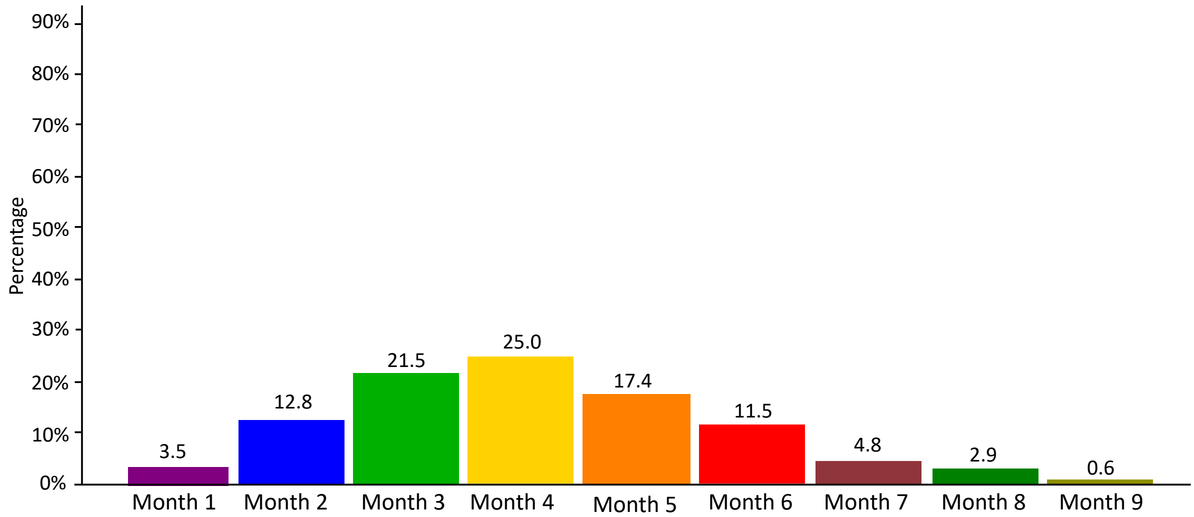

Figure 54. Timing of the first antenatal care visit by month of pregnancy among pregnant women, Nigeria 2021
Based on question wpw2. How many months pregnant were you when first received antenatal care?
Data are weighted to account for survey design and non-response
Number of pregnant women who responded nationally: (n=863)

Figure 55 presents the adequacy of the number of antenatal care visits among pregnant women by the length of pregnancy nationally. The WHO recommends at least one ANC contact in the first trimester, at least two contacts in the second trimester, and at least five contacts in the third trimester of pregnancy. Relatively fewer pregnant women received adequate ANC contacts across the 40 weeks of pregnancy.

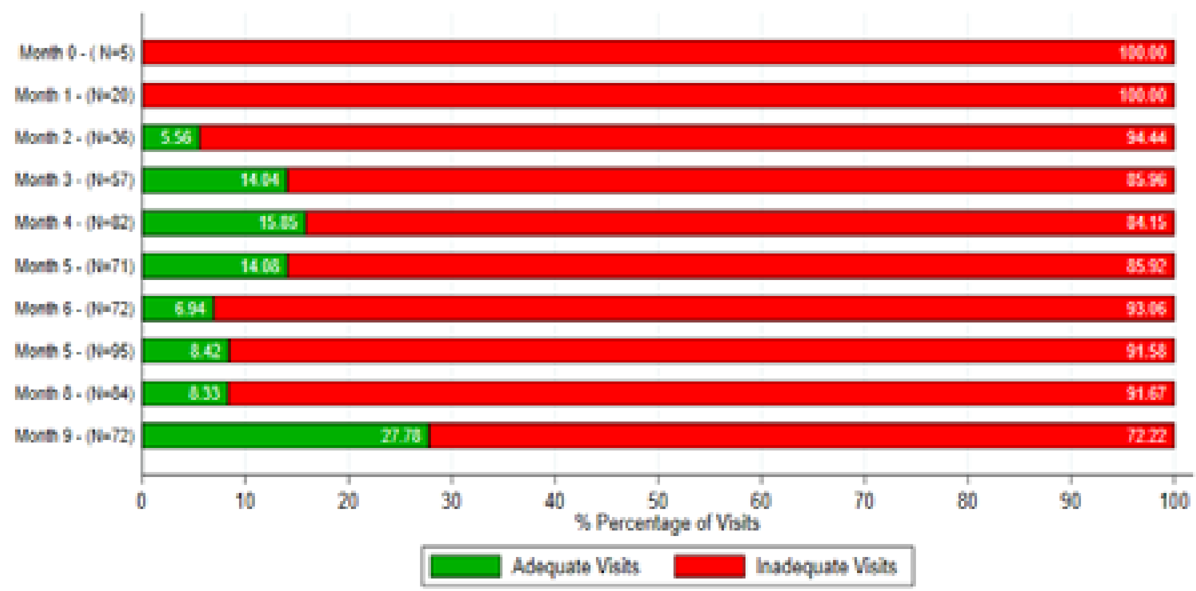

Figure 55. Adequacy of number of antenatal care visits by the length of pregnancy among pregnant women, Nigeria 2021
Based on question wpw3. How many times have you received antenatal care so far?
Data are weighted to account for survey design and non-response.
Number of pregnant women who responded nationally: (n=595)
One woman in the 10th month of pregnancy not depicted (she had adequate visits).

Use of iron and/or folic acid tablets

Table 78 presents the percentage of pregnant women (aged 15 to 49 years) who consumed a tablet or syrup containing iron in the past seven days and those who consumed a tablet or syrup containing iron and/or folic acid the day before the interview. The data are stratified by age, residence, wealth quintile, and educational attainment.

- **Consumed a tablet or syrup containing iron in the past seven days**: There was no significant variation across the background characteristics.
- **Consumed a tablet or syrup containing iron and/or folic acid yesterday**: There was a statistically significant difference in the *use of tablet/syrup containing iron and/or folic acid among pregnant women the day before the interview* with educational attainment (*P* = 0.006). The prevalence was highest among pregnant women with no educational attainment (87 percent).

Table 78. Percentage of pregnant women (aged 15 to 49 years) who consumed a tablet or syrup containing iron at least once in the last seven days and those who consumed a tablet or syrup containing iron and/or folic acid the day before the interview, Nigeria 2021

Background characteristics	Consumed a tablet or syrup containing iron at least once in the past seven days?		Consumed a tablet or syrup containing Iron and/or folic acid yesterday?	
	N	% [95% CI]	N	% [95% CI]
Age category	(*P* = 0.847)		(*P* = 0.577)	
15-19 years	10	89.9[50.0, 98.8]	10	79.5 [44.3, 95.0]
20-29 years	55	85.0 [70.3, 93.1]	64	68.2 [52.2, 80.9]
30-39 years	41	87.1 [71.8, 94.7]	46	59.0 [41.2, 74.7]
40-49 years	4	100.0 [., .]	4	81.1 [27.3, 98.0]
Residence	(*P* = 0.714)		(*P* = 0.818)	
Urban	52	88.6 [74.4, 95.4]	60	64.8 [50.4, 77.0]
Rural	58	86.0 [73.8, 93.1]	64	67.2 [51.2, 80.0]
Wealth quintile[1]	(*P* = 0.969)		(*P* = 0.329)	
Lowest	17	89.0 [68.4, 96.8]	21	59.3 [29.5, 83.4]
Second	20	83.9 [61.1, 94.6]	21	78.4 [56.6, 91.0]
Middle	20	84.4 [57.2, 95.6]	21	77.4 [53.6, 91.0]
Fourth	29	87.0 [61.7, 96.5]	33	51.2 [33.5, 68.6]
Highest	24	90.6 [70.3, 97.5]	27	72.1 [47.5, 88.1]
Educational attainment[1]	(*P* = 0.133)		(*P* = 0.006 **)	
None	20	97.2 [82.4, 99.6]	22	87.4 [71.9, 94.9]
Primary	15	71.0 [39.7, 90.1]	16	46.0 [22.0, 72.1]
Secondary	61	81.9 [67.5, 90.7]	69	56.2 [41.9, 69.5]
Tertiary	10	85.9 [40.0, 98.2]	12	80.0 [46.1, 94.9]
National	**110**[2]	**87.0 [78.5, 92.4]**	**124**	**66.2 [55.3, 75.7]**

The data are based on question wpw7 of the biomarker questionnaire
wpw7. How many days in the last seven days (one week) did you consume a tablet or syrup containing Iron?
wpw8. Did you consume a tablet or syrup containing Iron and/or folic acid yesterday?
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of pregnant women who responded nationally: (n= 124)
[1]Less than (n = 124) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 124) due to the response “Don’t Know”

Figure 56 presents the frequency of use of a tablet or syrup containing iron in the past seven days. Fifty (50) percent of the pregnant women who responded in the affirmative took iron tablets or syrup for the past seven days.

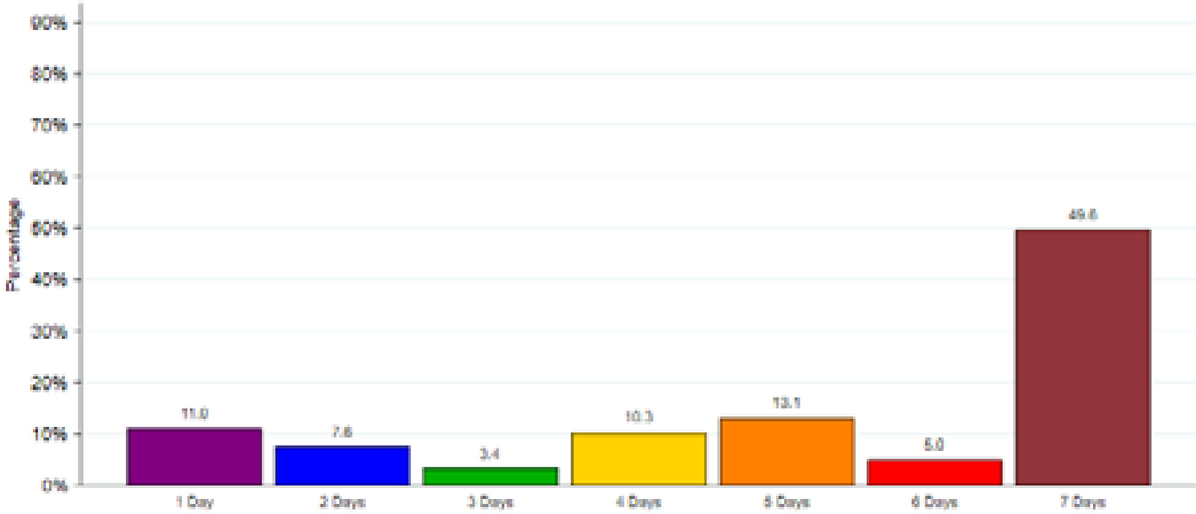

Figure 56. Frequency of use of iron tablet or syrup in the past seven days among pregnant women, Nigeria 2021
Based on question wpw7. How many days in the last seven days (one week) did you consume a tablet or syrup containing iron?
Data are weighted to account for survey design and non-response.
Number of pregnant women who responded nationally: (n=863)

Nutrition counselling

Table 79 presents the percentage of pregnant women (aged 15-49 years) who had spoken to a health worker or community volunteer about what foods to eat during pregnancy and breastfeeding their newborn. The data are stratified by age, residence, wealth quintile, and educational attainment.

- **Spoke with a health worker or community volunteer about what foods to eat during pregnancy**: There was a statistically significant difference in the *prevalence of pregnant women who had spoken to a health worker or community volunteer about what foods to eat during pregnancy* among the age groups (P = 0.029), residence (P < 0.001), wealth quintile (P < 0.001), and educational attainment (P < 0.001). The prevalence was highest in the 40-49 -years old age category (45 percent). It was higher among pregnant women residing in the urban (46 percent) than in the rural (28 percent) areas. It was highest among pregnant women in the highest wealth quintile (55 percent) and among pregnant women who had attained tertiary education (55 percent).

- **Spoke with a health worker or community volunteer about breastfeeding your newborn**: There was a statistically significant difference in the *prevalence of pregnant women who had spoken to a health worker or community volunteer about breastfeeding their newborn* among residence (P < 0.001), wealth quintile (P < 0.001), and educational attainment (P < 0.001). The prevalence was lower among pregnant women residing in rural (26 percent) compared to urban (44 percent) areas. It was highest among pregnant women in the highest wealth quintile (49 percent) and among pregnant women who had attained tertiary education (57 percent).

Table 79. Percentage of pregnant women (aged 15-49 years) who had spoken to a health worker or community volunteer about what foods to eat during pregnancy and about breastfeeding their newborn

Background characteristics	Health worker or community volunteer spoke with you about what foods to eat during pregnancy		Health worker or community volunteer spoke with you about breastfeeding your newborn	
	N	% [95% CI]	N	% [95% CI]
Age category	(P = 0.029 *)		(P = 0.152)	
15-19 years	76	21.7 [12.1, 35.9]	76	17.8 [9.3, 31.2]
20-29 years	451	29.9 [24.3, 36.2]	451	29.6 [23.1, 36.9]
30-39 years	293	41.7 [35.2, 48.6]	293	37.3 [30.9, 44.3]
40-49 years	43	44.9 [23.5, 68.4]	43	36.6 [16.4, 63.0]
Residence	(P < 0.001 ***)		(P = 0.000 ***)	
Urban	352	46.4 [39.4, 53.5]	352	43.9 [36.3, 51.8]
Rural	511	28.2 [23.3, 33.6]	511	25.7 [21.3, 30.7]
Wealth quintile[1]	(P < 0.001 ***)		(P = 0.000 ***)	
Lowest	184	24.9 [18.6, 32.5]	184	24.6 [18.4, 32.0]
Second	179	21.5 [14.5, 30.8]	179	18.2 [12.0, 26.8]
Middle	167	37.7 [29.6, 46.5]	167	32.6 [24.5, 41.8]
Fourth	178	47.5 [39.4, 55.7]	178	47.5 [38.9, 56.2]
Highest	152	54.5 [44.5, 64.1]	152	49.4 [40.1, 58.7]
Educational attainment[1]	(P < 0.001 ***)		(P = 0.000 ***)	
None	203	24.2 [17.7, 32.2]	203	22.8 [16.6, 30.4]
Primary	132	31.9 [23.4, 41.8]	132	25.2 [17.8, 34.4]
Secondary	388	41.1 [34.2, 48.3]	388	37.8 [31.6, 44.5]
Tertiary	94	54.7 [44.4, 64.5]	94	57.2 [47.4, 66.6]
National	**863**	**34.0 [29.7, 38.5]**	**863**	**31.5 [27.4, 35.9]**

The data are based on questions wpw9 and wpw10 of the biomarker questionnaire
wpw9. So far, during this pregnancy, has a health worker or community volunteer spoken with you about what foods to eat during pregnancy?
wpw10. So far, during this pregnancy, has a health worker or community volunteer spoken with you about breastfeeding your newborn?
Data are weighted to account for survey design and non-response.
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Sample size for pregnant women nationally: (n= 863)
[1]Less than (n = 863) due to relatively fewer respondents for the household and dietary intake questionnaires

Self-reported morbidity prevalence

A key objective of the survey was to assess morbidity as a critical factor associated with anaemia.

Figure 57 presents the overall prevalence of self-reported illness (fever, malaria, diarrhoea, and cough) and hospitalization/clinic visits in the past two weeks among pregnant women (aged 15-49 years). Nationally, the prevalence of fever, malaria, diarrhoea, and cough among pregnant women was 40, 30, 21, and 20 percent, respectively. The prevalence of hospitalization among pregnant women was 19 percent.

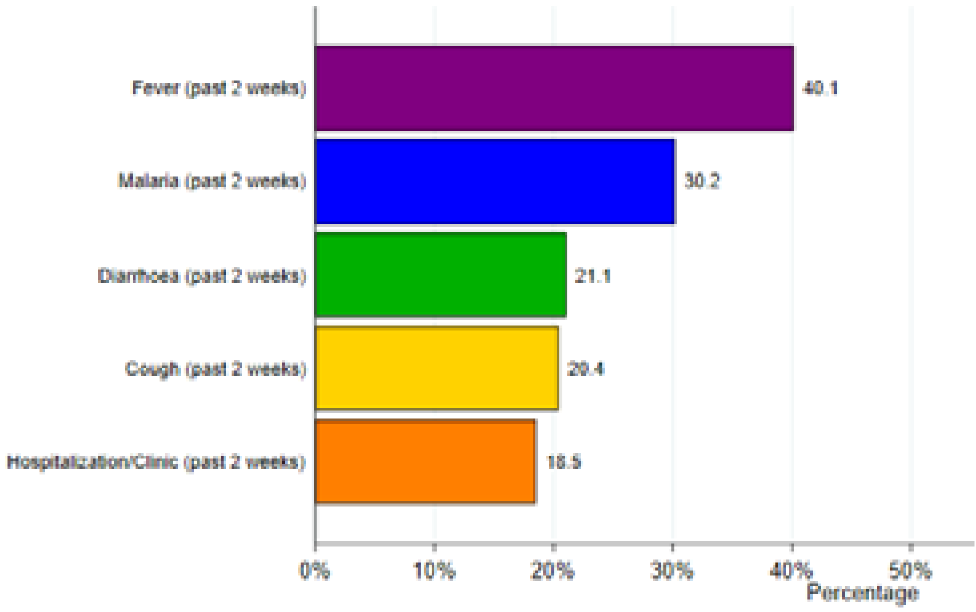

Figure 57. Overall prevalence of self-reported illness (fever, malaria, diarrhoea, and cough) and hospitalization/clinic visits in the last two weeks among pregnant women, Nigeria 2021
Data are weighted to account for survey design and non-response
Number of pregnant women who responded nationally: (n= 863)

Table 80 presents the prevalence of self-reported illness (fever, malaria, diarrhoea, and cough) and hospitalization/clinic visits in the past two weeks among pregnant women (aged 15-49 years) stratified by age, residence, wealth quintile, and educational attainment.

a. **Diarrhoea in the past two weeks**: There was no significant variation in the prevalence of diarrhoea in the past two weeks among pregnant women across the background characteristics.

b. **Cough in the past two weeks**: There was no significant variation in the prevalence of cough in the past two weeks among pregnant women across the background characteristics.

c. **Fever in the past two weeks**: There was no significant variation in the prevalence of fever in the past two weeks among pregnant women across the background characteristics.

d. **Malaria in the past two weeks**: There was no significant variation in the prevalence of malaria in the past two weeks among pregnant women across the background characteristics.

e. **Hospitalization in the past two weeks**: There was no significant variation in the prevalence of hospitalization in the past two weeks among pregnant women across the background characteristics.

Table 80. Prevalence of self-reported illness and hospitalization/clinic visits in the last two weeks among pregnant women (aged 15-49 years), Nigeria 2021

Background characteristics	Had diarrhoea[1] in the past two weeks		Had cough in the past two weeks		Had fever in the past two weeks		Had malaria in the past two weeks		Had any hospitalization and /or clinic visits due to illness in the past two weeks	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age		(*P* = 0.883)		(*P* = 0.669)		(*P* = 0.799)		(*P* = 0.763)		(*P* = 0.620)
15-19 years	76	23.7 [12.8, 39.6]	76	23.0 [12.7, 37.9]	76	34.3 [20.8, 51.0]	75	26.5 [14.6, 43.2]	76	19.1 [9.5, 34.8]
20-29 years	450	20.3 [15.7, 25.9]	450	21.8 [17.3, 27.2]	449	39.3 [32.4, 46.6]	436	28.9 [22.6, 36.0]	450	20.2 [15.8, 25.5]
30-39 years	292	20.6 [14.9, 27.7]	293	17.4 [12.4, 23.8]	291	42.4 [35.2, 49.9]	283	33.6 [25.9, 42.3]	293	17.0 [12.1, 23.2]
40-49 years	43	27.2 [9.0, 58.3]	43	22.1 [10.2, 41.4]	43	44.5 [22.8, 68.6]	42	28.0 [11.7, 53.1]	43	10.5 [3.0, 31.0]
Residence		(*P* = 0.523)		(*P* = 0.211)		(*P* = 0.392)		(*P* = 0.623)		(*P* = 0.070)
Urban	351	19.6 [15.4, 24.5]	351	23.5 [18.7, 29.2]	349	37.3 [31.0, 44.1]	341	28.5 [22.5, 35.5]	352	23.0 [17.5, 29.7]
Rural	510	21.8 [17.3, 27.1]	511	19.0 [14.8, 24.1]	510	41.4 [35.0, 48.2]	495	30.9 [24.5, 38.3]	510	16.4 [12.8, 20.9]
Wealth quintile[2]		(*P* = 0.154)		(*P* = 0.639)		(*P* = 0.092)		(*P* = 0.654)		(*P* = 0.713)
Lowest	182	24.4 [16.2, 35.0]	184	19.1 [12.9, 27.3]	183	39.0 [30.8, 48.0]	179	35.7 [25.6, 47.3]	183	17.0 [11.7, 24.1]
Second	179	20.1 [14.1, 27.8]	178	20.0 [13.9, 27.9]	179	41.2 [30.8, 52.6]	173	28.6 [19.9, 39.1]	179	15.4 [9.7, 23.5]
Middle	167	27.3 [19.1, 37.2]	167	25.6 [17.3, 36.0]	165	48.2 [39.9, 56.7]	161	29.7 [21.0, 40.1]	167	20.4 [13.2, 30.0]
Fourth	178	17.9 [11.7, 26.5]	178	21.0 [13.5, 31.2]	177	41.0 [31.9, 50.9]	170	27.3 [17.9, 39.3]	178	21.0 [13.1, 32.0]
Highest	152	11.8 [7.4, 18.2]	152	16.3 [10.8, 23.8]	152	26.5 [19.7, 34.7]	150	27.0 [19.6, 35.9]	152	22.5 [13.8, 34.4]
Educational attainment[2]		(*P* = 0.409)		(*P* = 0.580)		(*P* = 0.260)		(*P* = 0.914)		(*P* = 0.220)
None	202	22.5 [16.5, 29.8]	203	22.2 [15.5, 30.7]	202	40.9 [31.2, 51.3]	196	30.8 [22.8, 40.2]	202	21.5 [15.3, 29.4]
Primary	132	28.3 [20.2, 38.0]	131	27.0 [19.5, 36.0]	131	40.4 [31.0, 50.7]	127	28.5 [20.6, 38.1]	132	13.9 [7.9, 23.2]
Secondary	387	21.1 [16.0, 27.2]	388	20.7 [16.1, 26.1]	387	40.9 [33.4, 49.0]	378	32.5 [25.6, 40.4]	388	18.1 [13.7, 23.4]
Tertiary	94	16.0 [8.3, 28.5]	94	17.9 [10.6, 28.7]	93	24.1 [15.1, 36.2]	90	30.7 [21.3, 42.0]	94	27.5 [18.3, 39.2]
National	**861**[3]	**21.1 [17.7, 24.9]**	**862**[4]	**20.4 [17.0, 24.3]**	**859**[5]	**40.1 [35.3, 45.2]**	**836**[6]	**30.2 [25.3, 35.5]**	**862**[7]	**18.5 [15.3, 22.2]**

Table 80. Prevalence of self-reported illness and hospitalization/clinic visits in the last two weeks among pregnant women (aged 15-49 years), Nigeria 2021 (continued)

The data are based on questions wah1, wah2, wah5, wah6, and wah7 of the biomarker questionnaire
wah1. Have you been ill with diarrhoea in the past two weeks?
wah2. Have you been ill with a cough or breathing problems in the past two weeks?
wah5. Have you been ill with a fever in the past two weeks?
wah6. Have you been ill with malaria in the past two weeks?
wah7. Have you had any hospitalization in the last two weeks?
[1]Diarrhoea is defined as three or more loose or watery stools in a 24-hour period
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of pregnant women who responded nationally: (n= 863)
[2]Less than (n 863) due to relatively fewer respondents for the household and dietary intake questionnaires
[3]Less than (n = 863) due to the response “Don’t Know”
[4]Less than (n = 863) due to the response “Don’t Know”
[5]Less than (n = 863) due to the response “Don’t Know”
[6]Less than (n = 863) due to the response “Don’t Know”
[7]Less than (n = 863) due to the response “Don’t Know”

Other anaemia risk factors among pregnant WRA (aged 15-49 years)

Nationally, smoking prevalence among pregnant women (aged 15-49 years) was 0.4 percent. **Table 81** presents the prevalence of smoking among pregnant women (aged 15-49 years) stratified by age, residence, wealth quintile, and educational attainment. There was a statistically significant difference in the *prevalence of smoking among pregnant women* with residence (*P* = 0.039). The prevalence was higher among pregnant women residing in urban (1 percent) than in rural (0.1 percent) areas.

Table 81. Prevalence of smoking among pregnant women, Nigeria 2021

Background characteristics	Smoked tobacco (excluding powder or chew type)		
	N	% [95% CI]	*P* value
Age category			
15-19 years	76	0.0 [., .]	(*P* = 0.266)
20-29 years	451	0.3 [0.1, 1.4]	
30-39 years	293	0.4 [0.1, 1.8]	
40-49 years	43	2.0 [0.3, 13.6]	
Residence			
Urban	352	1.0 [0.4, 2.8]	(*P* = 0.039 *)
Rural	511	0.1 [0.0, 1.0]	
Wealth quintile[1]			
Lowest	184	0.8 [0.2, 3.1]	(*P* = 0.770)
Second	179	0.4 [0.1, 2.9]	
Middle	167	0.4 [0.1, 2.8]	
Fourth	178	0.2 [0.0, 1.6]	
Highest	152	0.0 [., .]	
Educational attainment[1]			
None	203	0.3 [0.1, 1.4]	(*P* = 0.777)
Primary	132	0.8 [0.1, 5.4]	
Secondary	388	0.3 [0.0, 2.1]	
Tertiary	94	0.0 [., .]	
National	**863**	**0.4 [0.2, 1.0]**	

The data are based on question wah8 of the biomarker questionnaire
wah8. Do you smoke? (Do not include the powder and chew type)
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of pregnant women who responded nationally: (n= 863)
[1]Less than (n 863) due to relatively fewer respondents for the household and dietary intake questionnaires

Malaria, plasma glucose, H. pylori, helminths, Hba1c, haemoglobin genotype

This chapter presents the prevalence of malaria, plasma glucose, H. pylori, helminths, HbA1c, and haemoglobin genotype as assessed in the target population (see **Table 82**).

Malaria, plasma glucose, H. pylori, helminths, Hba1c

As earlier indicated, self-reported morbidity was assessed from a questionnaire administered to all target groups. In addition, malaria, plasma glucose, *Helicobacter pylori* (H. pylori), helminth, and glycated haemoglobin (HbA1c) were assessed from blood and stool samples for specific target groups, as detailed in the field (see **Table 81**). All sample collection started early in the morning and was completed before midday.

Malaria, H. pylori, and helminth: The field tests for malaria, H. pylori, and helminth provided dichotomous results (positive or negative/ sighted or not sighted for microscopy). *Plasmodium falciparum* malaria parasitemia in the venous blood sample was detected using a rapid diagnostic test kit (RDT). The presence of IgG antibodies specific to *Helicobacter pylori* (H. pylori) in the blood sample was detected using a rapid qualitative immune assay test RDT. For soil-transmitted helminths, the presence of helminth eggs in stool samples was detected using microscopy.

Plasma glucose: Plasma glucose measures the amount of glucose (sugar) currently in the blood system. Whole blood glucose concentration was measured using a HemoCue (Hb-301) instrument, and the results were converted to equivalent plasma values using a constant factor of 1.11. Random plasma glucose tests were done between early morning and midday. As reported in the results, elevated plasma glucose is defined as plasma glucose > 200 mmol/L or mg/dL.

[45]*Plasma equivalent glucose (mmol/L or mg/dL) = Whole blood glucose (mmol/L or mg/dL) x 1.11.*

HbA1c: Glycated haemoglobin is a form of haemoglobin chemically linked to sugar. Most monosaccharides, including glucose, spontaneously bond with haemoglobin when present in humans' bloodstream. The test is often called A1c or HbA1c. HbA1c reflects the average blood glucose (sugar) level for the last two to three months. Haemoglobin A1c was tested in blood samples using a Bio-Rad D10 auto-analyzer in a laboratory setting. Elevated HbA1c, as reported in the results, is defined as the amount of glucose attached to haemoglobin > 5.6 percent.

Table 82. Blood analysis done in the field and laboratory for respective respondents

Respondent	Malaria	Plasma glucose	H. pylori	Helminths	HbA1c	Haemoglobin genotype
Children (aged 6-59 months)	Yes	No	Yes	Yes	No	Yes
Adolescents (aged 10-14 years)	Yes	No	Yes	No	No	No
WRA (aged 15-49 years old)	Yes	Yes	Yes	Yes	Yes	Yes
Pregnant women (aged 15-49 years)	Yes	No	Yes	Yes	No	No

45 Kuwa K, Nakayama T, Hoshino T, Tominaga M. Relationships of glucose concentrations in capillary whole blood, venous whole blood and venous plasma. Clin Chim Acta. 2001 May;307(1-2):187-92. doi: 10.1016/s0009-8981(01)00426-0. PMID: 11369356.

Figure 58 presents the prevalence at the national level of malaria, H. pylori, helminths, elevated plasma glucose, and elevated HbA1c as assessed in the target population.

a. **Malaria**: The national prevalence of malaria among children (aged 6-59 months), adolescent girls, WRA, and pregnant women was 24, 33, 13, and 14 percent, respectively.
b. **H. pylori**: The national prevalence of H. pylori among children (aged 6-59 months), adolescent girls, WRA, and pregnant women was 36, 55, 64, and 59 percent, respectively.
c. **Helminths:** The national prevalence of helminth among children (6-59 months), WRA, and pregnant women was 11, 6, and 4 percent, respectively.
d. **Elevated plasma glucose** (plasma glucose > 200 mmol/L or mg/dL): The national prevalence of elevated plasma glucose among WRA was 0.2 percent.
e. **Elevated HbA1c (**glycated haemoglobin > 5.6%): The national prevalence of elevated HbA1c among WRA was 16 percent.

Prevalence of malaria, H. pylori, and helminths among children (aged 6-59 months)

Table 83 shows the prevalence of malaria, H. pylori, and helminths among children (aged 6-59 months).

Malaria: The prevalence of malaria among children 6-59 months stratified by age, sex, residence, zone, and wealth quintile are shown in **Table 83**. There was a statistically significant difference in the *prevalence of malaria among children* among age category ($P < 0.001$), residence ($P < 0.001$), wealth quintile ($P < 0.001$), and educational attainment ($P < 0.001$). The prevalence of malaria was lowest in the 6 to 11-months age category (15 percent). It was higher in children residing in rural (30 percent) compared to urban (12 percent) areas. It was lowest in children in the highest wealth quintile (7 percent) and in children whose caregivers had attained tertiary education (8 percent).

H. pylori: The prevalence of H. pylori among children (aged 6-59 months) stratified by age, sex, residence, zone, and wealth quintile is shown in **Table 83**. There was a statistically significant difference in the *prevalence of H. pylori among children* between age groups ($P = 0.012$) and the zones ($P = 0.006$). The prevalence of H. pylori was highest in children in the 48 to 59-months age category (42 percent) and children in the South East zone (52 percent).

Helminth: The prevalence of helminth among children (aged 6-59 months) stratified by age, sex, residence, zone, and wealth quintile is shown in **Table 83**. There was a statistically significant difference in the *prevalence of helminth among children* between residence ($P = 0.004$), the zones ($P < 0.001$), wealth quintiles ($P = 0.018$), and educational attainment of the caregiver ($P = 0.002$). The prevalence of helminth was higher in children residing in rural (13 percent) compared to urban (7 percent) areas. It was lowest in the South East zone (0.3 percent). It was highest in children in the lowest wealth quintile (15 percent) and in children whose caregivers had no education (14 percent).

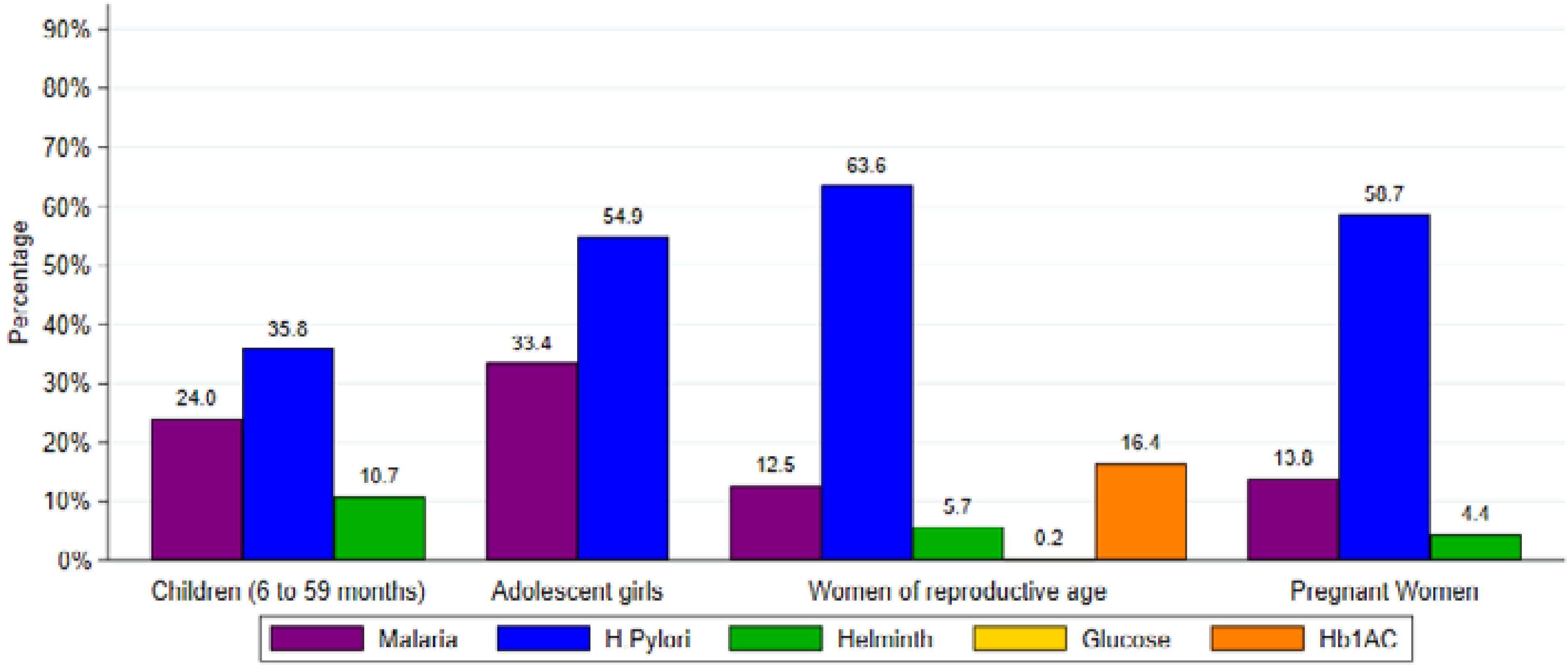

Figure 58. Overall prevalence of malaria, H. pylori, helminths, elevated plasma glucose, and elevated HbA1c among children 6-59 months, adolescent girls, WRA, and pregnant women, respectively, Nigeria 2021.

Malaria: the presence of Plasmodium falciparum malaria parasitemia in blood sample detected using RDT
H. pylori: the presence of IgG antibodies specific to Helicobacter pylori (H. pylori) in blood sample detected using a rapid qualitative immune assay test RDT
Helminth: the presence of helminth eggs in stool samples detected using microscopy
Plasma glucose: Random plasma glucose test taken in the AM. Elevated plasma glucose defined as > 200 mg/dl
HbA1c: Haemoglobin A1c was tested in a blood sample using a Bio-Rad D10 auto-analyzer. Elevated HbA1c defined as > 5.6%
Data are weighted to account for survey design and non-response
Number of children aged 6-59 months (C6-59m) who responded nationally: Malaria (n = 5641), H. pylori (n= 4672), Helminth (n= 4240)
Number of adolescent girls (ADOL) who responded nationally: Malaria (n = 996), H. pylori (n= 984)
Number of WRA (WRA) who responded nationally: Malaria (n = 5159), H. pylori (n= 5161), Helminth (n= 4669), HbA1c (n= 5309), Plasma glucose (n = 5109)
Number of pregnant women (PW) who responded nationally: Malaria (n = 959), H. pylori (n= 959), Helminth (n= 846)

Table 83. Prevalence of malaria, H. pylori, and helminths among children (aged 6-59 months), Nigeria 2021

Background characteristics	Malaria		H. pylori		Helminths	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* < 0.001***)		(*P* = 0.012*)		(*P* = 0.485)
6-11 months	448	14.7 [10.7, 19.8]	446	31.2 [24.6, 38.6]	402	7.0 [4.2, 11.5]
12-23 months	1060	17.7 [14.4, 21.6]	1056	32.2 [28.1, 36.7]	968	11.1 [8.0, 15.2]
24-35 months	1121	25.9 [20.8, 31.8]	1121	34.2 [30.0, 38.8]	1043	10.7 [8.4, 13.5]
36-47 months	1173	28.1 [22.8, 34.2]	1172	38.0 [32.6, 43.7]	1053	11.6 [8.9, 15.0]
48-59 months	876	29.0 [24.5, 33.9]	876	41.8 [36.2, 47.6]	774	11.0 [8.1, 14.7]
Sex		(*P* = 0.198)		(*P* = 0.086)		(*P* = 0.819)
Male	2341	23.0 [19.3, 27.3]	2341	37.3 [33.1, 41.7]	2130	10.9 [8.7, 13.6]
Female	2337	25.0 [21.2, 29.2]	2330	34.3 [30.8, 38.0]	2110	10.5 [8.6, 12.9]
Residence		(*P* < 0.001***)		(*P* = 0.494)		(*P* = 0.004**)
Urban	1909	12.2 [9.1, 16.2]	1907	34.0 [27.6, 40.9]	1681	7.0 [4.8, 10.0]
Rural	2769	29.9 [25.3, 34.9]	2764	36.7 [32.7, 41.0]	2559	12.7 [10.5, 15.2]
Zone		(*P* = 0.072)		(*P* = 0.006**)		(*P* < 0.001***)
North Central	727	19.1 [12.7, 27.7]	726	43.7 [35.6, 52.2]	677	19.9 [15.2, 25.7]
North East	797	16.6 [11.0, 24.3]	799	33.6 [24.4, 44.2]	792	16.4 [11.5, 22.9]
North West	843	29.0 [21.4, 38.1]	837	28.4 [22.5, 35.3]	745	9.9 [7.3, 13.5]
South East	692	22.2 [14.7, 32.0]	692	51.9 [43.1, 60.6]	673	0.3 [0.1, 1.2]
South South	811	28.2 [21.3, 36.3]	811	41.1 [34.5, 48.1]	760	3.4 [1.5, 7.6]
South West	808	24.8 [19.4, 31.2]	806	36.4 [29.4, 43.9]	593	4.7 [3.1, 7.0]
Wealth quintile[1]		(*P* < 0.001***)		(*P* = 0.345)		(*P* = 0.018*)
Lowest	1000	32.9 [27.7, 38.6]	1000	37.7 [32.7, 43.1]	936	14.5 [11.2, 18.6]
Second	966	32.7 [26.1, 40.2]	963	37.6 [32.0, 43.5]	894	11.9 [9.1, 15.4]
Middle	936	21.7 [17.9, 26.2]	933	36.9 [31.4, 42.8]	855	8.9 [5.7, 13.7]
Fourth	920	13.9 [10.9, 17.8]	921	33.4 [28.8, 38.4]	821	7.2 [4.8, 10.6]
Highest	835	7.2 [4.5, 11.3]	833	30.6 [22.9, 39.5]	720	8.6 [5.9, 12.4]
Caregivers' educational attainment[1]		(*P* < 0.001***)		(*P* = 0.186)		(*P* = 0.002**)
None	1239	29.6 [24.4, 35.4]	1236	33.4 [29.4, 37.8]	1118	14.3 [11.4, 17.8]
Primary	738	25.7 [20.6, 31.6]	736	39.3 [32.9, 46.0]	674	11.1 [7.5, 16.1]
Secondary	1919	19.3 [15.8, 23.4]	1918	37.8 [32.8, 43.2]	1756	7.9 [6.1, 10.3]
Tertiary	487	7.6 [4.0, 13.9]	486	32.2 [25.3, 40.1]	432	7.9 [4.7, 13.2]
National	**4678**	**24.0 [20.5, 28.0]**	**4671**[2]	**35.8 [32.3, 39.5]**	**4240**	**10.7 [9.1, 12.6]**

Malaria: the presence of Plasmodium falciparum malaria parasitemia in blood sample detected using RDT
H. pylori: the presence of IgG antibodies specific to Helicobacter pylori (H. pylori) in blood sample detected using a rapid qualitative immune assay test RDT
Helminth: the presence of helminth eggs in stool samples detected using microscopy
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of children aged (6-59 months) who responded nationally: Malaria (n = 4678), H. pylori (n= 4672), Helminth (n= 4240)
[1]Less than [Malaria (n = 4678), H. pylori (n= 4672), Helminth (n= 4240)] due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 4671) due to invalid results

Prevalence of malaria and H. pylori among adolescent girls (aged 10-14 years)

Table 84 shows the prevalence of malaria and H. pylori among adolescent girls (aged 10-14 years).

Malaria: **Table 84** shows the prevalence of malaria in adolescent girls stratified by age, residence, and wealth quintile. There was a statistically significant difference in the *prevalence of malaria among adolescent girls* between residence (P < 0.001) and wealth quintile (P < 0.001). The prevalence of malaria was higher in adolescent girls residing in the rural (43 percent) than in the urban (17 percent) areas. The prevalence was lowest among adolescent girls in the highest wealth quintile (6 percent).

H. pylori: **Table 84** shows the prevalence of H. pylori in adolescent girls stratified by age, residence, and wealth quintile. There was a statistically significant difference in the *prevalence of H. pylori among adolescent girls* between the ages (P = 0.007). The prevalence was highest in 12-year-olds (65 percent).

Table 84. Prevalence of malaria and H. pylori among adolescent girls (aged 10-14 years), Nigeria 2021

Background characteristics	Malaria		H. pylori	
	N	% [95% CI]	N	% [95% CI]
Age	(P = 0.839)		(P = 0.007**)	
10 years	263	34.8 [26.9, 43.5]	258	56.3 [47.8, 64.4]
11 years	158	33.0 [22.8, 45.1]	158	42.4 [32.1, 53.5]
12 years	191	34.4 [24.8, 45.5]	186	64.8 [55.5, 73.2]
13 years	196	28.7 [20.9, 38.0]	193	47.2 [37.7, 57.0]
14 years	189	35.6 [25.5, 47.3]	189	61.0 [50.6, 70.5]
Residence	(P < 0.001***)		(P = 0.127)	
Urban	420	17.2 [12.1, 23.8]	418	49.8 [42.1, 57.4]
Rural	577	42.7 [35.6, 50.1]	566	57.9 [50.8, 64.6]
Wealth quintile[1]	(P < 0.001***)		(P = 0.809)	
Lowest	213	49.1 [39.8, 58.5]	210	57.8 [48.0, 67.0]
Second	188	46.3 [36.6, 56.4]	187	57.6 [47.1, 67.3]
Middle	206	31.3 [22.6, 41.5]	202	51.6 [41.0, 62.2]
Fourth	195	21.6 [15.3, 29.5]	191	53.2 [43.8, 62.4]
Highest	193	6.1 [3.0, 12.4]	192	52.3 [42.3, 62.1]
National	**997**	**33.4 [28.2, 39.1]**	**984**	**54.9 [49.6, 60.1]**

Malaria: the presence of Plasmodium falciparum malaria parasitemia in blood sample detected using RDT
H. pylori: the presence of IgG antibodies specific to Helicobacter pylori (H. pylori) in blood sample detected using a rapid qualitative immune assay test RDT
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of adolescent girls who responded nationally: Malaria (n = 997), H. pylori (n= 984)
[1]Less than [Malaria (n = 997), H. pylori (n= 984)] due to relatively fewer respondents for the household and dietary intake questionnaires

Prevalence of malaria, H. pylori, helminths, elevated plasma glucose, and elevated glycated haemoglobin (HbA1c) among WRA (aged 15-49 years)

Table 85 shows the prevalence of malaria, H. pylori, helminths, elevated plasma glucose, and elevated glycated haemoglobin (HbA1c) among WRA.

Malaria: **Table 85** shows the prevalence of malaria in WRA stratified by age, residence, zone, and wealth quintile. There was a statistically significant difference in the *prevalence of malaria among WRA* between the age groups (*P* < 0.001), residence (*P* < 0.001), wealth quintile (*P* < 0.001), and educational attainment (*P* < 0.001). The prevalence of malaria was highest in the 15 to19-years age category (21 percent). It was higher among women residing in rural (15 percent) compared to urban (8 percent) areas. It was lowest in WRA in the highest wealth quintile (4 percent) and women who had attained tertiary education (5 percent).

H. pylori: **Table 85** shows the prevalence of H. pylori in WRA stratified by age, residence, zone, and wealth quintile. There was a statistically significant difference in the *prevalence of H. pylori among WRA* between the age groups (*P* = 0.043) and zones (*P* < 0.001). The lowest prevalence of *H.* pylori was in the 15 to 19-years (61 percent) and 20 to 29-years (61 percent) age categories. The prevalence was lowest in the North West zone (53 percent).

Helminth: **Table 85** shows the prevalence of helminth in WRA stratified by age, residence, zone, and wealth quintile. There was a statistically significant difference in the *prevalence of helminth among WRA* between residence (*P* = 0.022), zones (*P* < 0.001), wealth quintile (*P* = 0.012), and educational attainment (*P* = 0.016). The prevalence of helminth was higher in WRA residing in rural (7 percent) compared to urban (4 percent) areas. It was highest in WRA in the North East zone (12 percent). It was highest in WRA in the lowest wealth quintile (9 percent) and lowest in women who had attained tertiary education (4 percent).

Elevated plasma glucose (plasma glucose > 200 mg/dl): **Table 85** shows the prevalence of elevated plasma glucose in WRA stratified by age, residence, zone, and wealth quintile. There was no significant variation in the prevalence of elevated plasma glucose in WRA across the background characteristics.

Elevated glycated haemoglobin (HbA1c > 5.6%): **Table 85** shows the prevalence of elevated HbA1c in WRA stratified by age, residence, zone, and wealth quintile. There was a statistically significant difference in the *prevalence of elevated HbA1c among WRA* between the age groups (*P* = 0.001), residence (*P* < 0.001), and wealth quintile (*P* = 0.003). The prevalence of elevated HbA1c was highest in the 40 to 49-years age category (22 percent). It was higher in WRA residing in urban (21 percent) than in rural (13 percent) areas. It was lowest among WRA in the lowest wealth quintile (11 percent)..

Table 85. Prevalence of malaria, H. pylori, helminths, elevated plasma glucose, and elevated HbA1c among WRA (aged 15-49 years), Nigeria 2021

Background characteristics	Malaria		H. pylori		Helminth		Elevated plasma glucose		Elevated HbA1c	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age		(*P* < 0.001***)		(*P* = 0.043*)		(*P* = 0.907)		(*P* = 0.005)		(*P* = 0.001***)
15-19 years	1124	20.6 [16.8, 25.1]	1124	61.0 [56.0, 65.7]	1000	6.1 [4.3, 8.6]	1098	0.0 [., .]	1093	14.4 [11.1, 18.6]
20-29 years	1637	11.2 [9.4, 13.3]	1638	61.4 [57.2, 65.5]	1460	5.8 [4.3, 7.7]	1572	0.0 [., .]	1559	13.7 [11.1, 16.8]
30-39 years	1495	10.1 [7.9, 12.9]	1497	66.3 [62.1, 70.3]	1373	5.6 [4.2, 7.4]	1444	0.5 [0.2, 1.4]	1430	17.5 [14.2, 21.4]
40-49 years	1012	8.6 [5.8, 12.6]	1011	66.4 [62.0, 70.5]	935	5.2 [3.6, 7.3]	995	0.2 [0.1, 0.7]	1000	21.8 [18.5, 25.6]
Residence		(*P* < 0.001***)		(*P* = 0.169)		(*P* = 0.022*)		(*P* = 0.325)		(*P* < 0.001***)
Urban	2138	8.2 [6.2, 10.8]	2138	60.7 [54.7, 66.3]	1865	4.0 [2.8, 5.9]	2078	0.1 [0.0, 0.3]	2013	20.9 [17.0, 25.4]
Rural	3130	15.3 [13.3, 17.7]	3132	65.5 [61.9, 68.9]	2903	6.8 [5.4, 8.5]	3031	0.2 [0.1, 0.6]	3069	12.7 [10.7, 15.1]
Zone		(*P* = 0.411)		(*P* < 0.001***)		(*P* < 0.001***)		(*P* = 0.636)		(*P* = 0.218)
North Central	863	14.8 [11.1, 19.4]	862	71.7 [65.4, 77.3]	785	8.9 [6.2, 12.7]	826	0.0 [., .]	832	16.8 [13.0, 21.6]
North East	855	9.8 [6.8, 13.9]	857	58.2 [47.1, 68.5]	836	11.7 [8.3, 16.3]	818	0.0 [., .]	824	20.4 [14.6, 27.7]
North West	901	14.0 [10.6, 18.2]	901	52.9 [47.6, 58.0]	792	4.1 [2.7, 6.3]	869	0.4 [0.1, 1.3]	880	15.0 [10.0, 21.8]
South East	880	10.5 [7.0, 15.5]	880	75.9 [70.6, 80.5]	846	1.0 [0.2, 6.1]	861	0.8 [0.3, 2.1]	845	21.4 [17.3, 26.3]
South South	881	13.0 [9.1, 18.2]	883	76.2 [70.6, 81.1]	827	2.9 [1.5, 5.6]	858	0.0 [., .]	837	15.6 [12.3, 19.6]
South West	888	11.5 [8.5, 15.4]	887	63.0 [57.6, 68.1]	682	2.5 [1.1, 5.3]	877	0.0 [., .]	864	12.8 [9.5, 17.0]
Wealth quintile[1]		(*P* < 0.001***)		(*P* = 0.373)		(*P* = 0.012*)		(*P* = 0.352)		(*P* = 0.003**)
Lowest	1095	17.9 [15.0, 21.3]	1095	61.7 [56.8, 66.4]	1013	8.9 [6.7, 11.7]	1050	0.2 [0.0, 1.2]	1057	10.5 [7.9, 13.9]
Second	1122	18.7 [15.5, 22.5]	1124	64.8 [60.1, 69.3]	1046	6.2 [4.2, 8.9]	1081	0.1 [0.0, 0.7]	1083	14.6 [11.3, 18.5]
Middle	1104	10.2 [8.1, 12.7]	1105	67.1 [62.1, 71.9]	975	5.2 [3.4, 8.1]	1073	0.4 [0.1, 1.7]	1066	18.5 [15.0, 22.5]
Fourth	988	9.5 [7.3, 12.2]	987	62.4 [56.5, 68.0]	877	4.2 [2.6, 6.5]	963	0.0 [., .]	961	19.4 [15.0, 24.6]
Highest	937	4.0 [2.6, 6.3]	937	61.1 [54.3, 67.4]	839	3.5 [1.9, 6.3]	920	0.2 [0.0, 0.5]	901	20.3 [15.3, 26.4]
Educational attainment[1]		(*P* < 0.001***)		(*P* = 0.069)		(*P* = 0.016*)		(*P* = 0.552)		(*P* = 0.065)
None	1235	15.2 [12.5, 18.2]	1237	60.8 [56.4, 65.0]	1109	7.5 [5.8, 9.7]	1170	0.0 [., .]	987	13.3 [10.6, 16.5]
Primary	850	13.8 [11.1, 17.0]	849	68.0 [62.3, 73.1]	795	6.5 [4.4, 9.7]	828	0.1 [0.0, 0.4]	819	16.9 [13.7, 20.7]
Secondary	2397	11.6 [9.6, 13.9]	2399	63.2 [58.4, 67.7]	2162	4.5 [3.4, 6.1]	2342	0.1 [0.0, 0.3]	2394	18.0 [14.9, 21.6]
Tertiary	533	4.5 [2.6, 7.5]	531	69.2 [62.8, 75.0]	474	3.6 [2.0, 6.5]	523	0.1 [0.0, 0.7]	705	14.5 [11.1, 18.7]
National	**5268[2]**	**12.5 [10.9, 14.3]**	**5270[3]**	**63.6 [60.4, 66.6]**	**4768**	**5.7 [4.7, 6.9]**	**5109**	**0.2 [0.1, 0.4]**	**5082[4]**	**16.4 [14.2, 18.9]**

Table 85. Prevalence of malaria, H. pylori, helminths, elevated plasma glucose, and elevated HbA1c among WRA (aged 15-49 years), Nigeria 2021 (continued)

Malaria: the presence of Plasmodium falciparum malaria parasitemia in blood sample detected using RDT
H. pylori: the presence of IgG antibodies specific to Helicobacter pylori (H. pylori) in blood sample detected using a rapid qualitative immune assay test RDT
Helminth: the presence of helminth eggs in stool samples detected using microscopy
Plasma glucose: random plasma glucose test taken in the AM. Elevated plasma glucose defined as > 200 mg/dl
HbA1c: Haemoglobin A1c was tested in a blood sample using a Bio-Rad D10 auto-analyzer. Elevated HbA1c defined as > 5.6%
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of WRA who responded nationally: Malaria (n = 5269), H. pylori (n= 5272), Helminth (n= 4768), Plasma glucose (n = 5109), HbA1c (n= 5089)
[1]Less than [Malaria (n = 5269), H. pylori (n= 5272), Helminth (n= 4768), Plasma glucose (n = 5109), HbA1c (n= 5089)] due to relatively fewer respondents for the HH and dietary intake questionnaires
[2]Less than (n = 5269) due to invalid results
[3]Less than (n = 5272) due to invalid results
[4]Less than (n = 5089) due to invalid results

Prevalence of malaria, H. pylori, and helminths among pregnant women (aged 15-49 years)

Table 86 shows the prevalence of malaria, H. pylori, and helminths among pregnant women stratified by age, residence, wealth quintile, and educational attainment.

Malaria: There was a statistically significant difference in the *prevalence of malaria among pregnant women* between the age groups (*P* = 0.002) and residence (*P* = 0.003). The prevalence was lowest in the 30-39-years age category (8 percent). It was higher among pregnant women residing in rural (17 percent) than in urban (8 areas) areas.

***H.* pylori**: There was no significant variation in the prevalence of H. pylori among pregnant women across the background characteristics.

Helminth: There was no significant variation in the prevalence of helminth among pregnant women across the background characteristics.

Table 86. Prevalence of malaria, H. pylori, and helminths among pregnant women (aged 15-49 years) Nigeria 2021

Background characteristics	Malaria		H. pylori		Helminth	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* = 0.0017**)		(*P* = 0.115)		(*P* = 0.889)
15-19 years	73	34.8 [20.7, 52.2]	73	63.5 [49.3, 75.7]	63	5.3 [2.1, 12.7]
20-29 years	446	14.4 [10.6, 19.1]	445	58.5 [51.2, 65.5]	394	4.3 [2.3, 7.7]
30-39 years	286	7.7 [4.0, 14.5]	287	54.4 [46.0, 62.6]	252	4.6 [2.5, 8.3]
40-49 years	43	10.9 [2.7, 34.9]	43	79.2 [62.8, 89.6]	38	2.2 [0.3, 14.9]
Residence		(*P* = 0.0026**)		(*P* = 0.376)		(*P* = 0.255)
Urban	347	8.3 [5.7, 12.0]	348	55.6 [47.5, 63.5]	291	3.0 [1.4, 6.5]
Rural	501	16.5 [12.6, 21.4]	500	60.2 [54.1, 66.0]	456	5.1 [3.2, 7.8]
Wealth quintile[1]		(*P* = 0.1426		(*P* = 0.178)		(*P* = 0.539)
Lowest	181	16.9 [10.9, 25.2]	181	56.0 [47.2, 64.5]	165	5.9 [3.2, 10.8]
Second	174	16.2 [10.4, 24.3]	174	62.7 [52.2, 72.1]	158	5.0 [2.5, 9.9]
Middle	165	17.0 [9.9, 27.6]	165	68.5 [56.9, 78.1]	151	5.2 [1.9, 13.3]
Fourth	176	10.2 [4.3, 22.7]	176	51.7 [38.7, 64.5]	145	2.4 [0.9, 6.2]
Highest	149	3.7 [1.4, 8.9]	149	51.6 [41.0, 62.1]	126	1.8 [0.3, 11.3]
Educational attainment[1]		(*P* = 0.119)		(*P* = 0.078)		(*P* = 0.579)
None	198	16.7 [11.3, 24.0]	198	56.0 [45.7, 65.7]	174	3.7 [1.9, 7.2]
Primary	131	12.2 [7.5, 19.4]	131	53.9 [41.2, 66.1]	111	3.6 [1.3, 9.7]
Secondary	383	13.4 [9.1, 19.2]	384	66.3 [59.1, 72.9]	343	5.8 [3.1, 10.6]
Tertiary	93	3.7 [1.2, 11.0]	92	47.5 [36.7, 58.5]	78	2.8 [0.9, 8.9]
National	**848**	**13.8 [10.9, 17.3]**	**848**	**58.7 [53.8, 63.4]**	**747**	**4.4 [3.0, 6.4]**

Malaria: the presence of Plasmodium falciparum malaria parasitemia in blood sample detected using RDT
H. pylori: the presence of IgG antibodies specific to Helicobacter pylori (H. pylori) in blood sample detected using a rapid qualitative immune assay test RDT
Helminth: the presence of helminth eggs in stool samples detected using microscopy
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of pregnant women who responded nationally: Malaria (n = 848), H. pylori (n= 848), Helminth (n= 747)
[1]Less than [Malaria (n = 848), H. pylori (n= 848), Helminth (n= 747)] due to relatively fewer respondents for the household and dietary intake questionnaires

Haemoglobin genotype (Blood disorders)

Inherited blood disorders are common among children in many parts of Africa[46]. The different blood disorders include α-thalassemia, β-thalassemia, sickle cell, haemoglobin E, and glucose-6-phosphate dehydrogenase deficiency (G6PD). These are broadly classified into structural or qualitative disorders.[47]

Sickle Cell Disease (SCD) is a structural disorder of the blood characterized by a mutation in the beta-globin gene located on chromosome 11. The nucleotide adenine at position six is substituted with thymine causing a change in amino acid sequence from glutamic acid to valine. On the other hand, thalassaemias are a group of qualitative disorders characterized by a reduced production rate or absence of the globulin units of haemoglobin.

Haemoglobin genotype of children (aged 6-59 months) and WRA was assessed using electrophoresis in a laboratory. The tests were done using HPLC. Capillary electrophoresis was used to confirm rare variants identified on HPLC.

A key objective of the survey was to assess blood disorders as an important factor associated with anaemia.

Figure 59 presents the national prevalence of haemoglobin genotype and inherited blood disorders among children (aged 6-59 months) and WRA (aged 15-49 years). The percentage of children (aged 6-59 months) with normal haemoglobin (HbAA) was 78 percent. The prevalence of sickle cell trait (HbAS) among children was 19 percent. The prevalence of SCD is 0.7 percent. The percentage of WRA with normal haemoglobin (HbAA) was 75 percent. The prevalence of sickle cell trait (HbAS) among children was 23 percent and prevalence of SCD is 0.2 percent.

Table 87 presents the prevalence of haemoglobin genotype and inherited blood disorders among children (aged 6-59 months) stratified by age, residence, zone, and wealth quintile. There was no significant variation in the prevalence of inherited blood disorders in children across the background characteristics.

Table 88 presents the prevalence of haemoglobin genotype and inherited blood disorders among WRA (aged 15-49 years) stratified by residence, zone, and wealth quintile. There was a statistically significant difference in the *prevalence of sickle cell among WRA* between residence (P = 0.002). The prevalence of SCD (HbSS) was higher in women residing in rural (0.3 percent) than in urban (0.0 percent) areas.

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47 Modell B, Darlison M. Global epidemiology of haemoglobin disorders and derived service indicators. Bull World Health Organ. 2008 Jun;86(6):480-7. doi: 10.2471/blt.06.036673. PMID: 18568278; PMCID: PMC2647473.

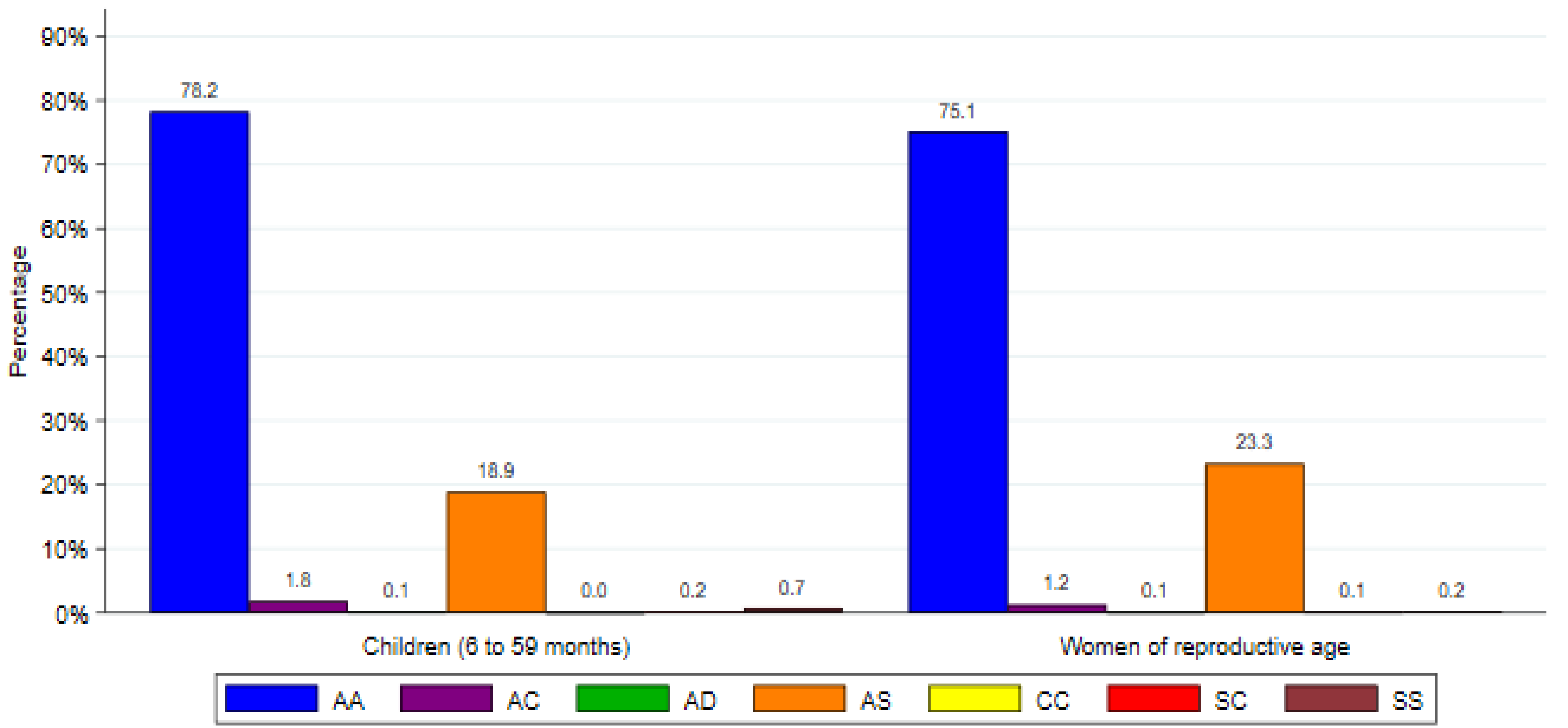

Figure 59. Prevalence of haemoglobin genotype and prevalence of inherited blood disorders by target group at national level (linked to Tables 88 and 89), Nigeria 2021
Haemoglobin genotype (blood disorders) was assessed using HPLC in a laboratory setting
Capillary electrophoresis was used to confirm rare variants identified on HPLC
Data are weighted to account for survey design and non-response
Number of children (aged 6-59 months) who responded nationally: (n= 4548)
Number of children presenting with Hb: AA (n=3,469), AC (n=69); AD (n=7); AS (n= 877); CC (n=1); SS (n= 33)
Number of WRA who responded nationally:(n= 5137)
Number of women presenting with Hb: AA (n=3,924), AC (n=58); AD (n= 5); AS (n=166); CC (n=0); SS (n= 11)

Table 87. Prevalence of haemoglobin genotype (HbAA, HbAS) and prevalence of inherited blood disorders (HbSS) among children (aged 6-59 months), Nigeria 2021

Background characteristics	Haemoglobin Genotype					
	AA		AS		SS	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category	(*P* = 0.383)		(*P* = 0.180)		(*P* = 0.568)	
6-11 months	448	79.1 [74.1, 83.3]	448	17.1 [13.2, 21.8]	448	1.1 [0.3, 4.8]
12-23 months	1037	78.4 [74.9, 81.5]	1037	18.6 [15.7, 21.9]	1037	0.8 [0.3, 2.0]
24-35 months	1130	78.2 [74.3, 81.6]	1130	19.6 [16.3, 23.3]	1130	0.6 [0.2, 1.4]
36-47 months	1127	79.9 [76.5, 83.0]	1127	17.0 [14.1, 20.3]	1127	1.0 [0.4, 2.2]
48-59 months	795	75.0 [69.9, 79.4]	795	22.4 [18.5, 26.9]	795	0.3 [0.1, 0.8]
Sex	(*P* = 0.990)		(*P* = 0.803)		(*P* = 0.913)	
Male	2272	78.2 [74.9, 81.2]	2272	18.7 [16.0, 21.6]	2272	0.8 [0.3, 1.7]
Female	2265	78.2 [75.4, 80.8]	2265	19.1 [16.7, 21.7]	2265	0.7 [0.4, 1.4]
Residence		0.2987		0.0672)		0.3398
Urban	1828	79.7 [76.0, 83.0]	1828	16.5 [13.7, 19.8]	1828	1.0 [0.5, 2.0]
Rural	2709	77.3 [74.4, 80.0]	2709	20.3 [17.8, 23.0]	2709	0.6 [0.3, 1.3]
Zone	(*P* = 0.140)		(*P* = 0.425)		(*P* = 0.661)	
North Central	695	82.6 [78.2, 86.2]	695	15.9 [12.5, 20.1]	695	0.4 [0.1, 1.2]
North East	783	78.9 [73.0, 83.8]	783	19.1 [14.5, 24.8]	783	1.1 [0.3, 3.8]
North West	828	78.9 [73.7, 83.3]	828	17.9 [13.9, 22.8]	828	0.8 [0.4, 2.0]
South East	678	78.2 [74.5, 81.5]	678	20.8 [17.4, 24.6]	678	0.2 [0.1, 0.8]
South South	783	76.7 [73.1, 80.0]	783	22.4 [19.1, 26.1]	783	0.5 [0.2, 1.5]
South West	770	72.7 [67.9, 77.0]	770	20.0 [16.7, 23.8]	770	0.8 [0.3, 2.1]
Wealth quintile[1]	(*P* = 0.288)		(*P* = 0.278)		(*P* = 0.708)	
Lowest	971	79.8 [76.5, 82.8]	971	17.9 [14.9, 21.4]	971	0.7 [0.3, 1.9]
Second	946	75.1 [69.2, 80.1]	946	22.1 [17.7, 27.1]	946	0.8 [0.3, 2.2]
Middle	911	78.0 [73.8, 81.6]	911	18.8 [15.6, 22.5]	911	0.6 [0.2, 1.7]
Fourth	891	79.1 [75.3, 82.5]	891	17.6 [14.6, 21.0]	891	1.1 [0.5, 2.3]
Highest	811	80.8 [75.7, 85.0]	811	16.3 [11.7, 22.3]	811	0.4 [0.1, 1.0]
National	**4537**[2]	**78.2 [75.9, 80.3]**	**4537**[3]	**18.9 [16.9, 21.0]**	**4537**[4]	**0.7 [0.4, 1.3]**

Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of children (aged 6-59 months) who responded nationally: (n= 4548)
[1]Less than (n = 4548) due to relatively fewer respondents for the household and dietary intake questionnaires
[2]Less than (n = 4548) due to invalid results
[3]Less than (n = 4548) due to invalid results
[4]Less than (n = 4548) due to invalid results

Table 88. Prevalence of haemoglobin genotype (HbAA, HbAS) and prevalence of inherited blood disorders (HbSS) among WRA (aged 15-49 years), Nigeria 2021

Background characteristics	Haemoglobin genotype					
	AA		AS		SS	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(P = 0.772)		(P = 0.796)		(P = 0.103)
15-19 years	1110	76.0 [72.9, 78.9]	1110	22.8 [20.0, 26.0]	1110	0.3 [0.1, 0.6]
20-29 years	1576	75.7 [73.0, 78.2]	1576	22.4 [20.0, 25.1]	1576	0.4 [0.1, 1.1]
30-39 years	1437	74.1 [71.1, 76.8]	1437	24.3 [21.6, 27.2]	1437	0.0 [0.0, 0.3]
40-49 years	1006	74.5 [69.7, 78.7]	1006	23.8 [19.6, 28.6]	1006	0.0 [., .]
Residence		(P = 0.695)		(P = 0.417)		(P = 0.002**)
Urban	2028	75.5 [72.8, 78.0]	2028	22.5 [20.2, 25.1]	2028	0.0 [0.0, 0.2]
Rural	3101	74.8 [72.7, 76.8]	3101	23.9 [21.8, 26.1]	3101	0.3 [0.1, 0.7]
Zone		(P = 0.183)		(P = 0.066)		(P = 0.881)
North Central	839	76.4 [73.3, 79.3]	839	23.0 [20.2, 26.1]	839	0.2 [0.0, 0.6]
North East	830	76.9 [72.5, 80.8]	830	21.9 [18.3, 25.9]	830	0.1 [0.0, 0.9]
North West	886	72.1 [68.0, 75.9]	886	26.5 [22.6, 30.8]	886	0.3 [0.1, 1.3]
South East	859	78.0 [75.0, 80.8]	859	21.2 [18.4, 24.1]	859	0.1 [0.0, 0.9]
South South	840	75.6 [72.3, 78.6]	840	24.1 [21.1, 27.4]	840	0.2 [0.1, 0.6]
South West	875	75.3 [71.9, 78.4]	875	20.1 [17.2, 23.3]	875	0.1 [0.0, 0.6]
Wealth quintile[1]		(P = 0.286)		(P = 0.396)		(P = 0.115)
Lowest	1065	74.8 [70.8, 78.4]	1065	24.1 [20.4, 28.3]	1065	0.1 [0.0, 0.5]
Second	1100	75.5 [72.0, 78.7]	1100	22.9 [19.7, 26.4]	1100	0.3 [0.1, 0.8]
Middle	1070	72.3 [68.7, 75.5]	1070	25.7 [22.5, 29.1]	1070	0.5 [0.1, 1.6]
Fourth	969	75.3 [71.9, 78.4]	969	22.8 [19.7, 26.3]	969	0.0 [., .]
Highest	911	78.0 [74.0, 81.6]	911	20.6 [17.0, 24.7]	911	0.1 [0.0, 0.5]
National	**5129**[2]	**75.1 [73.4, 76.7]**	**5129**[3]	**23.3 [21.7, 24.9]**	**5129**[4]	**0.2 [0.1, 0.4]**

Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of WRA who responded nationally: (n= 5137)
[1]Less than (n = 5137) due to relatively fewer respondents for the HH and dietary intake questionnaires
[2]Less than (n = 5137) due to invalid results
[3]Less than (n = 5137) due to invalid results
[4]Less than (n = 5137) due to invalid results

Anaemia

This chapter presents results on anaemia in the target population assessed from whole blood samples analyzed in the field.

Anaemia is the most evident consequence of iron deficiency. It is associated with significant morbidity and has been the focus for evaluating iron status.[48] Anaemia is characterized by low levels of haemoglobin (the protein in RBC responsible for carrying oxygen) in the blood. Iron is an essential component of haemoglobin, and iron deficiency is estimated to contribute to approximately one-half of anaemia cases worldwide[49]. Self-reported anaemia risk and use of multivitamin/ iron supplements were assessed from the questionnaire for all target groups.

Other micronutrient deficiencies (i.e., vitamin B_{12}, folate, and vitamin A) and non-nutritional causes (i.e., blood disorders, malaria, hookworm, and other helminths) can also cause anaemia. Anaemia impairs children's physical and cognitive development, increases susceptibility to infections, and results in fatigue and reduced work capacity among adults. Anaemia also increases the risk of child and maternal mortality.[1]

Anaemia, for all target groups, was assessed by measuring haemoglobin levels (grams per liter) in whole venous blood using a HemoCue (Hb-201) instrument. The cut-offs for the respective target groups for diagnosis of anaemia based on haemoglobin levels (grams per liter)[50] are as follows (see **Table 89**):

Table 89. Anaemia cut-offs for the respective target groups

		Anaemia (low haemoglobin)		
Target group	Non-anaemia	Mild	Moderate	Severe
Children (aged 6-59 months)	Hb≥ 100 g/L	100-109 g/L	70-99 g/L	< 70 g/L
Adolescent girls (10-11 years)	Hb≥ 115 g/L	110-114 g/L	80-109 g/L	< 80 g/L
Adolescent girls (12-14 years) WRA (aged 15-49 years)	Hb≥ 120 g/L	110-119 g/L	80-109 g/L	< 80 g/L
Pregnant women (aged 15-49 years)	Hb≥ 110 g/L	100-109 g/L	70-99 g/L	< 70 g/L

Individual haemoglobin values (g/dl) presented in the results were adjusted[51] to account for:

- Pregnancy: first trimester (+1.0), second (+1.5), third (+1.0), trimester unknown (+1.0).
- Altitude: Hb adjustment = -0.032 x (altitude x 0.0032808) + 0.022 x (altitude x 0.0032808)^2;
- Ethnicity: African extraction (+1.0); and
- Cigarette smoking: smoker, amount unknown (- 0.3).

48 Lynch, S., Pfeiffer, C. M., Georgieff, M. K., Brittenham, G., Fairweather-Tait, S., Hurrell, R. F., McArdle, H. J., & Raiten, D. J. (2018). Biomarkers of Nutrition for Development (BOND)-Iron Review. The Journal of nutrition, 148(suppl_1), 1001S–1067S. https://doi.org/10.1093/jn/nxx036
49 Kassebaum NJ; GBD 2013 Anaemia Collaborators. The Global Burden of Anaemia. Hematol Oncol Clin North Am. 2016 Apr;30(2):247-308. doi: 10.1016/j.hoc.2015.11.002. PMID: 27040955.
50 WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1) (http://www.who.int/vmnis/indicators/haemoglobin. pdf, accessed [±30 December 2021]).
51 Sullivan KM, Mei Z, Grummer-Strawn L, Parvanta I. Haemoglobin adjustments to define anaemia. Trop Med Int Health. 2008 Oct;13(10):1267-71. doi: 10.1111/j.1365-3156.2008.02143.x. Epub 2008 Aug 20. PMID: 18721184.

Figure 60 presents the national prevalence of anaemia by the target group.

- **Children (6-59 months old)**: Anaemia was present in 62 percent of children (6-59 months old). The prevalence of mild, moderate, and severe anaemia was 31, 29, and 2 percent, respectively.
- **Adolescent girls (10-14 years old)**: Anaemia was present in 41 percent of adolescent girls. The prevalence of mild, moderate, and severe anaemia was 16, 24, and 1 percent, respectively.
- **WRA (15-49 years old)**: Anaemia was present in 55 percent of WRA. The prevalence of mild, moderate, and severe anaemia was 31, 22, and 1 percent, respectively.
- **Pregnant women (15-49 years old)**: Anaemia was present in 86 percent of pregnant women. The prevalence of mild, moderate, and severe anaemia was 20, 62, and 4 percent, respectively.

Prevalence of anaemia among children (aged 6-59 months)

The prevalence of anaemia among children (aged 6-59 months) stratified by age, sex, residence, zone, and wealth quintile is shown in **Table 90.**

a. **Any anaemia**: There was a statistically significant difference in the *prevalence of any anaemia among children (aged 6-59 months)* between the age groups (P < 0.001), residence (P < 0.001), zones (P < 0.001), wealth quintiles (P < 0.001), and caregivers' educational attainment (P < 0.001). The prevalence of any anaemia was highest in the 6 to 11-months age category (74 percent). It was higher in children residing in rural (67 percent) than in the urban (51 percent) areas. It was highest in children in the North West zone (73 percent). The prevalence of any anaemia was lowest in children in the highest wealth quintile (47 percent) and in children whose caregivers had attained tertiary education (46 percent).

b. **Mild anaemia**: There was no significant variation in the prevalence of mild anaemia among children (aged 6-59 months) across the background characteristics.

c. **Moderate anaemia**: There was a statistically significant difference in the *prevalence of moderate anaemia among children (aged 6-59 months)* between the age groups (P < 0.001), residence (P < 0.001), zones (P < 0.001), wealth quintiles (P < 0.001), and caregivers' educational attainment (P < 0.001). The prevalence of moderate anaemia was lowest in the 48 to 59-months age category (18 percent). It was higher in children residing in rural (33 percent) than in urban (21 percent) areas. It was highest in children in the North West zone (40 percent). The prevalence of moderate anaemia was lowest in children in the highest wealth quintile (17 percent) and highest in children whose caregivers had no education (35 percent).

d. **Severe anaemia**: There was a statistically significant difference in the *prevalence of severe anaemia among children (aged 6-59 months)* between residence (P = 0.001) and wealth quintiles (P < 0.0001). It was higher in children residing in rural (2 percent) than in urban (0.8 percent) areas. It was highest in children in the lowest wealth quintile (17 percent).

The relationship between anaemia, infection, haemoglobin genotype (blood disorders), and the use of micronutrient powder among children (aged 6-59 months) is shown in **Table 91**. About 74 percent of children with severe anaemia had malaria (P < 0.001), and 78 percent of children with any anaemia had normal haemoglobin genotype (P < 0.001). Severity of anaemia was also associated with normal haemoglobin genotype (P < 0.001). Children with moderate anaemia (52 percent) had fever in the past two weeks, while 61 percent of children with severe anaemia had fever in the past two weeks (P = 0.006).

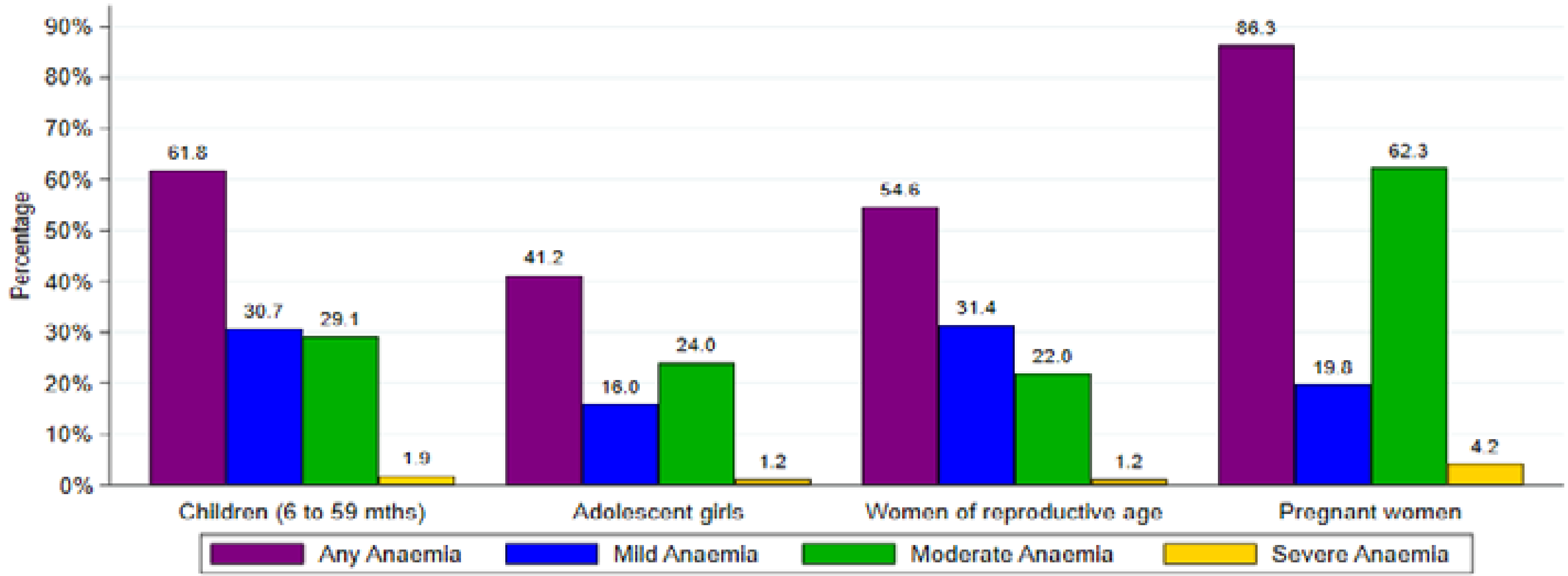

Figure 60. Overall prevalence of any, mild, moderate, and severe anaemia by target group, Nigeria 2021
Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Haemoglobin measurements were adjusted to account for pregnancy, altitude, and cigarette smoking as needed
Data are weighted to account for survey design and non-response
Number of children (aged 6-59 months) who responded nationally: (n= 4674)
Number of adolescent girls who responded nationally: (n= 999)
Number of WRA who responded nationally:(n= 5272)
Number of pregnant women who responded nationally: (n= 847)

Table 90. Prevalence of anaemia among children (aged 6-59 months), Nigeria 2021

Background characteristics	Any anaemia		Mild anaemia		Moderate anaemia		Severe anaemia	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		($P < 0.001$***)		($P = 0.697$)		($P < 0.001$***)		($P = 0.383$)
6-11 months	447	74.0 [68.5, 78.9]	447	34.0 [28.0, 40.5]	447	38.2 [32.5, 44.2]	447	1.9 [0.8, 4.2]
12-23 months	1057	70.8 [66.0, 75.1]	1057	30.5 [27.0, 34.3]	1057	37.8 [33.2, 42.6]	1057	2.5 [1.3, 4.8]
24-35 months	1121	63.5 [59.4, 67.5]	1121	31.9 [27.7, 36.4]	1121	29.2 [24.4, 34.5]	1121	2.5 [1.3, 4.8]
36-47 months	1173	56.5 [51.7, 61.2]	1173	29.5 [26.2, 33.0]	1173	25.8 [21.9, 30.0]	1173	1.2 [0.6, 2.4]
48-59 months	876	48.9 [43.5, 54.4]	876	29.6 [25.0, 34.5]	876	18.1 [14.1, 22.9]	876	1.3 [0.7, 2.6]
Sex		($P = 0.709$)		($P = 0.865$)		($P = 0.902$)		($P = 0.217$)
Male	2340	62.1 [58.6, 65.5]	2340	30.9 [28.3, 33.6]	2340	29.0 [25.2, 33.1]	2340	2.2 [1.5, 3.4]
Female	2334	61.4 [58.2, 64.5]	2334	30.6 [28.2, 33.1]	2334	29.3 [25.9, 32.9]	2334	1.6 [1.0, 2.5]
Residence		($P < 0.001$***)		($P = 0.345$)		($P < 0.001$***)		($P = 0.001$***)
Urban	1906	51.4 [47.9, 54.8]	1906	29.6 [26.9, 32.3]	1906	21.0 [18.4, 23.8]	1906	0.8 [0.5, 1.4]
Rural	2768	66.9 [63.5, 70.1]	2768	31.3 [29.0, 33.7]	2768	33.1 [29.3, 37.2]	2768	2.4 [1.7, 3.5]
Zone		($P < 0.001$***)		($P = 0.127$)		($P < 0.001$***)		($P = 0.069$)
North Central	725	55.5 [50.5, 60.5]	725	33.4 [30.0, 37.0]	725	21.1 [16.8, 26.2]	725	1.0 [0.4, 2.5]
North East	799	54.4 [48.4, 60.2]	799	27.7 [23.9, 31.8]	799	24.9 [20.9, 29.4]	799	1.8 [0.8, 3.8]
North West	839	72.7 [67.2, 77.7]	839	29.7 [26.2, 33.5]	839	40.1 [33.8, 46.9]	839	2.9 [1.6, 5.0]
South East	691	58.9 [52.3, 65.2]	691	32.4 [29.2, 35.8]	691	25.2 [19.9, 31.3]	691	1.3 [0.7, 2.7]
South South	812	61.4 [56.1, 66.5]	812	35.1 [30.0, 40.5]	812	24.2 [20.8, 27.8]	812	2.2 [1.3, 3.4]
South West	808	54.2 [48.8, 59.6]	808	30.2 [26.4, 34.3]	808	23.3 [19.2, 28.0]	808	0.7 [0.3, 1.9]
Wealth quintile[1]		($P < 0.001$***)		($P = 0.243$)		($P < 0.001$***)		($P = 0.002$***)
Lowest	999	68.2 [63.8, 72.2]	999	28.0 [24.9, 31.3]	999	36.0 [31.5, 40.8]	999	4.1 [2.5, 6.7]
Second	964	70.1 [65.3, 74.4]	964	33.1 [28.2, 38.3]	964	35.4 [29.8, 41.4]	964	1.6 [0.8, 3.3]
Middle	936	59.0 [54.8, 63.1]	936	32.8 [28.9, 36.9]	936	25.5 [21.5, 30.0]	936	0.7 [0.4, 1.4]
Fourth	920	54.8 [50.4, 59.2]	920	31.0 [27.0, 35.4]	920	22.6 [18.7, 27.0]	920	1.2 [0.6, 2.6]
Highest	834	46.5 [41.5, 51.6]	834	28.4 [24.9, 32.1]	834	17.4 [13.3, 22.4]	834	0.8 [0.2, 2.4]
Caregiver's educational attainment[1]		($P < 0.001$***)		($P = 0.463$)		($P < 0.001$***)		($P = 0.079$)
None	1236	67.7 [63.9, 71.3]	1236	30.5 [26.7, 34.6]	1236	34.8 [30.1, 39.8]	1236	2.4 [1.5, 3.8]
Primary	737	62.3 [57.3, 67.1]	737	33.2 [28.5, 38.4]	737	26.3 [21.9, 31.1]	737	2.8 [1.3, 6.2]
Secondary	1918	56.5 [52.7, 60.2]	1918	31.8 [29.0, 34.7]	1918	23.5 [20.6, 26.8]	1918	1.2 [0.8, 2.0]
Tertiary	488	45.9 [39.6, 52.3]	488	27.1 [22.5, 32.3]	488	18.2 [11.9, 26.8]	488	0.6 [0.2, 1.4]
National	**4674**	**61.8 [58.9, 64.5]**	**4674**	**30.7 [28.9, 32.6]**	**4674**	**29.1 [26.3, 32.2]**	**4674**	**1.9 [1.4, 2.6]**

Table 90. Prevalence of anaemia among children (aged 6-59 months), Nigeria 2021 (continued)
Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-301) instrument
Non-anaemia in children (aged 6-59 months) is defined as Hb≥ 100 g/L
Anaemia in children (aged 6-59 months) is defined as mild (100-109 g/L), moderate (70-99 g/L), or severe (< 70 g/L)
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of children (aged 6-59 months) who responded nationally: (n= 4674)
[1]Less than (n = 4674) due to relatively fewer respondents for the household and dietary intake questionnaires

Table 91. Anaemia among children (aged 6-59 months) by infection-related characteristics, haemoglobin genotype, and supplement use, Nigeria 2021

Characteristics	Non-anaemia		Any anaemia		Mild Anaemia		Moderate Anaemia		Severe Anaemia	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Malaria status	($P < 0.001$***)[1]				($P < 0.001$***)[2]					
Yes	1976	11.2 [9.0, 13.8]	2694	32.1 [27.6, 36.8]	1472	23.4 [20.1, 26.9]	1148	38.6 [31.9, 45.7]	74	73.5 [60.1, 83.7]
No		88.8 [86.2, 91.0]		67.9 [63.2, 72.4]		76.7 [73.1, 79.9]		61.4 [54.3, 68.1]		26.5 [16.3, 39.9]
Helminth status	($P = 0.089$)				($P < 0.001$***)					
Yes	1751	9.5 [7.5, 12.0]	2370	11.8 [9.8, 14.2]	1306	9.0 [7.2, 11.3]	1001	15.3 [12.1, 19.2]	63	4.5 [1.5, 12.2]
No		90.5 [88.0, 92.5]		88.2 [85.8, 90.2]		91.0 [88.7, 92.8]		84.7 [80.8, 87.9]		95.5 [87.8, 98.5]
H. pylori status	($P = 0.555$)				($P = 0.760$)					
Yes	1976	36.6 [32.3, 41.1]	2689	35.4 [31.6, 39.3]	1469	35.6 [31.4, 40.1]	1146	34.8 [30.0, 40.0]	74	39.8 [27.5, 53.5]
No		63.4 [58.9, 67.7]		64.6 [60.7, 68.4]		64.4 [59.9, 68.6]		65.2 [60.0, 70.0]		60.2 [46.5, 72.5]
Haemoglobin genotype	($P < 0.001$***)				($P < 0.001$***)					
AA	1887	82.5 [79.5, 85.1]	2521	78.1 [75.2, 80.8]	1393	77.4 [73.8, 80.6]	1062	79.2 [74.9, 82.9]	66	74.0 [54.5, 87.1]
AS		17.5 [14.9, 20.5]		20.7 [18.3, 23.4]		22.6 [19.4, 26.1]		19.2 [15.9, 23.1]		12.4 [3.4, 36.3]
SS		0.1 [0.0, 0.2]		1.2 [0.7, 2.0]		0.1 [0.0, 0.4]		1.6 [0.9, 3.0]		13.6 [6.3, 26.9]
Child had diarrhoea in the past two weeks	($P < 0.001$***)				($P = 0.007$**)					
Yes	1950	30.3 [27.4, 33.4]	2668	38.6 [35.0, 42.3]	1461	34.7 [31.1, 38.5]	1133	42.8 [37.9, 48.0]	74	36.4 [23.5, 51.6]
No		69.7 [66.6, 72.6]		61.4 [57.7, 65.0]		65.3 [61.5, 68.9]		57.2 [52.0, 62.1]		63.6 [48.4, 76.5]
Child had fever in the past two weeks	($P < 0.001$***)				($P = 0.006$**)					
Yes	1962	41.7 [37.9, 45.7]	2663	48.3 [44.6, 52.0]	1458	44.3 [40.1, 48.5]	1131	51.7 [46.8, 56.5]	74	61.4 [45.4, 75.3]
No		58.3 [54.3, 62.1]		51.7 [48.0, 55.4]		55.8 [51.5, 59.9]		48.3 [43.5, 53.2]		38.6 [24.7, 54.6]
Child had cough in the past two weeks	($P = 0.610$)				($P = 0.859$)					
Yes	1962	38.3 [34.5, 42.2]	2677	37.3 [34.2, 40.5]	1464	36.5 [32.9, 40.3]	1139	38.0 [33.4, 43.0]	74	38.6 [24.4, 55.1]
No		61.7 [57.8, 65.4]		62.7 [59.5, 65.8]		63.5 [59.7, 67.1]		62.0 [57.0, 66.6]		61.4 [44.9, 75.6]
Use of iron and micronutrient powder in the past six months	($P = 0.037$*)				($P = 0.729$)					
Yes	1979	8.0 [6.2, 10.4]	2695	6.0 [4.6, 7.8]	1472	5.6 [4.2, 7.5]	1149	6.3 [4.5, 8.8]	74	7.3 [2.4, 20.1]
No		92.0 [89.6, 93.8]		94.0 [92.2, 95.4]		94.4 [92.5, 95.8]		93.7 [91.2, 95.5]		92.7 [79.9, 97.6]

Table 91. Anaemia among children (aged 6-59 months) by infection-related characteristics, haemoglobin genotype, and supplement use, Nigeria 2021 (continued)

Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Non-anaemia in children (aged 6-59 months) is defined as Hb≥ 100 g/L
Anaemia in children (aged 6-59 months) is defined as mild (100-109 g/L), moderate (70-99 g/L), or severe (< 70 g/L)
Data are weighted to account for survey design and non-response
N, (unweighted) number of respondents who answered yes or no/ had an infection (yes) or didn't (no)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
[1]Chi-square test on 2x2 table of anaemia status (yes/no) verses condition status (yes/no)
[2]For those with any anaemia, Chi-square test of 3x2 table of anaemia severity (mild, moderate, severe) verses condition status (yes/no)

Prevalence of anaemia among adolescent girls (aged 10-14 years)

The prevalence of anaemia among adolescent girls stratified by age, residence, wealth quintile, and use of supplements is shown in **Table 92.**

a. **Any anaemia**: There was a statistically significant difference in the *prevalence of any anaemia among adolescent girls* between the ages (*P* = 0.024). The prevalence was lowest in 14-year-olds (29 percent).

b. **Mild anaemia**: There was a statistically significant difference in the *prevalence of mild anaemia among adolescent girls* between the residence (*P* = 0.031). The prevalence was higher in adolescent girls residing in urban (20 percent) versus rural (14 percent) areas.

c. **Moderate anaemia**: There was no significant variation in the prevalence of moderate anaemia among adolescent girls across the background characteristics.

d. **Severe anaemia**: There was a statistically significant difference in the *prevalence of severe anaemia among adolescent girls* between the residence (*P* = 0.033). The prevalence was higher in adolescent girls residing in rural (1.7 percent) versus urban (0.4 areas) areas.

The relationship between anaemia, infection, and the use of supplements in adolescent girls (aged 10-14 years) is shown in **Table 93.** About 84 percent of adolescent girls with severe anaemia were suffering from malaria (*P* = 0.016).

Table 92. Prevalence of anaemia among adolescent girls (aged 10-14 years), Nigeria 2021

Background characteristics	Any anaemia		Mild anaemia		Moderate anaemia		Severe anaemia	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* = 0.024*)		(*P* = 0.653)		(*P* = 0.101)		(*P* = 0.418)
10	264	47.3 [40.0, 54.7]	264	19.0 [13.6, 25.9]	264	25.8 [19.9, 32.8]	264	2.4 [0.6, 8.8]
11	159	35.8 [26.6, 46.1]	159	14.1 [9.1, 21.2]	159	20.9 [13.3, 31.5]	159	0.7 [0.1, 5.1]
12	191	46.4 [37.1, 56.1]	191	17.2 [11.2, 25.4]	191	28.0 [20.6, 36.7]	191	1.3 [0.2, 6.5]
13	196	42.6 [33.2, 52.6]	196	14.0 [9.3, 20.6]	196	28.2 [19.8, 38.3]	196	0.5 [0.1, 1.9]
14	189	29.4 [21.0, 39.4]	189	13.9 [8.8, 21.1]	189	14.9 [9.6, 22.2]	189	0.7 [0.1, 3.6]
Residence		(*P* = 0.387)		(*P* = 0.031*)		(*P* = 0.911)		(*P* = 0.033*)
Urban	421	43.9 [36.5, 51.6]	421	19.9 [15.7, 24.8]	421	23.7 [17.6, 31.0]	421	0.4 [0.1, 1.3]
Rural	578	39.6 [33.5, 46.0]	578	13.7 [10.7, 17.5]	578	24.1 [19.8, 29.1]	578	1.7 [0.7, 4.2]
Wealth quintile[1]		*P* = 0.2411		*P* = 0.4867		*P* = 0.0702		*P* = 0.5752
Lowest	213	46.6 [36.4, 57.2]	213	13.8 [8.9, 20.8]	213	30.9 [22.9, 40.2]	213	2.0 [0.4, 8.8]
Second	188	33.5 [25.0, 43.3]	188	13.2 [8.3, 20.6]	188	18.4 [12.9, 25.7]	188	1.9 [0.5, 7.1]
Middle	207	41.1 [31.6, 51.4]	207	20.4 [13.8, 29.2]	207	20.4 [14.0, 28.8]	207	0.3 [0.0, 2.4]
Fourth	195	45.8 [36.9, 55.0]	195	16.0 [11.3, 22.3]	195	29.0 [20.6, 39.2]	195	0.7 [0.1, 3.7]
Highest	194	38.4 [30.0, 47.6]	194	17.9 [12.2, 25.5]	194	19.7 [12.7, 29.2]	194	0.8 [0.2, 4.4]
National	**999**	**41.2 [36.4, 46.2]**	**999**	**16.0 [13.4, 18.9]**	**999**	**24.0 [20.4, 28.0]**	**999**	**1.2 [0.5, 2.8]**

Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Non-anaemia in adolescent girls (aged 10-11 years) is defined as Hb≥ 115 g/L
Anaemia in adolescent girls (aged 10-11 years) is defined as mild (110-114 g/L), moderate (80-109 g/L), or severe (< 80 g/L)
Non-anaemia in adolescent girls (aged 12-14 years) is defined as Hb≥ 120 g/L
Anaemia in adolescent girls (aged 12-14 years) is defined as mild (110-119 g/L), moderate (80-109 g/L) or severe < 80 g/L)
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of adolescent girls who responded nationally: (n=999)
[1]Less than (n = 999) due to relatively fewer respondents for the HH and dietary intake questionnaires

Table 93. Anaemia among adolescent girls (aged 10-14 years) by infection-related characteristics and supplement use, Nigeria 2021

Characteristics	No anaemia		Any anaemia		Mild Anaemia		Moderate Anaemia		Severe Anaemia	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Malaria status		(*P* = 0.005**)[1]						(*P* = 0.016*)[2]		
Yes	560	27.7 [21.2, 35.2]	437	41.6 [34.3, 49.3]	180	36.8 [27.9, 46.8]	246	42.6 [33.7, 52.0]	11	83.9 [51.1, 96.3]
No		72.3 [64.8, 78.8]		58.4 [50.7, 65.7]		63.2 [53.3, 72.1]		57.4 [48.0, 66.3]		16.1 [3.7, 48.9]
H. pylori status		(*P* = 0.307)						(*P* = 0.686)		
Yes	554	56.8 [50.4, 63.0]	430	52.2 [44.7, 59.6]	175	49.1 [39.5, 58.7]	244	53.7 [44.4, 62.7]	11	62.7 [20.5, 91.6]
No		43.2 [37.0, 49.6]		47.8 [40.4, 55.3]		50.9 [41.3, 60.5]		46.3 [37.3, 55.6]		37.3 [8.4, 79.5]
Respondent had malaria in the past two weeks		(*P* = 0.163)						(*P* = 0.274)		
Yes	545	18.2 [14.6, 22.5]	422	22.1 [17.9, 27.1]	171	27.6 [19.7, 37.2]	240	18.4 [12.9, 25.5]	11	26.6 [6.2, 66.6]
No		81.8 [77.5, 85.3]		77.8 [72.9, 82.1]		72.4 [62.8, 80.3]		81.6 [74.5, 87.1]		73.4 [33.5, 93.8]
Respondent had fever in the past two weeks		(*P* = 0.165)						(*P* = 0.249)		
Yes	555	27.2 [22.6, 32.4]	434	32.2 [26.9, 38.0]	178	38.4 [29.4, 48.4]	245	28.6 [22.2, 36.1]	11	22.1 [4.2, 64.7]
No		72.8 [67.6, 77.4]		67.8 [62.0, 73.2]		61.6 [51.6, 70.6]		71.4 [63.9, 77.8]		77.9 [35.3, 95.8]
Respondent had cough in the past two weeks		(*P* = 0.046*)						(*P* = 0.495)		
Yes	557	28.5 [23.6, 33.9]	432		177	39.8 [30.5, 49.8]	244	35.7 [28.9, 43.0]	11	20.7 [3.6, 64.6]
No		71.6 [66.1, 76.4]		63.2 [56.5, 69.4]		60.2 [50.2, 69.4]		64.3 [57.0, 71.1]		79.3 [35.4, 96.4]
Respondent had diarrhoea in the past two weeks		(*P* = 0.686)						(*P* = 0.646)		
Yes	555	16.4 [12.6, 21.0]	434	15.2 [11.3, 20.1]	178	15.4 [9.8, 23.5]	245	15.6 [11.0, 21.5]	11	5.0 [1.0, 22.0]
No		83.6 [79.0, 87.4]		84.8 [79.9, 88.7]		84.6 [76.5, 90.2]		84.4 [78.4, 89.0]		95.0 [78.0, 99.0]
Use of multivitamin tablets in the past six months		(*P* = 0.143)						(*P* = 0.111)		
Yes	561	6.8 [4.6, 10.2]	438	10.6 [6.8, 16.1]	181	11.2 [6.0, 19.8]	246	9.8 [6.1, 15.3]	11	19.3 [3.0, 64.5]
No		93.2 [89.8, 95.4]		89.4 [83.9, 93.2]		88.8 [80.2, 94.0]		90.2 [84.7, 93.9]		80.7 [35.5, 96.9]
Use of iron tablets or iron-folic acid in the past six months		(*P* = 0.248)						(*P* = 0.984)		
Yes	561	10.0 [7.3, 13.5]	438	12.6 [9.5, 16.6]	181	12.8 [8.1, 19.7]	246	12.6 [8.6, 18.2]	11	10.8 [1.8, 45.1]
No		90.0 [86.5, 92.7]		87.4 [83.4, 90.5]		87.2 [80.3, 91.9]		87.4 [81.8, 91.4]		89.2 [54.9, 98.2]
Use of multivitamin tablets in the past seven days		(*P* = 0.408)						(*P* = 0.408)		
Yes	42	49.0 [28.7, 69.6]	49	61.9 [40.2, 79.7]	19	47.3 [19.5, 76.8]	28	70.0 [47.0, 86.0]	2	91.2 [38.0, 99.4]
No		51.0 [30.4, 71.3]		38.1 [20.3, 59.8]		52.8 [23.2, 80.5]		30.0 [14.0, 53.0]		8.9 [0.6, 62.0]

Table 93. Anaemia among adolescent girls (aged 10-14 years) by infection-related characteristics and supplement use, Nigeria 2021 (continued)

Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Non-anaemia in adolescent girls (aged 10-11 years) is defined as Hb≥ 115 g/L
Anaemia in adolescent girls (aged 10-11 years) is defined as mild (110-114 g/L), moderate (80-109 g/L), or severe (< 80 g/L)
Non-anaemia in adolescent girls (aged 12-14 years) is defined as Hb≥ 120 g/L
Anaemia in adolescent girls (aged 12-14 years) is defined as mild (110-119 g/L), moderate (80-109 g/L) or severe < 80 g/L)
Data are weighted to account for survey design and non-response
N, (unweighted) number of respondents who answered yes or no/ had an infection (yes) or didn't (no)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
[1]Chi-square test on 2x2 table of anaemia status (yes/no) verses condition status (yes/no)
[2]For those with any anaemia, Chi-square test of 3x2 table of anaemia severity (mild, moderate, severe) verses condition status (yes/no)

Prevalence of anaemia among WRA (aged 15-49 years)

The prevalence of anaemia among WRA stratified by age, residence, zone, wealth quintile, educational attainment, and use of supplements is shown in **Table 94.**

a. **Any anaemia**: There was a statistically significant difference in the *prevalence of any anaemia among WRA* between residence ($P < 0.001$), zones ($P < 0.001$), and wealth quintiles ($P = 0.013$). The prevalence of any anaemia in WRA was higher in women residing in rural (58 percent) than in urban (50 percent) areas. It was lowest in women in the North East zone (46 percent) and highest among WRA in the lowest wealth quintile (60 percent).

b. **Mild anaemia**: There was a statistically significant difference in the *prevalence of mild anaemia among WRA* between the zones ($P < 0.001$). The prevalence was highest in WRA in South West zone (38 percent).

c. **Moderate anaemia**: There was a statistically significant difference in the prevalence of *moderate anaemia among WRA* between residence ($P < 0.001$), wealth quintiles ($P < 0.001$), and educational attainment ($P < 0.001$). The prevalence of moderate anaemia was higher in WRA residing in rural (25 percent) than in urban (16 percent) areas. It was lowest in the South West zone (16 percent). It was highest among WRA in the lowest wealth quintile (29 percent), and lowest among WRA who had attained tertiary education (18 percent).

d. **Severe anaemia**: There was a statistically significant difference in the *prevalence of severe anaemia among WRA* between residence ($P = 0.003$). The prevalence was higher in WRA residing in rural (1.6 percent) than in urban (0.6 percent) areas.

The relationship between anaemia, infection, haemoglobin genotype (blood disorders), and use of supplements among WRA (aged 15-49 years) is shown in **Table 95**. WRA with mild (77 percent), moderate (76 percent), and severe (66 percent) anaemia had normal haemoglobin.

Table 94. Prevalence of anaemia among WRA (aged 15-49 years), Nigeria 2021

Background characteristics	Any anaemia		Mild anaemia		Moderate anaemia		Severe anaemia	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* = 0.073)		(*P* = 0.136)		(*P* = 0.064)		(*P* = 0.252)
15-19 years	1126	52.2 [48.0, 56.4]	1126	31.4 [28.2, 34.8]	1126	19.8 [16.9, 23.1]	1126	1.0 [0.6, 1.7]
20-29 years	1637	52.9 [49.2, 56.6]	1637	29.0 [26.0, 32.3]	1637	22.3 [19.6, 25.2]	1637	1.6 [0.9, 2.8]
30-39 years	1497	55.8 [52.6, 58.9]	1497	34.2 [31.3, 37.2]	1497	20.8 [18.1, 23.8]	1497	0.8 [0.4, 1.6]
40-49 years	1012	58.7 [54.2, 63.1]	1012	31.6 [27.6, 35.7]	1012	25.8 [22.4, 29.5]	1012	1.4 [0.9, 2.3]
Residence		(*P* < 0.001***)		(*P* = 0.381)		(*P* < 0.001***)		(*P* = 0.003**)
Urban	2140	49.8 [46.6, 53.0]	2140	32.4 [29.7, 35.3]	2140	16.7 [14.7, 18.9]	2140	0.6 [0.4, 1.1]
Rural	3132	57.8 [54.8, 60.7]	3132	30.8 [28.6, 33.1]	3132	25.4 [23.2, 27.7]	3132	1.6 [1.1, 2.3]
Zone		(*P* < 0.001***)		(*P* < 0.001***)		(*P* = 0.005**)		(*P* = 0.346)
North Central	862	52.9 [48.4, 57.4]	862	30.1 [26.0, 34.6]	862	21.6 [18.1, 25.5]	862	1.2 [0.6, 2.3]
North East	857	45.7 [40.9, 50.7]	857	23.9 [20.8, 27.5]	857	21.1 [17.7, 25.0]	857	0.7 [0.3, 1.4]
North West	900	55.4 [49.7, 60.9]	900	28.7 [25.4, 32.3]	900	25.0 [21.2, 29.1]	900	1.7 [0.9, 3.2]
South East	881	62.9 [58.2, 67.4]	881	36.9 [33.9, 40.1]	881	24.4 [20.9, 28.3]	881	1.5 [0.8, 3.0]
South South	883	61.2 [56.0, 66.1]	883	36.1 [32.3, 40.0]	883	23.8 [19.8, 28.3]	883	1.3 [0.7, 2.3]
South West	889	55.0 [50.8, 59.1]	889	38.3 [34.7, 42.2]	889	15.8 [13.0, 19.1]	889	0.9 [0.4, 1.7]
Wealth quintile[1]		(*P* = 0.013*)		(*P* = 0.456)		(*P* < 0.001***)		(*P* = 0.066)
Lowest	1094	59.9 [55.5, 64.1]	1094	29.3 [26.3, 32.5]	1094	28.5 [25.5, 31.6]	1094	2.1 [1.2, 3.6]
Second	1123	55.9 [51.5, 60.1]	1123	30.2 [26.9, 33.7]	1123	24.2 [21.2, 27.6]	1123	1.4 [0.7, 2.5]
Middle	1105	54.3 [50.3, 58.2]	1105	33.1 [29.6, 36.8]	1105	20.3 [17.6, 23.3]	1105	0.9 [0.5, 1.7]
Fourth	988	50.3 [46.2, 54.4]	988	32.2 [29.0, 35.6]	988	17.6 [14.8, 20.8]	988	0.6 [0.2, 1.3]
Highest	940	51.9 [47.8, 55.9]	940	32.5 [28.8, 36.5]	940	18.2 [15.3, 21.6]	940	1.1 [0.6, 1.9]
Educational attainment[1]		(*P* = 0.124)		(*P* = 0.756)		(*P* < 0.001***)		(*P* = 0.457)
None	1234	57.6 [53.3, 61.7]	1234	31.1 [28.2, 34.1]	1234	25.0 [22.3, 27.9]	1234	1.5 [0.9, 2.5]
Primary	850	56.3 [51.4, 61.0]	850	30.6 [26.6, 34.8]	850	24.8 [20.8, 29.3]	850	0.9 [0.4, 1.8]
Secondary	2401	52.6 [49.6, 55.7]	2401	32.7 [30.0, 35.4]	2401	19.0 [17.0, 21.1]	2401	1.0 [0.6, 1.6]
Tertiary	533	51.1 [45.1, 57.2]	533	32.8 [27.8, 38.2]	533	17.6 [13.8, 22.0]	533	0.8 [0.3, 2.0]
National	**5272**	**54.6 [52.3, 56.9]**	**5272**	**31.4 [29.7, 33.2]**	**5272**	**22.0 [20.3, 23.7]**	**5272**	**1.2 [0.9, 1.7]**

Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Non-anaemia in WRA (aged 15-49 years) is defined as Hb≥ 120 g/L
Anaemia in WRA (aged 15-49 years) is defined as mild (110-119 g/L), moderate (80-109 g/L), or severe (< 80 g/L)
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies *P* <0.05, ** signifies *P* <0.01, *** signifies *P* <0.001).
Number of WRA who responded nationally: (n= 5272)
[1]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires

Table 95. Anaemia among WRA (aged 15-49 years) by infection-related characteristics, haemoglobin genotype, and supplement use, Nigeria 2021

Characteristics		No anaemia		Any anaemia		Mild Anaemia		Moderate Anaemia		Severe Anaemia	
		N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Malaria status		($P < 0.001$***)[1]				($P = 0.308$)[2]					
	Yes	2315	9.0 [7.3, 11.0]	2950	15.5 [13.5, 17.8]	1706	15.0 [12.4, 18.1]	1167	15.7 [13.1, 18.8]	77	25.0 [12.7, 43.3]
	No		91.0 [89.0, 92.7]		84.5 [82.2, 86.5]		85.0 [81.9, 87.6]		84.3 [81.2, 86.9]		75.0 [56.7, 87.3]
Helminth status		($P = 0.814$)				($P = 0.260$)					
	Yes	2094	5.5 [4.3, 7.0]	2635	5.7 [4.5, 7.3]	1533	5.2 [3.7, 7.2]	1031	6.2 [4.3, 8.8]	71	11.0 [5.6, 20.5]
	No		94.5 [93.0, 95.7]		94.3 [92.7, 95.5]		94.8 [92.8, 96.3]		93.8 [91.2, 95.8]		89.0 [79.5, 94.4]
H. pylori status		($P = 0.567$)				($P = 0.261$)					
	Yes	2313	63.1 [58.8, 67.1]	2952	64.2 [61.0, 67.2]	1708	65.7 [62.1, 69.2]	1167	62.3 [57.9, 66.6]	77	57.6 [41.5, 72.2]
	No		36.9 [32.9, 41.2]		35.8 [32.8, 39.0]		34.3 [30.9, 37.9]		37.7 [33.4, 42.1]		42.4 [27.8, 58.5]
Haemoglobin genotype		($P = 0.095$)				($P < 0.001$***)					
	AA	2228	77.0 [74.7, 79.2]	2766	76.0 [73.6, 78.3]	1627	76.5 [74.0, 78.8]	1068	75.8 [71.5, 79.7]	71	66.3 [53.1, 77.4]
	AS		23.0 [20.8, 25.3]		23.6 [21.4, 26.1]		23.5 [21.2, 26.0]		23.7 [19.8, 28.0]		27.1 [17.0, 40.3]
	SS		0.0 [., .]		0.4 [0.2, 0.8]		0.0 [., .]		0.5 [0.2, 1.6]		6.5 [2.7, 14.8]
Respondent had malaria in the past two weeks		($P = 0.168$)				($P = 0.388$)					
	Yes	2227	25.4 [22.6, 28.3]	2775	27.6 [25.2, 30.2]	1631	26.6 [23.6, 29.7]	1071	29.0 [25.6, 32.6]	73	31.7 [20.3, 45.8]
	No		74.6 [71.7, 77.4]		72.4 [69.8, 74.8]		73.4 [70.3, 76.3]		71.0 [67.4, 74.3]		68.3 [54.2, 79.7]
Respondent had fever in the past two weeks		($P = 0.109$)				($P = 0.931$)					
	Yes	2276	34.7 [31.5, 38.1]	2831	37.9 [34.4, 41.5]	1670	37.6 [34.2, 41.1]	1086	38.2 [33.5, 43.1]	75	39.7 [25.1, 56.3]
	No		65.3 [61.9, 68.5]		62.1 [58.5, 65.6]		62.4 [58.9, 65.8]		61.8 [56.9, 66.4]		60.3 [43.7, 74.9]
Respondent had cough in the past two weeks		($P = 0.011$*)				($P = 0.461$)					
	Yes	2286	21.1 [18.8, 23.6]	2836	25.0 [22.7, 27.5]	1667	24.4 [21.7, 27.3]	1095	25.5 [22.2, 29.1]	74	32.8 [19.2, 50.0]
	No		78.9 [76.4, 81.2]		75.0 [72.5, 77.3]		75.6 [72.7, 78.3]		74.5 [70.9, 77.8]		67.2 [50.0, 80.8]
Respondent had diarrhoea in the past two weeks		($P = 0.098$)				($P = 0.272$)					
	Yes	2289	16.0 [14.1, 18.0]	2834	18.0 [16.1, 20.1]	1668	16.7 [14.6, 19.1]	1092	20.1 [17.4, 23.1]	74	16.9 [6.1, 39.0]
	No		84.0 [81.9, 85.9]		82.0 [79.9, 83.8]		83.3 [80.9, 85.4]		79.9 [76.9, 82.6]		83.1 [61.0, 93.9]
Use of multivitamin tablets in the past six months		($P = 0.264$)				($P = 0.120$)					
	Yes	2317	11.9 [10.2, 13.7]	2955	13.1 [11.2, 15.2]	1710	14.3 [12.0, 16.9]	1168	11.3 [9.0, 14.1]	77	14.2 [7.4, 25.5]
	No		88.2 [86.3, 89.8]		86.9 [84.8, 88.8]		85.7 [83.1, 88.0]		88.7 [85.9, 91.0]		85.8 [74.4, 92.6]
Use of iron tablets or iron-folic acid in the past six months		($P = 0.196$)				($P = 0.064$)					
	Yes	2317	12.9 [11.1, 14.9]	2955	14.6 [12.7, 16.8]	1710	16.3 [13.9, 19.0]	1168	12.6 [9.9, 16.0]	77	9.2 [4.2, 18.9]
	No		87.1 [85.1, 88.9]		85.4 [83.2, 87.3]		83.7 [81.1, 86.1]		87.4 [84.0, 90.1]		90.8 [81.1, 95.8]

Table 95. Anaemia among WRA (aged 15-49 years) by infection-related characteristics, haemoglobin genotype, and supplement use, Nigeria 2021 (continued)

Characteristics		No anaemia		Any anaemia		Mild Anaemia		Moderate Anaemia		Severe Anaemia	
		N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Use of multivitamin tablets in the past seven days		(P = 0.150)				(P = 0.583)					
	Yes	307	54.2 [45.6, 62.6]	429	61.6 [52.9, 69.6]	268	63.6 [54.9, 71.4]	150	58.4 [45.9, 70.0]	11	55.2 [24.6, 82.3]
	No		45.8 [37.4, 54.4]		38.4 [30.4, 47.1]		36.4 [28.5, 45.1]		41.6 [30.0, 54.1]		44.8 [17.7, 75.4]
Use of iron tablets or iron-folic acid in the past seven days		(P = 0.999)				(P = 0.252)					
	Yes	354	58.1 [50.3, 65.4]	490	58.1 [50.4, 65.4]	316	61.3 [54.3, 67.9]	166	51.8 [38.7, 64.8]	8	64.6 [26.4, 90.3]
	No		41.9 [34.5, 49.7]		41.9 [34.6, 49.6]		38.7 [32.1, 45.7]		48.2 [35.2, 61.3]		35.4 [9.7, 73.6]

Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Non-anaemia in WRA (15-49 years) is defined as Hb≥ 120 g/L
Anaemia in WRA (aged 15-49 years) is defined as mild (110-119 g/L), moderate (80-109 g/L), or severe (< 80 g/L)
Data are weighted to account for survey design and non-response
N, (unweighted) number of respondents who answered yes or no/ had an infection (yes) or didn't (no)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
[1]Chi-square test on 2x2 table of anaemia status (yes/no) verses condition status (yes/no)
[2]For those with any anaemia, Chi-square test of 3x2 table of anaemia severity (mild, moderate, severe) verses condition status (yes/no)

Prevalence of anaemia among pregnant women (aged 15-49 years)

The prevalence of anaemia among pregnant women stratified by age, residence, wealth quintile, educational attainment, and use of supplements is shown in **Table 96**.

a. **Any anaemia:** There was a statistically significant difference in the *prevalence of any anaemia among pregnant women* between the age groups (*P* = 0.016) and educational attainment (*P* = 0.002). The prevalence was lowest in pregnant in the 40 to 49-years age category (64 percent). It was highest in pregnant women who had attained tertiary education (74 percent).

b. **Mild anaemia**: There was a statistically significant difference in the *prevalence of mild anaemia among pregnant women* between residence (*P* = 0.049) and the wealth quintiles (*P* = 0.038). The prevalence was higher in pregnant women residing in urban (25 percent) than in rural (18 percent) areas. It was highest in pregnant women in the highest wealth quintile (31 percent).

c. **Moderate anaemia**: There was no significant variation in the prevalence of moderate anaemia among pregnant women across the background characteristics.

d. **Severe anaemia**: There was no significant variation in the prevalence of severe anaemia among pregnant women across the background characteristics.

The relationship between anaemia, infection, and the use of supplements in pregnant women (aged 15-49 years) is shown in **Table 97**. There was no significant relationship across the characteristics.

Table 96. Prevalence of anaemia among pregnant women (aged 15-49 years), Nigeria 2021

Background characteristics	Any anaemia		Mild anaemia		Moderate anaemia		Severe anaemia	
	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Age category		(*P* = 0.016*)		(*P* = 0.139)		(*P* = 0.291)		(*P* = 0.153)
15-19 years	73	85.6 [68.0, 94.4]	73	9.9 [4.7, 19.9]	73	66.9 [50.6, 79.9]	73	8.8 [3.3, 21.1]
20-29 years	445	88.6 [84.5, 91.7]	445	23.0 [18.0, 28.9]	445	61.8 [55.0, 68.0]	445	3.8 [2.4, 6.1]
30-39 years	286	86.6 [81.2, 90.6]	286	17.5 [12.4, 24.0]	286	64.9 [57.4, 71.7]	286	4.2 [2.3, 7.6]
40-49 years	43	64.1 [42.6, 81.2]	43	18.8 [8.0, 38.1]	43	44.5 [23.9, 67.3]	43	0.8 [0.1, 5.7]
Residence		(*P* = 0.639)		(*P* = 0.049*)		(*P* = 0.181)		(*P* = 0.103)
Urban	348	85.4 [80.3, 89.4]	348	24.5 [19.8, 29.8]	348	58.3 [52.3, 64.1]	348	2.6 [1.3, 5.2]
Rural	499	86.8 [82.5, 90.2]	499	17.5 [13.3, 22.7]	499	64.3 [57.7, 70.4]	499	5.0 [3.3, 7.6]
Wealth quintile[1]		(*P* = 0.858)		(*P* = 0.038*)		(*P* = 0.144)		(*P* = 0.517)
Lowest	181	86.5 [78.8, 91.6]	181	19.2 [13.1, 27.3]	181	61.3 [53.8, 68.4]	181	5.9 [3.1, 11.1]
Second	173	86.6 [79.4, 91.6]	173	21.9 [14.2, 32.2]	173	61.4 [51.1, 70.7]	173	3.3 [1.5, 7.1]
Middle	165	88.9 [82.0, 93.3]	165	11.1 [6.9, 17.6]	165	72.7 [62.1, 81.2]	165	5.1 [2.4, 10.2]
Fourth	176	83.9 [75.6, 89.8]	176	19.0 [13.1, 26.6]	176	61.2 [49.5, 71.7]	176	3.8 [1.6, 8.5]
Highest	149	85.8 [78.7, 90.8]	149	31.0 [21.8, 41.9]	149	52.7 [42.6, 62.7]	149	2.1 [0.6, 6.6]
Caregivers educational attainment[1]		(*P* = 0.002**)		(*P* = 0.333)		(*P* = 0.092)		(*P* = 0.453)
None	197	92.6 [87.8, 95.7]	197	22.7 [15.3, 32.5]	197	65.7 [56.3, 74.1]	197	4.2 [2.1, 8.2]
Primary	131	84.9 [76.2, 90.8]	131	16.1 [9.6, 25.6]	131	61.9 [50.3, 72.3]	131	6.9 [3.5, 13.3]
Secondary	384	82.8 [76.4, 87.7]	384	18.9 [14.3, 24.5]	384	59.9 [53.0, 66.5]	384	4.0 [2.4, 6.6]
Tertiary	92	74.1 [62.0, 83.4]	92	28.6 [19.9, 39.3]	92	43.6 [32.2, 55.8]	92	1.8 [0.3, 11.9]
National	**847**	**86.3 [83.1, 89.1]**	**847**	**19.8 [16.4, 23.6]**	**847**	**62.3 [57.5, 67.0]**	**847**	**4.2 [2.9, 6.1]**

Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Non-anaemia in pregnant women is defined as Hb≥ 110 g/L
Anaemia in pregnant women is defined as mild (100-109 g/L), moderate (70-99 g/L), or severe (< 70 g/L)
Data are weighted to account for survey design and non-response
N, number of respondents in the sub-group (unweighted)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
Number of pregnant women who responded nationally: (n= 847)
[1]Less than (n = 4916) due to relatively fewer respondents for the household and dietary intake questionnaires

Table 97. Anaemia among pregnant women (aged 15-49 years) by infection-related characteristics and supplement use Nigeria, 2021

Characteristics		No anaemia		Any anaemia		Mild Anaemia		Moderate Anaemia		Severe Anaemia	
		N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Malaria status		($P = 0.163$)[1]				($P = 0.359$)[2]					
	Yes	129	6.8 [2.0, 20.0]	717	15.0 [11.8, 18.9]	178	11.4 [7.1, 17.8]	492	15.8 [11.9, 20.6]	47	20.0 [8.9, 39.3]
	No		93.2 [80.0, 97.9]		85.0 [81.1, 88.2]		88.6 [82.2, 92.9]		84.2 [79.4, 88.1]		80.0 [60.8, 91.1]
Helminth status		($P = 0.755$)				($P = 0.070$)					
	Yes	118	3.9 [1.7, 8.6]	622	4.5 [2.9, 6.8]	152	2.0 [0.9, 4.8]	428	5.4 [3.4, 8.6]	42	1.9 [0.3, 12.4]
	No		96.1 [91.4, 98.3]		95.5 [93.2, 97.1]		97.9 [95.2, 99.1]		94.6 [91.4, 96.6]		98.1 [87.6, 99.8]
H. pylori status		($P = 0.424$)				($P = 0.778$)					
	Yes	129	63.0 [51.7, 73.0]	718	58.0 [52.6, 63.2]	178	57.8 [46.6, 68.3]	493	57.6 [51.9, 63.1]	47	64.9 [45.9, 80.1]
	No		37.0 [27.0, 48.3]		42.0 [36.8, 47.4]		42.2 [31.8, 53.4]		42.4 [36.9, 48.1]		35.1 [19.9, 54.1]
Respondent had malaria in the past two weeks		($P = 0.819$)				($P = 0.800$)					
	Yes	129	63.0 [51.7, 73.0]	718	58.0 [52.6, 63.2]	178	57.8 [46.6, 68.3]	493	57.6 [51.9, 63.1]	47	64.9 [45.9, 80.1]
	No		37.0 [27.0, 48.3]		42.0 [36.8, 47.4]		42.2 [31.8, 53.4]		42.4 [36.9, 48.1]		35.1 [19.9, 54.1]
Respondent had fever in the past two weeks		($P = 0.651$)				($P = 0.268$)					
	Yes	129	38.1 [27.3, 50.3]	705	40.9 [35.7, 46.3]	174	34.4 [25.8, 44.2]	485	42.9 [36.7, 49.3]	46	41.2 [26.2, 58.1]
	No		61.9 [49.7, 72.7]		59.1 [53.7, 64.3]		65.6 [55.8, 74.2]		57.1 [50.7, 63.3]		58.8 [41.9, 73.8]
Respondent had cough in the past two weeks		($P = 0.858$)				($P = 0.462$)					
	Yes	129	20.4 [13.6, 29.4]	708	21.3 [17.3, 25.8]	175	17.3 [11.5, 25.1]	486	22.4 [17.5, 28.2]	47	22.7 [11.4, 40.1]
	No		79.6 [70.6, 86.4]		78.7 [74.2, 82.7]		82.7 [74.9, 88.5]		77.6 [71.8, 82.5]		77.3 [59.9, 88.6]
Respondent had diarrhoea in the past two weeks		($P = 0.853$)				($P = 0.066$)					
	Yes	129	20.3 [13.1, 30.0]	707	21.2 [17.4, 25.6]	175	22.5 [15.3, 31.9]	485	19.6 [15.1, 24.9]	47	39.5 [24.4, 56.9]
	No		79.7 [70.0, 86.9]		78.8 [74.4, 82.6]		77.5 [68.1, 84.7]		80.4 [75.1, 84.9]		60.5 [43.1, 75.6]
Use of tablet or syrup containing iron in the past seven days		($P = 0.363$)				($P = 0.0361$*)					
	Yes	14	85.8 [56.6, 96.5]	106	74.3 [61.3, 84.1]	28	87.1 [66.6, 95.8]	74	70.9 [56.6, 81.9]	4	25.3 [3.3, 76.9]
	No		14.2 [3.5, 43.4]		25.7 [15.9, 38.7]		12.9 [4.2, 33.4]		29.1 [18.1, 43.4]		74.7 [23.1, 96.7]

Table 97. Anaemia among pregnant women (aged 15-49 years) by infection-related characteristics and supplement use Nigeria, 2021 (continued)

Use of tablet or syrup containing iron and/folic acid yesterday	(*P* = 0.169)				(*P* = 0.867)					
Yes	14	49.7 [26.2, 73.3]	106	68.2 [56.1, 78.3]	28	72.2 [47.8, 88.1]	74	66.6 [53.4, 77.6]	4	65.7 [15.8, 95.1]
No		50.3 [26.8, 73.8]		31.8 [21.7, 43.9]		27.8 [11.9, 52.3]		33.4 [22.4, 46.6]		34.3 [4.9, 84.2]

Anaemia was measured in the field from a venous blood sample using a HemoCue (Hb-201) instrument
Non-anaemia in adolescent girls (aged 10-11 years) is defined as Hb≥ 115 g/L
Anaemia in adolescent girls (aged 10-11 years) is defined as mild (110-114 g/L), moderate (80-109 g/L), or severe (< 80 g/L)
Non-anaemia in adolescent girls (aged 12-14 years) is defined as Hb≥ 120 g/L
Anaemia in adolescent girls (aged 12-14 years) is defined as mild (110-119 g/L), moderate (80-109 g/L) or severe < 80 g/L)
Data are weighted to account for survey design and non-response
N, (unweighted) number of respondents who answered yes or no/ had an infection (yes) or didn't (no)
CI, Confidence Interval
Differences between groups were compared using Chi-square test (* signifies P <0.05, ** signifies P <0.01, *** signifies P <0.001).
[1]Chi-square test on 2x2 table of anaemia status (yes/no) verses condition status (yes/no)
[2]For those with any anaemia, Chi-square test of 3x2 table of anaemia severity (mild, moderate, severe) verses condition status (yes/no)

Conclusions

The NFCMS 2021 collected information on four distinct components: (1) socioeconomic and demographic information of sample HHs; (2) dietary intake - types and amounts of foods consumed in the last 24 hours; (3) anthropometry - height/length, weight, age; and (4) micronutrient status through a series of biomarkers such as haemoglobin genotype, HbA1c, status of iron and inflammation, VA, folate, zinc, iodine, vitamin B1, vitamin B2, malaria, H. pylori, haemoglobin, plasma glucose, and helminths from biological samples, precisely blood, urine, stool, and haemoglobin. This preliminary report presents a first look at selected findings from the NFCMS 2021 and covers respondent's household's socioeconomic and demographic characteristics including information collected from household listing, diet questionnaire, food sample analysis, anthropometry, biomarker questionnaire, and indices analyzed in-country. The report does not include findings from the 24-hr dietary recall and biomarker indices being analyzed outside the country; thus, drawing conclusion may be premature. In addition, linking of components to allow for further statistical analysis of the data to determine relationships among indices is yet to be conducted.

Nonetheless, from the preliminary results available, the following conclusions can be made: (1) two in every three households drank water from an improved water source located on premises and that the most common main source of drinking water was borehole; (2) there is high level of food insecurity and that the proportion of food insecurity reduced with higher education; (3) consumption of biofortified crops is low ; (4) stunting and anaemia are public health problems, and that there are zonal differences ; and (5) coverage of some national interventions is low. Therefore, the results present opportunities for the formulation of evidence-based policies and programmes and a baseline from which to monitor changes over time.

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Annexes

Annex 1. Coverage and response rates calculated using unweighted data

Table 98. Cluster (Sampled EAs for the Survey) Coverage Rate by Zone and Sector (Rural-Urban)

Number of Clusters Sampled				Number of Clusters Covered			Coverage Rate (%)		
Zone	Total	Rural	Urban	Total Covered	Rural Covered	Urban Covered	Total	Rural	Urban
NC	**65**	47	18	**59**	41	18	**90.8**	87.2	100.0
NE	**65**	48	17	**55**	40	15	**84.6**	83.3	88.2
NW	**65**	49	16	**61**	45	16	**93.8**	91.8	100.0
SE	**65**	34	31	**64**	34	30	**98.5**	100.0	96.8
SS	**65**	40	25	**62**	38	24	**95.4**	95.0	96.0
SW	**65**	16	49	**63**	15	48	**96.9**	93.8	98.0
National	**390**	**234**	**156**	**364**	**213**	**151**	**93.3**	**91.0**	**96.8**

Table 99. National Response Rates of Target Groups/Sector by Modules

Target Group	Total Sampled/ Final Respondent	Response to at least 1 Module	Response to Specific Modules									
		OVERALL[1]	Diet	HbA1c	Haemoglobin genotype	Anthropometry	Biomarker questionnaire	Plasma glucose	Haemoglobin (Anaemia)	Helminth	H. pylori	Malaria
CU5	Respondents	5171	4968	0	4548	4912	4916	0	4674	4240	4672	4678
	Sampled	5555	5555	0	5555	5555	5555	0	5555	5555	5555	5555
	Response Rate	**93.1**	**89.4**		**81.9**	**88.4**	**88.5**		**84.1**	**76.3**	**84.1**	**84.2**
Adolescent	Respondents	1010	0	0	0	1006	1002	0	998	0	984	996
	Sampled	1202	0	0	0	1202	1202	0	1202	0	1202	1202
	Response Rate	**84.0**				**83.7**	**83.4**		**83.0**		**81.9**	**82.9**
WRA	Respondents	5471	5281	5089	5137	5239	5239	5109	5162	4669	5161	5159
	Sampled	6071	6071	6071	6071	6071	6071	6071	6071	6071	6071	6071
	Response Rate	**90.1**	**87.0**	**83.8**	**84.6**	**86.3**	**86.3**	**84.2**	**85.0**	**76.9**	**85.0**	**85.0**
Pregnant Women	Respondents	1031	1006	0	0	976	863	0	958	846	959	959
	Sampled	1134	1134	0	0	1134	1134	0	1134	1134	1134	1134
	Response Rate	**90.9**	**88.7**			**86.1**	**76.1**		**84.5**	**74.6**	**84.6**	**84.6**
Rural	Respondents	7573	6674	3075	5826	7281	7203	3080	7081	6079	7075	7082
	Sampled	8183	7478	3563	6810	8183	8183	3563	8183	7478	8183	8183
	Response Rate	**92.5**	**89.2**	**86.3**	**85.6**	**89.0**	**88.0**	**86.4**	**86.5**	**81.3**	**86.5**	**86.5**
Urban	Respondents	5110	4581	2014	3859	4852	4817	2029	4711	3676	4701	4710
	Sampled	5779	5282	2508	4816	5779	5779	2508	5779	5282	5779	5779
	Response Rate	**88.4**	**86.7**	**80.3**	**80.1**	**84.0**	**83.4**	**80.9**	**81.5**	**69.6**	**81.3**	**81.5**
National	Respondents	12683	11255	5089	9685	12133	12020	5109	11792	9755	11776	11792
	Sampled	13962	12760	6071	11626	13962	13962	6071	13962	12760	13962	13962
	Response Rate	**90.8**	**88.2**	**83.8**	**83.3**	**86.9**	**86.1**	**84.2**	**84.5**	**76.4**	**84.3**	**84.5**

[1] Overall Sampled is the total number selected for the survey; Overall Respondents is total number that responded to at least one of the modules; and Overall Response Rate is the percentage of the sampled respondents that answered to at least one module (that did not refuse to participate at all levels).

Table 100. Response Rate by Sector (Rural-Urban), Target Groups and Specific Modules

Sector	Target Group	Total Sampled/ Final Respondent	Response to at least 1 Module	Response to Specific Modules									
			[1] OVERALL	Diet	HbA1c	Haemoglobin genotype	Anthropometry	Biomarker questionnaire	Plasma glucose	Haemoglobin (Anaemia)	Helminth	H. pylori	Malaria
Rural	CU5	Respondents	3057	2909	0	2718	2925	2926	0	2793	2622	2793	2796
		Sampled	3247	3247	0	3247	3247	3247	0	3247	3247	3247	3247
		Response Rate	**94.1**	**89.6**		**83.7**	**90.1**	**90.1**		**86.0**	**80.8**	**86.0**	**86.1**
	Adolescent	Respondents	600	0	0	0	599	595	0	590	0	582	590
		Sampled	705	0	0	0	705	705	0	705	0	705	705
		Response Rate	**85.1**				**85.0**	**84.4**		**83.7**		**82.6**	**83.7**
	WRA	Respondents	3295	3162	3075	3108	3168	3171	3080	3119	2924	3120	3116
		Sampled	3563	3563	3563	3563	3563	3563	3563	3563	3563	3563	3563
		Response Rate	**92.5**	**88.7**	**86.3**	**87.2**	**88.9**	**89.0**	**86.4**	**87.5**	**82.1**	**87.6**	**87.5**
	Women Pregnant	Respondents	621	603	0	0	589	511	0	579	533	580	580
		Sampled	668	668	0	0	668	668	0	668	668	668	668
		Response Rate	**93.0**	**90.3**			**88.2**	**76.5**		**86.7**	**79.8**	**86.8**	**86.8**
	All Rural	Respondents	**7573**	**6674**	**3075**	**5826**	**7281**	**7203**	**3080**	**7081**	**6079**	**7075**	**7082**
		Sampled	**8183**	**7478**	**3563**	**6810**	**8183**	**8183**	**3563**	**8183**	**7478**	**8183**	**8183**
		Response Rate	**92.5**	**89.2**	**86.3**	**85.6**	**89.0**	**88.0**	**86.4**	**86.5**	**81.3**	**86.5**	**86.5**
Urban	CU5	Respondents	2114	2059	0	1830	1987	1990	0	1881	1618	1879	1882
		Sampled	2308	2308	0	2308	2308	2308	0	2308	2308	2308	2308
		Response Rate	**91.6**	**89.2**		**79.3**	**86.1**	**86.2**		**81.5**	**70.1**	**81.4**	**81.5**
	Adolescent	Respondents	410	0	0	0	407	407	0	408	0	402	406
		Sampled	497	0	0	0	497	497	0	497	0	497	497
		Response Rate	**82.5**				**81.9**	**81.9**		**82.1**		**80.9**	**81.7**
	WRA	Respondents	2176	2119	2014	2029	2071	2068	2029	2043	1745	2041	2043
		Sampled	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508
		Response Rate	**86.8**	**84.5**	**80.3**	**80.9**	**82.6**	**82.5**	**80.9**	**81.5**	**69.6**	**81.4**	**81.5**
	PREG	Respondents	410	403	0	0	387	352	0	379	313	379	379

Table 100. Response Rate by Sector (Rural-Urban), Target Groups and Specific Modules (continued)

Sector	Target Group	Total Sampled/ Final Respondent	Response to at least 1 Module	Response to Specific Modules									
			[1] OVERALL	Diet	HbA1c	Haemoglobin genotype	Anthropometry	Biomarker questionnaire	Plasma glucose	Haemoglobin (Anaemia)	Helminth	H. pylori	Malaria
		Sampled	466	466	0	0	466	466	0	466	466	466	466
		Response Rate	**88.0**	**86.5**			**83.0**	**75.5**		**81.3**	**67.2**	**81.3**	**81.3**
	All Urban	Respondents	**5110**	**4581**	**2014**	**3859**	**4852**	**4817**	**2029**	**4711**	**3676**	**4701**	**4710**
		Sampled	**5779**	**5282**	**2508**	**4816**	**5779**	**5779**	**2508**	**5779**	**5282**	**5779**	**5779**
		Response Rate	**88.4**	**86.7**	**80.3**	**80.1**	**84.0**	**83.4**	**80.9**	**81.5**	**69.6**	**81.3**	**81.5**
National	Total	Respondents	**12683**	**11255**	**5089**	**9685**	**12133**	**12020**	**5109**	**11792**	**9755**	**11776**	**11792**
		Sampled	**13962**	**12760**	**6071**	**11626**	**13962**	**13962**	**6071**	**13962**	**12760**	**13962**	**13962**
		Response Rate	**90.8**	**88.2**	**83.8**	**83.3**	**86.9**	**86.1**	**84.2**	**84.5**	**76.4**	**84.3**	**84.5**

Overall Sampled is the total number selected for the survey; Overall Respondents is total number that responded to at least one of the modules; and Overall Response Rate is the percentage of the sampled respondents that answered to at least one module (that did not refuse to participate at all levels).

Table 101. Zonal Response Rates of Target Groups by Modules

Zone	Target Groups	Total Sampled/ Final Respondent	Response to at least 1 Module	Response to Specific Modules									
			OVERALL[1]	Diet	HbA1c	Haemoglobin genotype	Anthropometry	Biomarker questionnaire	Plasma glucose	Haemoglobin (Anaemia)	Helminth	H. pylori	Malaria
		Respondents	787	756	0	699	771	771	0	725	677	726	727
		Sampled	865	865	0	865	865	865	0	865	865	865	865
	CU5	**Response Rate**	**91.0**	**87.4**		**80.8**	**89.1**	**89.1**		**83.8**	**78.3**	**83.9**	**84.0**
		Respondents	152	0	0	0	151	151	0	150	0	149	150
		Sampled	181	0	0	0	181	181	0	181	0	181	181
	Adolescent	**Response Rate**	**84.0**				**83.4**	**83.4**		**82.9**		**82.3**	**82.9**
		Respondents	882	857	835	842	861	861	826	845	768	844	846
		Sampled	974	974	974	974	974	974	974	974	974	974	974
	WRA	**Response Rate**	**90.6**	**88.0**	**85.7**	**86.4**	**88.4**	**88.4**	**84.8**	**86.8**	**78.9**	**86.7**	**86.9**
		Respondents	162	160	0	0	155	135	0	151	134	151	151
		Sampled	179	179	0	0	179	179	0	179	179	179	179
	Pregnant	**Response Rate**	**90.5**	**89.4**			**86.6**	**75.4**		**84.4**	**74.9**	**84.4**	**84.4**
		Respondents	1983	1773	835	1541	1938	1918	826	1871	1579	1870	1874
		Sampled	2199	2018	974	1839	2199	2199	974	2199	2018	2199	2199
NC	**Total**	**Response Rate**	**90.2**	**87.9**	**85.7**	**83.8**	**88.1**	**87.2**	**84.8**	**85.1**	**78.2**	**85.0**	**85.2**
		Respondents	871	827	0	783	833	827	0	799	792	799	797
		Sampled	922	922	0	922	922	922	0	922	922	922	922
	CU5	**Response Rate**	**94.5**	**89.7**		**84.9**	**90.3**	**89.7**		**86.7**	**85.9**	**86.7**	**86.4**
		Respondents	167	0	0	0	167	166	0	164	0	162	164
		Sampled	187	0	0	0	187	187	0	187	0	187	187
	Adolescent	**Response Rate**	**89.3**				**89.3**	**88.8**		**87.7**		**86.6**	**87.7**
		Respondents	869	830	824	830	839	832	818	831	811	832	829
		Sampled	914	914	914	914	914	914	914	914	914	914	914
	WRA	**Response Rate**	**95.1**	**90.8**	**90.2**	**90.8**	**91.8**	**91.0**	**89.5**	**90.9**	**88.7**	**91.0**	**90.7**
		Respondents	187	182	0	0	180	152	0	177	171	178	178
		Sampled	197	197	0	0	197	197	0	197	197	197	197
	Pregnant	**Response Rate**	**94.9**	**92.4**			**91.4**	**77.2**		**89.8**	**86.8**	**90.4**	**90.4**
		Respondents	2094	1839	824	1613	2019	1977	818	1971	1774	1971	1968
		Sampled	2220	2033	914	1836	2220	2220	914	2220	2033	2220	2220
NE	**Total**	**Response Rate**	**94.3**	**90.5**	**90.2**	**87.9**	**90.9**	**89.1**	**89.5**	**88.8**	**87.3**	**88.8**	**88.6**
		Respondents	985	916	0	829	905	908	0	839	745	838	843
		Sampled	1022	1022	0	1022	1022	1022	0	1022	1022	1022	1022
	CU5	**Response Rate**	**96.4**	**89.6**		**81.1**	**88.6**	**88.8**		**82.1**	**72.9**	**82.0**	**82.5**
		Respondents	162	0	0	0	160	158	0	160	0	158	159
NW	**Adolescent**	Sampled	209	0	0	0	209	209	0	209	0	209	209

Table 101. Zonal Response Rates of Target Groups by Modules (continued)

Zone	Target Groups	Total Sampled/ Final Respondent	Response to at least 1 Module	Response to Specific Modules									
			1 OVERALL	**Diet**	**HbA1c**	**Haemoglobin genotype**	**Anthropometry**	**Biomarker questionnaire**	**Plasma glucose**	**Haemoglobin (Anaemia)**	**Helminth**	**H. pylori**	**Malaria**
		Response Rate	**77.5**				**76.6**	**75.6**		**76.6**		**75.6**	**76.1**
		Respondents	979	944	880	887	908	911	869	876	773	878	877
		Sampled	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024
	WRA	**Response Rate**	**95.6**	**92.2**	**85.9**	**86.6**	**88.7**	**89.0**	**84.9**	**85.5**	**75.5**	**85.7**	**85.6**
		Respondents	201	192	0	0	177	154	0	169	151	169	170
		Sampled	217	217	0	0	217	217	0	217	217	217	217
	Pregnant	**Response Rate**	**92.6**	**88.5**			**81.6**	**71.0**		**77.9**	**69.6**	**77.9**	**78.3**
		Respondents	2327	2052	880	1716	2150	2131	869	2044	1669	2043	2049
		Sampled	2472	2263	1024	2046	2472	2472	1024	2472	2263	2472	2472
	Total	**Response Rate**	**94.1**	**90.7**	**85.9**	**83.9**	**87.0**	**86.2**	**84.9**	**82.7**	**73.8**	**82.6**	**82.9**
		Respondents	751	731	0	678	716	716	0	691	673	692	692
		Sampled	809	809	0	809	809	809	0	809	809	809	809
	CU5	**Response Rate**	**92.8**	**90.4**		**83.8**	**88.5**	**88.5**		**85.4**	**83.2**	**85.5**	**85.5**
		Respondents	173	0	0	0	173	171	0	171	0	170	171
		Sampled	210	0	0	0	210	210	0	210	0	210	210
	Adolescent	**Response Rate**	**82.4**				**82.4**	**81.4**		**81.4**		**81.0**	**81.4**
		Respondents	914	855	845	859	871	871	861	871	837	870	870
		Sampled	1045	1045	1045	1045	1045	1045	1045	1045	1045	1045	1045
	WRA	**Response Rate**	**87.5**	**81.8**	**80.9**	**82.2**	**83.3**	**83.3**	**82.4**	**83.3**	**80.1**	**83.3**	**83.3**
		Respondents	144	140	0	0	138	128	0	138	132	138	138
		Sampled	154	154	0	0	154	154	0	154	154	154	154
	Pregnant	**Response Rate**	**93.5**	**90.9**			**89.6**	**83.1**		**89.6**	**85.7**	**89.6**	**89.6**
		Respondents	1982	1726	845	1537	1898	1886	861	1871	1642	1870	1871
		Sampled	2218	2008	1045	1854	2218	2218	1045	2218	2008	2218	2218
SE	**Total**	**Response Rate**	**89.4**	**86.0**	**80.9**	**82.9**	**85.6**	**85.0**	**82.4**	**84.4**	**81.8**	**84.3**	**84.4**
		Respondents	876	854	0	789	833	834	0	812	760	811	811
		Sampled	954	954	0	954	954	954	0	954	954	954	954
	CU5	**Response Rate**	**91.8**	**89.5**		**82.7**	**87.3**	**87.4**		**85.1**	**79.7**	**85.0**	**85.0**
		Respondents	180	0	0	0	180	180	0	179	0	174	179
		Sampled	208	0	0	0	208	208	0	208	0	208	208
	Adolescent	**Response Rate**	**86.5**				**86.5**	**86.5**		**86.1**		**83.7**	**86.1**
		Respondents	907	888	841	844	861	866	858	860	808	860	858
		Sampled	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046	1046
	WRA	**Response Rate**	**86.7**	**84.9**	**80.4**	**80.7**	**82.3**	**82.8**	**82.0**	**82.2**	**77.2**	**82.2**	**82.0**
		Respondents	169	167	0	0	161	142	0	161	149	161	160
SS	**Pregnant**	Sampled	194	194	0	0	194	194	0	194	194	194	194

Table 101. Zonal Response Rates of Target Groups by Modules (continued)

Zone	Target Groups	Total Sampled/ Final Respondent	Response to at least 1 Module	Response to Specific Modules									
			OVERALL[1]	**Diet**	**HbA1c**	**Haemoglobin genotype**	**Anthropometry**	**Biomarker questionnaire**	**Plasma glucose**	**Haemoglobin (Anaemia)**	**Helminth**	**H. pylori**	**Malaria**
		Response Rate	**87.1**	**86.1**			**83.0**	**73.2**		**83.0**	**76.8**	**83.0**	**82.5**
		Respondents	2132	1909	841	1633	2035	2022	858	2012	1717	2006	2008
		Sampled	2402	2194	1046	2000	2402	2402	1046	2402	2194	2402	2402
	Total	**Response Rate**	**88.8**	**87.0**	**80.4**	**81.7**	**84.7**	**84.2**	**82.0**	**83.8**	**78.3**	**83.5**	**83.6**
		Respondents	901	884	0	770	854	860	0	808	593	806	808
		Sampled	983	983	0	983	983	983	0	983	983	983	983
	CU5	**Response Rate**	**91.7**	**89.9**		**78.3**	**86.9**	**87.5**		**82.2**	**60.3**	**82.0**	**82.2**
		Respondents	176	0	0	0	175	176	0	174	0	171	173
		Sampled	207	0	0	0	207	207	0	207	0	207	207
	Adolescent	**Response Rate**	**85.0**				**84.5**	**85.0**		**84.1**		**82.6**	**83.6**
		Respondents	920	907	864	875	899	898	877	879	672	877	879
		Sampled	1068	1068	1068	1068	1068	1068	1068	1068	1068	1068	1068
	WRA	**Response Rate**	**86.1**	**84.9**	**80.9**	**81.9**	**84.2**	**84.1**	**82.1**	**82.3**	**62.9**	**82.1**	**82.3**
		Respondents	168	165	0	0	165	152	0	162	109	162	162
		Sampled	193	193	0	0	193	193	0	193	193	193	193
	Pregnant	**Response Rate**	**87.0**	**85.5**			**85.5**	**78.8**		**83.9**	**56.5**	**83.9**	**83.9**
		Respondents	2165	1956	864	1645	2093	2086	877	2023	1374	2016	2022
		Sampled	2451	2244	1068	2051	2451	2451	1068	2451	2244	2451	2451
SW	**Total**	**Response Rate**	**88.3**	**87.2**	**80.9**	**80.2**	**85.4**	**85.1**	**82.1**	**82.5**	**61.2**	**82.3**	**82.5**

[1] Overall Sampled is the total number selected for the survey; Overall Respondents is total number that responded to at least one of the modules; and Overall Response Rate is the percentage of the sampled respondents that answered to at least one module (that did not refuse to participate at all levels).

Table 102. Response Rates by Age Group and Zone

	Geo-political Zone						
Age group	**NC**	**NE**	**NW**	**SE**	**SS**	**SW**	**All Zones**
6 to 11 months	90.3	93.3	95.6	81.6	95.2	89.7	**91.4**
12 to 23 months	91.4	96.0	96.7	94.6	89.8	90.1	**93.1**
24 to 59 months	90.9	94.1	96.4	93.8	91.9	92.6	**93.3**
10 to 14 years	84.0	89.3	77.5	82.4	86.5	85.0	**84.0**
15 to 24 years	90.5	95.1	96.0	84.7	84.5	83.7	**89.4**
25 to 34 years	90.7	94.3	96.3	89.0	86.8	87.5	**90.7**
35 to 49 years	90.4	95.8	92.3	91.1	89.2	87.4	**90.7**
All Ages	**90.2**	**94.3**	**94.1**	**89.4**	**88.8**	**88.3**	**90.8**

Annex 2. Anthropometry and Biomarker component – Scope of the preliminary report

Anthropometry and Biomarker component – Scope of the preliminary report

Biomarker component: Information presented in the preliminary report is based on anthropometric measurements, the biomarker questionnaire (interventions, health status, and anaemia risk), and the measurement of biological samples by target groups.

Target groups	Anthropometry	Interventions	Health Status	Anemia Risk	Measurements
01 Children 6-59 months	Stunting Wasting, Underweight Overweight	Vitamin A Nutrition counselling Sprinkles with iron/ MNP Deworming Therapeutic feeds	Diarrhoea Cough Fever	Pica	Malaria Anemia H. Pylori Helminths Hb genotype
02 Adolescent girls 10-14 years	Thinness Normal weight Overweight Obesity	Deworming Multivitamin tablets Iron/Iron-Folic acid	Diarrhoea Cough Fever Malaria Hospitalization	Anemia diagnosis Smoking Pica	Malaria Anemia H. Pylori
03 Women of Reproductive age 15-49 years	Thinness Normal weight Overweight Obesity				Malaria, Anemia, Plasma Glucose, H. Pylori, Helminths, HbA1c, Hb genotype
04 Pregnant women 15-49 years	n/a	Antenatal care Iron Iron-Folic acid (IFA) Iron &/or Folic acid use Nutrition counselling	Diarrhoea Cough Fever Malaria Hospitalization	Smoking	Malaria Anemia H. Pylori Helminths

Annex 3. Anthropometry Data Quality Report

Data quality assessment report template with results from WHO Anthro Survey Analyzer
Analysis date: 17 March 2022 09:56:35
Link: https://worldhealthorg.shinyapps.io/anthro/

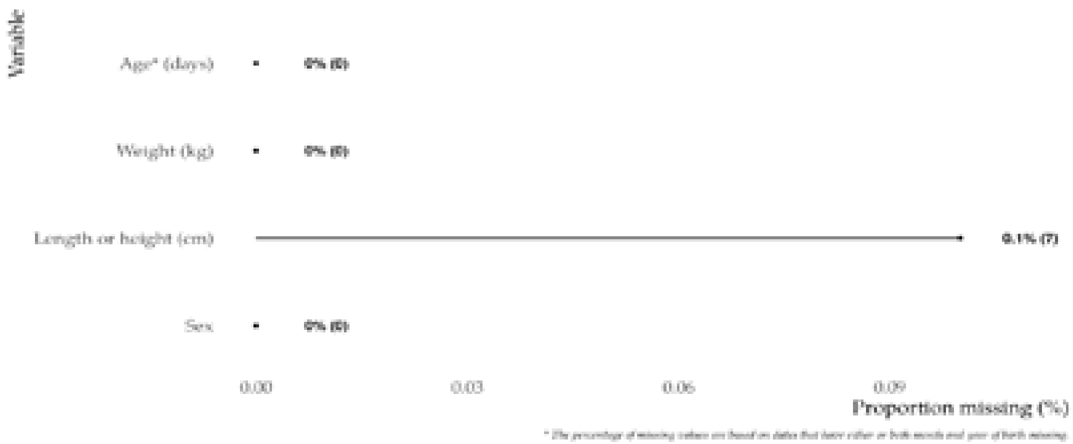
This report is a template that includes key data quality checks that can help to identify issues with the data and considerations when interpreting results. Other outputs relevant to your analyses can be saved directly from the tool interactive dashboards and added to the report.

For guidance on interpreting the results, the user should refer to the document "Recommendations for improving the quality of anthropometric data and its analysis and reporting" by the Working Group on Anthropometric Data Quality for the WHO-UNICEF Technical Expert Advisory Group on Nutrition Monitoring (TEAM). The document is available at www.who.int/nutrition/team, under "Technical reports and papers."

Missing data

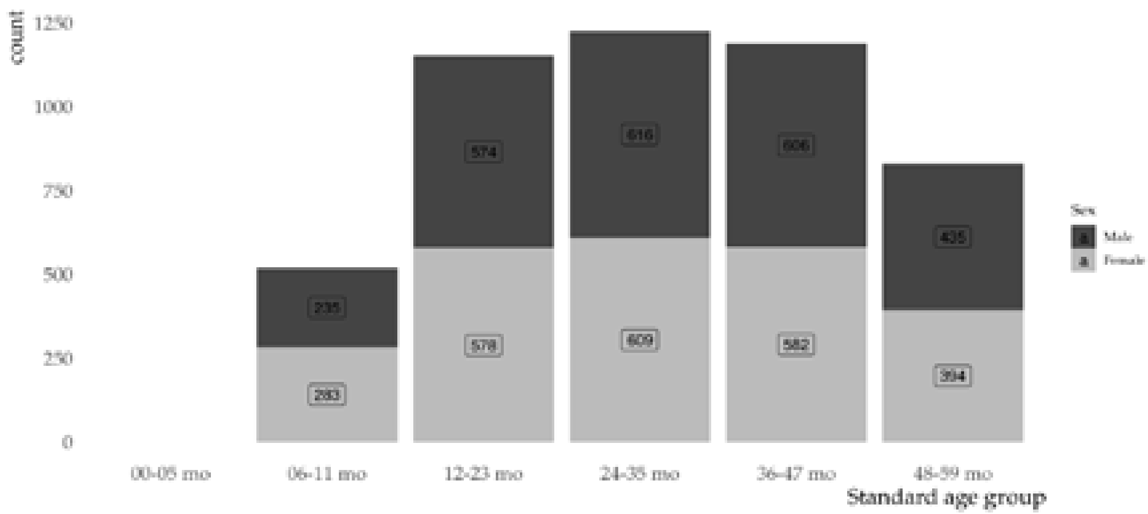
Percentage (number of cases) of children missing information on variables used in the analysis

The total number of children: 4912.

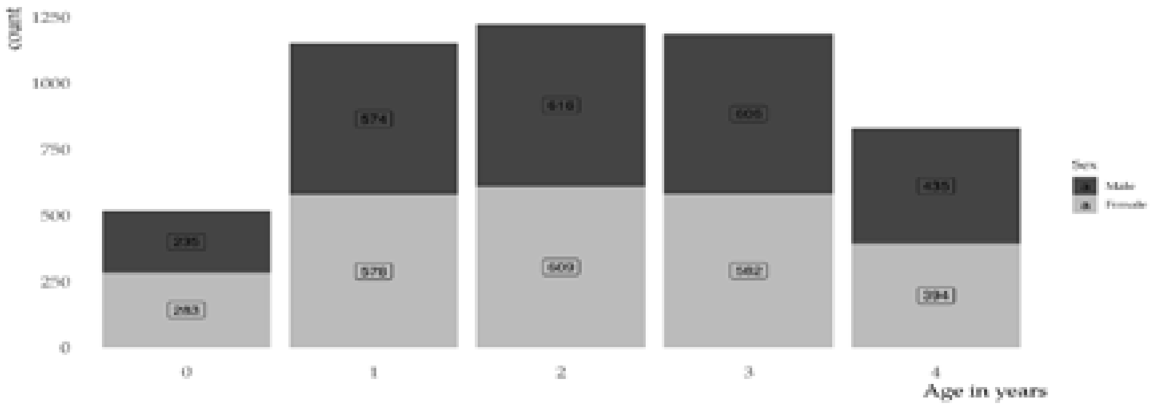


Data Distribution

Distribution by standard age grouping and sex



Distribution by age in years and sex



The number of cases and proportions of mismatches between length/height measurement position and recommended position, by age group.

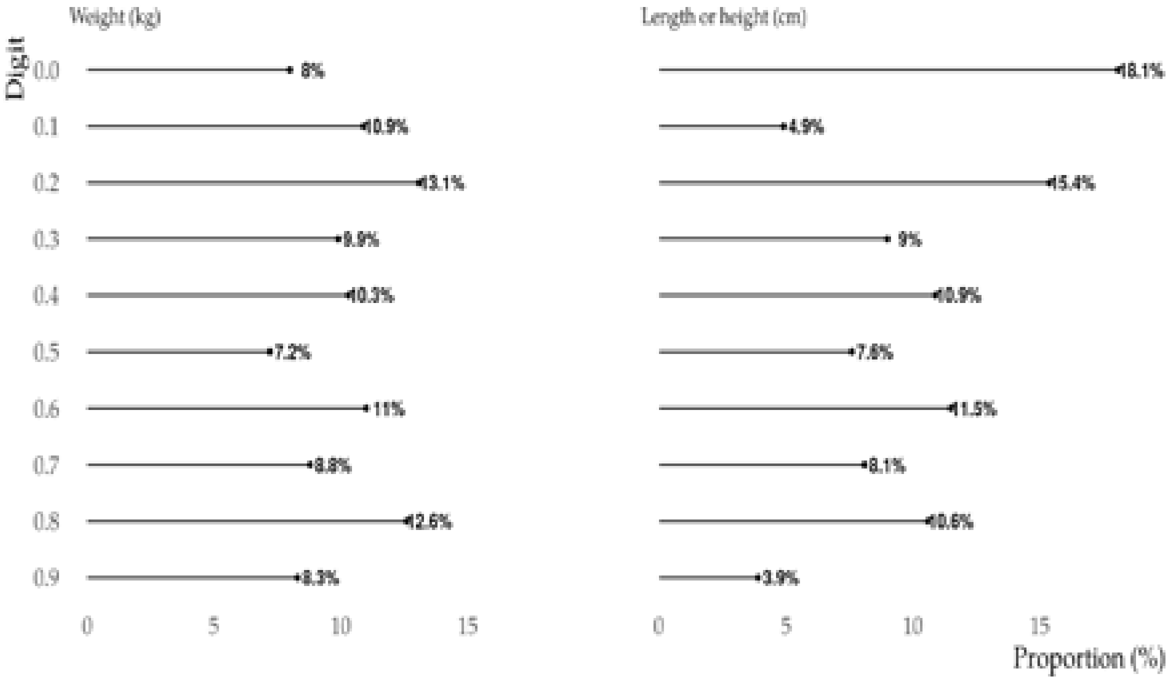
Age group	Expected position	Total	Observed mismatch*	% mismatch*
0 to 11 months	lying	511	6	1.2%
0 to 8 months	lying	208	0	0.0%
12 to 23 months	lying	1152	176	15.3%
24 to 35 months	standing	1225	119	9.7%
36 to 47 months	standing	1188	15	1.3%
48 to 59 months	standing	829	7	0.8%
Total		4905	323	6.6%

Number of children with missing information on measurement position: 7

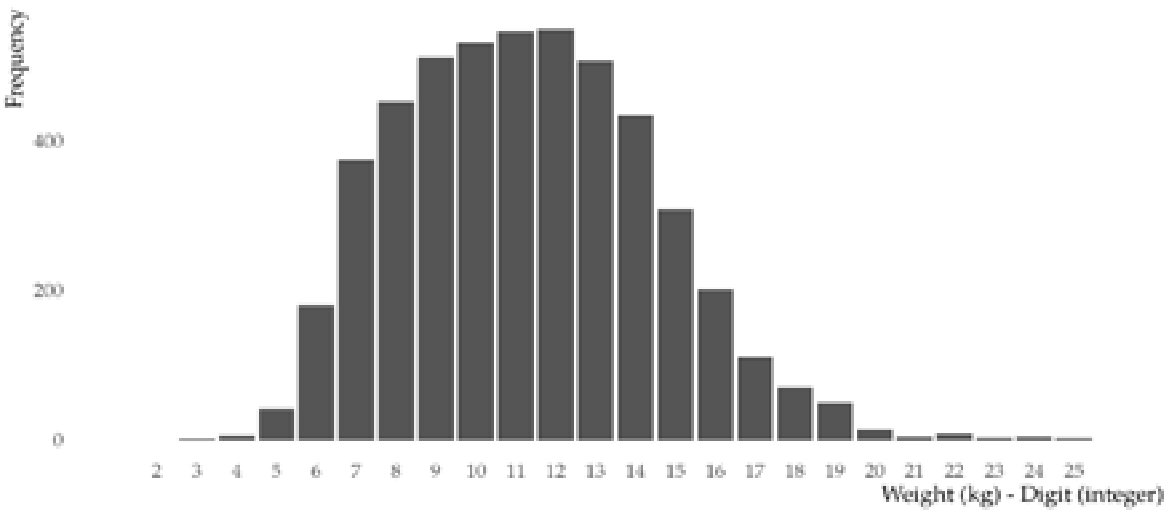
A mismatch means children under 24 months were measured standing (height) or children 24 months or older were measured lying down (recumbent length).

Digit preference charts

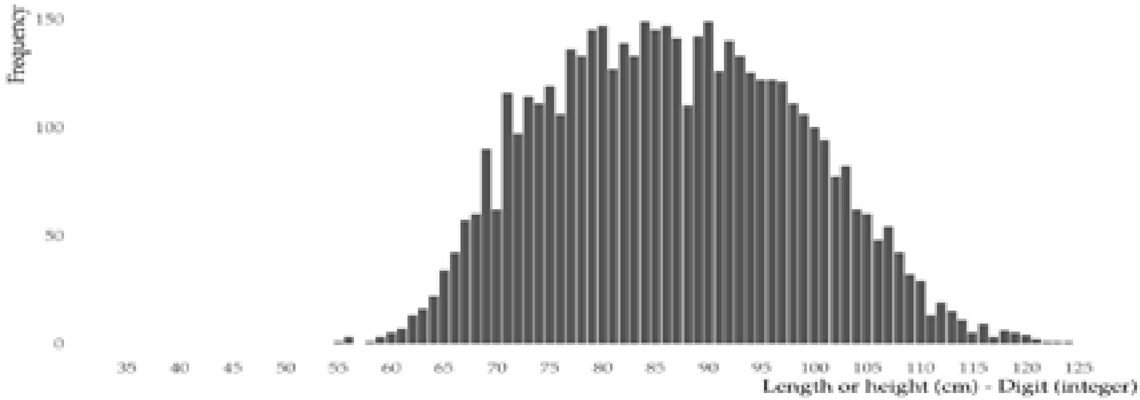
Decimal digit preference for weight and length/height



Whole number digit preference for weight

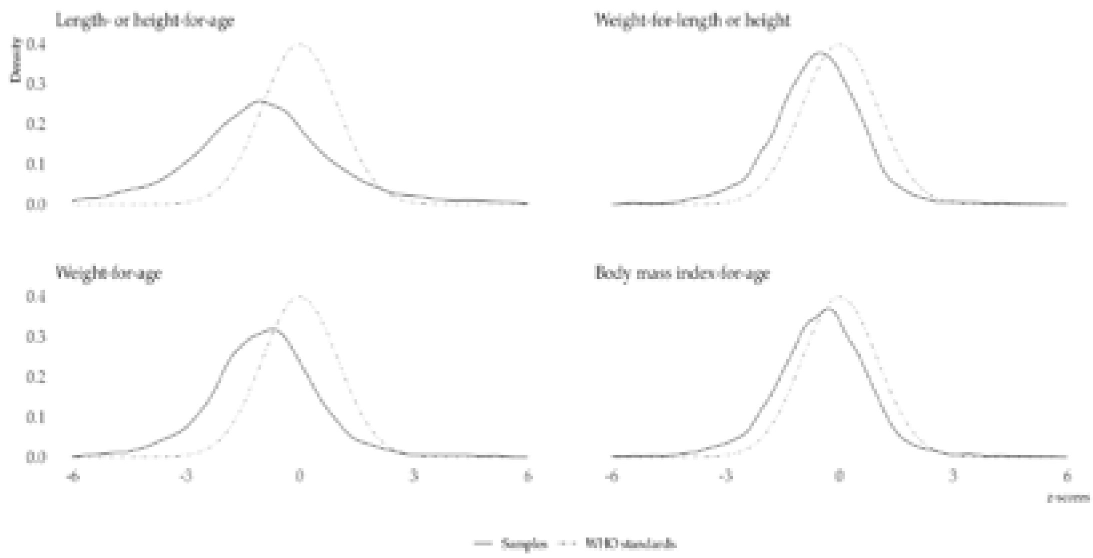


Whole number digit preference for length/height

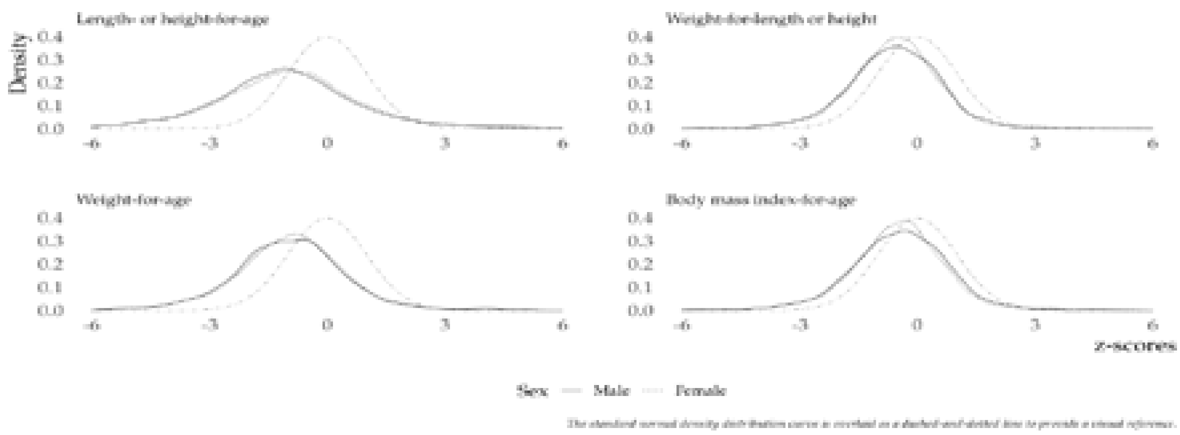


Z-score distribution of indicators

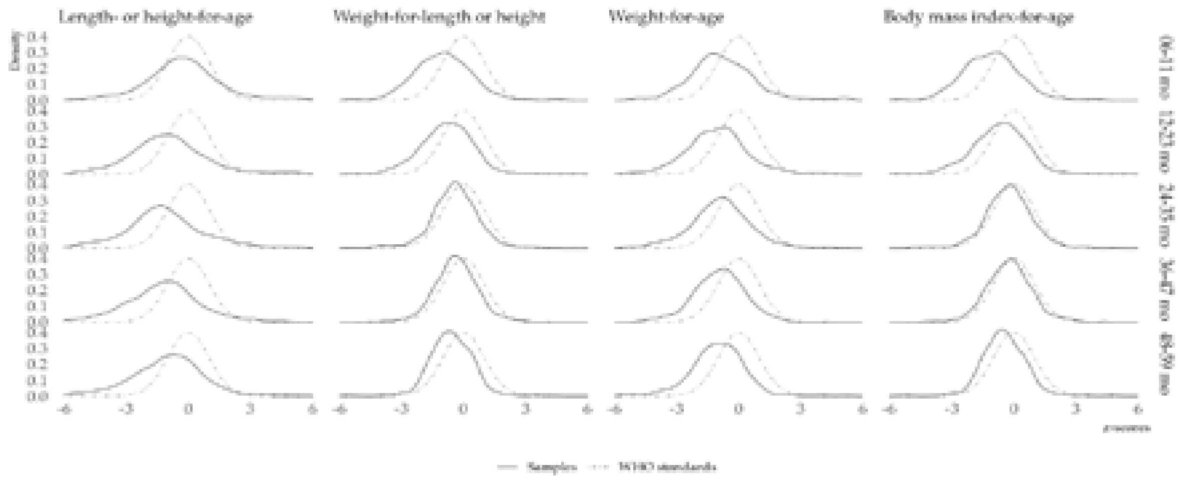
Z-score distribution by index



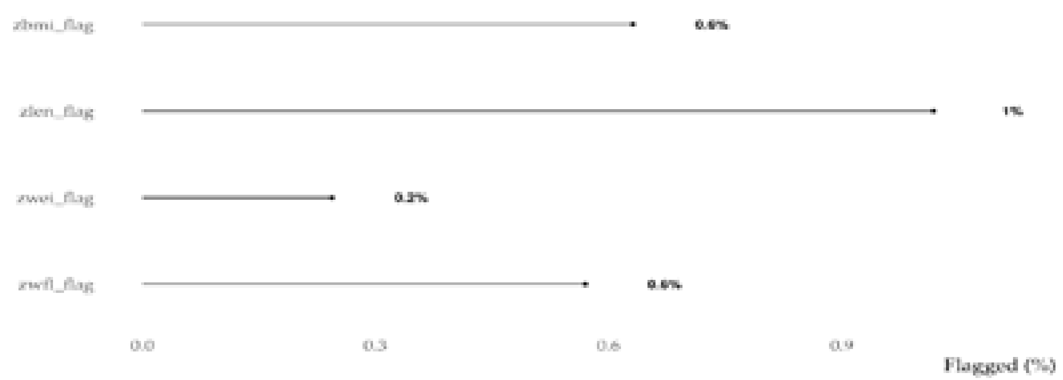
Z-score distribution by index and sex



Z-score distribution by index and age group



Percentage of flagged z-scores based on WHO flagging system by index



Z-score summary table

Z-score distribution of unweighted summary statistics by index

Group	Unweighted N	Mean (zlen)	Standard deviation (zlen)	Skewness (zlen)	Kurtosis (zlen)	Mean (zwei)	Standard deviation (zwei)	Skewness (zwei)	Kurtosis (zwei)
All	4912	-0.98	1.85	0.33	3.89	-0.95	1.39	0.08	4.11
Age group: 6 to 11 months	518	-0.24	1.81	0.27	4.18	-0.83	1.49	0.36	4.16
Age group: 12 to 23 months	1152	-0.95	1.89	0.55	4.12	-1.03	1.52	0.26	4.09
Age group: 24 to 35 months	1225	-1.10	1.90	0.43	3.83	-0.90	1.44	-0.04	3.85
Age group: 36 to 47 months	1188	-1.16	1.79	0.23	3.73	-0.91	1.25	-0.01	3.75
Age group: 48 to 59 months	829	-1.01	1.72	-0.06	3.74	-1.03	1.24	-0.27	4.25
Sex: Male	2466	-1.03	1.84	0.39	4.01	-0.97	1.42	0.13	4.27
Sex: Female	2446	-0.93	1.86	0.26	3.78	-0.92	1.37	0.03	3.93

Z-score distribution of unweighted summary statistics by index (continued)

Group	Unweighted N	Mean (zbmi)	Standard deviation (zbmi)	Skewness (zbmi)	Kurtosis (zbmi)	Mean (zwfl)	Standard deviation (zwfl)	Skewness (zwfl)	Kurtosis (zwfl)
All	4912	-0.46	1.20	0.02	4.11	-0.58	1.16	0.04	4.26
Age group: 6 to11 months	518	-1.06	1.33	0.47	4.00	-0.94	1.37	0.57	4.46
Age group: 12 to 23 months	1152	-0.67	1.27	0.04	3.69	-0.80	1.25	0.13	3.89
Age group: 24 to 35 months	1225	-0.27	1.16	-0.21	4.77	-0.42	1.13	-0.16	4.60
Age group: 36 to 47 months	1188	-0.22	1.11	0.16	4.22	-0.36	1.07	0.00	4.41
Age group: 48 to 59 months	829	-0.45	1.00	0.53	5.01	-0.57	0.98	0.35	4.49
Sex: Male	2466	-0.45	1.22	0.00	4.01	-0.58	1.19	-0.01	4.04
Sex: Female	2446	-0.48	1.18	0.05	4.22	-0.57	1.14	0.10	4.50

Annex 3 (con't) Summary of recommended data quality checks

The Working Group (WG) on Anthropometry Data Quality recommendation is that data quality is assessed and reported based on assessment on the following seven parameters: (i) completeness; (ii) sex ratio; (iii) age distribution; (iv) digit preference of heights and weights; (v) implausible z score values; (vi) standard deviation of z scores; and (vii) normality of z scores.

The WG recommends that (i) data quality checks should not be considered in isolation; (ii) formal tests or scoring should not be conducted; and (iii) the checks should be used to help users identify issues with the data quality to improve interpretation of the malnutrition estimates from the survey. A summary of details on the various checks is provided below to help their use. Full details and more comprehensive guidance, including how to calculate, can be found in the full report on the WG's recommendations[52].

(i) Completeness: although not all statistics are included in the WHO Anthro Survey Analyzer, report on the structural integrity of the aspects listed below should be included in the final report.

- PSUs: Percent of selected PSUs that were visited
- Households: Percent of selected HHs in the PSUs interviewed or recorded as not interviewed (specifying why)
- HH members: Percent of HH rosters that were completed
- Children: Percent of all eligible children are interviewed and measured, or recorded as not interviewed or measured (specifying why), with no duplicate cases
- Dates of birth: Percent of dates of birth for all eligible children that were complete

(ii) Sex ratio

- What: Ratio of girls to boys in the survey and compare to expected for the country. The observed ratios should be compared to the expected patterns based on reliable sources.
- Why: To identify potential selection biases

(iii) Age distribution

- What: Age distributions by age in completed years (six bars weighted), months (72 bars), and calendar month of birth (12 bars) as histograms
- Why: To identify potential selection biases or misreporting

(iv) Height and weight digit preference

- What: Terminal digits, as well as whole number integer distributions through histograms
- Why: Digit preference may be a tell-tale sign of data fabrication or inadequate care and attention during data collection and recording. It should be presented by a team or other relevant disaggregation categories when possible.

(v) Implausible z score values

- What: The percent of cases outside WHO flags[53] for each HAZ, WHZ, and WAZ
- Why: A percent above one percent can indicate potential data quality issues in measurements or age determination. It should be presented by a team or other relevant disaggregation categories.

(vi) Standard deviations

- What: SD for each HAZ, WHZ, and WAZ

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[52] Working Group on Anthropometric Data Quality, for the WHO-UNICEF Technical Expert Advisory Group on Nutrition Monitoring (TEAM). Recommendations for improving the quality of anthropometric data and its analysis and reporting. Available at www.who.int/nutrition/team (under "Technical reports and papers").

[53] WHO Anthro Software for personal computers - Manual (2011). Available at www.who.int/childgrowth/software/anthro_pc_manual_v322.pdf?ua=1.

- Why: Large SDs may signify data quality problems and/or population heterogeneity. It is unclear what causes SD's size, and more research is needed to determine the appropriate interpretation. It should be noted that SDs are typically wider for HAZ than WHZ or WAZ, and that HAZ SD is typically widest in youngest (0-5 months old) and increases as children age through to five years. No substantial difference should be observed between boys and girls. It should be presented by a team or other relevant disaggregation categories.

(vii) Checks of normality

- What: Measures of asymmetry (skew) and tailedness (kurtosis) of HAZ, WHZ, and WAZ, as well as density plots
- Why: A general assumption that three indices are normally distributed but unclear if applicable to populations with varying patterns of malnutrition. One can use the rule of thumb ranges of <-0.5 or >+0.5 for skewness to indicate asymmetry and <2 or >4 for kurtosis to indicate heavy or light tails. Further research is needed to understand patterns in different contexts. Anyhow, the comparisons among the distribution by disaggregation categories might help interpret the results.

Annex 4. Infant and Young Child Feeding Practices

Table 103. Infant and young child feeding practices

	Children (6-11 months)				Children (12-17 months)				Children (18-23 months)				Children (6-23 months)				Children (24-59 months)			
	N[1]	%	95%CI[2]		N[1]	%	95%CI[2]		N[1]	%	95%CI[2]		N[1]	%	95%CI[2]		N[1]	%	95%CI[2]	
Ever breastfed																				
Residence	(P = 0.364)				(P = 0.902)				(P = 0.301)				(P = 0.350)				(P = 0.761)			
Urban	240	**99.6**	99.0	100.0	232	**97.9**	95.9	99.8	230	**89.4**	81.5	97.4	702	**95.7**	93.3	98.0	1381	**91.2**	88.6	93.7
Rural	269	**99.0**	97.9	100.0	372	**97.7**	95.9	99.6	311	**94.2**	89.9	98.6	952	**97.0**	95.5	98.5	1911	**90.6**	87.7	93.4
Sex	(P = 0.765)				(P = 0.200)				(P = 0.141)				(P = 0.091)				(P = 0.957)			
Male	235	**99.4**	98.4	100.0	286	**96.8**	94.5	99.1	257	**88.7**	82.0	95.5	778	**95.1**	92.8	97.4	1687	**90.7**	88.2	93.3
Female	274	**99.2**	98.1	100.0	318	**98.7**	97.0	100.0	284	**95.3**	90.2	100.0	876	**97.8**	96.0	99.5	1605	**90.8**	88.3	93.4
National	509	**99.3**	98.6	100.0	604	**97.8**	96.4	99.2	541	**92.3**	88.2	96.4	1654	**96.5**	95.2	97.8	3292	**90.8**	88.8	92.8
	Currently breastfed				Continued breastfeeding								Currently breastfed							
Residence	(*P* = 0.425)				(*P* = 0.026)*				(*P* = 0.007)**				**(*P* = 0.015)***				(*P* = 0.090)			
Urban	240	**94.8**	91.7	97.8	232	**71.8**	61.9	81.6	230	**23.3**	15.2	31.3	702	**63.6**	**57.5**	**69.7**	1381	**4.2**	2.9	5.4
Rural	269	**92.6**	88.0	97.1	372	**83.5**	79.1	87.8	311	**38.1**	30.9	45.4	952	**72.3**	**68.7**	**76.0**	1911	**6.0**	4.3	7.7
Sex	(*P* = 0.520)				(*P* = 0.641)				(*P* = 0.128)				(*P* = 0.215)				(*P* = 0.777)			
Male	235	**92.5**	87.6	97.3	286	**78.6**	72.8	84.4	257	**27.3**	19.2	35.3	778	**67.0**	62.3	71.7	1687	**5.5**	3.4	7.6
Female	274	**94.4**	90.9	97.8	318	**80.2**	75.3	85.2	284	**36.3**	28.4	44.1	876	**70.7**	66.9	74.4	1605	**5.1**	3.7	6.6
National	509	**93.5**	90.5	96.5	604	**79.5**	75.3	83.6	541	**32.1**	26.6	37.6	1654	**69.0**	65.9	72.1	3292	**5.3**	4.1	6.5

Table 103. Infant and young child feeding practices (continued)

Bottle feeding 0–23 months old (child drank anything from a bottle with a nipple yesterday)																				
Residence	(P = 0.271)				(P = 0.816)				(P = 0.203)				(P = 0.949)				(P = 0.451)			
Urban	240	**31.4**	24.2	38.6	232	**17.0**	9.9	24.0	230	**10.8**	5.6	16.0	702	**19.8**	14.7	24.9	1381	**3.9**	0.5	7.3
Rural	268	**26.0**	19.6	32.4	369	**18.1**	12.0	24.2	311	**15.6**	10.3	20.8	948	**19.6**	16.1	23.1	1909	**2.5**	1.6	3.4
Sex	(P = 0.387)				(P = 0.656)				(P = 0.964)				(P = 0.746)				(P = 0.228)			
Male	234	**25.5**	18.3	32.8	286	**18.6**	12.4	24.8	257	**13.7**	7.9	19.6	777	**19.2**	15.3	23.0	1685	**2.4**	1.3	3.5
Female	274	**30.7**	22.8	38.6	315	**16.9**	11.4	22.5	284	**13.5**	8.0	19.1	873	**20.1**	15.9	24.4	1605	**3.7**	1.4	5.9
National	508	**28.3**	23.4	33.2	601	**17.7**	13.1	22.4	541	**13.6**	9.8	17.5	1650	**19.7**	16.8	22.6	3290	**3.0**	**1.6**	**4.4**

1 Unweighted sample size

2 Data are weighted to account for survey design and non-response.

Differences between groups were compared using Chi-square test (* signifies *P*<0.05, ** signifies *P*<0.01, *** signifies *P*<0.001).

Annex 5. Biofortification Coverage

Table 104. Consumed yellow cassava or any food products made from it in the past 30 days

	N[1]	Consumed yellow cassava in the past 30 days[2] %	95%CI		*P* value
National					
Non-pregnant women (aged15-49 years)	5273	**3.2**	2.4	4.1	NA[3]
NP non-lactating women	4565	**3.2**	2.4	4.1	
NP lactating women	708	**3.3**	1.5	5.0	
Pregnant women (aged15-49 years)	1004	3.7	2.2	5.2	
Children (aged 6-59 months)	4938	**3.4**	2.5	4.3	
Children (aged 6-23 months)	1650	**2.9**	1.8	4.0	
Children (aged 24-59 months)	3288	**3.7**	2.7	4.7	
Residence, Non-pregnant women (aged15-49 years)					
Urban	2152	**2.8**	1.6	4.0	(*P* = 0.322)
Rural	3121	**3.6**	2.5	4.8	
Residence, NP non-lactating women					
Urban	1916	**2.7**	1.5	4.0	(*P* = 0.289)
Rural	2649	**3.7**	2.4	5.0	
Residence, NP lactating women					
Urban	236	**3.2**	0.0	6.4	(*P* = 0.958)
Rural	472	**3.3**	1.3	5.3	
Residence, Pregnant women					
Urban	411	**3.9**	1.4	6.4	(*P* = 0.887)
Rural	593	**3.6**	1.7	5.6	
Residence, Children (aged 6-59 months)					
Urban	2081	**2.4**	1.0	3.8	(*P* = 0.109
Rural	2857	**4.0**	2.7	5.3	
Sex, Children (aged 6-59 months)					
Male	2462	**3.4**	2.3	4.5	(*P* = 0.942)
Female	2476	**3.4**	2.3	4.6	
Regional, Non-pregnant women (aged 15-49 years)					
North Central	857	**3.7**	1.3	6.1	(*P* = 0.0003***)
North East	829	**7.6**	4.1	11.0	
North West	942	**1.0**	0.0	2.0	
South East	853	**4.2**	2.2	6.2	
South South	888	**3.5**	1.5	5.4	
South West	904	**1.7**	0.7	2.8	

Table 104. Consumed yellow cassava or any food products made from it in the past 30 days (continued)

Wealth quintile, Non-pregnant women (15-49 years old)					
Lowest	1079	**4.1**	2.0	6.1	(*P* = 0.516)
Second	1110	**3.5**	2.0	5.1	
Middle	1099	**2.7**	1.4	3.9	
Fourth	996	**2.4**	1.3	3.6	
Highest	967	**3.5**	1.9	5.0	

1 Unweighted sample size. This analysis excludes respondents who could not report whether they consumed the food.
2 Data are weighted to account for survey design and non-response.
3 Differences across groups were not tested statistically.
Differences between groups were compared using Chi-square test (* signifies *P*<0.05, ** signifies *P*<0.01, *** signifies *P*<0.001).

Table 105. Frequency of consumption of yellow cassava or any food products made from it in the past 30 days among consumers

	N[1]	Frequency of consumption[2]											
		1-9 days			10-19 days			20-29 days			Daily		
		%	95%CI		%	95%CI		%	95%CI		%	95%CI	
National													
Non-pregnant women (15-49 years old)	188	**77.4**	70.6	84.2	**13.3**	8.4	18.2	**7.7**	2.7	12.7	**1.6**	0.0	3.3
NP non-lactating women	170	**75.9**	68.3	83.4	**15.0**	9.2	20.8	**7.3**	2.4	12.2	**1.8**	0.0	3.8
NP lactating women	18	**87.7**	67.8	100.0	**1.7**	0.0	5.2	**10.6**	0.0	30.2	-	-	-
Pregnant women (15-49 years old)	39	**65.3**	48.2	82.4	**16.4**	2.0	30.8	**10.4**	1.3	19.5	**7.8**	0	16.9
Children (6-59 months old)	165	**73.5**	64.5	82.6	**11.9**	5.5	18.3	**8.2**	1.2	15.1	**6.4**	0.8	12.1
Children (6-23 months old)	47	**87.2**	77.8	96.5	**7.0**	0.0	14.3	**3.6**	0.0	8.9	**2.2**	0.0	5.2
Children (24-59 months old)	118	**68.3**	55.7	80.8	**13.8**	6.2	21.3	**9.9**	0.4	19.5	**8.0**	0.7	15.4

1 Unweighted sample size for respondents who consumed yellow cassava (or any food products made from it) the previous 30 days. This analysis excludes respondents who could not report whether they consumed the food or could not report frequency of consumption.
2 Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.

Table 106. Consumed OFSP or any food products made from it in the past 30 days

	N[1]	Consumed sweet potato in past 30 days[2]			
		%	95%CI		*P* value
National[3]					
Non-pregnant women (15-49 years old)	5275	**4.6**	3.3	5.9	NA[3]
NP non-lactating women	4567	**4.7**	3.3	6.1	
NP lactating women	708	**4.2**	1.9	6.4	
Pregnant women)15-49 years old)	1004	**4.7**	2.7	6.8	
Children (6-59 months old)	4943	**4.8**	3.3	6.4	
Children (6-23 months old)	1652	**3.2**	1.9	4.5	
Children (24-59 months old)	3291	**5.6**	3.7	7.5	
Residence, Non-pregnant women (15-49 years old)					
Urban	2156	**5.6**	3.1	8.0	(*P* = 0.211)
Rural	3119	**3.7**	2.5	5.0	
Residence, NP non-lactating women					
Urban	1920	**5.8**	3.1	8.5	(*P* = 0.166)
Rural	2647	**3.6**	2.4	4.9	
Residence, NP lactating women					
Urban	236	**4.0**	0.0	8.3	(*P* = 0.885)
Rural	472	**4.3**	2.0	6.7	
Residence, Pregnant women					
Urban	412	**5.4**	1.9	8.8	(*P* = 0.661)
Rural	592	**4.4**	1.8	7.0	
Residence, Children (6-59 months old)					
Urban	2084	**4.2**	1.2	7.2	(*P* = 0.583)
Rural	2859	**5.2**	3.3	7.1	
Sex, Children (6-59 months old)					
Male	2464	**4.5**	3.0	6.0	(*P* = 0.453)
Female	2479	**5.1**	3.2	6.9	
Regional, Non-pregnant women (15-49 years old)					
North Central	855	**2.2***	1.0	3.4	(*P* < 0.0001***)
North East	829	**16.3***	10.5	22.1	
North West	942	**1.9***	0.8	3.1	
South East	855	**2.1***	0.8	3.5	
South South	888	**2.5***	0.6	4.5	
South West	906	**2.4***	1.4	3.4	

Table 106. Consumed OFSP or any food products made from it in the past 30 days (continued)

Wealth quintile, Non-pregnant women (15-49 years old)						
	Lowest	1077	**5.4**	3.4	7.3	(*P* = 0.698)
	Second	1110	**4.5**	2.5	6.4	
	Middle	1099	**3.8**	2.3	5.4	
	Fourth	997	**3.8**	1.5	6.1	
	Highest	970	**5.6**	1.0	10.2	

1 Unweighted sample size. This analysis excludes respondents who could not report whether they consumed the food.

2 Data are weighted to account for survey design and non-response.

3 Differences across groups were not tested statistically.

Differences between groups were compared using Chi-square test (* signifies *P*<0.05, ** signifies *P*<0.01, *** signifies *P*<0.001).

Table 107. Frequency of consumption of OFSP or any food products made from it in the past 30 days among consumers

	N[1]	Frequency of consumption[2]											
		1-9 days			10-19 days			20-29 days			Daily		
		%	95%CI		%	95%CI		%	95%CI		%	95%CI	
National													
Non-pregnant women (15-49 years old)	222	**83.6**	76.9	90.3	**11.8**	6.2	17.5	**4.6**	1.0	8.1	-	-	-
NP non-lactating women	192	**82.4**	75.1	89.6	**12.4**	6.1	18.8	**5.2**	1.3	9.1	-	-	-
NP lactating women	30	**92.7**	82.4	100.0	**7.3**	0.0	17.6	-	-	-	-	-	-
Pregnant women (15-49 years old)	45	**83.3**	72.1	94.5	**2.5**	0.0	6.0	**10.6**	0.1	21.1	**3.7**	0.0	9.8
Children (6-59 months old)	199	**91.4**	84.3	98.5	**7.0**	0.2	13.8	**1.0**	0.0	2.4	**0.6**	0.0	1.8
Children (6-23 months old)	49	**100.0**	100.0	100.0	-	-	-	-	-	-	-	-	-
Children(24-59 months old)	150	**88.9**	79.6	98.3	**9.0**	0.1	17.9	**1.3**	0.0	3.0	**0.8**	0.0	2.3

1 Unweighted sample size for respondents who consumed yellow cassava (or any food products made from it) the previous 30 days. This analysis excludes respondents who could not report whether they consumed the food or could not report frequency of consumption.
2 Data are weighted to account for survey design and non-response.
Differences across groups were not tested statistically.

Table 108. Consumed orange maize or any food products made from it in the past 30 days

	N[1]	Consumed orange maize in past 30 days[2]			
		%	95%CI		*P* value
National3					
Non-pregnant women (15-49 years old)	5264	**13.4**	10.9	15.9	NA[3]
NP non-lactating women	4556	**13.2**	10.6	15.8	
NP lactating women	708	**14.8**	9.6	20.0	
Pregnant women (15-49 years old)	1005	**14.9**	11.5	18.3	
Children (6-59 months old)	4934	**13.2**	10.7	15.8	
Children (6-23 months old)	1647	**12.2**	9.3	15.2	
Children (24-59 months old)	3287	**13.8**	11.0	16.5	
Residence, Non-pregnant women (15-49 years old)					
Urban	2148	**15.3**	10.4	20.1	(*P* = 0.226)
Rural	3116	**11.8**	9.3	14.2	
Residence, NP non-lactating women					
Urban	1912	**15.2**	10.1	20.3	(*P* = 0.199)
Rural	2644	**11.3**	9.0	13.7	
Residence, NP lactating women					
Urban	236	**15.9**	6.0	25.8	(*P* = 0.747)
Rural	472	**14.0**	8.6	19.5	
Residence, Pregnant women					
Urban	412	**17.0**	11.2	22.7	(*P* = 0.374)
Rural	593	**13.6**	9.2	18.0	
Residence, Children (6-59 months old)					
Urban	2077	**15.3**	10.1	20.6	(*P* = 0.299)
Rural	2857	**12.0**	9.1	14.9	
Sex, Children (6-59 months old)					
Male	2461	**12.7**	10.2	15.1	(*P* = 0.479)
Female	2473	**13.8**	10.3	17.4	
Regional, Non-pregnant women (15-49 years old)					
North Central	852	**10.8***	7.1	14.6	(*P* < 0.0001***)
North East	830	**38.3***	29.3	47.4	
North West	942	**6.0***	2.6	9.5	
South East	849	**13.6***	10.3	16.9	
South South	888	**3.6***	1.5	5.6	
South West	903	**11.4***	8.5	14.4	
Wealth quintile, Non-pregnant women (15-49 years old)					
Lowest	1078	**13.2**	9.3	17.1	(*P* = 0.749)
Second	1109	**15.1**	10.8	19.4	

Table 108. Consumed orange maize or any food products made from it in the past 30 days (continued)

Wealth quintile, Non-pregnant women (15-49 years old)					
Lowest	1078	**13.2**	9.3	17.1	(*P* = 0.749)
Second	1109	**15.1**	10.8	19.4	
Middle	1096	**12.1**	8.7	15.4	
Fourth	993	**14.1**	9.7	18.4	
Highest	966	**12.5**	7.1	18.0	

1 Unweighted sample size. This analysis excludes respondents who could not report whether they consumed the food.

2 Data are weighted to account for survey design and non-response.

3 Differences across groups were not tested statistically.

Differences between groups were compared using Chi-square test (* signifies $P<0.05$, ** signifies $P<0.01$, *** signifies $P<0.001$).

Table 109. Frequency of consumption of orange maize or any food products made from it in the past 30 days among consumers

	N[1]	Frequency of consumption[2]											
		1-9 days			10-19 days			20-29 days			Daily		
		%	95%CI		%	95%CI		%	95%CI		%	95%CI	
National													
Non-pregnant women (15-49 years old)	663	**55.7**	48.0	63.5	**13.0**	9.4	16.5	**14.9**	10.9	19.0	**16.4**	9.7	23.0
NP non-lactating women	569	**55.2**	47.9	62.4	**13.9**	10.0	17.8	**15.7**	11.2	20.2	**15.3**	9.2	21.4
NP lactating women	94	**58.8**	40.4	77.2	**7.9**	1.3	14.5	**10.9**	1.5	20.4	**22.4**	10.1	34.7
Pregnant women (15-49 years old)	141	**55.3**	41.5	69.1	**13.0**	5.5	20.5	**10.1**	3.1	17.1	**21.6**	11.5	31.8
Children (6-59 months old)	586	**54.2**	45.5	63.0	**11.9**	8.7	15.2	**13.7**	10.0	17.4	**20.1**	12.1	28.2
Children (6-23 months old)	186	**51.0**	41.1	60.9	**11.1**	5.6	16.7	**15.3**	8.9	21.7	**22.5**	11.6	33.5
Children (24-59 months old)	400	**55.7**	45.8	65.5	**12.3**	8.5	16.1	**13.0**	9.2	16.7	**19.1**	10.3	27.8

1 Unweighted sample size for respondents who consumed yellow cassava (or any food products made from it) the previous 30 days. This analysis excludes respondents who could not report whether they consumed the food or could not report frequency of consumption.
2 Data are weighted to account for survey design and non-response.

Differences across groups were not tested statistically.

Annex 6. Fortification Coverage

Table 110. Type, source, and brand of vegetable oil obtained for the household, by target group1

	Non-pregnant women (15-49 years old)			Pregnant women (15-49 years old)			Children (6-59 months old)		
	%	95%CI		%	95%CI		%	95%CI	
The household uses vegetable oil	N=5281[2]			N=1006[2]			N=4947[2]		
Yes	**90.3**	88.5	92.1	**90.0**	87.0	93.0	**88.0**	85.8	90.3
No	**9.7**	7.9	11.5	**10.0**	7.0	13.0	**12.0**	9.7	14.2
Main type of vegetable oil used in household	N= 4749[3]			N=911[3]			N=4411[3]		
Groundnut oil	**50.8**	47.5	54.2	**50.0**	45.3	54.6	**51.6**	48.1	55.1
Palm olein/palm oil	**43.8**	40.0	47.5	**46.9**	42.2	51.5	**42.9**	39.1	46.7
Soybean oil	**1.6**	1.0	2.2	**0.8**	0.0	1.8	**1.1**	0.6	1.6
Oil blend	**1.3**	0.6	2.0	**1.5**	0.2	2.7	**1.8**	0.3	3.3
Sunflower oil	**0.4**	0.1	0.7	-	-	-	**0.5**	0.1	0.9
Other	**0.8**	0.4	1.3	**0.4**	0.0	0.9	**0.8**	0.3	1.3
Unknown[4]	**1.3**	0.8	1.9	**0.4**	0.0	0.9	**1.3**	0.8	1.8
How household obtained vegetable oil the last time it was obtained[5]	N=4646[5]			N=902[5]			N=4320[5]		
Purchased	**91.6**	90.1	93.2	**91.2**	88.5	94.0	**90.6**	88.7	92.5
Homemade	**7.9**	6.3	9.5	**8.2**	5.5	10.9	**8.9**	7.0	10.9
Received from relative/friend/food	**0.4**	0.3	0.6	**0.6**	0.1	1.1	**0.5**	0.2	0.7
Brand of vegetable oil obtained the last time	N=4320[6]			N=847[6]			N=4048[6]		
Unbranded	**30.4**	27.3	33.4	**32.7**	28.0	37.4	**33.8**	**30.5**	**37.2**
King's 100% vegetable oil	**22.0**	19.3	24.7	**15.5**	12.3	18.8	**17.7**	**15.1**	**20.1**
Power oil - Pure vegetable oil	**12.7**	11.1	14.3	**12.3**	9.5	15.0	**11.8**	**10.2**	**13.4**
Golden Penny-pure soya oil	**0.9**	0.5	1.2	**0.9**	0.1	1.7	**0.8**	**0.4**	**1.2**
Turkey	**0.9**	0.3	1.4	-	-	-	**0.7**	**0.3**	**1.2**
Oki	**0.6**	0.2	1.0	-	-	-	**0.5**	**0.1**	**0.9**
Laziz - Pure vegetable oil	**0.5**	0.2	0.8	**0.4**	0.0	0.7	**0.4**	**0.2**	**0.6**

Table 110. Type, source, and brand of vegetable oil obtained for the household, by target group1 (continued)

	Sunola - Soybean oil	**0.5**	0.1	0.9	**0.2**	0.0	0.5	**0.3**	0.0	0.6
	Mamador	**0.3**	0.1	0.5	**-**	-	-	**0.1**	0.1	0.2
	Gino	**0.3**	0.0	0.6	**-**	-	-			
	Controller	**0.2**	0.0	0.4	**-**	-	-	**0.7**	0.0	1.4
	Solive	**0.1**	0.0	0.2	**-**	-	-	**0.1**	0.0	0.2
	Other	**1.5**	1.0	1.9	**2.0**	0.9	3.0	**1.1**	0.7	1.5
	Unknown[4]	**29.2**	26.0	32.4	**36.1**	30.5	41.8	**33.8**	30.5	37.2

[1] Data are weighted to account for survey design and non-response.
[2] Unweighted sample size for all respondents.

[3] Unweighted sample size for respondents who used the food vehicle in the household (excluding respondents with a missing value).
[4] The response was classified as “unknown” when the respondent could not report the type, source or brand of food vehicle used in the household.
[5] Unweighted sample size for respondents who used the food vehicle in the household and the main type of food vehicle was not “other” or “unknown” (excluding respondents with a missing value).
[6] Unweighted sample size for respondents who used the food vehicle in the household, the main type of food vehicle was not “other” or “unknown” and the food vehicle was not “home-made”. (excluding respondents with a missing value).
Differences across groups were not tested statistically.

Table 111. Type, source, and brand of wheat flour obtained for the household, by target group[1]

	Non-pregnant women (15-49 years old)			Pregnant women (15-49 years old)			Children (6-59 months old)		
	%	95%CI		%	95%CI		%	95%CI	
The household uses wheat flour	N=5281[2]			N=1006[2]			N=4[2]		
Yes	**28.2**	24.3	32.2	**26.7**	21.7	31.6	**25.9**	22.0	29.8
No	**71.8**	67.8	75.7	**73.3**	68.4	78.3	**74.1**	70.2	78.0
Main type of wheat flour used in household	N=1226[3]			N=234[3]					
All-purpose flour	**59.0**	53.0	65.0	**58.6**	51.5	65.7	**62.7**	57.1	68.3
Refined wheat flour	**16.3**	12.1	20.6	**16.4**	11.0	21.7	**16.0**	11.3	20.6
Whole wheat	**14.6**	11.3	17.9	**9.5**	5.1	13.8	**10.2**	7.5	12.9
Bread flour	**2.8**	1.4	4.3	**6.1**	2.3	9.8	**2.9**	1.3	4.5
Cake flour	**0.7**	0.2	1.3	**0.3**	0.0	0.7	**0.4**	0.1	0.8
Self-rising flour	**0.4**	0.0	1.1	**-**	-	-	**0.1**	0.0	0.2
Other	**-**	-	-	**0.2**	0.0	0.6	**-**	-	-
Unknown[4]	**6.1**	3.6	8.6	**9.0**	3.4	14.7	**7.8**	3.9	11.7
How household obtained wheat flour the last time it was obtained[5]	N=1140[5]			N=211[5]			N=1014[5]		
Purchased	**96.0**	94.1	98.0	**99.4**	98.7	100.0	**98.3**	97.4	99.1
Homemade	**3.6**	1.8	5.5	**0.6**	0.0	1.3	**1.4**	0.7	2.0
Received from relative/friend/food	**0.3**	0.0	0.7	**-**	-	-	**0.4**	0.0	0.8
Brand of wheat flour obtained the last time	N=1095[6]			N=210[6]			N=993[6]		
Dangote	**22.0**	16.5	27.6	**19.4**	11.7	27.1	**21.7**	**17.6**	**25.8**
Unbranded	**16.7**	13.8	19.6	**15.8**	9.6	22.0	**16.2**	**13.4**	**18.9**
Bua flour	**15.1**	9.1	21.1	**17.3**	9.6	25.0	**12.8**	**8.4**	**17.1**
Golden Penny	**7.1**	4.9	9.3	**6.0**	2.3	9.7	**6.1**	**4.2**	**8.0**
Honeywell	**3.8**	2.4	5.2	**3.1**	1.2	5.1	**3.3**	**2.0**	**4.6**
Other	**2.6**	1.1	4.1	**1.1**	0.0	2.3	**1.8**	**0.4**	**3.2**
Unknown[4]	**32.8**	28.3	37.3	**37.3**	28.1	46.5	**38.1**	**34.0**	**42.2**

[1] Data are weighted to account for survey design and non-response.
[2] Unweighted sample size for all respondents.
[3] Unweighted sample size for respondents who used the food vehicle in the household (excluding respondents with a missing value).
[4] The response was classified as "unknown" when the respondent could not report the type, source or brand of food vehicle used in the household.[5] Unweighted sample size for respondents who used the food vehicle in the household and the main type of food vehicle was not "other" or "unknown" (excluding respondents with a missing value).
[6] Unweighted sample size for respondents who used the food vehicle in the household, the main type of food vehicle was not "other" or "unknown" and the food vehicle was not "home-made". (excluding respondents with a missing value).
Differences across groups were not tested statistically.

Table 112. Type, source, and brand of maize flour obtained for the household by target group[1]

	Non-pregnant women (15-49 years old)			Pregnant women (15-49 years old)			Children (6-59 months old)		
	%	95%CI		%	95%CI		%	95%CI	
The household uses maize flour	N=5281[2]			N=1006[2]			N=4947[2]		
Yes	**57.4**	53.8	61.0	**62.0**	56.9	67.2	**62.0**	58.3	65.6
No	**42.6**	39.0	46.2	**38.0**	32.8	43.1	**38.0**	34.4	41.7
Main type of maize flour used in household	N=2573[3]			N=515[3]			N=2476[3]		
White maize flour	**91.7**	89.7	93.6	**90.5**	87.1	93.9	**92.3**	90.6	94.0
Yellow maize flour	**7.6**	5.7	9.5	**8.0**	4.9	11.1	**6.4**	5.0	7.7
Other	**0.2**	0.0	0.4	**0.3**	0.0	0.9	**0.8**	0.2	1.5
Unknown[4]	**0.6**	0.2	1.0	**1.2**	0.1	2.3	**0.5**	0.1	1.0
How household obtained maize flour the last time it was obtained[5]	N=2542[5]			N=506[5]			N=2447[5]		
Purchased	**51.6**	47.5	55.8	**53.7**	47.4	60.1	**52.7**	48.6	56.7
Homemade	**47.8**	43.6	52.0	**46.0**	39.7	52.3	**47.0**	43.0	51.0
Received from relative/friend/food	**0.5**	0.2	0.9	**0.3**	0.0	0.7	**0.1**	0.0	0.2
Brand of maize flour obtained the last time	N=1231[6]			N=249[6]			N=1239[6]		
Unbranded	**54.0**	48.7	59.4	**49.8**	41.3	58.4	**49.6**	**44.9**	**54.4**
Ammani Foods, Maize Flour	**1.2**	0.0	3.0	**0.6**	0.0	1.7	**0.9**	**0.1**	**1.7**
Ultimate, Maize flour	**0.8**	0.1	1.4	**0.6**	0.0	1.4	-	-	-
Other	**0.4**	0.0	0.8	**0.1**	0.0	0.3	**0.6**	**0.1**	**1.1**
Unknown[4]	**43.6**	38.3	48.8	**49.0**	40.4	57.5	**49.6**	**44.9**	**54.4**

[1] Data are weighted to account for survey design and non-response.
[2] Unweighted sample size for all respondents.
[3] Unweighted sample size for respondents who used the food vehicle in the household (excluding respondents with a missing value).
[4] The response was classified as "unknown" when the respondent could not report the type, source or brand of food vehicle used in the household.
[5] Unweighted sample size for respondents who used the food vehicle in the household and the main type of food vehicle was not "other" or "unknown" (excluding respondents with a missing value).
[6] Unweighted sample size for respondents who used the food vehicle in the household, the main type of food vehicle was not "other" or "unknown" and the food vehicle was not "home-made". (excluding respondents with a missing value).
Differences across groups were not tested statistically.

Table 113. Type, source, and brand of semolina flour obtained for the household by target group[1]

	Non-pregnant women (15-49 years old)			Pregnant women (15-49 years old)			Children (6-59 months old)		
	%	95%CI		%	95%CI		%	95%CI	
The household uses semolina flour	N=5281[2]			N=1006[2]			N=4947[2]		
Yes	**28.7**	25.4	32.1	**22.5**	18.1	27.0	**25.1**	21.5	28.7
No	**71.3**	67.9	74.6	**77.5**	73.0	81.9	**74.9**	71.3	78.5
Main type of semolina flour used in household	N=1578[3]			N=282[3]			N=1481[3]		
Wheat based	**65.1**	60.8	69.5	**73.7**	67.5	79.9	**67.2**	62.0	72.3
Wheat-Maize	**26.9**	23.0	30.8	**19.8**	13.1	26.5	**25.3**	20.6	30.0
Other	-	-	-	**0.5**	0.0	1.4	**0.6**	0.0	1.5
Unknown[4]	**7.9**	5.3	10.5	**6.0**	2.2	9.9	**6.9**	4.4	9.4
How household obtained semolina flour the last time it was obtained[5]	N=1458[5]			N=266[5]			N=1376[5]		
Purchased	**99.4**	98.9	99.8	**99.6**	99.1	100.0	**99.4**	98.9	99.9
Homemade	**0.1**	0.0	0.2	-	--		**0.1**	0.0	0.3
Received from relative/friend/food	**0.6**	0.1	1.0	**0.4**	0.0	0.9	**0.2**	0.1	1.0
Brand of semolina flour obtained the last time	N=1460[6]			N=267[6]			N=1376[6]		
Golden Penny Semovita	**54.9**	50.9	58.8	**52.3**	44.5	60.1	**48.9**	**43.2**	**54.5**
Dangote Semolina	**13.0**	10.2	15.9	**12.5**	5.8	19.2	**13.7**	**10.5**	**16.9**
Honeywell Semolina	**12.8**	9.9	15.8	**11.5**	7.5	15.5	**13.0**	**10.7**	**15.4**
Mamagold	**3.2**	1.8	4.7	**5.4**	1.6	9.1	**2.9**	**1.4**	**4.3**
Unbranded	**1.7**	0.8	2.6	**2.7**	0.3	5.2	**3.5**	**1.6**	**5.5**
Supreme Semolina	**1.4**	0.7	2.0	**1.1**	0.1	2.0	**1.1**	**0.6**	**1.7**
Pure Prima	**0.4**	0.1	0.7	-	--		**0.4**	**0.1**	**0.7**
Other	**0.5**	0.0	1.0	**0.5**	0.0	1.0	**0.3**	**0.0**	**0.5**
Unknown[4]	**12.1**	9.2	14.9	**14.1**	9.2	19.1	**16.2**	**11.7**	**20.8**

[1] Data are weighted to account for survey design and non-response.
[2] Unweighted sample size for all respondents.
[3] Unweighted sample size for respondents who used the food vehicle in the household (excluding respondents with a missing value).
[4] The response was classified as "unknown" when the respondent could not report the type, source or brand of food vehicle used in the household.
[5] Unweighted sample size for respondents who used the food vehicle in the household and the main type of food vehicle was not "other" or "unknown" (excluding respondents with a missing value).
[6] Unweighted sample size for respondents who used the food vehicle in the household, the main type of food vehicle was not "other" or "unknown" and the food vehicle was not "home-made". (excluding respondents with a missing value).
Differences across groups were not tested statistically.

Table 114. Type, source, and brand of sugar obtained for the household by target group[1]

	Non-pregnant women (15-49 years old)			Pregnant women (15-49 years old)			Children (6-59 months old)		
	%	95%CI		%	95%CI		%	95%CI	
The household uses sugar	N=5281[2]			N=1006[2]			N=4947[2]		
Yes	**88.2**	86.3	90.2	**85.1**	81.5	88.6	**87.4**	84.8	90.0
No	**11.8**	9.8	13.7	**14.9**	11.4	18.5	**12.6**	10.0	15.2
Main type of v used in household	N=4715[3]			N=881[3]			N=4445[3]		
White granulated	**86.6**	84.4	88.8	**87.7**	84.4	91.0	**88.1**	86.1	90.0
White cube	**11.0**	9.0	13.1	**9.2**	6.3	12.1	**8.9**	7.1	10.7
Brown granulated	**1.3**	0.5	2.1	**2.0**	0.0	4.1	**1.0**	0.4	1.5
Brown cube	**0.7**	0.3	1.0	**0.5**	0.0	1.1	**1.3**	0.5	2.2
Unknown[4]	**0.4**	0.1	0.8	**0.6**	0.0	1.2	**0.5**	0.2	0.9
How household obtained sugar the last time it was obtained[5]	N=4692[5]			N=871[5]			N=4401[5]		
Purchased	**99.8**	99.5	100.0	**99.8**	99.4	100.0	**99.8**	99.7	100.0
Homemade	**0.2**	0.0	0.5	**0.0**	0.0	0.1	**0.1**	0.0	0.2
Received from relative/friend/food	**-**	-	-	**0.2**	0.0	0.6	**0.0**	0.0	0.1
Brand of sugar obtained the last time	N=4696[6]			N=874[6]			N=4421[6]		
Unbranded	**42.4**	39.3	45.6	**43.2**	38.2	48.2	**41.4**	**37.9**	**44.8**
Dangote - Refined Granulated White Sugar	**19.6**	17.2	21.9	**16.6**	13.0	20.1	**18.5**	**16.3**	**20.8**
Golden Penny - Premium quality white granulated sugar	**1.9**	1.4	2.4	**1.5**	0.2	2.8	**1.1**	**0.7**	**1.5**
Bua - Premium Refined Sugar	**1.8**	1.1	2.5	**0.6**	0.1	1.1	**1.6**	**1.0**	**2.1**
Family - Refined granulated Sugar	**1.5**	0.9	2.0	**1.5**	0.3	2.8	**0.9**	**0.6**	**1.2**
St Loius	**1.0**	0.6	1.4	**0.8**	0.3	1.4	**0.9**	**0.6**	**1.2**
Dogan	**0.8**	0.5	1.1	**0.8**	0.3	1.3	**0.6**	**0.4**	**0.9**
Other	**0.1**	0.0	0.2	**0.2**	0.0	0.5	**0.1**	**0.0**	**0.2**
Unknown[4]	**30.9**	28.3	33.5	**34.8**	30.7	38.9	**34.9**	**31.6**	**38.2**

[1] Data are weighted to account for survey design and non-response.
[2] Unweighted sample size for all respondents.
[3] Unweighted sample size for respondents who used the food vehicle in the household (excluding respondents with a missing value).
[4] The response was classified as "unknown" when the respondent could not report the type, source or brand of food vehicle used in the household.
[5] Unweighted sample size for respondents who used the food vehicle in the household and the main type of food vehicle was not "other" or "unknown" (excluding respondents with a missing value).
[6] Unweighted sample size for respondents who used the food vehicle in the household, the main type of food vehicle was not "other" or "unknown" and the food vehicle was not "home-made". (excluding respondents with a missing value).
Differences across groups were not tested statistically.

Table 115. Type, source, and brand of salt obtained for the household by target group[1]

	Non-pregnant women (15-49 years old)			Pregnant women (15-49 years old)			Children (6-59 months old)		
	%	95%CI		%	95%CI		%	95%CI	
The household uses salt	N=5281[2]			N=1006[2]			N=4947[2]		
Yes	**99.3**	99.0	99.6	**99.1**	98.5	99.8	**99.2**	98.8	99.6
No	**0.7**	0.4	1.0	**0.9**	0.2	1.5	**0.8**	0.4	1.2
Main type of salt used in household	N=4715[3]			N=880[3]			N=4910[3]		
Table salt-fine	**65.8**	62.3	69.3	**68.4**	63.6	73.2	**63.9**	60.5	66.6
Edible/cooking salt-Coarse	**29.3**	26.2	32.4	**26.6**	22.5	30.7	**30.2**	27.6	32.9
Edible salt for industrial use	**1.1**	0.6	1.7	**0.9**	0.1	1.7	**0.9**	0.5	1.3
Sea salt-fine	**0.6**	0.2	1.0	**1.0**	0.0	2.2	**0.6**	0.1	1.1
Salt-low sodium	**0.4**	0.0	0.7	**0.2**	0.0	0.5	**0.6**	0.2	0.9
Sea salt-coarse	**0.3**	0.0	0.6	**0.1**	0.0	0.4	**0.2**	0.0	0.5
Unknown[4]	**2.5**	1.8	3.3	**2.8**	0.6	4.9	**3.7**	2.5	4.9
How household obtained salt the last time it was obtained[5]	N=4586[5]			N=862[5]			N=4748[5]		
Purchased	**99.8**	99.7	99.9	**99.9**	99.8	100.0	**99.8**	99.6	99.9
Homemade	**0.1**	0.0	0.1	**-**	--	-	**0.2**	0.0	0.3
Received from relative/friend/food	**0.1**	0.0	0.2	**0.1**	0.0	0.2	**0.1**	0.0	0.1
Brand of salt obtained the last time	N=4620[6]			N=864[6]			N=4781[6]		
Dangote - refined and iodized salt	**29.9**	27.0	32.8	**23.3**	19.2	27.4	**26.1**	**22.4**	**29.7**
Unbranded	**20.2**	17.7	22.7	**23.8**	19.5	28.1	**22.6**	**19.5**	**25.7**
Mr. Chef - pure refined and iodized salt	**19.4**	16.8	22.1	**17.0**	13.6	20.4	**15.0**	**12.8**	**17.2**
Uncle palm - iodized salt	**4.3**	3.1	5.5	**3.9**	2.3	5.6	**3.7**	**2.7**	**4.6**
Annapurna	**0.5**	0.1	0.8	**0.3**	0.0	0.6	**0.3**	**0.1**	**0.6**
Royal salt - edible iodized salt	**0.3**	0.1	0.5	**0.5**	0.0	1.1	**-**	-	-
Other	**0.2**	0.0	0.4	**0.1**	0.0	0.2	**0.2**	**0.0**	**0.3**
Unknown[4]	**25.2**	22.5	27.9	**31.1**	26.6	35.6	**32.5**	**28.4**	**36.5**

[1] Data are weighted to account for survey design and non-response.
[2] Unweighted sample size for all respondents.
[3] Unweighted sample size for respondents who used the food vehicle in the household (excluding respondents with a missing value).
[4] The response was classified as "unknown" when the respondent could not report the type, source or brand of food vehicle used in the household.
[5] Unweighted sample size for respondents who used the food vehicle in the household and the main type of food vehicle was not "other" or "unknown" (excluding respondents with a missing value).
[6] Unweighted sample size for respondents who used the food vehicle in the household, the main type of food vehicle was not "other" or "unknown" and the food vehicle was not "home-made". (excluding respondents with a missing value).
Differences across groups were not tested statistically.

Table 116. Type, source, and brand of bouillon obtained for the household by target group[1]

	Non-pregnant women (15-49 years old)			Pregnant women (15-49 years old)			Children (6-59 months old)		
	%	95%CI		%	95%CI		%	95%CI	
The household uses bouillon cube	N=5249[2]			N=1006[2]			N=4947[2]		
Yes	**98.9**	98.5	99.3	**98.6**	97.7	99.5	**98.8**	98.3	99.2
No	**1.1**	0.7	1.5	**1.4**	0.5	2.3	**1.2**	0.8	1.7
Main type of bouillon used in household	N=5178[3]			N=984[3]			N=4870[3]		
Cube	**91.3**	89.3	93.2	**88.1**	83.5	92.6	**88.1**	85.5	90.8
Granule	**6.5**	4.9	8.2	**9.9**	5.4	14.4	**8.5**	6.2	10.9
Powder	**1.5**	0.9	2.1	**1.7**	0.5	2.9	**2.5**	1.5	3.5
Other	**0.1**	0.0	0.1	**-**	-	-	**0.6**	0.2	1.1
Unknown[4]	**0.6**	0.3	1.0	**0.3**	0.0	0.7	**0.2**	0.0	0.4
How household obtained bouillon the last time it was obtained[5]	N=5141[5]			N=973[5]			N=4865[5]		
Purchased	**99.8**	99.6	99.9	**99.9**	99.7	100.0	**99.8**	99.6	99.9
Homemade	**0.1**	0.0	0.3	**0.1**	0.0	0.3	**0.1**	0.0	0.2
Received from relative/friend/food	**0.1**	0.0	0.1	**-**	-	-	**0.0**	0.0	0.1
Brand of bouillon obtained the last time	N=5135[6]			N=974[6]			N=4865[6]		
Maggi	**54.8**	51.2	58.4	**55.8**	50.2	61.4	**55.0**	**50.4**	**59.5**
Ajinomoto	**10.0**	7.7	12.3	**15.1**	10.1	20.1	**13.0**	**9.9**	**16.2**
Onga	**9.9**	7.5	12.2	**8.4**	5.6	11.3	**8.7**	**6.6**	**10.7**
Knorr	**8.0**	6.6	9.4	**5.5**	3.8	7.3	**5.7**	**4.6**	**6.8**
Tasty	**7.6**	6.1	9.0	**5.3**	3.6	7.1	**6.1**	**4.7**	**7.6**
Mr Cheff	**2.7**	1.9	3.4	**1.2**	0.3	2.1	**2.5**	**1.4**	**3.5**
Terra seasoning cubes	**2.4**	1.5	3.2	**2.6**	1.1	4.2	**2.3**	**1.3**	**3.3**
Royco	**1.7**	0.9	2.6	**3.8**	0.1	7.5	**1.9**	**0.7**	**3.2**
Gino max seasoning cube	**1.5**	1.0	1.9	**0.8**	0.3	1.3	**1.0**	**0.6**	**1.3**
Suppy seasoning cubes	**0.2**	0.1	0.4	**-**	-	-	**0.1**	**0.0**	**0.2**
Ami seasoning cube	**0.2**	0.1	0.3	**-**	-	-	**-**	**-**	**-**
Super seasoning Vedan	**0.1**	0.0	0.2	**-**	-	-	**0.4**	**0.0**	**0.9**
Other	**0.3**	0.0	0.6	**1.2**	0.3	2.1	**0.5**	**0.2**	**0.8**
Unknown[4]	**0.7**	0.5	1.0	**0.2**	0.0	0.5	**1.1**	**0.5**	**1.7**

[1] Data are weighted to account for survey design and non-response.
[2] Unweighted sample size for all respondents.
[3] Unweighted sample size for respondents who used the food vehicle in the household (excluding respondents with a missing value).
[4] The response was classified as "unknown" when the respondent could not report the type, source or brand of food vehicle used in the household.
[5] Unweighted sample size for respondents who used the food vehicle in the household and the main type of food vehicle was not "other" or "unknown" (excluding respondents with a missing value).
[6] Unweighted sample size for respondents who used the food vehicle in the household, the main type of food vehicle was not "other" or "unknown" and the food vehicle was not "home-made". (excluding respondents with a missing value).
Differences across groups were not tested statistically.

Annex 7. Summary of Food Samples Collected and Analyzed

Table 117. Summary of the food samples collected, processed and distributed for laboratory analyses

Food vehicles	Total collected
Salt	1153
Vegetable oil	338
Sugar	400
Semolina flour	89
Wheat flour	51
Total	**2031**

Sample Distribution by Laboratory

Table 118. MicroChem Lab., South Africa

Food samples	Total	Analyses to run	Comments
Wheat flour	37	VA, Fe & Zn	All samples are at least 20 g weight.
Semolina	78	VA, Fe & Zn	
Vegetable Oil	232	VA	
Sugar	274	VA	
Total	**621**		

Table 119. Intertek Lab., Germany

Food samples	Total	Analyses to run	Comments
Salt	73	Iodine	All samples are at least 30g weight.
Wheat flour	11	VA, Fe & Zn	
Semolina	17	VA, Fe & Zn	
Sugar	32	VA	
Total	**133**		

Table 120. BATO Lab., Lagos

Food samples	Total	Analyses to run	Comments
Salt	30	Iodine	All samples are at least 30g weight.
Semolina	8	VA, Fe & Zn	
Sugar	14	VA	
Vegetable Oil	22	VA	
Total	**74**		

Table 121. FIIRO, Oshodi Lagos

Food samples	Total	Analyses to run	Comments
Salt	14	Iodine	All samples are at least 20g weight.
Total	**14**		

Annex 8. Household listing form

Form ID No: | | | | | | | | |

(Leave Blank)

Nigeria National Food Consumption and Micronutrient Survey (NFCMS)

Household Listing Form

IDENTIFICATION		NAME	CODE
ID-1	ZONE		
ID-2	STATE		
ID-3	LGA		
ID-4	Locality		
ID-5	EA		
ID-6	EA Serial No		
ID-7	Sector (Urban = 1; Rural = 2)		
ID-8	Building Number		

ID-9.GPS Coordinates?

LATITUDE (N)	LONGITUDE (E)

ID-10. Address of Building:...

....

ID-11. Use of Household Unit

Residential only = 1
Commercial only = 2
Religious only = 3
Residential/commercial = 4
Residential/Religious = 5

Institutional = 6
Hotel/Restaurant = 7
Vacant = 8
Uncompleted = 9
Others = 10

ID-12S/No of Residential HU:______

ID-13S/No of households: ______

ID-14. Name of Head of Household: ....

ID-15. Phone number(s): ....

Purpose(s) of survey:

We are conducting a national survey to assess the micronutrient status and dietary intake of women(15-49 years old), including pregnant and lactating women, and children(6–59 months old), as well as the micronutrient status of non-pregnant adolescent girls (aged 10–14 years) and to identify key factors associated with poor nutrition in these populations. The information generated will provide a foundation for the formulation of evidence informed policies and programs. In the short to medium term, the information will provide a baseline from which to monitor changes over time.

We would very much appreciate your participation in this survey. This information will help the government to plan health and nutrition services. The results from this survey will be kept strictly confidential and will not be shared with anyone other than members of our survey team

Do you have any questions for me?	1 = Yes →	**Give objective answer any question that is relevant to the survey**
	0 = No	
May I begin the interview now?	1 = Yes	
	0 = No →	**Thank the respondent and record reason for no consent**

Interviewer's Visits

No of Visit		1	2	3	Final Visit
Date					Day: ___________ Month ___________ Year: ___________
Interviewer's name					
Result*					
Next Visit:	Date	____/____/20_____	____/____/20____	____/____/20_____	Total No of visits to HH
	Time	_____:_____	_____:_____	_____:_____	______
Time Interview Started		_____:_____	_____:_____	_____:_____	_____:_____
Time Interview Ended					

***Result codes**

1. Completed
2. No household member at home or no competent respondent at home at time of visit
3. Entire household absent for extended period of time
4. Postponed
5. Refused
6. Dwelling vacant or address not a dwelling
7. Dwelling destroyed
8. Dwelling not found
9. Other (specify)

Data Collection, Editing, and Entry Record

	Data collection	Field editing	Office editing	Data entry
Name	___________________	___________________	___________________ _	___________________
Date	___________________	___________________	___________________ _	___________________

Respondent: Head of household or any knowledgeable adult member of the household

HR-0	HR-1	HR-2	HR-3		HR-4		HR-5	HR-6		HR-7	HR-8		HR-9	HR-10		
Line Number	**USUAL RESIDENTS AND VISITORS**	**Relationship to Head of Household**	**SEX**		**RESIDENCE**		**AGE**	**CHILDREN UNDER 5 YEARS**						**WOMEN OF REPRODUCTIVE AGE**		
	Please give me the names of the persons who usually live in the HH and guests of the HH who stayed here last night,		Is [NAME} male or female?		Does [NAME] usually live here? *(at least 6 months of year)*		How old is [NAME]? Enter completed years at last birthday	**If under 5 years**		**Date of Birth** What is the date of birth of (name)?	**Certificate of Birth** Ask if **[NAME]** has a birth certificate or any written documentation		**Source of Birth Certificate** or any written documentation	If female 14-49 years Ask if [name] is currently pregnant		
	Start with the head of the household		**M**	**F**	**Yes**	**No**	**Age < than 1 year = 0**	**Enter Age in Months**		**DD/MM/YYYY**	**Yes**	**No**	**Enter code of the source**	**Yes**	**No**	**Dk**
01		**01**	**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**
02			**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**
03			**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**
04			**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**
05			**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**
06			**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**
07			**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**
08			**1**	**2**	**1**	**2**					**1**	**2**		**1**	**2**	**9**

HR.2:
Relationship to Head

Head	01	Parent-in-law................	07
Spouse	02	Brother/Sister	08
Own child............	03	Others relatives............	09
Child-in-law...........	04	Adopted/foster/stepchild	10
Grand Child...........	05	Not related..	11

HR9:
Source of Birth Certificate

Birth certificate........................ 1
Child health card.................... 2
Holy Card.............................. 3
Local event calendar..............4
Recall 5
Index method 6

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

Annex 9. Household Questionnaire

Nigeria National Food Consumption and Micronutrient Survey(NFCMS)

Household Socio-Economic Questionnaire

(To be administered by Field Enumerators)

IDENTIFICATION		NAME	CODE
ID-1	ZONE		
ID-2	STATE		
ID-3	LGA		
ID-4	Locality		
ID-5	EA		
ID-6	EA Serial No		
ID-7	Sector(Urban = 1; Rural = 2)		
ID-8	Building Number		

ID-9.GPS Coordinates?

LATITUDE (N)	LONGITUDE (E)
__ __ ° __ __ . __ __ __	__ __ ° __ __ . __ __ __

ID-10. Address of Building:……………………..……………………..………..………………

………………………………..………………………………….……..

ID-11. Use of Household Unit ☐

Residential only = 1
Commercial only = 2
Religious only = 3
Residential/commercial = 4
Residential/Religious = 5
Institutional = 6
Hotel/Restaurant = 7
Vacant = 8
Uncompleted = 9
Others = 10

ID-12. S/No of Residential HU:_______ ID-13. S/No of HH: ________

ID-14. Name of Head of Household: ____

ID-15. Phone number(s): _______________________ _________________________

HH SEC Questionnaire

Form ID No

Zone	State		EA			HH	Indiv	

Consent Statement:

I have read this form and/or someone has read it to me. I was encouraged to ask questions and given time to ask questions. Any questions that I had, have been answered satisfactorily. I agree to take part in the household interview. I know that after choosing to be in the interview, I may withdraw at any time. My taking part is voluntary. I have been offered a copy of this consent form.

Do you agree to do the household interview?	1 = Yes→ 0 = No→	**'YES' means that you agree to do the interview.** **'NO' means that you will NOT do the interview.**

Head of household signature or mark_________________________ Date: ____/____/20____

Name of head of household **[PRINTED]** ____

Household ID number: ______________________

[FOR ILLITERATE PARTICIPANTS]

Signature of witness____ Date: ____/____/20____

Printed name of witness_____________________________________

Signature of person obtaining consent__________________________ Date: ____/____/20____

Name of person obtaining consent: **[PRINTED]** _______________________

Survey staff ID number _________________________________

If the witness is from the survey staff, state his/her role in the survey, his/her staff ID number and describe the reason why an impartial witness could not be identified:

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

Do you have any questions for me?	1 = Yes→ 0 = No	**Give objective answer any question that is relevant to the survey**
May I begin the interview now?	1 = Yes 0 = No→	**Thank the respondent and record reason for no consent**

Interviewer's Visits

No of Visit		1	2	3
Date(dd/mm./yy)		____/____/20____	____/____/20____	____/____/20____
Interviewer's name				
RESULT(codes 1-8)				
Next Visit:	Date Time	___/___/20____ ____:____	___/___/20____ ____:____	___/___/20____ ____:____
Time Interview Started		____:____	____:____	____:____
Time Interview Ended		____:____	____:____	____:____

Result codes

10. Completed
11. Incomplete
12. Refused
13. Incapacitated
14. Not found
15. Ineligible
16. Away for a long period
17. Other (specify)

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

Data Collection, Editing, and Entry Record

	Data collection	Field editing	Office editing	Data entry
Name	______________	______________	______________	______________
Date	______________	______________	______________	______________

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

RESPONDENT IDENTIFICATION CONFIRMATION

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
RIC-1	**Confirm respondent** What is your name? **[NAME LINKED TO LINE LISTING?]**	Yes .... No	1 2 ---→	**Update/correct in the Roster**
RIC-2	**Confirm respondent** **[GENDER LINKED TO LINE LISTING?]**	Yes .... No	1 2 ---→	**Update/correct in the Roster**
RIC-3	**Confirm respondent** How old are you? **[AGE LINKED TO LINE LISTING?]**	Yes .... No	1 2 ---→	**Update/correct in the Roster**
RIC-4	Confirm completion of household questionnaire: Did anyone in your household answers questions about your household during a previous visit?	Yes .... No	1 2 ---→	**Identify initial respondent**
RIC-5	Confirm completion of household questionnaire: If yes, was that you or someone else?	Myself................................ Someone else....................	1 2	
RIC-6	**Confirm respondent** **[SIGN CONSENT FORM?]**	Yes .... No	1 2 ---→	**Ensure respondent sign to continue**
RIC-7	Line number of the respondent in the HH Roster			

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

GENERAL HOUSEHOLD INFORMATION

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
GHI-1	What is the ethnic group of [NAME of household head]?	Hausa……………………………… Yoruba……………………………. Igbo………………………………. Ijaw……………………………… Kanuri …………………………… Fulani …………………………… Ibibio…………………………… Tiv……………………………… Others(Specify) ___________	01 02 03 04 05 06 07 08 98	
GHI-2	What is the religion of [NAME of household head]?	Christian………. …………………………… Muslim….. …………………………………… Traditional……. ……………………………… No Religion ……………………………… Others(Specify) ______________________ Don't know ………………………………………	1 2 3 4 8 9	
GHI-3	What is the highest level of school [NAME of household head] has <u>completed</u>?	None……………………………………… Primary …………………………………… Secondary …………………………………… Technical / vocational certificate............. Higher / university/ college....................... Others(Specify) ______________________ Don't know ………………………………………	1 2 3 4 5 8 9	
GHI-4	What kind of work does [NAME of household head] **mainly** do for income? **(SELECT ONE ANSWER ONLY)**	Not working and didn't work in last 12 months Professional, Technical and Related Workers Administrative and Managerial Workers Office and Administrative Support Workers Sales and Related Workers…………………… Service Workers……………………………….. Installations, Maintenance and Repair Workers Agricultural, Animal Husbandry and Forestry Workers, Fishermen and Hunters………… Production, Construction and Extractions Workers………………………………………… Transportation and Material Moving Workers Others(Specify) ______________________ Don't know ………………………………………	01 02 03 04 05 06 07 08 09 10 96 99	

Form ID No

Zone	State	EA	HH	Indiv

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
GHI-5	What is the **main** source of drinking water for members of your household? **DO NOT READ LIST** **PROBE FOR ONE RESPONSE**	**Piped water**		
		Piped water into dwelling..................................	01	
		Piped water into compound, yard or plot..........	02	
		Piped to neighbor...	03	
		Public tap or standpipe....................................	04	
		Borehole or tube well.......................................	05	
		Dug well		
		Protected well..	06	
		Unprotected well...	07	
		Water from Spring		
		Protected spring...	08	
		Unprotected spring...	09	
		Rainwater		
		Rainwater collection..	10	
		Delivered or kiosk water		
		Truck-tanker..	11	
		Cart with small tank/drum...............................	12	
		Water kiosk...	13	
		Packaged water		
		Bottled water..	14	
		Sachet water...	15	
		Surface water		
		River/ stream, pond/ lake/ dam/canal/irrigation channel)	16	
		Other, (specify) ______________________	98	
GHI-6	**Ask if GHI-5 = 01-05 , 14, 15** What is the **main** source of water used by your household for other purposes such as cooking and hand-washing? **DO NOT READ LIST** **PROBE FOR ONE RESPONSE**	**Piped water**		
		Piped water into dwelling..................................	01	
		Piped water into compound, yard or plot..........	02	
		Piped to neighbor...	03	
		Public tap or standpipe....................................	04	
		Borehole or tube well.......................................	05	
		Dug well		
		Protected well..	06	
		Unprotected well...	07	
		Water from Spring		
		Protected spring...	08	
		Unprotected spring...	09	
		Rainwater		
		Rainwater collection..	10	
		Delivered or kiosk water		
		Truck-tanker..	11	
		Cart with small tank/drum...............................	12	
		Water kiosk...	13	
		Packaged water		

Form ID No

Zone	State	EA	HH	Indiv

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
		Bottled water... Sachet water... **Surface water** River/ stream, pond/ lake/ dam/canal/irrigation channel) Other, (specify) ______________________	14 15 16 98	
GHI-7	**Ask if GHI-6 = 01 or 02** Where is the water source located	In own dwelling....................................... In own yard/plot....................................... Elsewhere..	1 2 3	
GHI-8	**Ask if GHI-7 = 3** How long does it take to go to your main drinking water source water source, get water, and come back?	**[99 = don't know]** _______ minutes		
Q/N	**QUESTION**	**RESPONSE**	**CODE**	**INSTRUCTION**
GHI-9	In the last month, has there been any time when your household did not have sufficient quantities of drinking water when needed?	Yes, at least once... No, always sufficient...................................... Don't know..	1 2 9	
GHI-10	In the past month, for how many days was water from this source unavailable when needed	**00 = no interruption** **99 = don't know** [_______] days		
GHI-11	Do you or any other member of this household do anything to the water to make it safer to drink?	Yes .... No .... Don't Know..	1 2 → 9 →	 **Skip to GHI-13** **Skip to GHI-13**
GHI-12	What do you usually do to make the water safer to drink? ***PROBE:*** Anything else? **RECORD ALL METHODS MENTIONED.**	BOIL .... ADD BLEACH / CHLORINE .... STRAIN IT THROUGH A CLOTH .... USE WATER FILTER (CERAMIC, SAND, COMPOSITE, ETC.) .... SOLAR DISINFECTION LET IT STAND AND SETTLE .... OTHER (*specify*) ______________________ DON'T KNOW:	A B C D E F X Z	

Form ID No

Zone	State	EA	HH	Indiv

GHI-13	What kind of toilet facility do members of your household usually use? **(DO NOT READ LIST. PROBE FOR <u>ONE</u> RESPONSE)**	**Flush/pour flush toilet** Flush toilet connected to piped sewer system Flush toilet connected to septic tank Flush toilet connected to pit latrine Flush toilet connected to somewhere else Flush toilet connected to don't know where **Pit Latrine** Ventilated improved pit latrine...................... Pit latrine with slab.. Pit latrine without slab/open pit........................ Composting Toilet.. Bucket toilet.. Hanging toilet/hanging latrine......................... No facility/use bush or field............................. Other, (Specify) ______________________	 01 02 03 04 05 06 07 08 09 10 11 12 98	
GHI-14	Do you share your toilet facility with other households?	Yes .... No	1 2	
GHI-15	Where is the toilet facility located?	In own dwelling... In own yard/plot... Elsewhere..	1 2 3	
GHI-16	Has your (pit latrine or septic tank) ever been emptied? **Ask if GHI-11 = 02, 03, 06, 07, 08 or 09**	Yes emptied.. No, never emptied....................................... Don't know..	1 2 → 9 →	 **Skip to GHI-19** **Skip to GHI-19**
GHI-17	The last time (pit latrine or septic tank) was emptied, was it emptied by a service provider? **Ask if GHI-14 = 1**	Yes, by a service provider .... No, never emptied....................................... Don't know..	1 2 → 9 →	 **Skip to GHI-19** **Skip to GHI-19**
GHI-18	Where were the contents of the (pit latrine or septic tank) emptied to? **Ask if GHI-14 = 1**	To a treatment plant....................................... Buried in a covered... Uncovered pit/bush/field/open ground........... Surface water (river/dam/lake/pond/ stream/canal/irrigation channel)...................... Others, (specify) ____________________ Don't know..	1 2 3 4 8 9	
GHI-19	We would like to learn about the places where members of this household wash their hands. Can you please show me where members of your household <u>most often</u> wash their hands? *Record result and observation.*	**OBSERVED** Fixed facility observed (sink / tap) in dwelling... in yard /plot.. Mobile object observed (bucket / jug / kettle) .... **NOT OBSERVED** No handwashing place in dwelling / yard / plot... No permission to see.......................................	 1 2 3	 **Skip to GHI-23** **Skip to GHI-22**

HH SEC Questionnaire

Form ID No

Zone	State		EA			HH		Indiv	

		Other reason (*specify*)	4→ 5→ 6→	**Skip to GHI-23**
GHI-20	*Observe presence of water at the place for handwashing.* *Verify by checking the tap/pump, or basin, bucket, water container or similar objects for presence of water.*	WATER IS AVAILABLE WATER IS NOT AVAILABLE	1 2	
GHI-21	*Observe presence of soap or detergent at the place for handwashing?*	YES, SOAP/DETERGENT AVAILABLE .... NO, SOAP/DETERGENT NOT AVAILABLE	1→ 2→	**Skip to GHI-25** **Skip to GHI-23**
GHI-22	Where do you or other members of your household most often wash your hands?	Fixed facility (Sink / Tap) In dwelling In yard / plot Mobile object (Bucket / Jug / Kettle) No handwashing place in dwelling / yard / plot Other (*specify*)	 1 2 3 4 6	
GHI-23	Do you have any soap or detergent in your house for washing hands?	Yes .... No	1 2→	**Skip to GHI-26**
GHI-24	Can you please show it to me?	Yes, shown .... No, not shown	1 2→	**Skip to GHI-26**
GHI-25	**RECORD YOUR OBSERVATION.** **Record all that apply**.	Bar or Liquid soap .... Detergent (Powder / Liquid / Paste)	A B	
GHI-26	What is the **main** way in which this household disposes refuse? **(Select one answer only)**	Burning... Refuse heap.. Bush... Pay someone to dispose............................... Government disposal services....................... Others, (specify) ______________________ Don't know..	1 2 3 4 5 8 9	

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
GHI-27	What type of fuel does your household **mainly** use for cooking? **(Select one answer only)** **Read options?**	Electricity... Gas... Kerosene/ paraffin... Solar... Coal/lignite.. Charcoal... Wood... Animal dung cakes.. Grass/shrubs/ straw... Do not cook... Others, (specify) ______________________	01 02 03 04 05 06 07 08 09 10 98	
GHI-28	**Observe the main material of the floor of the dwelling** **Record observation**	Natural floor (earth/sand/mud, dung)................ Rudimentary floor (wood planks, palm/bamboo).. Finished floor (polished wood, vinyl, ceramic tiles, cement/concrete, carpet, rug.................... Others, (specify) ________________________	1 2 3 8	
GHI-29	**Observe the main material of the roof of the dwelling** **Record observation**	Natural floor (earth/sand/mud, dung)........... Rudimentary floor (wood planks, palm/bamboo).. Finished floor (polished wood, vinyl, ceramic tiles, cement/concrete, carpet, rug................... Others, (specify) ______________________	1 2 3 8	
GHI-30	**Observe the main material of the exterior walls of the dwelling** **Record observation**	Natural walls (no walls, cane/palm/trunks, dirt)..... Rudimentary walls (bamboo with mud, stone with mud, uncovered adobe, plywood, cardboard, reused wood).. Finished walls (cement, stone with lime/cement, bricks, cement blocks, covered adobe, wood planks/shingles).. Others, (specify) ______________________	1 2 3 8	
GHI-31	How many rooms in this household are used for sleeping?	_______ Rooms		
GHI-32	Does this household have electricity?	Yes ……….. No ………………………………………....... Don't Know...	1 2 9	
GHI-33	How many of the following animals do this household own? **IF NONE, RECORD '00'. IF 95 OR MORE, RECORD '95'. IF UNKNOWN, RECORD '99'.**	**Animal** / **Number owned** Chickens or other poultry? / Goats? / Sheep? / Milk cows or bulls /		

		Pigs?			
		Donkeys/ Mules?			
		Horses?			
		Camels?			
GHI-34	Does your household mostly consume, mostly sell, or both sell and consume these animals?**THIS WILL LOOP FOR ALL ANIMALS>0 IN GHI-24 ABOVE**	Mostly consume.... Mostly sell.... Both consume and sell.... Don't Know....		1 2 3 9	

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
GHI-35	Does this household own any livestock, herds, other farm animals, or poultry (even if these animals are not here right now)?	Yes .... No .... Don't Know....	1 2 9	
GHI-36	Does your household currently raise any of these animals (rabbit, guinea pigs, grass cutters, snails or other small animals) <u>for your household's own consumption</u>?	Yes .... No .... Don't Know....	1 2 9	
GHI-37	Does anyone in this household currently raise fish <u>for your household's own consumption</u>?	Yes .... No .... Don't Know....	1 2 9	
GHI-38	Does anyone in this household currently catch / harvest fish from the wild <u>for your household's own consumption</u>?	Yes .... No .... Don't Know....	1 2 9	
GHI-39	Does your household currently have a garden where you grow vegetables?	Yes .... No .... Don't Know....	1 2 9	
GHI-40	(If yes to vegetable garden) What does your household do with what you produce?	Mostly consume.... Mostly sell.... Both consume and sell.... Don't Know....	1 2 3 9	
GHI-41	(If no to vegetable garden) do you have access to any land where you could grow vegetables?	Yes .... No .... Don't Know....	1 2 9	
GHI-42	Does your household currently have any trees or bushes that produce fruits?	Yes .... No .... Don't Know....	1 2 9	
GHI-43	(If yes to fruits) what does your household do with what you produce?	Mostly consume.... Mostly sell.... Both consume and sell.... Don't Know....	1 2 3 9	

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

GHI-44	Does any member of this household have an account in a bank or other financial institution?	Yes ………………………………………… No ………………………………………… Don't Know…………………………………	1 2 9	

			Yes	No		
GHI-45	Does your household have a functional:	Radio	1	2		
		Television	1	2		
		Cable TV	1	2		
		Refrigerator	1	2		
		Generator	1	2		
		Air conditional	1	2		
		Computer	1	2		
		CD/DVD Player	1	2		
		Electric iron	1	2		
		Electric Fan	1	2		
		Washing Machine	1	2		
		Bed with Mattress	1	2		
		Chair	1	2		
		Table	1	2		
		Cupboard/Cabinet	1	2		

Q/N	QUESTION	RESPONSE	Yes	No	CODE	INSTRUCTION
GHI-46	Does any member of this household have a functional:	Watch	1	2		
		Mobile Phone	1	2		
		Bicycle	1	2		
		Motorcycle	1	2		
		Tricycle or Keke	1	2		
		Animal Drawn Cart	1	2		
		Car, Bus or Truck	1	2		
		Boat with Motor	1	2		
		Canoe or Boat without motor	1	2		
GHI-47	How long does it take in minutes to walk from your home to the nearest bus stop?	_______ minutes				Households in urban locations only
GHI-48	How long does it take in minutes to walk from your home to the nearest road that is motorable at all times of the year and in all weather conditions?	_______ minutes				Households in rural locations only
GHI-49	How long does it take in minutes to go from your home to the nearest healthcare facility, which could be a	_______ minutes				

Form ID No

Zone	State	EA	HH	Indiv

	hospital, a health clinic, a medical doctor, or a health post?			
GHI-50	How do you travel to this healthcare facility from your home? ***IF MORE THAN ONE WAY OF TRAVEL IS MENTIONED, CIRCLE THE ONE HIGHEST ON THE LIST.***	**Motorized** Car/truck…………………………………… Public bus…………………………………… Motorcycle…………………………………… Tricycle/Keke NAPEP……………………… Boat with motor……………………………… **Not motorized** Animal drawn cart…………………………… Bicycle………………………………………… Boat without motor………………………… Walking………………………………………… Others, (specify) ____________________	 01 02 03 04 05 06 07 08 09 98	
GHI-51	How long does it take in minutes to go from your home to the nearest food market?	________ minutes		
GHI-52	How do you travel to this food market from your home? ***IF MORE THAN ONE WAY OF TRAVEL IS MENTIONED, CIRCLE THE ONE HIGHEST ON THE LIST.***	**Motorized** Car/truck…………………………………… Public bus…………………………………… Motorcycle…………………………………… Tricycle/Keke NAPEP……………………… Boat with motor……………………………… **Not motorized** Animal drawn cart…………………………… Bicycle………………………………………… Boat without motor………………………… Walking………………………………………… Others, (specify) ____________________	 01 02 03 04 05 06 07 08 09 98	
GHI-53	How often is this food market open?	Daily…………………………………………… 2-5 days per week………………………… 1 day per week…………………………… Others, (specify) ____________________	1 2 3 8	

HH SEC Questionnaire

Form ID No	Zone	State	EA	HH	Indiv

HOUSEHOLD FOOD INSECURITY EXPERIENCE SCALE

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
HFI-1	During the last 12 months, was there a time when you or others in your household worried about not having enough food to eat because of a lack of money or other resources?	Yes .... No .... Don't Know...........................	1 2 9	
HFI-2	Still thinking about the last 12 months, was there a time when you or others in your household were unable to eat healthy and nutritious food because of a lack of money or other resources?	Yes .... No .... Don't Know...........................	1 2 9	
HFI-3	Was there a time when you or others in your household ate only a few kinds of food because of a lack of money or other resources?	Yes .... No .... Don't Know...........................	1 2 9	
HFI-4	Was there a time when you or others in your household had to skip a meal because there was not enough money or other resources to get food?	Yes .... No .... Don't Know...........................	1 2 9	
HFI-5	Still thinking about the last 12 months, was there a time when you or others in your household ate less than you thought you should because of a lack of money or other resources?	Yes .... No .... Don't Know...........................	1 2 9	
HFI-6	Was there a time when your household ran out of food because of a lack of money or other resources?	Yes .... No .... Don't Know...........................	1 2 9	
HFI-7	Was there a time when you or others in your household were hungry but did not eat because there was not enough money or other resources for food?	Yes .... No .... Don't Know...........................	1 2 9	
HFI-8	Was there a time when you or others in your household went without eating for a whole day because of a lack of money or other resources?	Yes .... No .... Don't Know...........................	1 2 9	

HH SEC Questionnaire

Form ID No

Zone	State	EA	HH	Indiv

HOUSEHOLD COPING STRATEGIES

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
HCS-1	In the past seven days were there times when your household did not have enough food or money to buy food?	Yes …………………………………………… No …………………………………………… Don't Know……………………………………	1 2 9	
HCS-2	If Yes, how many days in the past seven days did your household use the following coping strategies when you did not have enough food or money to buy food? Number of days out of the past seven. **[Write number.** **If not used, write '00']**	Rely on less preferred and less expensive foods………………………… Borrow food, or rely on help from a friend or relative………………………………… Limit portion size at mealtimes? Restrict consumption by adults in order for small children to eat ……………….. Reduce number of meals eaten in a day?	1 2 3 4 5	

END of HOUSEHOLD/RESPONDENT QUESTIONNAIRE

NB:

1. **Response code in figures [e.g. 1, 2, 9, 01, 02 ... 99] ➔ only one response option is allowed**
2. **Response code in alphabets [e.g. A, B, C, D ..... X] ➔ multiple response options are allowed**
3. **Panel Headings are in BLUE Colour**
4. **Instructions to enumerators are in BLUE Fonts**
5. **Code for "Others, (specify)"**
    a. **= 8 if it is a single-digit code**
    b. **= 88 if it is a double-digit code**
6. **Code for "Don't know"**
    a. **= 9 if it is a single-digit code**
    b. **= 99 if it is a double-digit code**

Annex 10. Diet Questionnaire (for first visit)

Nigeria National Food Consumption and Micronutrient Survey (NFCMS)

DIET INTAKE Questionnaire FOR WOMEN

FIRST HOME VISIT – “Dietary Intake Survey Form”

Preliminary Session

I would like to start by asking you some questions to confirm that I am speaking to the intended person

Q/N	QUESTION	RESPONSE	CODE	SKIP PATTERN
RIC-8	What is your name? Select ‘Yes’ if the name given is the same or similar to [NAME]. Select ‘No’ if the name given is different.	Yes No	1 2	If yes, go to RIC-2.
i	Is [NAME] available for an interview now?	Yes No	1 2	If yes, go to RIC-2.
ii	Is it possible to reschedule and interview with [NAME]	Yes No	1 2	If yes, go to iv.
iii	Why is it not possible to interview [NAME]?	Text_____________		End interview
iv	Are you able to get a date for the rescheduled interview?	Yes No	1 2	
v	When would [NAME] be available for an interview?	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		
vi	Select the time of the day	Morning Afternoon Evening	1 2 3	
RIC-9	How old are you? Check if the reported age is close to the age provided during the line-listing. [NAME] was reported to be [AGE] years old	__________		If the age is correct, go to RIC-3.
	The age is different by more than 2 years, probe further to establish is this is the correct respondent.			

Age Verification

RIC-10	Can I see an identification card such as (National ID, Voter’s card, Driver’s License, Birth certificate, or International passport)? This is asked to confirm the date of birth	Yes No		If yes, go to RIC-4 If no, go to RIC-5

RIC-11	Record date of birth as documented	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		Skip to question **RIC-8**
RIC-12	Do you know your FULL date of birth?	Yes No		If no, go to b
a	What is your date of birth?	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		
b	Do you know the year you were born?	Yes No		If no, go to RIC-7
c	What year you were born?	_ _ _ _		
d	Do you know the month you were born?	Yes No		
e	What month you were born?	January February March April May June July August September October November December	1 2 3 4 5 6 7 8 9 10 11 12	
RIC-13	Based on your date of birth, you are [AGE] years old. Is it correct? You mentioned earlier in this interview that you were [AGE] years old	Yes No	1 2	If no, go back to RIC-5
RIC-14	Can you recall an event that happened when you were born?	Enter short text.		

Confirm previous visit

RIC-15	Did anyone in your household answer questions about your household during a previous visit?	Yes No	1 2	Please can you arrange a household visit as soon as possible. Inform your supervisor.

Consent

If 18 years old or older

Give the respondent the dietary survey information sheet and the consent form. Read out the information provided then ask the respondent if she has questions. Answer any questions asked. Ask the respondent or a witness to fill in and sign the consent form.

Please confirm that you, or a witness, signed the informed consent form for the dietary survey.

Yes Go to next question

No The current respondent does not agree to be interviewed, therefore the interview must be ended.

If 15-17 years old, establish if emancipated

Please note that [NAME] is[AGE] years old, therefore establish if she is emancipated.

	Do you live with your parents?	Yes No	1 2	If yes, not emancipated If no, ask if married
	Are you married?	Yes No	1 2	If yes, emancipated If no, as if HH head
	Are you the head of your household?	Yes No	1 2	If yes, emancipated If no, not emancipated

If emancipated

Give the respondent the dietary survey information sheet and the consent form. Read out the information provided then ask the respondent if she has questions. Answer any questions asked. Ask the respondent or a witness to fill in and sign the consent form.

Please confirm that you, or a witness, signed the informed consent form for the dietary survey.

Yes Go to next question

No The current respondent does not agree to be interviewed, therefore the interview must be ended.

If not emancipated:

Give the guardian and girl the dietary survey information sheet. Give and the guardian the consent form and the girl the assent form. Read out the information provided then ask them if they have questions. Answer any questions asked. Ask the guardian or a witness to fill in and sign the consent form. Ask the girl or a witness to fill in and sign the assent form.

Please confirm that you, or a witness, signed the assent form and a guardian, or a witness, signed the consent form for the dietary survey.

Yes Go to next question

No The current respondent does not agree to be interviewed, therefore the interview must be ended.

	May I begin the interview now?	Yes No	1 2	If yes, go to next section
	Why do you prefer not to continue the interview?	____________	1 2	
	Is it possible to schedule an interview with [NAME]?	Yes No	1 2	If yes, schedule interview If no, end interview
	When would [NAME] be available for an interview?	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		
	Select the time of the day	Morning Afternoon Evening	1 2 3	

Respondent Socio-Demographics

Let me ask you a few general questions about you.

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
RSD-1	What is your ethnic group? Do NOT read the responses out loud	Hausa Yoruba Igbo Ijaw Kanuri Fulani Ibibio Tiv Etc Etc Etc Other (Specify)	1 2 3 4 5 6 7 8 88	
RSD-2	What is your religion? Do NOT read the responses out loud	Christian Muslim Traditional No Religion Other (Specify)	1 2 3 4 88 99	
RSD-3	What is the highest level of school you <u>completed</u>?	None Primary Junior secondary Senior secondary Technical / vocational certificate Higher / university/ college Other (Specify)	1 2 3 4 5 6 88 99	
RSD-4	Have you done any paid or unpaid work outside your home in the last seven days?	Yes No No response Don't Know	1 2 77 99	Skip to next Section
RSD-5	In the last seven days, what kind of work did you do?	Artisan (such as hair dressor, tailor, soap maker) Farmer Business/trader Civil servant Education/teacher Security personnel (such as police, army) Health worker Other (Specify)		
RSD-6	Was this paid or unpaid?	Paid Unpaid Both No response Don't Know	1 2 3 77 99	

Pregnancy and Lactation

We need to interview a few pregnant women so we will ask a few questions about pregnancy, this information will remain confidential.

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
PAL-1	Are you pregnant?	Yes No No response Don't know	1 2 77 99	Skip to PLP5
PAL-2	How many months pregnant are you? Fill in the number of months as a value between 0 and 10. Or fill in 77 if no response. Or 99 if don't know/cant remember.	________ No response Don't know/Can't remember	 77 99	
PAL-3	Do you know the expected delivery month?	Yes No No response Don't know	1 2 77	Skip to PLP5
PAL-4	What is the expected delivery month?	January February March April May June July August September October November December	1 2 3 4 5 6 7 8 9 10 11 12	
PAL-5	Are you currently breastfeeding?	Yes No No Response	1 2 9	Skip to next section
PAL-6	If currently breastfeeding, did you breastfeed a child yesterday during the day or night?	Yes No No Response	1 2 99	
PAL-7	How old is the youngest child you are breastfeeding? Indicate age in years and months. Enter 77 if no response or 99 if don't know.	_________ years Enter a value between 0 and 4. _________ months Enter a value beweten 0 and 11.		

Biofortified Food Consumption

Now I would like to ask about how often you consumes specific foods

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
BFW-1	In the last 30 days, did you eat yellow cassava or any food products made from it?	Yes No Don't Know	1 2 99	Skip to BFW-3
BFW-2	In the last 30 days, how many days did you eat yellow cassava or any food products made from it? Fill in the number of days reported as value between 1 and 30, or fill in 99 if unknown	DAYS [__ __] Don't Know	 99	
BFW-3	In the last 30 days, did you eat orange-fleshed sweet potato or any food products made from it?	Yes No Don't Know	1 2 99	Skip to BFW-5
BFW-4	In the last 30 days, how many days did you eat orange-fleshed sweet potato or any food products made from it? Fill in the number of days reported as value between 1 and 30, or fill in 99 if unknown	DAYS [__ __] Don't Know	 99	
BFW-5	In the last 30 days, did you eat orange maize or any food products made from it?	Yes No Don't Know	1 2 99	Skip to Next Section
BFW-6	In the last 30 days, how many days did you eat orange maize or any food products made from it? Fill in the number of days reported as value between 1 and 30, or fill in 99 if unknown	DAYS [__ __] Don't Know	 99	

Fortification Coverage

Now I'm going to ask you few questions about some food items (vegetable oil, wheat flour, semolina, sugar,salt and boullion). If you have any of these at home, could you please bring them out here so I can see them?

Q/N	QUESTION	RESPONSE		CODE	INSTRUCTION
FCW-1	Does your household use any of the following to prepare foods at home?	Vegetable oil	Yes No	1 2	If yes, go to the relevant option
		Wheat flour	Yes No		
		Maize flour	Yes No		
		Semolina flour	Yes No		
		Sugar	Yes No		
		Salt	Yes No		
		Bouillon	Yes No		

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
FCW-2	What is the main type of vegetable oil that your household uses? Select ONE response	Groundnut oil Oil blend Palm olein/palm oil Soybean oil Sunflower oil Other (Specify) Don't know/Can't remember	1 2 3 4 5 88	
FCW-3	The last time your household got vegetable oil, how did you get it? Select ONE response.	Purchased Home made Received from relative/friend/food aid Other (Specify) ___________ Don't know/ Can't remember	1 2 3 88 99	Skip to FCW-4

FCW-4	The last time your household got vegetable oil, what was the brand? Select ONE response	King's 100% vegetable oil Laziz - Pure vegetable oil Power oil - Pure vegetable oil Sunola - Soybean oil Winner-100% pure soya oil Golden Penny-pure soya oil Bulk/open source with no brand name Other (Specify) Don't know/ Can't remember	1 2 3 4 5 6 7 88 99	
	What is the main type of wheat flour that your household uses ~~on most days~~? Select ONE response	All-purpose flour Bread flour Cake flour Refined wheat flour Self-rising flour Whole wheat Other (Specify) Don't know/Can't remember	1 2 3 4 5 6 88	
FCW-5	The last time your household got wheat flour, how did you get it? Select ONE response	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember	1 2 3 88 99	Skip to FCW-7
FCW-6	The last time your household got wheat flour, what was the brand? Select ONE response	Golden Penny Dangote Bakewell Bua flour Honeywell Eagle flour Open bulk source with no brand name Other (Specify) Don't know/ Can't remember	1 2 3 4 8 9 88 99	
	What is the main type of maize flour that your household uses? Select ONE response	White maize flour Yellow maize flour Other (Specify) Don't know/ Can't remember	1 2 88 99	
FCW-7	The last time your household got maize flour, how did you get it? Select ONE response	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember	1 2 3 88 99	Skip to FCW-10
FCW-8	The last time your household got maize flour, what was the brand?	Not branded	1	

	Select ONE response	Ultimate - Maize flour Jifatu - Maize flour meal Ammani Foods - Maize Flour Munro - Corn Flour Other (Specify) Don't know/ Can't remember	2 3 4 5 6 88 99	
	What is the main type of semolina that your household uses? Select ONE response	Wheat based Wheat-Maize Other (Specify) Don't know/Can't remember	1 2 3 88	
FCW-9	The last time your household got semolina, how did you get it? Select ONE response	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember	1 2 3 88 99	Skip to FCW-14
FCW-10	The last time your household got semolina, what was the brand? Select ONE response	Not branded Golden Penny Semovita Dangote semolina Honeywell Semolina Other (Specify) Don't know/ Can't remember	1 2 3 4 88 99	
FCW-11	What is the main type of sugar that your household uses? Select ONE response	White granulated White cube Brown granulated Brown cube Don't know/ Can't remember Other (Specify)	1 2 3 4 88	
FCW-12	The last time your household got sugar, how did you get it? Select ONE response	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember	1 2 3 88 99	Skip to FCW-17
FCW-13	The last time your household got sugar, what was the brand? Select ONE response	Family - Refined granulated Sugar Dangote - Refined Granulated White Sugar Bua - Premium Refined Sugar Golden Penny - Premium quality white granulated sugar Family - Sugar Cubes Open bulk source with no brand name Other (Specify)	1 2 3 4 5 6 88	

		Don’t know/ Can’t remember	99	
FCW-14	What is the main type of salt that your household uses? Select ONE response	Table salt-fine Sea salt-fine Salt-low sodium Sea salt-coarse Edible/cooking salt-Coarse Edible salt for industrial use Other (Specify) Don’t know/ Can’t remember	1 2 3 4 88	
FCW-15	The last time your household got salt, how did you get it? Select ONE response	Purchased Home made Received from relative/friend/food aid Other (Specify) Don’t know/ Can’t remember	1 2 3 88 99	Skip to Next Section
FCW-16	The last time your household got salt, what was the brand? Select ONE response	Dangote - Refined and iodized salt Royal Salt - Edible iodized Salt Mr. Chef - Pure refined and iodized salt Dangote - Fine edible salt iodized Uncle Palm - Iodized salt Open bulk source with no brand name Other (Specify) Don’t know/ Can’t remember	1 2 3 4 5 6 88 99	
	What is the main type of boullion that your household uses? Select ONE response	Cube Granule Powder Liquid Other (Specify) Don’t know/ Can’t remember		
	The last time your household got bouillon, how did you get it? Select ONE response	Purchased Home made Received from relative/friend/food aid Other (Specify) Don’t know/ Can’t remember	1 2 3 88 99	
	The last time your household got boullion, what was the brand? Select ONE response	Maggi Knorr Royco Onga Mr Cheff Ajinomoto Other (Specify)		
		Don’t know/ Can’t remember		

Annex 11. Questionnaire for Children

FIRST HOME VISIT – “Dietary Intake Survey Form”

Respondent Identification Confirmation

I would like to start by asking you some questions to confirm we are speaking about the correct child.

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
RIC-1	What is the child’s name? Select ‘Yes’ if the name given is the same or similar to [CHILD NAME]. Select ‘No’ if the name given is different	Yes No	1 2	
i	Is [CHILD NAME]’s primary caregiver available for an interview now?	Yes No	1 2	If yes, go to RIC-2.
ii	Is it possible to reschedule and interview with [CHILD NAME]	Yes No	1 2	If yes, go to iv.
iii	Why is it not possible to interview [CHILD NAME]’s caregiver?	Text_____________		End interview
iv	Are you able to get a date for the rescheduled interview?	Yes No	1 2	
v	When would [CHILD NAME] be available for an interview?	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		
vi	Select the time of the day	Morning Afternoon Evening	1 2 3	
RIC-2	Is [CHILD NAME] a boy or girl?	Boy Girl	1 2	If
	[CHILD NAME] was recorded as being [female/male] during the line listing. If gender is different than what was previously recorded, probe further to establish if this is the correct respondent.			
RIC-3	How old is [CHILD NAME] Enter age in years and months.	__________ years Enter a value between 0 and 4. __________ months Enter a value beweten 0 and 11.		
	Check if the reported age is close to the age provided during the line-listing. [CHILD NAME] was reported to be [AGE] months old. The calculated age is [AGE] months old.			

	The age is different by more than 2 months, probe further to establish is this is the correct respondent.			

Age Verification

~~RIC-4~~	~~Do you have a vaccination card or a birth certifiate for [CHILD NAME]?~~ ~~*This is asked to confirm the date of birth. Ask to see document.*~~	~~Yes~~ ~~No~~		~~If not available, go to RIC-9~~
~~RIC-5~~	~~Record date of birth as documented~~	~~__ __ __ __ __ __ __ __~~ ~~D D – M M - Y Y Y Y~~		~~Go to next section~~
RIC-6	Do you have a vaccination card for [CHILD NAME]? *This is asked to confirm the date of birth. Ask to see document.*	Yes No		If not available, go to RIC-9
RIC-7	May I see where [CHILD NAME] vaccinations are written down?	Yes No		
RIC-8	Record date of birth as documented	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		Go to next section
RIC-9	Do you see any records of Vitamin A administration?	Yes No		Only if they have vaccination card
RIC-10	Record date of last vitamin A dose given	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y None recorded		Only if they have vaccination card
RIC-11	Do you have a birth certificate for [CHILD NAME]? *This is asked to confirm the date of birth*	Yes No		If not available, go to RIC-11
RIC-12	Record date of birth as documented	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		
RIC-16	Do you know the FULL date of birth of [CHILD NAME] ?	Yes No		If no, go to b
a	What is [CHILD NAME]'s date of birth?	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		Go to next session
b	Do you know the year [CHILD NAME] was born?	Yes No		If no, go to RIC-7
c	What year you was [CHILD NAME] born?	_ _ _ _		
d	Do you know the month [CHILD NAME] were born?	Yes No		
e	What month was [CHILD NAME] born?	January February March	1 2 3	

		April May June July August September October November December	4 5 6 7 8 9 10 11 12	
RIC-17	Based on your date of birth, you [CHILD NAME] is [AGE] years old. Is it correct? You mentioned earlier in this interview that [CHILD NAME] was [YEARS] years and [MONTHS] months old	Yes No	1 2	If no, go back to RIC-5
RIC-13	Can you recall an event that happened when [CHILD NAME] was born? Enter short text.			
RIC-14	Did anyone in [CHILD NAME]'s household answers questions about his/her household during a previous visit?	Yes No	1 2	

Informed Consent

Give the guardian the dietary survey information sheet. Read out the information provided then ask them if they have questions. Answer any questions asked. Ask the guardian or a witness to fill in and sign the consent form.

Please confirm that you, or a witness, signed the informed consent form for the dietary survey.

Yes Go to next question

No The current respondent does not agree to be interviewed, therefore the interview must be ended.

	May I begin the interview now?	Yes No	1 2	If yes, go to next section
	Why do you prefer not to continue the interview?	____________________	1 2	
	Is it possible to schedule an interview with [CHILD NAME]'s primary caregiver?	Yes No	1 2	If yes, schedule interview If no, end interview
	When would [CHILD NAME]'s primary caregiver be available for an interview?	__ __ __ __ __ __ __ __ D D – M M - Y Y Y Y		
	Select the time of the day	Morning Afternoon Evening	1 2 3	

Child Caregiver Characteristics

Now I would like to ask a few questions about you because you are a caregiver, not the child.

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
CCC-1	Are you the person mostly responsible for feeding [CHILD NAME]?	Yes No	1 2	
CCC-2	Were you with [CHILD NAME] most of the day yesterday?	Yes No	1 2	If yes, skip to CCC-4
CCC-3	Is there another person available now who can help tell us what [CHILD NAME] ate yesterday?	Yes No	1 2	
CCC-4	What is your relationship to [NAME OF CHILD]?	Mother Father Other family member Other (Specify)	1 2 3 8	
CCC-5	Note the sex of the respondent	Male Female	1 2	
CCC-6	How old are you? Enter age in years, enter 99 if age is unknown.	☐☐	99	If the age is <16 y, show message "You need to get someone who is 16 years or older to proceed".
RSD-7	What is your name?	______________________		
RSD-8	What is your ethnic group? Do NOT read the responses out loud	Hausa Yoruba Igbo Ijaw Kanuri Fulani Ibibio Tiv Etc. Other (Specify)	1 2 3 4 5 6 7 8 88	
RSD-9	What is your religion? Do NOT read the responses out loud	Christian Muslim Traditional No Religion Other (Specify) No response	1 2 3 4 88 99	
RSD-10	What is the highest level of school you completed? *Select ONE response*	None Primary Junior Secondary Senior Secondary	1 2 3 4	

		Technical / vocational certificate Higher / university/ college Other (Specify)	5 88 99	

Infant and Young Child Feeding

Now I would like to ask you a few questions about breastfeeding and bottle feeding of [CHILD NAME].

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
IYC-1	Has [CHILD NAME] ever been breastfed?	Yes No Don't Know	1 2 99	Skip to IYC3
IYC-2	Was [CHILD NAME] breastfed yesterday during the day or at night?	Yes No	1 2 99	
IYC-3	Did [CHILD NAME] drink anything from a bottle with a nipple yesterday during the day or night?	Yes No Don't Know	1 2 99	Skip to next section
IYC-4	What was fed to [CHILD NAME] from a bottle with a nipple yesterday during the day or night? Select MORE THAN ONE response if relevant	Breast Milk Formula milk/other milks Water with sugar Juice (Herbal/fruits) Pap Other (Specify) Other text	0,1 0,1 0,1 0,1 0,1 0,1 text	

Biofortified Food Consumption

Now I would like to ask you a few questions about food that [CHILD NAME] may eat.

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
BFC-1	In the last 30 days, did [CHILD NAME] eat yellow cassava or any food products made from it?	Yes No Don't Know	1 2 8	Skip to BFC-3
BFC-2	In the last 30 days, on how many days did [CHILD NAME] eat yellow cassava or any food products made from it?	DAYS [__ __] Don't Know	99	
BFC-3	In the last 30 days, did [CHILD NAME] eat orange-fleshed sweet potato or any food products made from it?	Yes No Don't Know	1 2 99	Skip to BFC-5
BFC-4	In the last 30 days, on how many days did [CHILD NAME] eat orange-fleshed sweet potato or any food products made from it?	DAYS [__ __] Don't Know	99	
BFC-5	In the last 30 days, did [CHILD NAME] eat orange maize or any food products made from it?	Yes No Don't Know	1 2 8	Skip to Next Section
BFC-6	In the last 30 days, on how many days did [CHILD NAME] eat orange maize or any food products made from it?	DAYS [__ __] Don't Know	99	

Fortification Coverage

Now I'm going to ask you few questions about some foods (vegetable oil, wheat flour, semolina flour, sugar salt and bullion). If there are any of these foods in [CHILD NAME]'s household, could you please bring them out here so I can see them?

Q/N	QUESTION	RESPONSE		CODE	INSTRUCTION
FCW-17	Does [CHILD NAME]'s household use any of the following to prepare foods at home?	Vegetable oil	Yes No	1 2	If yes, go to the relevant option
		Wheat flour	Yes No		
		Maize flour	Yes No		
		Semolina flour	Yes No		
		Sugar	Yes No		
		Salt	Yes No		
		Bouillon	Yes No		
Vegetable oil					
FCW-18	What is the main type of vegetable oil that [CHILD NAME]'s household uses? Select ONE response	Groundnut oil Oil blend Palm olein/palm oil Soybean oil Sunflower oil Other (Specify) Don't know/Can't remember			
FCW-19	The last time the [CHILD NAME] household got vegetable oil, how did they get it? Select ONE response	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/Can't remember			Skip to FCW-4
FCW-20	The last time the household of [CHILD NAME] got vegetable oil, what was the brand? Select only one answer	King's 100% vegetable oil Laziz - Pure vegetable oil Power oil - Pure vegetable oil Sunola - Soybean oil Winner-100% pure soya oil Golden Penny-pure soya oil Bulk/open source with no brand name			

		Other (Specify) Don't know/ Can't remember		
FCW-21	What is the main type of wheat flour that [CHILD NAME]'s household uses? Select only one answer			
FCW-22	The last time the [CHILD NAME] household got wheat flour, how did they get it? Select only one answer	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember		Skip to FCW-7
FCW-23	The last time the household of [CHILD NAME] got wheat flour, what was the brand? Select only one answer			
maize flour				
FCW-24	What is the main type of maize flour that [CHILD NAME]'s household uses? Select only one answer			
FCW-25	The last time the [CHILD NAME] household got maize flour, how did they get it? Select only one answer	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember		Skip to FCW-10
FCW-26	The last time the household of [CHILD NAME] got maize flour, what was the brand? Select only one answer			
semolina				

FCW-27	What is the main type of semolina flour that [CHILD NAME]'s household uses on most days? Select only one answer			
FCW-28	The last time the [CHILD NAME] household got semolina flour, how did they get it? Select only one answer	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember		Skip to FCW-14
FCW-29	The last time the household of [CHILD NAME] got semolina flour, what was the brand? Select only one answer			
sugar				
FCW-30	What is the main type of sugar that [CHILD NAME]'s household uses on most days? Select only one answer			
FCW-31	The last time the [CHILD NAME] household got sugar, how did they get it? Select only one answer	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember		Skip to FCW-17
FCW-32	The last time the household of [CHILD NAME] got sugar, what was the brand? Select only one answer			
salt				
FCW-33	What is the main type of salt that [CHILD NAME]'s household uses on most days? Select only one answer			
FCW-34	The last time the [CHILD NAME] household got salt, how did they get it? Select only one answer	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember		Skip to Next Section

FCW-35	The last time the household of [CHILD NAME] got salt, what was the brand? Select only one answer			
bullion				
	What is the **main** type of bullion that [CHILD NAME]'s household uses? Select ONE response			
	The last time [CHILD NAME]'s household got bullion, how did they get it?	Purchased Home made Received from relative/friend/food aid Other (Specify) Don't know/ Can't remember		
	The last time the household of [CHILD NAME) got bullion, what was the brand? Select ONE response			

Annex 12. Biomarker Questionnaire (Q)[54]

Q1. Children (6-59 months old)

RESPONDENT IDENTIFICATION CONFIRMATION

For infants and young children				
RIC-18	Confirm respondent. What is the child's name? **[NAME LINKED TO LINE LISTING]**	Yes …………………………… No ………………………………	1 2 --->	**Update/correct in the Roster**
RIC-19	Confirm respondent. Is (CHILD NAME) a boy or girl? **[GENDER LINKED TO LINE LISTING]**	Yes …………………………… No ………………………………	1 2 --->	**Update/correct in the Roster**
RIC-20	Confirm respondent How old is (CHILD NAME) **[AGE LINKED TO LINE LISTING]**	Yes …………………………… No ………………………………	1 2 --->	**Update/correct in the Roster**
RIC-21	Confirm completion of household questionnaire: Did anyone in your household answers questions about your household during a previous visit?	Yes …………………………… No ………………………………	1 2 --->	
RIC-22	Confirm completion of household questionnaire: If yes, was that you or someone else?	Myself…………………… Someone else………………	1 2	
RIC-23	Confirm consent is signed **[SIGN PHYSICAL CONSENT FORM]** **Request for Assent** Confirm assent	Yes …………………………… No ………………………………	1 2 --->	**Ensure respondent signs to continue**
RIC-24	Line number of the respondent in the HH Roster	☐☐		

[54] Paper version before digitization on CommCare App

QUESTIONS RELATED INTERVENTION COVERAGE & HEALTH STATUS (CHILDREN 6-59 MONTHS OLD) (If grp = 4)			
chs1.	Do you have a card or other document where (NAME)'s vaccinations are written down?	01= Yes 00= No	
chs2.	May I see the card or other document where (NAME)'s vaccinations are written down?	01= Yes 00= No	if chs1 = 1
chs3.	Document down most recent date of vitamin A given	Day/month/year	
chs4.	In the last six months, has a health worker or community volunteer spoken with you about how to feed [NAME CHILD]?	01= Yes 00= No 98= Don't Know	
chs5.	If yes, the health worker or community volunteer speak with about any of these topics? (*READ EACH ITEM AND RECORD RESPONSE)*	(see sub-table below)	Ask if chs4 = 1
chs6.	Within the last six months, was (NAME) given a vitamin A dose like (this/any of these)? SHOW COMMON CAPSULES	01= Yes 00= No 98= Don't Know	
chs7.	Source of verification	Mother's recall 01 Health card 02 Vaccination card 03 Other (Specify)____98	Ask if chs6 = 1
chs8.	In the last six months, did you receive a supply of sprinkles with iron or any micronutrient powder like (SHOW IMAGE WITH PACKAGING) to give to [NAME]?	01= Yes 00= No 98= Don't Know	
chs9.	Was (NAME) given any drug for intestinal worms in the last six months?	01= Yes 00= No 98= Don't Know	
chs10	In the last 7 days, has (NAME) eaten earth, clay, mud, or soil from any source (e.g., walls of mud houses, the yard, purchased at the market)?	01= Yes 00= No 98= Don't Know	
chs11	Has (NAME) had diarrhea in the last two weeks?	01= Yes 00= No 98= Don't Know	
chs12	Was there any blood in the stools?	01= Yes 00= No 98= Don't Know	
chs13	Did (NAME) have diarrhea yesterday?	01= Yes 00= No 98= Don't Know	
chs14	Was he/she given any of the following to drink at any time since he/she started having the diarrhea: A fluid	01= Yes 00= No 98= Don't Know	Ask if chs13 = 1

chs5. responses:

	No= 0	Yes= 1	Dk= 98
Breastfeeding			
When to start feeding foods other than breastmilk (e.g., after 6 months)			
Giving a variety of types of foods			
Giving animal source foods specifically (eggs, milk, meats or fish)			
How often to feed the child			
Not feeding sugary drinks (e.g., fizzy drinks)			

	made from a special packet called [LOCAL NAME FOR ORS PACKET]? A pre-packaged ORS liquid? A government-recommended homemade fluid? (Show image)		
chs15	What (else) was given to treat the diarrhea?	Pill or Syrup Antibiotic ....1 Antimotility... 2 Zinc...3 Other (Not antibiotic, antimotility, or zinc)...4 Unknown Pill or Syrup......................5 Injection Antibiotic ....6 Non-Antibiotic...7 Unknown Injection ....8 Intravenous..9 Home Remedy/Herbal Medicine ....10 Others Specify 98	Ask if chs13 = 1
chs16	Has (NAME) been ill with a fever at any time in the last 2 weeks?	01= Yes 00= No 98= Don't Know	
chs17	Has (NAME) had an illness with a cough at any time in the last 2 weeks?	01= Yes 00= No 98= Don't Know	
chs18	Has (NAME) had fast, short, rapid breaths or difficulty breathing at any time in the last 2 weeks?	01= Yes 00= No 98= Don't Know	
chs19	Was the fast or difficult breathing due to a problem in the chest or to a blocked or runny nose?	01= Yes 00= No 98= Don't Know	Ask if chs18= 1
chs20	In the last 12 months, was (NAME) given any ready-to-use therapeutic feeds/plumpy'nut like (SHOW COMMON PACKAGING) because the child was malnourished?	01= Yes 00= No 98= Don't Know	
chs21	Did [CHILD] consume it yesterday?	1= Yes 0= No 98 = Don't Know	Ask if chs20 = 1

Anthropometry Questionnaire

Question Number	Questions	Options	Skip
name_respondent	Please confirm that CHILD is [ ] years old and is [ ] Gender.	01= This respondent age and gender is the same 02= The respondent age and gender is different 03= ONLY the respondent's AGE is different 04= ONLY the respondent's GENDER is different	
month_label_notification	Confirm correct age in month	01= Yes 02= No	
new_age	Enter respondent's age		If **name_respondent !**=1
new_age	Enter respondent's age in month		If **name_respondent !**=1
preg_notification	Please note that the respondent was reported to be pregnant during the listing. Is she currently pregnant?	01= Yes 02= No	
confirm_stand	Please kindly confirm that respondent is able to stand during the measurement during height measurement.	01= The CHILD can stand 02= The CHILD is disabled and is unable to stand 03= The CHILD is ill and therefore cannot stand.	If respondent is <=24months
fw1	Enter the Accurate weight #1 of the respondent (in kg).		
cg1	Enter the Accurate weight #1 of CAREGIVER ONLY (in kg).		
cgcu51	Enter the Accurate weight #1 of the CAREGIVER and CHILD (in kg).		
cu51	Enter the Accurate weight #1 of CHILD		
height_note	Please confirm that you are able to remove or push aside any barrettes, braids, or hairstyles that might interfere with the measurement of respondent_name	01= There is no problem with barrettes, braids, or hairstyles. 02= I am able to remove or adjust barrettes, braids, or hairstyles 03= I am NOT able to remove or adjust barrettes, braids, or hairstyles	
height_note	Is respondent overdressed	01= Yes 02= No	
h1	Enter the accurate height/length 1 of the respondent in cm		
fw2	Enter the accurate weight #2 of respondent		
cg2	Enter the accurate weight #2 of the CAREGIVER only		
cgcu52	Enter the accurate weight #2 of the CAREGIVER and CHILD		
cu52	Enter the accurate weight #2 of CHILD		
h2	Enter the accurate height/length 2 of the respondent in cm		
fw3	Enter the accurate weight #3 of respondent		
cg3	Enter the accurate weight #3 of the CAREGIVER only		
cgcu53	Enter the accurate weight #3 of the CAREGIVER and CHILD		
cu53	Enter the accurate weight #3 of CHILD		

h3	Enter the accurate height/length 3 of the respondent in cm		
height_scale_id_confirm	Confirm height Scale ID	01= I can confirm that my height Scale ID is still the same. 02= I have another Height equipment	
new_scale_height_id	New height Scale ID		If weight_scale_id_confirm = 2
weight_scale_id_confirm	Confirm weight Scale ID	01= I can confirm that my weight Scale ID is still the same. 02= I have another weight equipment	
new_scale_weight_id	New weight Scale ID		If weight_scale_id_confirm = 2

Annex 13. Adolescent girls (10-14 years old) and WRA (15-49 years old)

RESPONDENT IDENTIFICATION CONFIRMATION

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
RIC-25	**Confirm respondent** What is your name? **[NAME LINKED TO LINE LISTING?]**	Yes .... No	1 2 --->	**Update/correct in the Roster**
RIC-26	**Confirm respondent** **[GENDER LINKED TO LINE LISTING?]**	Yes .... No	1 2 --->	**Update/correct in the Roster**
RIC-27	**Confirm respondent** How old are you? **[AGE LINKED TO LINE LISTING?]**	Yes .... No	1 2 --->	**Update/correct in the Roster**
RIC-28	Confirm completion of household questionnaire: Did anyone in your household answers questions about your household during a previous visit?	Yes .... No	1 2 --->	**Identify initial respondent**
RIC-29	Confirm completion of household questionnaire: If yes, was that you or someone else?	Myself............................... Someone else..................	1 2	
RIC-30	**Confirm respondent** **[SIGN CONSENT FORM?]** SIGN ASSENT FORM/ GIVE ASSENT	Yes .... No	1 2 --->	**Ensure respondent sign to continue**
RIC-31	Line number of the respondent in the HH Roster	|__|__|		

ANAEMIA RISK (WRA AND ADOLESCENT GIRL)			
Now I would like to ask you some questions about your health. We will first ask about the last six months.			
wrf1.	Have you been diagnosed with anaemia in the past six months?	01= Yes 00= No 98= Don't Know	
wrf2.	Did you take any drugs for intestinal worms in the past six months?	01= Yes 00= No 98 = Don't Know	
Now I would like to ask you about your health in the last 2 weeks.			
wah1.	Have you been ill with diarrhoea in the past 2 weeks? *DEFINED AS THREE OR MORE LOOSE OR WATERY STOOLS IN A 24-HOUR PERIOD*	01= Yes 00= No 98 = Don't Know	
wah2.	Have you been ill with a cough or breathing problems in the past 2 weeks?	01= Yes 00= No 98 = Don't Know	
wah3.	When you had an illness with a cough, did you breathe faster than usual with short, rapid breaths or have difficulty breathing?	01= Yes 00= No 98 = Don't Know	
wah4.	Was the fast or difficult breathing due to a problem in the chest or to a blocked or runny nose?	Chest only ....01 Blocked or runny nose only. ....02 Both ....03 Other (specify)__________________77 Don't know 98	
wah5.	Have you been ill with a fever in the past two weeks?	01= Yes 00= No 98 = Don't Know	
wah6.	Have you been ill with malaria in the past two weeks?	01= Yes 00= No 98 = Don't Know	
wah7.	Have you had any hospitalization and /or clinic visits due to illness in the last two weeks?	01= Yes 00= No 98 = Don't Know	
wah8.	Do you smoke? (do not include the powder and chew type)	00= No 01= Yes	
Now we would like to ask you some questions about other topics			
wtt1.	In the last seven days, have you eaten earth, clay, mud or soil from any source (e.g, walls of mud houses, the yard, purchased at the market)?	00= No 01= Yes	
wtt2.	During the last six months, did you take any multivitamin tablets for yourself? *(SHOW TABLETS)* *ASK TO SEE THE TABLETS*	01= Yes 00= No 98 = Don't Know	
wtt3.	How many days did you take any of these products in the last week (7 days)	Number of days......... (IF NONE, ENTER 00) (IF DON'T KNOW, ENTER 98)	
wtt4.	During the last six months, did you take any iron tablets, iron-folic acid tablets for yourself? *(SHOW TABLETS)* *ASK TO SEE THE TABLETS*	01= Yes 00= No 98 = Don't Know	
wtt5.	How many days did you take any iron tablets, iron-folic acid tablets in the last week (7 days)	Number of days......... (IF NONE, ENTER 00) (IF DON'T KNOW, ENTER 98)	

Annex 14. Pregnant women (15-49 years old)

RESPONDENT IDENTIFICATION CONFIRMATION

Q/N	QUESTION	RESPONSE	CODE	INSTRUCTION
RIC-32	**Confirm respondent** What is your name? **[NAME LINKED TO LINE LISTING?]**	Yes …………………………… No ………………………………	1 2 ---→	**Update/correct in the Roster**
RIC-33	**Confirm respondent** **[GENDER LINKED TO LINE LISTING?]**	Yes …………………………… No ………………………………	1 2 ---→	**Update/correct in the Roster**
RIC-34	**Confirm respondent** How old are you? **[AGE LINKED TO LINE LISTING?]**	Yes …………………………… No ………………………………	1 2 ---→	**Update/correct in the Roster**
RIC-35	Confirm completion of household questionnaire: Did anyone in your household answers questions about your household during a previous visit?	Yes …………………………… No ………………………………	1 2 ---→	**Identify initial respondent**
RIC-36	Confirm completion of household questionnaire: If yes, was that you or someone else?	Myself…………………………. Someone else………………	1 2	
RIC-37	**Confirm respondent** **[SIGN CONSENT FORM?]**	Yes …………………………… No ………………………………	1 2 ---→	**Ensure respondent sign to continue**
RIC-38	Line number of the respondent in the HH Roster	☐☐		

ANAEMIA RISK			
Now I would like to ask you about your health in the last two weeks.			
wah9.	Have you been ill with diarrhoea in the past two weeks? *DEFINED AS THREE OR MORE LOOSE OR WATERY STOOLS IN A 24-HOUR PERIOD*	01= Yes 00= No 98 = Don't Know	
wah10.	Have you been ill with a cough or breathing problems in the past two weeks?	01= Yes 00= No 98 = Don't Know	
wah11.	When you had an illness with a cough, did you breathe faster than usual with short, rapid breaths or have difficulty breathing?	01= Yes 00= No 98 = Don't Know	
wah12.	Was the fast or difficult breathing due to a problem in the chest or to a blocked or runny nose?	Chest only ....01 Blocked or runny nose only..........02 Both ....03 Other (specify)________________77 Don't know 98	
wah13.	Have you been ill with a fever in the past two weeks?	01= Yes 00= No 98 = Don't Know	
wah14.	Have you been ill with malaria in the past two weeks?	01= Yes 00= No 98 = Don't Know	
wah15.	Have you had any hospitalization and /or clinic visits due to illness in the last two weeks?	01= Yes 00= No 98 = Don't Know	
wah16.	Do you smoke? (do not include the powder and chew type)	00= No 01= Yes	
INTERVENTION COVERAGE FOR PREGNANT WOMEN			
wpw1.	Have you seen any health worker for antenatal care during this pregnancy so far?	01 = Yes 00 = No	
wpw2.	How many months pregnant were you when you first received antenatal care for this pregnancy?	[____] Months Don't know	
wpw3.	How many times have you received antenatal care so far?	[____] times Don't know	
wpw4.	During this pregnancy, have you received or purchased any tablets, syrups, or tonics containing iron? SHOW COMMON VARIETIES – IFA	1 = Yes 0 = No 98 Don't Know	
wpw5.	Did you receive for free or purchase these tablets or syrup?	1 = Receive for free 2 = Purchase Don't know	
wpw6.	How many iron-folic acid IFA tablets did you receive during your pregnancy	[___] Tablets [Enter 0-180] Don't know	
wpw7.	How many days in the last 7 days (one week) did you consume a tablet or syrup containing iron?	[___] Days [Enter 0-7] Don't know	
wpw8.	Did you consume a tablet or syrup containing iron and/folic acid yesterday?	1 = Yes 0 = No 98= Don't know	
wpw9.	So far, during this pregnancy, has a health worker or community volunteer spoken with you about what foods to eat during pregnancy?	1 = Yes 0 = No 98= Don't know	
wpw10.	So far, during this pregnancy, has a health worker or community volunteer spoken with you about breastfeeding your newborn?	1 = Yes 0 = No 98 = Don't know