ORIE Nutrition Research in Northern Nigeria

ORIE Nigeria: Quantitative Impact Evaluation

Baseline Report

Aly Visram, Paul Jasper, Lucie Moore, Femi Adegoke, Andrej Kveder, Shafique Arif, and Patrick Ward

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Preface

This report presents the findings from the baseline survey of the quantitative impact evaluation of the Working to Improve Nutrition in Northern Nigeria (WINNN) Programme interventions in Northern Nigeria. The household survey data collection was conducted in June 2013 and a final round of data collection is scheduled for June 2016. Both baseline and endline survey data will be used to estimate the collective impact of the WINNN Programme interventions that are focused at the level of the Local Government Area – Community Management of Acute Malnutrition (CMAM) and Infant and Young Child Feeding (IYCF).

This assessment is being carried out by ORIE managed by Oxford Policy Management. The project manager is Patrick Ward. The remaining team members are Aly Visram, Paul Jasper, Lucie Moore, Femi Adegoke, Andrej Kveder, and Shafique Arid. For further information contact Aly Visram at aly.visram@opml.co.uk.

ORIE

6 St Aldates Courtyard
38 St Aldates
Oxford OX1 1BN
United Kingdom

Tel +44 (0) 1865 207 300
Fax +44 (0) 1865 207 301
Email admin@opml.co.uk
Website www.opml.co.uk

Executive summary

Introduction

Working to Improve Nutrition in Northern Nigeria (WINNN) is an ambitious six-year Department for International Development (DFID)-funded programme to improve maternal, newborn and child nutrition in Northern Nigeria. WINNN works in five states: Jigawa, Katsina, Kebbi, Zamfara, and Yobe. The Operations Research and Impact Evaluation (ORIE) component of this programme aims at filling important gaps in the knowledge about the causes of and optimal responses to undernutrition in Northern Nigeria.

ORIE is composed of six workstreams, of which one is a mixed quantitative and qualitative impact evaluation of the WINNN Programme as a whole. The quantitative evaluation aims at assessing the impact of two of the WINNN outputs – the Community Management of Acute Malnutrition (CMAM) and Infant and Young Child Feeding (IYCF) interventions – as both are outputs focused on the Local Government Area (LGA) level. Other outputs of the WINNN Programme include integrating micro-nutrient interventions into routine primary health services and improving government planning and coordination in the nutrition sector. These interventions operate at the state and federal level and are thus within the remit of the qualitative impact evaluation.

This report presents the results of the baseline study for the quantitative impact evaluation. The qualitative evaluation baseline is provided in a separate report.

Methods

The quantitative impact evaluation uses a quasi-experimental design that uses both treatment and control groups to assess the impact of the WINNN IYCF and CMAM package of interventions. The treatment group is composed of 12 LGAs in which the WINNN interventions are being implemented. There are three treatment LGAs in each of the four states of Jigawa, Katsina, Kebbi and Zamfara[1]. Each treatment LGA has been matched to a control LGA within the same state in which there is no intervention. By comparing the changes in outcomes over time between the treatment and control groups, a robust assessment of the impact of the WINNN interventions can be made. This type of impact evaluation design is called difference-in-difference and allows us to assess the impact of the WINNN programme in a 'real world' scenario.

Data collection

In order to implement this analysis, baseline data was collected from households across both treatment and control groups in June 2013. This data included specific information on children aged 0-35 months and women of reproductive age (15-49 years). To assess any changes to outcomes as a result of the WINNN Programme, data will be collected from the same households in the endline survey in June 2016 after three years of programme implementation.

In the baseline, data was collected from a total of 3,355 households, which included data from 5,967 mothers with children aged 0–35 months, and 6,833 children aged 0–35 months.

[1] Although WINNN is working in Yobe, this state is not part of the ORIE evaluation due to the level of insecurity in that state.

More on methods and data collection

See **Section 2** for a full description of the methods used in this study including:

- Overview of the ORIE impact evaluation of the WINNN Programme;
- Details of the quasi-experimental design;
- Description of the data collection and quality assurance mechanisms;
- Explanation of the data management including entry, cleaning and analysis; and
- A discussion of important limitations and risks of the study.

Results: Characteristics of communities and households

The households surveyed were all located in rural areas that were difficult to access. Only about 15% were accessible via a tarmac road and flooding was a common problem. Yet communities had relatively good access to health facilities and primary schools, as these were accessible within about 30 minutes of travel time.

The households surveyed were mainly headed by adult males, consisted of many children (seven on average) and very few elderly people. For every working-age adult, there were 1.5 dependents (either young children or elderly) which is similar to what was measured in the General Household Survey (GHS) 2010/11 for North West Nigeria. A third of all household heads had some form of formal education and their economic activity was mainly farming for subsistence. When asked about any formal transfers or grants received either through government or non-governmental organisation (NGO) programmes – such as cash transfer programmes – only 2% indicated they had received any transfers in the last 12 months.

Nearly two-thirds of households had access to electricity. However, utilisation of electronic devices was very low, with the exception of mobile phones. The typical home had about four bedrooms and was constructed of a mud floor, corrugated iron sheets for a roof, and walls made of earth or cement bricks. Safe drinking water was not easily accessible, as only about 60% of all households used an improved source of drinking water. Treatment of drinking water was uncommon. Similarly, sanitation infrastructure was poor: about 80% of households used a pit latrine and nearly 20% used no facility. In terms of hygiene practices, only 40% had a designated place for washing hands inside the household – with only 13% of these having soap or detergent onsite.

The main access point to health services for households were dispensaries, which lay within one hour of one-way travel time for 80% of the households, and health facilities (75% within one hour). Food insecurity was a problem for many households: about half reported not having enough food for the household inhabitants at least once in the last 12 months.

More on community and household characteristics

See **Section 4** for a full analysis of community and household characteristics including:

- Community accessibility and exposure to shocks;
- Household demographics;
- Household characteristics and asset ownership;
- Poverty analysis of households with state-by-state disaggregations;
- Water, sanitation and hygiene indicators;
- Access to health care and health care seeking; and
- Household food security analysis.

Results: Characteristics of mothers

The average age of the mothers interviewed was 27 years old. Nearly 80% of them got married before the age of 16 and most had their first child two years later at the age of 17. While the majority

of mothers were exposed to Quranic education, only 9% had any form of formal education. The majority of mothers (nearly 65%) ran their own small business and were involved in a number of decision-making processes within the household. The survey asked about involvement in a number of common decisions within the house – such as decisions on the control of the mother's earnings, on child health care, purchasing of large household items and food purchases – and found mothers to be least likely to be involved in decisions regarding food purchases.

Knowledge of best breastfeeding practices was limited among mothers. Only 59% of mothers knew that breastfeeding of infants should start immediately or within the first hour after birth, while 76% knew that colostrum was beneficial for an infant's health and should not be discarded. Similarly, only 7% of mothers knew that infants should not receive any water in addition to breast milk, even on a particularly hot day. Yet almost all mothers (93%) accepted non-standard feeding times for infants, which is beneficial to a baby's health. Further analysis of these data revealed there was a strong correlation between knowledge of appropriate breastfeeding practices and household wealth.

Less than half (42%) of mothers to children born in the last 35 months had received any antenatal care (ANC). Those who did reported an average of four visits during the pregnancy and that they had received iron and folic acid supplements. Almost all mothers had delivered their child at home and only 14% of mothers had gone to a health facility to receive post-natal care (PNC).

The Body Mass Index (BMI) of non-pregnant mothers was assessed in the survey, which found that the majority of mothers had a normal BMI for their age (72%), although a significant percentage (18%) were underweight. Only a few mothers were overweight (10%) according to these measures. This is confirmed by similar findings in the Nigeria Demographic and Health Survey (NDHS) 2008.

More on maternal characteristics and IYCF knowledge

See **Section 5** for a full analysis of maternal characteristics including:

- Detailed analysis on decision making power and how this varies by the age and parity of the mother;
- Decision-making power scores presented state-by-state;
- IYCF knowledge and how this varies by household wealth;
- Knowledge of family planning and variations by education level of mother;
- Breastfeeding practice, use of ANC, delivery and PNC services; and
- Maternal nutritional status and correlations to education level, household wealth, decision-making power and attitudes towards wife beating.

Results: Characteristics of children

In this study, child nutritional status is assessed using three standard anthropometric indices that are derived by comparing height and weight measurements with WHO reference curves: height-for-age, weight-for-age, and weight-for-height. Using the reference data, these measures are standardised and anthropometric values are expressed as z-scores relative to the reference median. For all three indicators, the age range was defined from age 0 to 35 months. As suggested by the WHO, prevalence was calculated both overall and for different age groups. The analyses revealed that the nutritional status of children was very critical in the areas surveyed in the study. More than half of the children surveyed (58%) were classified as stunted, significantly above the WHO cut-off for a critical situation (40%) (WHO, 2014b). Some 41% of the children were considered underweight, again significantly higher than the WHO cut-off for severe levels of malnutrition (30%) and wasting was at unacceptably high levels (16%) (WHO, 2014b). Some 6% of all children surveyed were found to be severely wasted.

Further analysis of the data revealed that children that were born to mothers with a secondary education or higher were significantly less likely to be stunted. However, the nutrition status of children did not differ much across household wealth quintiles or levels of mother's decision-making power.

Age-appropriate breastfeeding measures the proportion of children aged 0–5 months that are exclusively breastfed and the proportion of children aged 6–23 months that are currently breastfed but also receive complementary food. According to this measure only about half of the surveyed children (55%) were appropriately breastfed. The majority of children were put to the breast within 24 hours of birth (62%), but immediate initiation of breastfeeding was about 20 percentage points lower at 42%. In terms of exclusive breastfeeding, only 7% of children aged 0–5 months were exclusively breastfed.

Using the World Health Organisation (WHO) standards for minimum meal frequency (minimum number of times of feeding), minimum dietary diversity (food from four or more food groups), and minimum acceptable diet (combination of meal frequency and dietary diversity), it is clear that only very few children were appropriately fed. Only about a quarter of children aged 6–23 months (23%) received food the suggested minimum number of times, and an even lower number (14%) received food from four or more food groups. The combination of both indicators shows that only about 5% of all children received a minimum acceptable diet. In terms of the nutritional value of this food, iron-rich or iron-fortified food (such as meats and fish) was only consumed by 14% of all children.

Regular implementation of preventive health care practices was uncommon among children surveyed in the study. Only about a third (35%) had slept under a mosquito net the previous night and only 37% had received a Vitamin A drop in the six months preceding the survey, although this figure was slightly higher among children aged 6–35 months (41%). Predominantly, children received Vitamin A drops at home (84%), indicating the importance of Immunisation Plus Days in Northern Nigeria where Vitamin A is distributed house to house. Similarly, vaccination levels were low: only 3% of children aged 12–23 months could be considered fully vaccinated according to the standard set out in the NDHS. While vaccination status among the various vaccines varied widely, a high proportion of all children aged 12–35 months (41%) had not received any vaccination, which is evidence for the low level of preventive health care in the area of the study. Finally, under a tenth of all children had ever had their mid-upper arm circumference (MUAC) (9%) or weight/height measured (9%).

More on the characteristics of children and IYCF practices

See **Section 6** for a full analysis of the characteristics of children including:

- IYCF practices and how this varies by household wealth, education level of mothers, and age of mothers;
- Preventative health care practices such as Vitamin A, sleeping under a mosquito net and vaccinations and variations by state; and
- Child nutritional status with analysis by age group and characteristics such as maternal nutritional status, household wealth, and education level of the mother.

Results: Experience of the WINNN interventions

The study included a number of questions related to the household and community's exposure to elements of the WINNN interventions, as some of these were implemented before the baseline was conducted. This is discussed in more detail in the main body of the report.

The percentage of mothers that had participated in IYCF sessions was generally low. On average, about 18% of mothers received IYCF training at health facilities. A significantly lower proportion just 5% of mothers had received community-based IYCF training, while training conducted through community support groups/women's groups was very uncommon.

About half (53%) of all respondent groups to the community questionnaires, who were mainly made up of educated, male, prominent members of the communities, had ever heard of MNCH weeks. However, only about a tenth (12%) of all mothers had ever heard of MNCH weeks, indicating a large information gap between the awareness of prominent member of the community and mothers. A very small proportion of mothers (5%) had attended the MNCH day immediately preceding the survey in May 2013.

Roughly one-third (30%) of all respondents to community questionnaires in the study reported that their community had a community mobiliser who identifies malnourished children using MUAC. As with MNCH weeks, the general awareness of CMAM interventions among households was significantly lower; only 6% of all households reported that they were aware of a community mobiliser in their community.

More on the community and household experience of IYCF, CMAM and MNCH interventions

See **Section 7** for a full analysis of community and household experience of IYCF, CMAM and MNCH Weeks interventions including:

- Differences between community-level and household-level awareness of these interventions;
- Accessibility of the interventions; and
- Attitudes towards these interventions and reasons for low turn-out;

Discussion: Baseline findings

Stunting begins in the womb

One of the most striking findings of the baseline study was that nearly a third of children 0-5 months old were stunted. Given that stunting is a result of chronic malnutrition, this indicates that a number of these children were born stunted and were exposed to chronic nutritrient deprivation during pregnancy in the womb (intrauterine growth retardation).

Adequate nutrition for mothers during pregnancy is essential

Furthermore, both the prevalence of stunting and underweight was significantly higher among children whose mother was underweight indicating a correlation between maternal and childhood malnutrition. Analysis of maternal malnutrition indicated that on average younger mothers were more likely to be classified as underweight.

Stunting rates are unacceptably high – potentially leading to low IQ, poor school achievement and low-skilled employment

With such a high prevalence of stunting among children aged 0-35 months, it is imperative to improve child health and nutrition. Malnutrition during pregnancy and infancy does not only affect height but can also affect cognitive capacity, educational attainment, and thus future adult earnings. There is strong evidence that children with restricted development during this period are at risk of poor school achievement, early school drop out, and low-skilled employment, which ultimately contributes to the intergenerational transmission of poverty (Grantham-McGregor *et al*., 2007).

Educated mothers had children less likely to be malnourished

Further investigation into maternal characteristics revealed that mothers with a secondary education or higher were significantly less likely to have a stunted child or a child with any form of malnutrition.

It is clear that preventative interventions such as ANC and IYCF, and improving girls in education have an important role to play.

IYCF interventions must reach communities as health facility access is low

With regards to ANC and IYCF interventions, coverage was found to be very low with less than half of mothers with children born in the last 35 months having received any ANC. Coverage of IYCF was also very low, although this might be expected given this was a baseline study and IYCF training has only recently been rolled out across WINNN states. Nevertheless, with such poor access to health facilities, these findings indicate the importance of IYCF interventions reaching beyond the health facility to communities. This could be done through a combination of outreach activities or community volunteers, but either way, reaching mothers within their communities will be an important factor in enhancing the impact of the programme.

Community leaders could be an important mobiliser

The importance of working with communities is further illustrated by the survey's findings in relation to exposure to IYCF, MNCH weeks and CMAM interventions. The baseline suggests that community members consistently showed higher levels of awareness of these interventions than mothers. Perhaps the most striking discrepancy is for MNCH weeks where 53% of community informants reported being aware of the MNCH weeks intervention whereas only 12% of mothers reported the same. Given the MNCH weeks intervention had been operating long before the baseline survey was conducted, one would expect higher levels of awareness at the level of the household. Such a discrepancy certainly warrants further work using community leaders as an important mobiliser of communities.

IYCF Interventions seem to hold promise for improving child nutrition

Given that almost all women felt that it was important to attend IYCF sessions, these seem to provide an important entry point to improving child nutrition. Tailoring IYCF messages based on findings in the baseline survey - for example focusing on not giving water or other liquids to infants under 6 months will improve the effectiveness of WINNN's messages.

Coordination of the scale-up and roll-out of nutrition evaluations to preserve the rigour of the impact evaluation

Finally, it must be reiterated that this baseline study has been designed to provide evidence of impact of the WINNN package of interventions in a 'real-world' setting thereby providing practical evidence for the scale-up of similar or indeed replicated models of the WINNN interventions. Careful attention must be taken to coordinate the implementation of any new or scaled-up nutrition specific or nutrition sensitive programmes in the evaluation areas, both treatment and control LGAs, so as to preserve the rigour of the impact evaluation design until June 2016.

Discussion: Impact evaluation design

The overall impact evaluation design is judged to be a robust design to assess the impact of the WINNN Programme package of interventions despite some pre-existing statistical differences in estimates between treatment and control groups. These differences were expected and are a result of the fact that treatment and control LGAs were not randomly selected and that treatment areas were exposed to the intervention before the baseline study could be conducted. The study will use a difference-in-difference approach to estimate impact which effectively factors out all pre-existing differences between the two groups to be able to assess the impact of the WINNN programme.

More on the discussion of findings or impact evaluation design

See **Section 8** for a complete discussion including:

- Importance of the baseline findings; and
- The quality of the impact evaluation design

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List of abbreviations

ABU	Ahmadu Bello University at Zaira
ACF	Action Against Hunger
ANC	Antenatal Care
ATT	Average Treatment on the Treated
BMI	Body Mass Index
CI	Confidence Interval
CMAM	Community Management of Acute Malnutrition
CSPRO	Census and Survey Processing System
DEFF	Design Effect
DFID	Department for International Development
DRMC	Data Research and Mapping Consult, Ltd.
EA	Enumeration Area
EDU	Evidence, Dissemination and Uptake (an ORIE workstream)
FANTA	Food and Nutrition Technical Assistance
FBFI	Food Basket Foundation International
GHS	General Household Survey
GPS	Global Positioning System
HIV	Human Immunodeficiency Virus
ICC	Intra-Cluster Correlation
IDS	Institute of Development Studies
ITT	Intention To Treat
IP	Implementing Partner
IYCF	Infant and Young Child Feeding
JMP	WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation
LGA	Local Government Area
LSHTM	London School of Hygiene and Tropical Medicine
MICS	Multiple Indicator Cluster Survey
MNCH	Maternal and Newborn Child Health

MUAC	Mid-Upper Arm Circumference
NDHS	Nigeria Demographic and Health Survey
NGO	Non-Governmental Organisation
NLSMS	Nigeria Living Standards Measurement Study
OPM	Oxford Policy Management
ORIE	Operations Research and Impact Evaluation
ORS	Oral Rehydration Salts
OTP	Outpatient Therapeutic-Feeding Programme
PHC	Primary Health Care
PNC	Post-Natal Care
PSU	Primary Sampling Unit
RUTF	Ready-To-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SCUK	Save the Children UK
SCI	Save the Children International
SMART	Standard Monitoring and Assessment of Relief and Transition
UNICEF	United Nations Children's Fund
WAZ	Weight-for-age z-score
WHO	World Health Organisation
WHZ	Weight-for-height z-score
WLZ	Weight-for-length z-score
WINNN	Working to Improve Nutrition in Northern Nigeria

1 Introduction

1.1 Overview of the WINNN Programme

The WINNN Programme is an ambitious £50 million, six-year DFID-funded programme to improve maternal, newborn and child nutrition, which aims to reach 6.2 million under-fives in five states of Northern Nigeria. The programme will deliver evidence-based direct interventions to tackle some of the immediate causes of undernutrition, shown to be cost-effective in other contexts, with four basic outputs:

Output 1 is concerned with the integration of micro-nutrient intervention into routine primary health services. For this output UNICEF procures and delivers Ferrous Sulphate, Folic Acid (both for pregnant women) and Abendazole (for children up to five years) to the central medical stores (or equivalent) at state level; each LGA is responsible for the collection of these commodities for distribution during the MNCH weeks. Though not financed by WINNN, Vitamin A is also procured by UNICEF and distributed in the same manner for the whole state. From mid-2013 UNICEF began procuring Zinc/oral rehydration salts (ORS) (for children up to five years who have diarrhoea and dehydration), and the delivery of this is state-wide in the WINNN states through the routine Primary Health Care (PHC) services. In non-WINNN LGAs, in-state logistics, training and monitoring for Zinc/ORS implementation is provided by Partnership for Reviving Routine Immunisation in Northern Nigeria (PRRINN-MNCH) using resources from the Micro-nutrient Initiative (MI) in Jigawa, Katsina, Yobe and Zamfara.

Output 2 is concerned with the delivery of effective IYCF interventions. For this, materials have been developed based on UNICEF generic IYCF materials. Likewise, a standardised methodology for training was used and implementation is based in 15 PHC facilities, including the five CMAM PHC centres in each of the three WINNN LGAs.

Output 3 is concerned with CMAM and is centred on five PHC facilities that deliver the Out-patient Therapeutic (Feeding) Programme in each LGA, with (at least) one (but occasionally two) referral centres that deliver the In-patient Therapeutic (Feeding) Programme.

Output 4 is related to improving government planning and coordination in nutrition and related sectors at the national and state levels, as well as building a stronger health system, through the integration of direct nutrition interventions into routine health services funded by the government.

Output 4 is key to raising the political profile of undernutrition in Nigeria, and to securing government commitment to address the causes of undernutrition at all levels – local, state and national. Despite a strong nutrition governance framework, with a National Policy on Food and Nutrition and a National Plan of Action on Nutrition in place, political will, commitment and leadership to improve nutrition are lacking. Moreover, the country's weak and fragmented health system is unable to provide basic health and nutrition services at the primary care level. Ultimately, it is expected that the interventions promoted by WINNN will be funded, sustained and expanded by government authorities. For this reason, key LGAs with demonstrated political commitment are being selected, three in each state, to cover a total of 15 LGAs.

The WINNN Programme is being implemented by three implementing partners (IPs): UNICEF, Save the Children International (SCI) and Action Against Hunger (ACF). SCI lead operations in Katsina and Zamfara while ACF lead operations in Jigawa, Kebbi and Yobe. It is important to note that, due to the level of insecurity in Yobe, the ORIE project does not conduct any research in this state due to the level of security infrastructure that would be required to support research teams.

1.2 The ORIE component

The fifth output of the WINNN Programme is a project in and of itself called ORIE, which is run by a consortium independent of the three IPs. The acronym 'ORIE' stands for Operations Research and Impact Evaluation. The ORIE consortium is responsible for undertaking operations research and assessing the impact of the WINNN Programme. It is managed by Oxford Policy Management (OPM) and consists of three other UK-based institutions – the London School of Hygiene and Tropical Medicine (LSHTM), the Institute of Development Studies (IDS) and Save the Children UK (SCUK) – in conjunction with four Nigerian partners: the University of Ibadan, Kaduna Polytechnic, Ahmadu Bello University at Zaria (ABU), and Food Basket Foundation International (FBFI).

The ORIE project began on 21 February 2012 and had an inception phase of six months to finalise the designs of its various workstreams. The project will run for five years until 20 February 2017. The original terms of reference for the ORIE component are presented in Annex A and more detail on the ORIE project as a whole can be found in the ORIE Technical Proposal and ORIE Inception Phase Reports – Volumes 1 and 2.

The overall purpose of ORIE is to 'fill important gaps in knowledge about the causes of and optimal responses to undernutrition in Northern Nigeria' (WINNN logframe: Output 5). ORIE outputs have been designed to improve the delivery of nutrition services by integrating research and evaluation findings into WINNN Programme implementation and to influence Nigerian policy and practice via the dissemination and uptake of research and evaluation evidence.

ORIE is composed of six workstreams:

1. Operations research;
2. Impact evaluation (using quantitative and qualitative methods);
3. Economic evaluation;
4. Cohort study to investigate the underlying determinants of stunting;
5. Evidence dissemination and uptake; and
6. Nutrition research.

1.3 Who this report is for and associated research products

This report constitutes the baseline report of the quantitative impact evaluation of the WINNN Programme. This report is the primary technical reference for the study design, implementation and baseline analysis and will serve as the point of comparison for the final impact analysis. While the report contains a lot of technical detail, every effort has been made to ensure it is accessible to the non-technical reader.

The primary users of the baseline report fall into three categories. The first being the WINNN Programme as there are a number of findings that may have important implications for WINNN Programme implementation. These are discussed in section 8. Further, the WINNN Programme might consider the findings of the baseline report to update and / or triangulate point estimates for key impact and outcome indicators in the WINNN Programme logframe.

The second category of users include civil society, the research community in Nigeria and indeed globally, and the donor community. The baseline study provides the most recent update on number

of nutrition, health and welfare indicators in Northern Nigeria. For example, the data might be useful for the design of the DFID-funded Child Development Grant Programme and its evaluation which is expected to operate in Jigawa and Zamfara.

Finally, the third category of users of this report include federal, state and local governments. Data from the baseline can be used to expand the contextual information of challenges that remain to be overcome in Northern Nigeria as well as serve as an evidence base to make policy and programme decisions.

In addition to the main technical report presented here, all data and associated reports will be made available in the public domain to better serve the three sets of users mentioned above. The Evidence Dissemination and Uptake (EDU) workstream of the ORIE Project will produce a condensed version of the main technical report that is easier to access.

Findings from the main report and the condensed report will be presented in a 3-day learning event currently schedule for April 26-29, 2014 in Abuja with representatives from all of the end-user groups identified above.

1.4 Structure of this report

This report constitutes the baseline report of the quantitative impact evaluation of the WINNN Programme. The report is structured as follows: **Section 2** presents the impact evaluation design, sampling strategy, sample size and overview of the data-collection processes. Limitations of the design and its risks are also discussed in this section. **Section 3** provides a generic orientation to the conventions used in presenting and interpreting findings throughout the report. The characteristics of communities and households are first presented in **Section 4**, which is then followed by findings related to maternal characteristics in **Section 5**. **Section 6** contains findings as they relate to young children. This includes key IYCF indicators as well as anthropometric measurements. The community and household's experience of the elements of the WINNN Programme are presented in **Section 7**. Finally, a discussion of salient findings including implications for policy and the WINNN programme are presented in **Section 8.**

2 Methods

2.1 Overall impact evaluation design

The overall approach to the impact evaluation is to utilise a mix of quantitative and qualitative methods to arrive at a complete assessment of the impact of the WINNN Programme as a whole. The impact of individual interventions – as technologies – will not be assessed as there already exists an extensive evidence base for these interventions (Bhutta et al., 2008 and 2013; Longhurst et al, 2013). The precise combination of methods to be used for assessing the impact of the WINNN Programme will vary according to each output so as to capitalise on the strengths of each method.

For simplicity, the WINNN outputs can be divided into two broad categories: interventions that are focused at the level of the LGA (Outputs 1 and 2) and interventions that are focused at the level of the state and federal governments (Outputs 3 and 4). The level at which the intervention is focused determines the precise combination of methods used in the impact assessment.

For outputs focused at the level of the LGA (Outputs 1 and 2), the impact assessment will be based on both quasi-experimental techniques relying on data from population-based quantitative surveys and qualitative methods. On the other hand, the outputs focused beyond the level of the LGA (Outputs 3 and 4) will solely rely on qualitative methods of impact assessment and analysis of secondary data. A more comprehensive discussion of the impact evaluation methodology is presented in the ORIE Inception Report (OPM et al., 2012). The table below summarises the overall approach to the impact evaluation of the WINNN Programme.

Table 2-1 WINNN impact evaluation structure

	Qualitative methods and secondary data analysis	Quasi-experimental methods
Interventions focused at the level of the LGA		
Output 2 – IYCF	●	●
Output 3 – CMAM	●	●
Interventions focused at the level of the state and federal governments		
Output 1 – micro-nutrients	●	
Output 4 – govt. planning and coordination	●	

As indicated above, this report is the baseline study of the quasi-experimental component of the overall impact evaluation of outputs 2 and 3 of the WINNN Programme. The qualitative baseline report is presented as a separate document as it is an institutional baseline that is primarily focussed at the federal, state and local government levels, whereas the quantitative baseline report is focussed on households and communities. It was thus decided that these two baselines would best be presented as independent reports. As per the impact evaluation design outlined in the ORIE Inception Report, the qualitative component of the impact evaluation workstream will include a greater focus on community and household level impacts in the endline study and therefore will be integrated with the quantitative endline study at that time.

2.2 Quasi-experimental design

The quantitative impact evaluation uses a quasi-experimental design in which the WINNN interventions as a package are evaluated against the counter-factual of no intervention. The study uses a panel of households that are surveyed at the baseline and then again at the endline after three years of programme implementation to arrive at an estimate of impact.

The study compares two study groups:

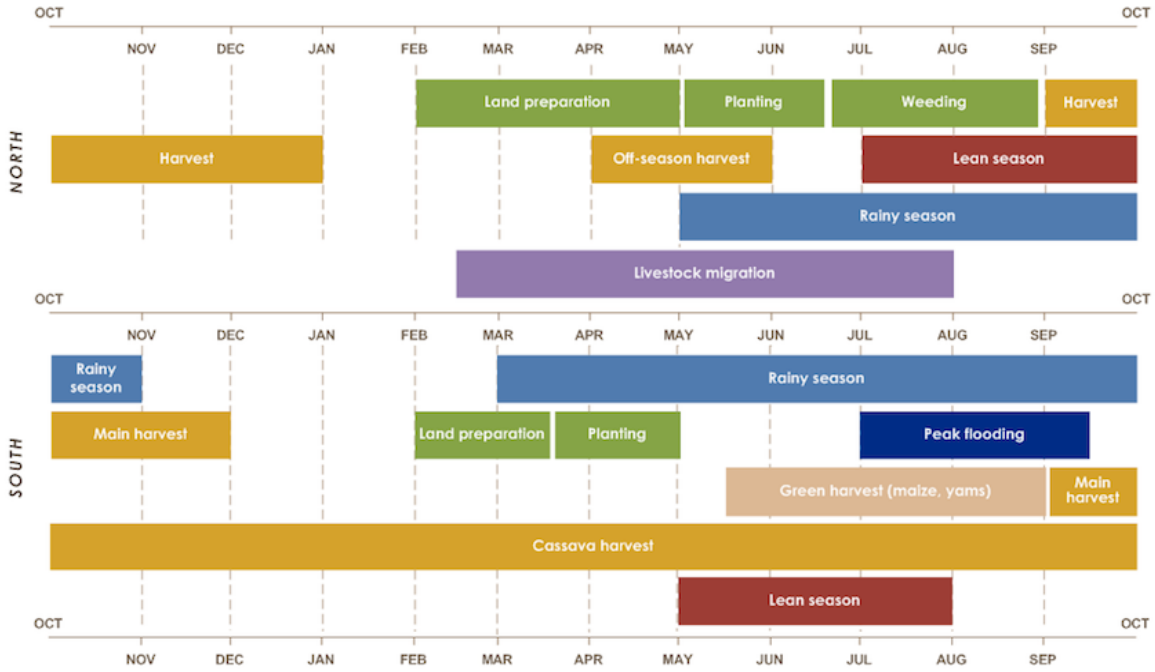
- The treatment group
    - The WINNN interventions are delivered in three LGAs per state across four states, making a total of 12 treatment LGAs.
    - The WINNN interventions include IYCF (Output 2) and CMAM (Output 3):
        - The IYCF intervention is based on the standard UNICEF materials adapted for Nigeria and approved by the federal government. This intervention uses facility-based, outreach and mother-group models to deliver IYCF messages.
        - The CMAM intervention delivers an out-patient therapeutic feeding programme linked to referral centres that deliver an in-patient therapeutic feeding programme.
- The control group
    - The control group is comprised of 12 LGAs that were matched to the treatment LGAs based on a number of observable characteristics (see Section 2.2.4 below).

The underlying justification for using a matched control design is that treatment LGAs were purposefully selected by the WINNN Programme and state governments before the ORIE component became involved in the WINNN Programme. Therefore, random assignment of treatment and control status throughout the study area was not possible. Hence, a matching exercise was undertaken in order to identify an equivalent number of control sites within each state.

2.2.1 The baseline and endline surveys

As both WINNN and ORIE are only set to be implemented until early 2017, the time between the baseline and the endline survey is set at three years so as to maximise the exposure of the treatment group to the intervention while balancing the need to conduct the baseline and endline surveys in the same period of the year. The baseline was conducted in June 2013 and the endline will be conducted in June 2016. As indicated in the figure below, the surveys coincide with the beginning of the rainy season when planting is taking place and just before the lean season when households are more likely to have low food stock levels and experience localised food shortages. As such, the impact evaluation is designed to assess the impact of the WINNN Programme interventions when households are approaching their most vulnerable period within a year. Conducting the baseline and endline surveys in the same month will effectively minimise any variation in impact indicators due to seasonal variations.

Figure 1: Seasonal calendar



Source: http://www.fews.net/west-africa/nigeria

As a number of key indicators are influenced by the season, such as anthropometry and food security, any comparison of the baseline findings to other surveys must be careful to take into account any variations driven by seasonal effects.

2.2.2 Ethics approval, confidentiality and data sets

The overall study design of the ORIE quantitative impact evaluation workstream and all questionnaires and protocols were submitted to the National Health Research Ethics Committee of Nigeria for ethical review and approval. Formal approval was received in May 2013, after which data collection began.

Permission to carry out the survey was sought from all respondents by means of a consent form that was read to the respondent in their translated into the local language. Respondents were informed of the nature of the study, what would be required of them as study participants as well as an indication of the time that would be required to complete the survey. It is important to note that no incentives were given to respondents for participation in the study as this is the common practice with such social research studies in Northern Nigeria.

All personal data collected as part of this survey are stored securely within the ORIE office in Abuja, are only available to authorised individuals for analytical purposes and are handled with data protection best practices. Each respondent has been assigned a unique identifier that is used to analyse the data by group characteristics such as age bands and gender. All meta-data related to the baseline study will be made available after final approval of the baseline report. This includes analytical syntax, raw data and cleaned data that have all been anonymised by removing personal information that could be used to identify respondents.

2.2.3 Key impact indicators

The study was designed in line with the impact and outcome-level indicators defined in the WINNN Programme logframe. In terms of impact-level indicators, the WINNN logframe includes:

1. Under-5 mortality
2. Under-5 prevalence of acute malnutrition
3. Under-5 prevalence of underweight
4. Under-5 prevalence of stunting

It is important to note that under-five mortality cannot be assessed through a quasi-experimental impact evaluation study as the sample size required to measure this accurately in the treatment and control populations is very large. This is described in detail in the ORIE Inception Report and it is indicated in the WINNN logframe that the NDHS and Standard Monitoring and Assessment of Relief and Transition (SMART) surveys will be used to populate this indicator in the logframe.

In terms of the three anthropometric impact-level indicators (2, 3 and 4 above), the quantitative impact evaluation will be able to provide robust estimates of impact but for a narrower age range. Given the nature of the WINNN interventions, the largest impact window will be in the first 1,000 days from the start of a woman's pregnancy until the child's second birthday. Because the age of young children is notoriously difficult to assess accurately, the ORIE sample of children has been optimised to include a sufficiently large sample of children within the slightly larger window of 0–35 months in order to be better able to detect the impact of the programme (see Annex C for more details on power and minimum detectable effect calculations).

In terms of outcome-level indicators, the WINNN logframe includes:

1. Proportion of children aged 6–59 months who received Vitamin A supplementation in the last six months during MNCH weeks;
2. Proportion of infants aged 0–6 months who are exclusively breastfed;
3. Proportion of children aged 6–23 months who receive foods from four or more food groups in target LGAs;
4. Recovery rate (CMAM); and
5. Number of states with budget line for nutrition that is funded and at least 30% released.

The ORIE impact evaluation will be used to assess impact against Outcomes 1, 2 and 3, with the age range being for children aged 0–35 months for outcome indicator 1 (as explained above). Outcome indicators 4 and 5 remain outside of the remit of the impact evaluation and will be assessed using data from the WINNN Programme itself and budget data provided by state governments and reported on by other workstreams within the ORIE project.

In addition to the indicators defined in the WINNN logframe, the impact evaluation includes a number of key indicators, some of which are presented in the table below (see Annex D for a full list of key indicators and their definitions):

Table 2-2 Key indicators included in the impact evaluation	
Categories	**Indicators**
Anthropometric	Percentage of children stunted (aged 0–35 months)
	Percentage of children underweight (aged 0–35 months)
	Percentage of children wasted (aged 0–35 months)
	Percentage of children severely wasted (aged 0–35 months)
IYCF practices	Proportion of children born ever breastfed
	Age-appropriate breastfeeding
	Early initiation of breastfeeding (<1h)
	Early initiation of breastfeeding (<24h)
	Exclusive breastfeeding among children aged < 6 months
	Minimum meal frequency (aged 6–23 months)

2.2.4 Identifying the control group

The gold standard in impact evaluation is to randomly allocate treatment and control status to produce two evaluation groups that have a high probability of being statistically identical – so long as the number of study locations is sufficiently large. Furthermore, random assignment will minimise any biases in the assessment of impact due to the effect of other health and social welfare interventions that are concurrently implemented in the state.

As ORIE was not able to influence where the WINNN Programme was implemented, special consideration was given to the selection of the control group so as to strengthen the robustness of the impact analysis. Three options were considered: (1) a control group in another non-WINNN state in Northern Nigeria; or a control group within the WINNN state, either at (2) the level of the LGA or (3) the level of the Ward. As states in Nigeria are autonomously governed, large differences often exist between them. Therefore, the study required a control group within each of the WINNN states. After discussions with WINNN, it was clear that the interventions were intended to be implemented at the level of the LGA; thus, this effectively determined that the control group needed to be selected at the same level.

The control LGAs were matched to treatment LGAs on a number of observable characteristics, including:

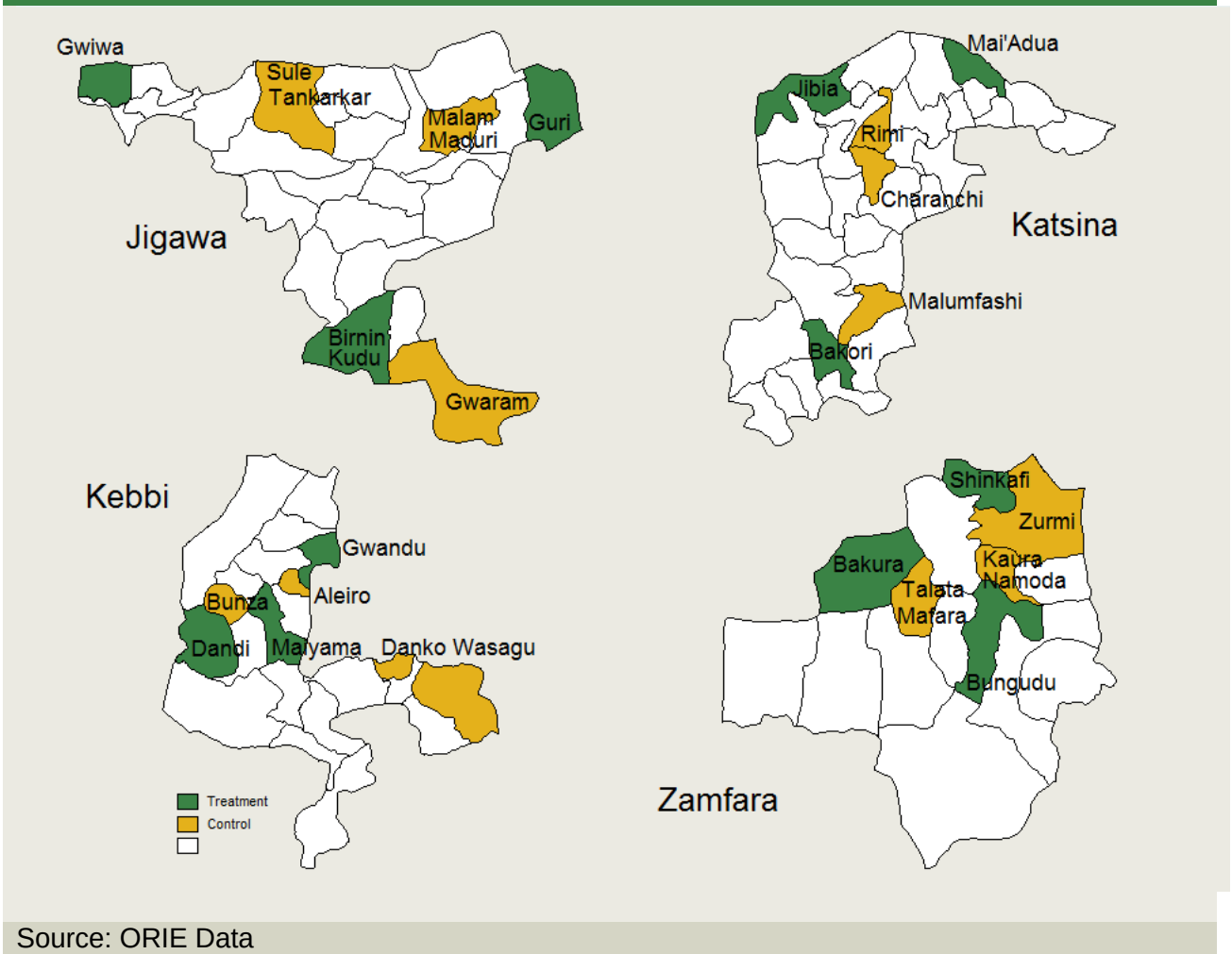
- Being in the same state as the treatment LGA;
- Number and type of health facilities;
- Population density;
- Type and number of health care staff in each LGA;
- Types of health services offered in each LGA; and
- Geographical latitude and longitude.

The exact number of characteristics used in matching depended on the availability of data for both treatment and non-treatment LGAs. Matching was implemented by calculating a dissimilarity measure between the treatment LGA and all other non-treatment LGAs within the same state. However, all LGAs where CMAM operations that pre-existed the WINNN Programme were being

implemented were excluded from the matching procedure and the analysis, in order to prevent contamination of control areas with non-WINNN interventions.

Based on these measures and criteria, a set of closely matched LGAs were chosen as controls to previously identified treatment LGAs, which were then shared with the WINNN Programme and respective state governments for validation. A graphical overview of treatment and control LGAs is presented below in Figure 2 along with the assignment of treatment and control status in Table 2-3.

Figure 2: Treatment and control LGAs in Jigawa, Katsina, Kebbi, and Zamfara



Source: ORIE Data

Table 2-3 LGA designation

	Jigawa	Katsina	Kebbi	Zamfara
Treatment LGAs	Birnin Kudu	Bakori	Dandi	Bakura
	Guri	Jibia	Gwandu	Bungudu
	Gwiwa	Mai'Adua	Maiyama	Shinkafi
Control LGAs	Gwaram	Charanchi	Aleiro	Kaura Namoda
	Malam Maduri	Malumfashi	Bunza	Talata Mafara
	Sule Tankarkar	Rimi	Danko Wasagu	Zurmi

2.2.5 Estimating impact

As described above, the quasi-experimental design will estimate the 'collective' impact of the WINNN Programme. This means the impact of the CMAM and IYCF interventions that are being implemented across all four states will be pooled in order to arrive at an overall estimate of the impact of the programme.

Despite using matching techniques to select control LGAs, the study groups may still be intrinsically unbalanced as this is something that can only be avoided when there is random assignment of the treatment. Furthermore, selection into the 'treatment' may be based on un-observable time-invariant characteristics. Therefore, difference-in-difference methods will be used on a panel of households to effectively remove this influence.

To further refine the impact estimate, the study will focus on children within the age range of 0–3 years old, as the CMAM and IYCF interventions are likely to have the greatest impact on key nutrition indicators within this age window. The final difference-in-difference impact model will rely on matching (via age) children interviewed at baseline with their siblings measured at follow-up who will have been exposed to the WINNN intervention since birth.

We intend to use the ITT estimate as this will tell us the impact of the programme on our target population regardless of whether or not they actually received treatment. It averages the effect of those who accepted the offer of treatment with those who did not receive the offer of treatment. This is an important impact estimator when trying to determine the impact of the programme in a 'real world' scenario. Please refer to Annex G for the impact estimation model.

2.2.6 Definition of the household

In order to boost the number of children under three years old in the study sample, a slightly different definition of a household compared to that used in the NDHS and Nigeria Living Standards Measurement Study (NLSMS) was used. The definition of the household used in the current survey is 'a person or group of related or un-related persons that live together in the same dwelling unit and acknowledge one adult male or female as the head of the household'. The NDHS, on the contrary, defines a household as 'a person or a group of persons, related or un-related, who live together and share common cooking and eating arrangements' (NDHS, 2008, p.11). In Northern Nigeria, polygamous households are common and a man married to four wives would have each wife living in separate, and often detached, living quarters with their respective children. As such, the NDHS definition of a household would classify this one family as four separate households, whereas the household definition used in this study classifies them as one household.

2.2.7 Sampling strategy

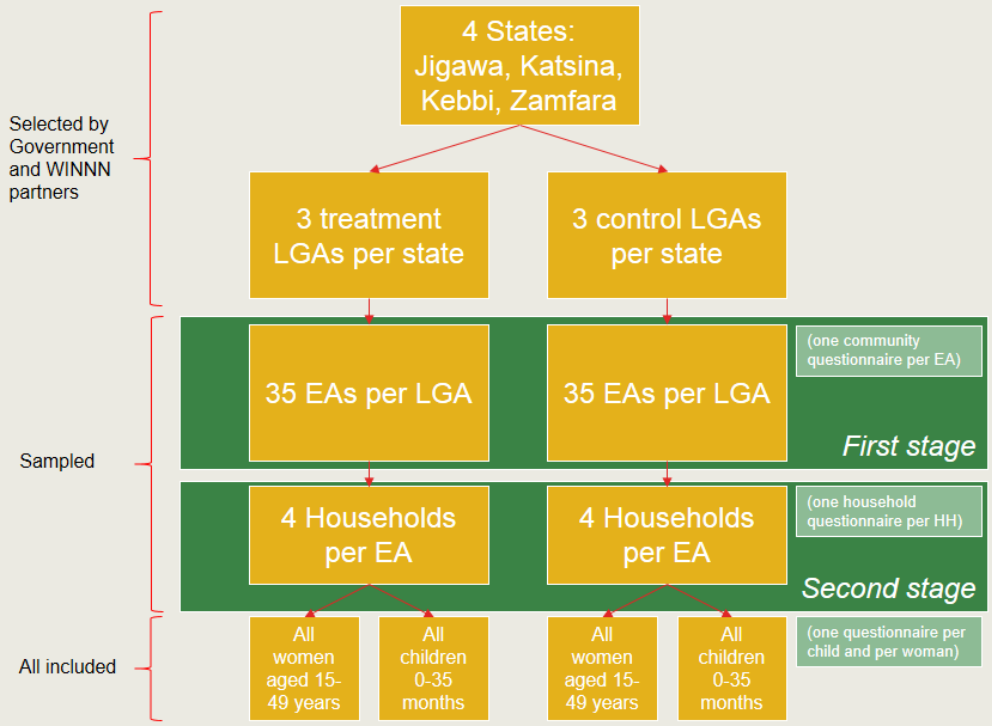
The sampling strategy used to collect data for this study was a multistage random sampling method. As previously explained, treatment was not allocated randomly to LGAs. Rather, state officials and WINNN IPs selected certain LGAs for treatment. Hence, control LGAs were also not chosen at random, but matched to the treatment LGAs based on a list of observed variables (see Section 2.2.4 for more information on the selection of controls). In each state, three treatment and three control LGAs were selected for this study.

Within this total number of 24 LGAs, the primary sampling units (PSUs) were Enumeration Areas (EA) as defined by the 2006 Nigerian Census. In the context of this report, these EAs are referred to as 'communities'. A sampling frame was not available at the outset of the evaluation. Hence, a list of all EAs across treatment and control LGAs was prepared. Thirty-five EAs were then sampled per LGA using a random draw, with each EA in the same LGA having the same probability of being selected. This is the first stage of sampling.

The second sampling stage occurred within each EA, where households with at least one child under the age of three were sampled. Section 2.2.5 explains why the study focused on children under the age of three and Section 2.2.6 gives the household definition used in this study. Where a sampled EA did not contain at least 10 households with at least one child under the age of three, an adjacent EA was linked to it. Within each EA, a listing exercise was conducted during which a census of all households was collected. Detailed maps of the EA were prepared to enable the baseline and follow-up survey teams to identify sampled households.

A random sample of households was independently drawn and provided to the baseline survey team. In total, four households were sampled per EA, thus making a total of 3,360 households throughout the study (4 households per EA * 35 EAs per LGA * 6 LGAs per state * 4 states). In addition to the sampled households, the baseline survey team was also provided with a randomised list of potential replacement households within each EA (see Figure 3 below and Annex C for more details).

Figure 3: Sampling strategy



Source: Authors

2.2.8 Sample size

Sample size and power calculations have been computed for the ITT impact estimator and for some key outcome variables including the prevalence of wasting, stunting and underweight. The sample size of children under three is 3,463 in the treatment group and 3,370 in the control group, making a total of 6,833 children aged 0–35 months in the study. Across 840 clusters (EAs) with an intra-cluster correlation (ICC) of 0.09 for stunting, 0.13 for underweight and 0.02 for wasting, this sample size will be sufficient to detect a decrease in stunting by five percentage points (from 58% to 53%), in underweight by five percentage points (from 41% to 36%), and in wasting by three percentage points (from 16% to 13%).

An overview of the sample breakdown is presented in Table 2-4 below and in more detail in Annex C.

Table 2-4 Sample size by location and treatment status			
	N		
	Full Sample	Treatment	Control
LGAs			
Total	24	12	12
Communities			
Total	840	420	420
Households			
Total	3,355	1,677	1,678
Mothers with children under 3			
Total	5,967	2,993	2,974
Children under 3 years old			
Total	6,833	3,463	3,370

It is important to note that about 3% (N=102) of the households initially surveyed were not included in the present analysis. This was due to two reasons: first, enumerators identified some households as not eligible for the survey as no children under the age of three could be identified at the time of data collection. In this case, a replacement household from the same EA was identified using the sampling data. Second, at the stage of data cleaning, a cleaned child age variable identified some instances where households did not actually include a child under the age of three years. Often, cleaning of the age variable revealed that one child in the household was just over the three-year cut-off by a matter of months and thus not eligible for the study. These households were dropped from the analysis. We do not expect this to have any effect on our overall design as the baseline survey achieved over 99% of the expected sample.

2.2.9 Data collection

OPM collaborated with the Nigerian survey company DRMC to conduct the ORIE listing and baseline surveys. The firm have experience of conducting a number of large-scale surveys and were selected through a competitive tender process. DRMC were engaged early in the design phase of the survey and actively participated in the development of the overall impact evaluation design, survey instruments and protocols. All six directors of the company were closely involved in the baseline preparations and field supervision throughout the data-collection period.

The listing and baseline survey were conducted by two separate and independent teams. State listing teams were recruited from experienced personnel native to Northern Nigeria, with each team consisting of at least one member from the National Bureau of Statistics. Due to reasons of insecurity, OPM consultants could not travel to Northern Nigeria to conduct the training so each state listing team was brought to Abuja for a five-day training programme. This included lectures, role play and two pilots – the first of which was conducted around the training location in Abuja and the second in the state itself before the listing exercise began.

The listing team was trained in Abuja in April 2013 and deployed throughout the study areas in May 2013. Detailed maps of the EAs were prepared to enable the baseline and follow-up survey teams to identify sampled households. Basic household information to identify the household as well as the nature of its composition was collected at this time. In total, 855 EAs were listed and each consisted of approximately 27 households on average. Fifteen EAs had less than 10 households with a child under three, meaning they were ‘linked’ to a neighbouring EA to boost the effective universe from which households could be sampled. Thus, 840 EAs – 15 of which were ‘linked’ to another – were

selected for the study. All listing forms and maps were returned to Abuja where the listing forms were entered using a double data-entry programme developed in CSPRO.

A separate and independent team was recruited for the baseline survey. All interviewers were female, could speak Hausa fluently and had experience of conducting a survey in Northern Nigeria. To the extent possible, interviewers were recruited to work in the state in which they were born or currently lived in. There was one survey team for each of the four states in the survey. Each state team was composed one state team leader, one deputy state team leader and four baseline survey teams. Each baseline survey team consisted of:

- One supervisor;
- Three interviewers (female);
- One anthropometric specialist (female); and
- One driver.

In total, there were 16 supervisors, 48 interviewers, 16 anthropometric specialists and 16 drivers. The survey team was set up in this manner so as to complete the data collection within one month as the survey began in June 2013, which corresponds to the beginning of the rainy season in Northern Nigeria. Prolonging data collection any longer into the rainy season would have made it much more difficult and even made some sampled communities inaccessible due to the washed out roads and flooding frequently reported in the months of July and August. On average, one baseline survey team was able to complete data collection of one EA in one day with the three interviewers splitting the four households per EA sample among themselves.

In an effort to minimise any inconvenience on the part of the respondent and at the same time improve the quality of the data collected, survey teams were trained to schedule interviews according to the preferences of the respondent. On some occasions, this meant that some interviews were conducted over two or more sessions, either on the same day or on the following day, so that interviews could be conducted without rushing through the questionnaire and guaranteeing that the right respondent was available to respond to corresponding sections of the questionnaire.

This team set-up also offered two unique opportunities to enhance the quality of the data collection. The deputy coordinator was selected from among the interviewers as the best interviewer within a state team and was designated the task of conducting re-visits as well as sitting in on ‘live’ interviews to assess interviewer performance and coach them to improve where required.

The second unique feature of this team set-up is the dedicated anthropometric specialist. With this specialist, we were able to ensure that all anthropometric measurements were made by someone who had previous experience of using such equipment and whose sole responsibility was to take accurate measurements. Having a dedicated anthropometric specialist avoided the need for an excessive number of anthropometric kits and eliminated the hurried feeling interviewers typically report when taking anthropometric measurements at the end of a long household interview before rushing off to the next household.

In addition to these ‘intrinsic’ quality assurance mechanisms, a separate and independently hired team of survey consultants within OPM’s wider network in Nigeria were trained and deployed to conduct random spot-checks on the survey teams throughout the survey period. This independent quality assurance team reported directly to OPM every other day.

As with the training for the listing team, the entire baseline survey team was brought to Abuja for a training programme that spanned two weeks. A one-day pre-training course was specially prepared for state team leaders and this was followed by a 12-day training programme for the main survey team. Anthropometric specialists were invited to Abuja in the last four days of the training programme and were given specialist training through a combination of parallel and joint sessions with the interview and supervisory teams. Anthropometric methods were standardised following methods recommended in FANTA (Cogill, 2003). All team members then participated in two 'live pilots' that were conducted in Hausa-speaking surrounding areas of Abuja.

The anthropometric equipment selected for this baseline survey included:

- SECA 213 – Portable stadiometer;
- SECA 417 – Measuring board for mobile use;
- Tanita WB100s – professional weight scales; and
- Standard 5kg weight used for daily calibration of the weight scale.

One questionnaire was administered per household, which included modules on general household characteristics and household members. In addition, separate questionnaires were administered for each child aged 0–35 months and each woman aged 15–49 years in the household. Each child questionnaire was answered by the child's mother or main caregiver. As was specified above, the anthropometric modules of both the children's and women's questionnaires were completed by the anthropometrics specialists.

In addition, one community questionnaire was administered for every EA. EAs were defined by the National Population Commission during the last census and do not necessarily correspond to the communities in which households live in the 'traditional' sense of the word. Nevertheless, the community questionnaire provides enough information on the context in which households are situated. In every EA, the Emir that had oversight over the entire area was sought out to suggest at least two or three prominent members of the community to collectively respond to the community questionnaire. Typical respondents included health professionals, businessmen, government officials and civil servants. It is important to note that all distances in the community questionnaire use the Emir's Palace as the point of reference as this was typically situated in the centre of the community.

The determination of the ages of children can be particularly difficult in this context. As such, a bespoke event calendar was developed for use in this survey. An event calendar is typically used in such contexts to determine the age of the child by asking the child's mother and other members of the household to recall major events that occurred around the time of the child's birth. Such events include religious celebrations, the change in season, local elections and significant events such as the death of an Emir or a plane crash. By knowing the date of a number of significant events that occurred in and around the local community, an interviewer is able to triangulate the month and year that a child was born in. For this survey, an event calendar was produced specifically for Northern Nigeria and was tailored to each community by asking respondents of the community questionnaire to inform the survey team of any significant community-level events – such as when the village flooded. Some households had a vaccination card and even birth certificates, but experience revealed that age determination by event calendar was more accurate as vaccination cards were typically issued to children many months after they were actually born, especially for children not born in a health facility. Birth certificates were even more unreliable as they are typically issued much later due to the administrative and financial costs associated with getting one.

2.2.10 Data entry, cleaning and analysis

Once the data collection and all 'in-field' quality checks were completed, the questionnaires were transported to the ORIE office in Abuja for data entry. All questionnaires were entered using a double-entry program designed in CSPRO by OPM. OPM trained and supervised the data-entry team, which was complemented by the four deputy state team leaders. The role of the deputy state team leaders was to work with the data-entry team in resolving any remaining issues in the questionnaires. The double data-entry program consisted of a number of checks including ranges, values and skips. The data were then sent to a Stata analyst where these checks in addition to logical consistency were verified. Any errors in the data were resolved by referring to the hard-copy questionnaire and confirming the resolution with the deputy state team leader.

All households and individuals are uniquely identified by ID codes assigned at the time the listing survey. All variables were created and analysed in Stata using standardised methods and clear documentation.

The entire analysis was implemented taking into account the sampling structure of the survey. In Stata, the 'svyset' and 'svy' commands, with adequate specification of PSUs and clustering, were used to ensure that all tabulations and graphs incorporated the correct survey set-up and weights. In order to test whether the differences observed between treatment and control groups are significant in a statistical sense, a Wald test adjusted for sampling weights was carried out for each indicator. The hypothesis tested is equality of means, i.e. whether the average value observed in treatment areas is equal to the average value in control areas. The resulting test statistic follows an F distribution, which is used to compute the significance level of the hypothesis test. In the tables, significance levels at which the null hypothesis can be rejected are reported using * for 95%, ** for 99%, and *** for 99.9%. This is the standard test for equality of means used in Stata in a survey environment (see Judge et al., 1985, pp. 20–28 and Korn and Graubard, 1990, for more information). Note that, disregarding weights and clustering in surveys, this test is asymptotically equivalent to a simple t-test.

2.2.11 Limitations and risks of the study

The present study design will allow a difference-in-difference analysis to examine the collective impact of the WINNN-implemented CMAM and IYCF interventions. However, there are some limitations and risks worth mentioning.

First, the quasi-experimental impact evaluation design treats the WINNN intervention as one homogenous intervention. While this is not the case in reality, with SCI implementing in Zamfara and Katsina and ACF implementing in Jigawa and Kebbi, the impact evaluation does not have a sufficiently large sample size to disaggregate results by state to treat the WINNN intervention in any other way. The risk here lies in variable implementation of the CMAM and IYCF interventions. Any implementation failures over the next three years could dilute the overall impact assessed. That said, the intention of the impact evaluation is not to 'test' WINNN interventions as individual technologies but rather to test them as a package of interventions in the real world. As such, any impact or lack thereof will allow us to determine the real impact of these interventions as they are implemented in a Northern Nigerian context. Nevertheless, it will still be important to monitor implementation effectiveness. To a large extent, the Operations Research and Qualitative Impact Evaluation workstreams will be able to monitor this within their scope of work; however, we can identify key indicators from the WINNN Programme's Monitoring and Evaluation system to monitor implementation effectiveness. These include:

- Output 1 (CMAM):

  - Number of CMAM sites set up and maintained
  - Number of children admitted for CMAM
  - Number of children completing CMAM treatment
- Output 2 (IYCF):
  - Number of active IYCF community promoters
  - Number of IYCF dissemination events

Second, the study relies on a panel survey design where there is the risk of attrition. Typically in panel surveys, attrition arises either from the dropping out of participants from the treatment group during the intervention or a failure to collect data from a unit in subsequent rounds of the panel survey. Given that the treatment in this case does not necessarily require households to 'opt in' as treatment status is assigned at the level of the LGA, it is the latter form of attrition that requires special attention. A number of steps have been taken at the baseline to minimise losses to follow-up. These include detailed, hand-drawn maps of EAs where individual households are mapped and labelled to enable the follow-up team to precisely locate the household of the study respondent. The baseline team also collected the GPS coordinates and mobile phone numbers of respondents themselves or of a neighbour if they did not have one.

Third, information collected from respondent mothers/caregivers was based on recall over various time periods. Any recall bias was mitigated through pre-testing of all survey instruments, the use of standardised methodologies and scales, in-depth enumerator training and close supervision of the survey work.

Fourth, the study sample was drawn to provide representative estimates of WINNN Programme areas only and is therefore not representative of Northern Nigeria or indeed of the four states included in the study. This is because the selection of states and LGAs within those states was purposive and not random. For these reasons, the external validity of the study, in a statistical sense, is limited, however it is important to acknowledge that the study findings are still useful.

A number of states in Northern Nigeria, and indeed across the western Sahel, share similar characteristics in terms of seasons, health service provision, cultural practices and beliefs, which might give an indication of what can be achieved elsewhere should such a programme be scaled-up or replicated elsewhere. That said, before any inferences are made to another context, one must interpret the findings from this study in context of how the programme was implemented and its operational effectiveness. Monitoring the effective implementation of the WINNN Programme is the explicit remit of the Operations Research workstream within the ORIE Project and will be summarised in the endline survey when the final impact analysis is presented.

In terms of the implications of the study's findings to Yobe, the fifth WINNN state that remains outside the scope of the ORIE project, it is difficult to make any inferences as the continuing level of insecurity in Yobe makes this a very different operational context than the four WINNN states included in the study. To provide some measure of comparison, the cross-reference tables presented in Annex F include statistics from other surveys for Yobe state when they are available.

Fifth, the quasi-experimental impact evaluation design relies on maintaining a control group throughout the study period. In the context of widespread malnutrition throughout Northern Nigeria, the ORIE project is not recommending the exclusion of control LGAs from any future programmes. Rather, the approach we are recommending is that any expansion of any existing or roll-out of new

nutrition-related programmes be coordinated in a way to preserve the control LGAs as long as possible. In other words, this means trying to roll out future interventions to control LGAs last.

To date, OPM has been working with a number of stakeholders to monitor the implementation of large-scale nutrition-related programmes in Northern Nigeria. For example, OPM is working with DFID in the selection of intervention areas for the recently launched Child Development Grant Programme. Further, OPM is currently working with UNICEF to systematically map existing and future nutrition interventions in the region. Finally, continued awareness raising of the impact evaluation study among federal and state-level governments as well as donors will help to mitigate this risk.

Sixth, it should be noted that the baseline study is not a 'pure' baseline in the sense that data were collected before any interventions were rolled out. The WINNN package of interventions was rolled out in a staggered way such that CMAM was rolled out before IYCF. Roll-out was also not uniform in the sense that the timing and extent of each intervention varied between states. However, given the nature of the impact indicators (stunting, underweight and wasting) we do not expect to see much of an effect from the pre-baseline implementation of these interventions, especially considering the time it will take for interventions of that size and complexity to settle in and become fully functional. Furthermore, using difference-in-difference techniques to estimate impact as described in Section 2.2.5 will effectively mitigate this influencing the final assessment of impact.

3 How to read this report

3.1 The tables

As the treatment of the WINNN intervention was not random, we expect there to be some differences between the treatment and control groups. As described above, any differences between groups at the baseline will be factored out of the impact assessment using difference-in-difference methods. Nevertheless, the baseline results are presented separately for the treatment and control groups as well as for the full sample.

A statistical test is used to assess if there are any real differences between treatment and control areas (see Section 2.2.10). Any differences are marked in the tables with a series of asterisks:

* = significant at the 95% level

** = significant at the 99% level

*** = significant at the 99.9% level

This means that the more asterisks that are shown, the more likely that the observed difference is due to a real difference between the treatment and control groups rather than being due to chance. It is important to note that, where results are not asterisked, this does not mean that there is no difference between the groups but rather that any difference cannot be asserted with such a high degree of confidence (95% or more). Throughout the text, statements of significant differences between the two groups account for the probability that such observed discrepancies could have occurred by chance in 5%, 1%, or 0.1% of the cases.

To give an indication about the precision of estimated values, 95% confidence intervals (CI) are presented for some key indicators in Annex 0. These intervals represent the range within which the true value of the indicator is going to lie with 95% probability.

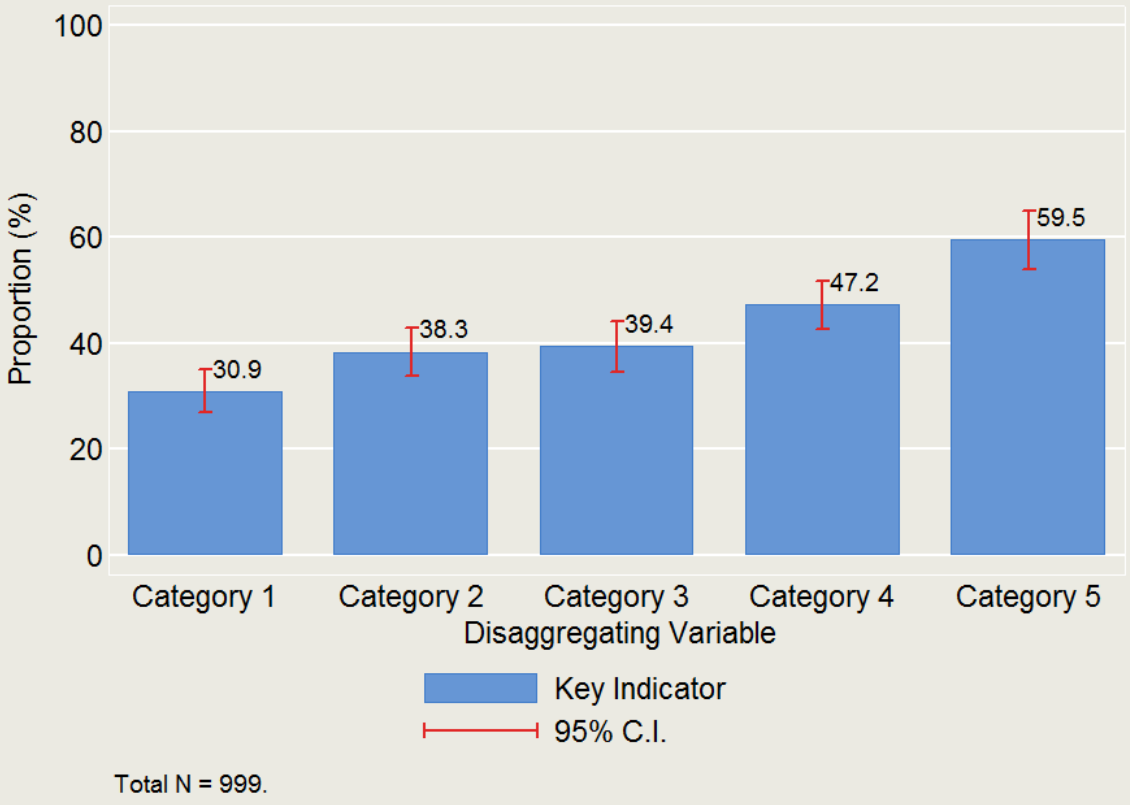
3.2 The ‘N’ value

Immediately below each indicator, the ‘N’ value is presented in brackets as follows: (N). This indicates the un-weighted number of observations in the sample on which that indicator is based. This gives an indication of how certain we can be about the estimate in question. The more respondents that answer a question, the more certain we can be that the estimate is real and that any differences identified are statistically significant.

3.3 The figures

A number of cross-tabulations are presented graphically in the form of a bar chart as displayed below.

Figure 4: Example chart



Source: ORIE Data

This bar chart presents a key indicator disaggregated by the categories of another variable. The mean value of the indicator is presented as a number above the bar and the 95% confidence interval for this estimate is presented by the red line on either side of the point estimate. These are presented for each category. Where the confidence intervals do not overlap, a statistically significant difference at the 95% confidence level or higher exists. However, it is important to state that this is, as with the asterisks in the tables, a probabilistic statement about correlation and not causation. Such observed differences may arise by chance in 5% of the cases, and might be driven by a number of confounding factors, not necessarily by a direct relationship between the indicator and the disaggregating variable.

3.4 Cross-referencing the survey findings

Annex F cross-references key indicators in the baseline with other surveys such as the NDHS 2008, NDHS 2013 (preliminary report), the GHS 2010/11, and the SMART Survey 2012. It is important to note that indicators are not always exactly comparable as there are differences in the definition of the base population for some indicators. The season in which each survey was done is also important to take into consideration when making comparisons. Where baseline indicators are cross-references, a green box is presented in the main text identifying which indicators are cross-referenced in the annex.

4 Characteristics of households and communities

The following section describes the general characteristics of the 840 communities and 3,355 households surveyed in the study. As specified in Section 2.2.9, the community questionnaires were generally answered by two to three prominent members of the community that were selected by the Emir of each EA and who typically were health professionals, businessmen, government officials, or civil servants. Hence, responses to this questionnaire mainly reflect the knowledge and views of a relatively small sample of educated, powerful and largely male informants from the community. It is also important to reiterate that all distances in the community questionnaire use the Emir's Palace as the point of reference, as this was typically situated in the centre of the community.

4.1 Community characteristics

Table 4-1 presents information on the accessibility of communities in the study area. All households were located in rural areas, with over half of them living in communities with a mud or dirt road as the main access route. Only 11% of completed community questionnaires indicated that communities had a tarmac road that was in good condition. Access to hospitals was poor, as for more than 40% of communities travel to the nearest hospital required more than 60 minutes on a one-way journey and over 50% of communities lay outside a 10km radius to these facilities. Access to food markets (not local food shops or informal vendors) was similarly poor, with 68% of communities requiring more than 60 minutes of travel time. Health posts and primary schools could be accessed more easily as these services tended to be located within the community itself or in a neighbouring community and could often be accessed within one-way journey times of 30 minutes or less.

Table 4-1 Accessibility			
	Estimate		
Indicator	Full sample	Treatment	Control
Quality of the main road used to access the community			
Mud / dirt – good condition	15.6	16.6	14.8
Mud / dirt – poor condition	38.6	43.3*	34.7
Compacted stones – good condition	14.2	14.9	13.6
Compacted stones – poor condition	5.6	3.6*	7.2
Tarmac – good condition	10.7	7.6**	13.2
Tarmac – poor condition	4.6	3.7	5.5
Livestock track	2.6	3.6*	1.7
Footpath	5.2	5.5	5.0
Water transport	0.6	0.5	0.7
No road	2.3	0.7**	3.7
Total	100.0	100.0	100.0
	(837)	(417)	(420)
Percentage of communities…			
That lie within 60 minutes of travel time to the nearest general hospital	57.5	57.4	57.5
	(829)	(412)	(417)
That lie within 10 km of travel distance to the nearest general hospital	37.9	38.6	37.4
	(815)	(402)	(413)
That lie within 30 minutes of travel time to the nearest primary school	78.9	79.5	78.4
	(832)	(415)	(417)
That lie within 5 km of travel distance to the nearest primary school	89.8	91.4	88.4
	(825)	(410)	(415)
That lie within 30 minutes of travel time to the nearest health post	63.6	63.4	63.7
	(830)	(412)	(418)
That lie within 5 km of travel distance to the nearest health post	76.4	78.5	74.7
	(816)	(405)	(411)
That lie within 60 minutes of travel time to the nearest market	67.8	67.0	68.4
	(828)	(414)	(414)
That lie within 10 km of travel distance to the nearest market	63.3	62.1	64.4
	(813)	(402)	(411)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Community informants reported that a number of communities had experienced a natural disaster in the last 12 months, with nearly a third of communities having experience of a drought and over half reporting experience of flooding (Table 4-2). Flooding together with the general poor condition of roads limited the number of months that they could be used.

Table 4-2 Community-level shocks in the last 12 months

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of communities…			
That have experienced drought in the last 12 months	33.8	30.9*	36.1
	(838)	(418)	(420)
That have experienced flooding in the last 12 months	53.2	60.5***	47.2
	(839)	(419)	(420)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

4.2 Household demographics

Table 4-3 reports descriptive statistics on household demographics. As discussed in Section 2.2.6, this study used a distinctive definition of households, which resulted in a relatively large average household size of 12.1 individuals with at least one child aged 0–35 months. In addition, households consisted of an average of five adults (18+) and seven minors (0–17 years old). There were two very young children under the age of three years old and nearly three women of reproductive age per household. In general, there were very few elderly household members (aged 65 and above), with an average of one elderly person for every three households.

The demographic dependency ratio measures the number of individuals per household typically in the labour force and those typically not in the labour force (i.e. children and the elderly). Hence, it is a rough indicator of the economic burden on household members who are able to work. As the ratio increases, the more the household is reliant on able-bodied members. In the current survey, the demographic dependency ratio was on average 150 indicating that there were 1.5 dependents for every working-aged person. As there were not many elderly household members, the high value of the ratio was largely driven by the number of children (0–14 years old) in households.

Nearly all households had a male head of household, with only 1% being led by a female. Child-headed households, defined as those with a household head younger than 18, were very rare. The average age of the household head was 49. Only a third of household heads had any formal schooling, with 27% of them having completed primary school or a higher qualification. Quranic education was much more common, with 84% of household heads having completed some Quranic education, although only 2% had attended the integrated Quranic format. Finally, a little more than half of all household heads reported being married in a monogamous relationship (56%), while 43% were in a polygamous marriage.

Table 4-3 Household demographics			
	Estimate		
Indicator	Full sample	Treatment	Control
Household			
Mean number of children (0–12)	6.0	6.0	6.1
	(3,355)	(1,677)	(1,678)
Mean number of minors (0–17)	7.1	7.0	7.1
	(3,355)	(1,677)	(1,678)
Mean number of adults (18+)	5.0	5.0	5.0
	(3,355)	(1,677)	(1,678)
Mean number of elderly (65+)	0.3	0.3	0.4
	(3,355)	(1,677)	(1,678)
Mean household size	12.1	12.1	12.2
	(3,355)	(1,677)	(1,678)
Mean dependency ratio (individuals 0–14 + 65+ / individuals 15–64) X 100	145.5	145.9	145.2
	(3,354)	(1,677)	(1,677)
Mean number of children under the age of 3	2.0	2.0	2.0
	(3,355)	(1,677)	(1,678)
Mean number of women of reproductive age (15–49)	2.5	2.5	2.5
	(3,355)	(1,677)	(1,678)
Household head			
Type of household head			
Percentage of male-headed households	99.1	99.2	99.0
	(3,315)	(1,657)	(1,658)
Percentage of female-headed households	0.9	0.8	1.0
	(3,315)	(1,657)	(1,658)
Percentage of elderly-headed households	17.0	16.9	17.2
	(3,308)	(1,657)	(1,651)
Percentage of child-headed households (under 18 years old)	0.1	0.2	0.0
	(3,308)	(1,657)	(1,651)
Mean age of household head	49.1	48.8	49.3
	(3,345)	(1,674)	(1,671)
Percentage of household heads that have any schooling	33.3	33.2	33.3
	(3,333)	(1,667)	(1,666)
Percentage of household head has any Islamia education	84.0	82.8	85.1
	(3,335)	(1,670)	(1,665)
Formal educational attainment of household head			
No education	66.8	66.8	66.7
Nursery	0.2	0.1	0.3
Primary incomplete	5.8	6.6	4.9
Primary complete	8.1	8.2	8.0

Table 4-3 Household demographics			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Junior secondary	3.7	3.9	3.5
Senior secondary	8.5	8.3	8.6
More than secondary	7.1	6.2	8.0
Total	100.0	100.0	100.0
	(3,333)	(1,667)	(1,666)
Quranic educational attainment of household head			
No education	16.0	17.2	14.9
Quranic	81.6	80.1	83.0
Integrated Quranic	2.4	2.7	2.1
Total	100.0	100.0	100.0
	(3,335)	(1,670)	(1,665)
Marital status of male household heads			
Married (monogamous)	55.9	57.8	54.2
Married (polygamous)	43.3	41.5	44.9
Divorced/separated	0.3	0.2	0.3
Never married	0.3	0.3	0.2
Widowed	0.3	0.2	0.5
Total	100.0	100.0	100.0
	(3,275)	(1,640)	(1,635)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Cross-reference: Household demographics

See Annex F.1 for key household demographic indicators compared to other surveys in Nigeria. These include:

- Female household headship rates
- Educational attainment of household heads
- Demographic dependency ratios

4.3 Housing attributes and wealth

Nearly two-thirds of households (65%) in the study did not have access to electricity at home, either by means of a generator or able to access the electrical grid (Table 4-4). The typical home was constructed of a mud floor (63%), corrugated iron sheets for a roof (56%), and walls made of earth (30%) or cement bricks (24%). Typically, there were between one and four rooms in households (70%) that were used for sleeping, resulting in an average of four bedrooms per household. Table 4-4 also shows that almost all cooking was done outside of the home (87%) and that firewood was used as the primary cooking fuel (91%).

Table 4-4 Housing characteristics			
	Estimate		
Indicator	Full sample	Treatment	Control
Percentage of households that have access to electricity	35.3	38.3	32.7
	(3,336)	(1,668)	(1,668)
Flooring material			
Earth / sand / mud	61.2	65.7***	57.1
Dung	0.3	0.4	0.3
Wood plants	0.5	0.3	0.7
Parquet / polished wood	0.1	0.1	0.0
Vinyl / asphalt strips	0.0	0.1	0.0
Ceramic tiles	0.4	0.3	0.5
Cement / concrete	37.3	32.9***	41.3
Other	0.2	0.3	0.2
Total	100.0	100.0	100.0
	(3,349)	(1,674)	(1,675)
Roof material			
No roof	1.5	2.8***	0.3
Mud/ mud bricks	24.5	19.4***	29.2
Thatch	13.3	14.4	12.2
Sod	1.0	1.1	0.9
Palm / bamboo	1.9	3.0***	0.9
Wood planks / beams	1.0	1.4	0.7
Cardboard	0.3	0.0***	0.5
Metal / corrugated iron sheets / zinc	55.4	56.6	54.3
Calamine / cement fibre	0.1	0.1	0.1
Ceramic tiles	0.0	0.1	0.0
Cement	0.1	0.1	0.0
Roofing shingles	0.6	0.7	0.5
Other	0.4	0.3	0.5
Total	100.0	100.0	100.0
	(3,348)	(1,675)	(1,673)
Wall material			
No walls	0.2	0.2	0.2
Cane / palm / trunks	3.9	5.3*	2.6
Earth	29.6	26.4**	32.4
Bamboo with mud	16.4	15.5	17.3
Adobe (sun baked bricks)	22.6	28.2***	17.4
Re-used wood	1.5	2.1*	0.9
Wood	0.0	0.0	0.0
Cardboard	0.1	0.2	0.1
Stone / bricks / cement blocks / cement	23.9	20.2**	27.3
Other	1.8	1.9	1.8
Total	100.0	100.0	100.0
	(3,349)	(1,674)	(1,675)
Rooms used for sleeping			
1 – 2	32.2	33.7	30.9
3 – 4	38.0	39.0	37.1

Table 4-4 Housing characteristics			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
5 – 6	16.1	14.9	17.2
7 – 8	8.1	7.3	8.8
9 – 10	1.5	1.4	1.6
10+	4.1	3.8	4.5
Total	100.0	100.0	100.0
	(3,274)	(1,639)	(1,635)
Average rooms used for sleeping	3.9	3.8*	4.0
	(3,274)	(1,639)	(1,635)
Cooking fuel			
Electricity	0.2	0.1	0.3
Gas	0.0	0.0	0.0
Kerosene stove	1.4	1.1	1.5
Coal / lignite / charcoal	0.3	0.3	0.4
Fire wood	91.4	89.7**	92.9
Straw / shrubs / grass	6.7	8.8***	4.8
Total	100.0	100.0	100.0
	(3,334)	(1,667)	(1,667)
Percentage of households that cook indoors (confirmed by direct observation)	22.6	19.6**	25.4
	(3,343)	(1,672)	(1,671)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Table 4-5 presents the responses to questions on people's ownership of common household items. Almost three-quarters of all households (73%) owned a radio. Moreover, mobile phone penetration in Northern Nigeria is quite high and thus ownership of a mobile phone was similarly high at 73%. Unsurprisingly, televisions and refrigerators were uncommon. Nearly half of households (45%) owned a motorcycle or scooter and 36% owned a bicycle. Very few households owned other vehicles such as cars, trucks, or boats and canoes. The rate of any livestock ownership was 60% on average and nearly all households (92%) owned agricultural land.

Table 4-5 Asset ownership			
	Estimate		
Indicator	Full sample	Treatment	Control
Percentage of households that own…			
Household effects			
Radio	72.5	73.4	71.8
	(3,351)	(1,675)	(1,676)
Television	18.1	17.5	18.7
	(3,351)	(1,675)	(1,676)
Mobile phone	72.4	69.1**	75.5
	(3,347)	(1,672)	(1,675)
Refrigerator	8.0	8.0	8.0
	(3,351)	(1,675)	(1,676)
Modes of transport			
Canoe	0.6	0.7	0.5
	(3,349)	(1,675)	(1,674)
Bicycle	36.4	36.3	36.4
	(3,351)	(1,675)	(1,676)
Animal drawn cart	18.9	22.7***	15.3
	(3,351)	(1,675)	(1,676)
Motorcycle / scooter	45.3	44.3	46.2
	(3,351)	(1,675)	(1,676)
Car / truck	7.9	8.4	7.5
	(3,351)	(1,675)	(1,676)
Boat with a motor	1.4	2.2**	0.7
	(3,350)	(1,674)	(1,676)
Land and animals			
Agricultural land	92.0	92.3	91.7
	(3,349)	(1,675)	(1,674)
Farm animals	60.9	63.5*	58.5
	(3,348)	(1,674)	(1,674)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

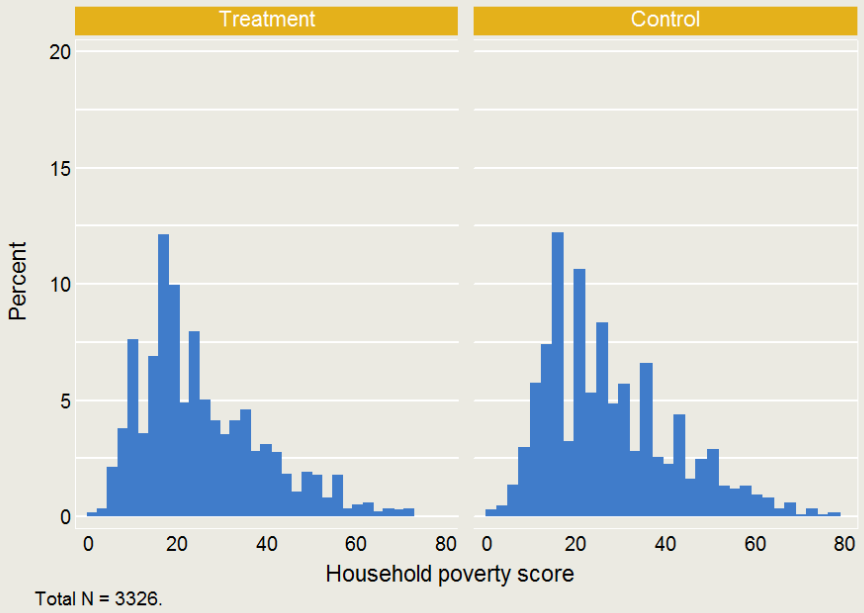
The household questionnaire also asked about the economic activities of the head of the household – if they were engaged in any business activity or any other paid activity outside the household, either for cash or in-kind payment. Nearly half of households (48%) had a household head that was working in farming or herding for subsistence, which underlines the importance of smallholder farming in the region (Table 4-6). The second most important category of economic activity was running a business (32%). Only about a tenth of all household heads were employed in paid work (11%) and a very small proportion reported not working or being inactive (1%).

Table 4-6 Economic activity of head of household			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Occupation			
Farming/herding mainly for subsistence	48.1	46.7	49.3
Commercial farming/herding to sell produce	7.2	9.2***	5.5
Paid work	11.2	11.0	11.4
Own business	31.6	31.2	32.0
Not working or inactive	1.4	1.4	1.4
Others	0.5	0.6	0.4
Total	100.0	100.0	100.0
	(3,350)	(1,675)	(1,675)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Table 4-7 presents information on household wealth, including a distribution of households according to a simple non-monetary wealth index. This index is based on a methodology developed by Chen (2008) and combines information on household size, household composition, housing characteristics, water and sanitation characteristics, and asset ownership to a simple additive score with a maximum value of 100. As explained in the methods section above, the household definition in this survey differs from the more common definition used in the NLSMS and results in a larger household size than expected. Therefore, the wealth index created here is only internally valid and thus only used for comparisons within the household survey sample.

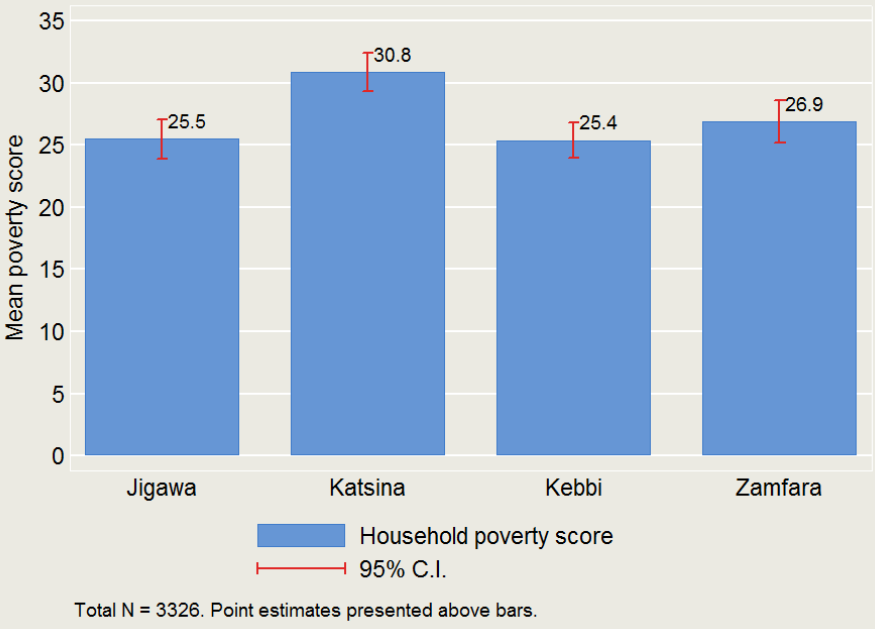
When using this index, households only scored an average of 27 points. Figure 5 below shows that the distribution of wealth scores is generally skewed to the left, that the vast majority of households score below 40 points, and that the distribution is relatively equal across treatment and control areas. In addition, Figure 6 shows that there were no large differences across Jigawa, Katsina, Kebbi, and Zamfara states. However, even though the absolute difference was not large, households in Katsina scored significantly higher – i.e. were significantly less poor – than in the other three states.

Figure 5: Distribution of households' wealth scores by treatment status



Source: ORIE Data

Figure 6: Mean poverty score by state



Source: ORIE Data

Typically, rural households have other sources of income in addition to that generated by their main economic activity. These sources include formal government sources and informal NGO-based transfers. However, when households were asked if they had received any monetary transfers either through governmental or non-governmental sources, just less than 2% of respondents reported receiving any in the last 12 months. Among those that did receive a transfer, about 64% received transfers in the last 12 months that amounted to NGN 10,000 or more.

The household questionnaire also investigated the level of community involvement using participation in local associations and groups as a proxy indicator for general engagement in the community. Only 33% of households had a head that regularly participated in local groups and associations.

Table 4-7 Access to formal / informal transfers, safety nets and wealth

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Wealth quintile			
Lowest	21.4	21.3	21.5
Second	18.7	20.6*	17.0
Middle	20.5	20.2	20.7
Fourth	20.2	19.9	20.4
Highest	19.3	18.0	20.5
Total	100.0	100.0	100.0
	(3,326)	(1,665)	(1,661)
Mean household poverty score	27.2	26.7	27.7
	(3,326)	(1,665)	(1,661)
Percentage of households that have received a government or non-government transfer in the last 12 months	1.7	1.7	1.8
	(3,230)	(1,603)	(1,627)
Percentage of households that received NGN 10,000 or more in transfers in the last 12 months+	64.2	62.7	65.8
	(59)	(30)	(29)
Percentage of households where household head participates in local groups / associations	32.9	34.4	31.5
	(3,296)	(1,653)	(1,643)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
+Indicator calculated for households that received cash grants only.

Cross-reference: Household characteristics

See Annex F.2 for a comparison of indicators on household characteristics from this report with other studies in Nigeria. These indicators include:

- Access to electricity
- Flooring materials
- Indoor cooking
- Cooking fuel
- Assets and transport modes

4.4 Household water, sanitation and hygiene

Safe drinking water was not easily available for households in the study area. For instance, only a quarter of all households had access to drinking water on the premises while the vast majority (64%) had to walk up to one hour for a return trip (Table 4-8). In addition, approximately two-thirds of households (60%) used an improved source of drinking water. Following WHO standards, these include piped water into dwelling or yard, public taps, tube wells or boreholes, protected dug wells,

protected springs, and rainwater (JMP, 2013). Similarly, most households did not treat their drinking water (87%) or only used a cloth for straining (7%). Finally, most households stored their water within the household in large covered containers (87%).

Table 4-8 Water

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Source of drinking water			
Non-improved source [+]	40.2	46.8***	34.2
Improved [++]	59.7	53.2***	65.6
Other sources	0.1	0.0	0.2
Total	100.0	100.0	100.0
Time to obtain drinking water (round trip)			
Water on premises	25.3	25.7	24.9
0 – 59 minutes	63.9	62.5	65.2
1 – 2 hours	7.1	7.7	6.6
2 – 4 hours	2.6	2.9	2.3
4 – 10 hours	0.9	1.0	0.9
10 hours or more	0.1	0.2	0.1
Total	100.0	100.0	100.0
	(3,287)	(1,649)	(1,638)
Water treatment prior to drinking			
Not treated	87.4	86.0	88.8
Boil	0.8	0.6	0.9
Add bleach or chlorine	1.8	1.3	2.2
Strain through a cloth	7.0	8.7**	5.5
Strain through a water filter (ceramic, sand, composite)	1.1	1.3	0.9
Solar disinfection	0.1	0.3	0.0
Let it stand still	1.1	0.7*	1.5
Other	0.7	1.2**	0.2
Total	100.0	100.0	100.0
	(3,339)	(1,670)	(1,669)
Percentage of households using an appropriate treatment method (boiling, bleaching, straining, filtering and solar disinfection)	10.8	12.1*	9.5
	(3,339)	(1,670)	(1,669)
Percentage of households with drinking water storage container covered (confirmed by direct observation)	87.4	88.3	86.7
	(3,318)	(1,659)	(1,659)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+] Non-improved sources include: unprotected dug well, unprotected spring, tanker truck / cart with small tank, surface water
[++] Improved sources include: piped into dwelling, public tap / stand pipe, tube well or borehole, protected dug well, protected spring, rainwater

Table 4-9 Household sanitation facilities			
	Estimate		
Indicator	Full sample	Treatment	Control
Type of toilet facility			
Flush / pour flush	3.8	4.0	3.6
Pit latrine	78.2	78.2	78.1
Bucket	0.0	0.0	0.0
Hanging toilet / latrine	0.3	0.1*	0.5
No facilities / bush / field	17.7	17.7	17.8
Total	100.0	100.0	100.0
	(3,343)	(1,672)	(1,671)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

As with safe drinking water availability, the sanitation infrastructure for the households surveyed was not ideal: the survey found that 78% of households used a pit latrine and nearly 20% had no facility available at all, thus using a nearby bush or field (Table 4-9). In addition, the results in Table 4-10 indicate that approximately 45% of all households had a designated place for washing hands inside the dwelling but only half of these households had any water available in that place at the time of interview. This was confirmed by direct observation, as was the presence of soap or any other detergent or cleansing agent (such as ash), which was only available at the designated place for washing hands in 13% of households.

Table 4-10 Soap use among households			
	Estimate		
Indicator	Full sample	Treatment	Control
Percentage of households that…			
Have a place for washing hands inside the dwelling (confirmed by direct observation)	43.9	44.5	43.4
	(3,345)	(1,673)	(1,672)
Have water at the place for washing hands	52.3	46.3***	57.5
	(1,374)	(679)	(695)
Have soap at the place for washing hands (includes detergent or other cleansing agent such as ash)	13.0	13.4	12.7
	(1,375)	(680)	(695)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Cross-reference: Water, sanitation and hygiene

See Annex F.3 for a comparison of indicators on water, sanitation and hygiene from this report with other studies in Nigeria. These indicators include:

- Access to improved water sources
- Utilisation of appropriate treatment methods
- Sanitation facilities

4.5 Household access to health services and food security

The household questionnaire asked a number of questions related to the household's access to health care services. Some 62% of households were able to access a dispensary within a travel time of 30 minutes (one-way), while only 49% could access a health facility within the same travel time (Table 4-11). The household survey also investigated health care-seeking behaviour and found that about 65% of households sought formal health care treatment advice the last time a household member was ill with a fever that lasted more than two days. When asked where they sought out health care advice, over 50% of these households went to PHC centres, health posts, mobile clinics and hospitals. Beyond this, dispensaries were a common source of health care advice, with less than 5% of households reporting they sought out the advice of a traditional practitioner.

Table 4-11 Access to health services and health care seeking

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Travel time to nearest dispensary			
<30 min	62.0	61.9	62.1
30 to <60 min	19.2	19.1	19.3
1 to <2 hours	12.6	13.0	12.2
2 hours to <5 hours	4.8	4.6	4.9
5 hours or more	1.5	1.5	1.5
Total	100.0	100.0	100.0
	(3,327)	(1,669)	(1,658)
Travel time to nearest health facility			
<30 min	49.9	50.7	49.3
30 to ≤60 mins	25.3	25.9	24.8
1 to ≤ 2 hours	16.6	15.9	17.1
2 hours to ≤ 5 hours	6.5	5.6	7.4
5 hours or more	1.7	2.0	1.5
Total	100.0	100.0	100.0
	(3,312)	(1,662)	(1,650)
Percentage of households that sought health care advice / treatment last time somebody was ill with a fever that lasted more than two days	64.6	63.2	65.8
	(3,351)	(1,675)	(1,676)
Percentage of households that sought health care advice / treatment from[+]:			
Neighbour / family friend	6.5	6.5	6.6
Traditional practitioner	4.4	5.6*	3.5
Dispensary / chemist / shop	32.5	30.8	34.0
Private medical clinic	4.1	1.4***	6.5
PHC centre / health post / mobile clinic	26.2	25.4	26.8
Hospital	26.3	30.5***	22.7
Total	100.0	100.0	100.0
	(2,163)	(1,033)	(1,130)

Notes:
[+]Indicator calculated for households that sought health care only.
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

Table 4-12 presents household-level food security indicators. Following Food and Agriculture Organisation guidelines, household hunger was measured using a simple 'Household Hunger Score' (Deitchler et al., 2011). In the questionnaire, questions were asked on three 'hunger' situations: Was there ever no food in the household in the four weeks previous to the survey? Did anybody ever go to sleep hungry in the four weeks preceding the survey? And; Did anybody ever go for 24 hours without eating in the four weeks preceding the survey? The Household Hunger Score assigns each household one point if it answered these questions with 'rarely' and two points for 'often'. Categories were then constructed for little or no hunger (0–1 points), moderate hunger (2–3 points), and severe hunger (4–6 points). Table 4-12 shows that a large proportion of households (82%) experienced little or no hunger according to this index.

However, other indicators show that situations of food scarcity were common among the households surveyed. For example, about half of all households (50%) reported not having enough food at least once in the 12 months preceding the survey. Despite a distinct lean season spanning from July to the end of October in Northern Nigeria (see Figure 1), these results indicate that households consistently report not having enough food throughout the year. This may be due to the nature of the questionnaire module that relies heavily on historical recall up to one year before the survey. Nevertheless, perception of food scarcity is high with households reporting an average of 7 months with adequate food provisioning in the year preceding the survey.

Table 4-12 Household-level food security indicators

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Household Hunger Scale			
Little or no hunger	82.0	80.7	83.1
Moderate hunger	16.4	17.0	15.8
Severe hunger	1.7	2.3**	1.0
Total	100.0	100.0	100.0
	(3,311)	(1,659)	(1,652)
Percentage of households that report not having enough food for the household at least once in the last 12 months	50.1	53.4**	47.0
	(3,349)	(1,675)	(1,674)
Percentage of households that report not enough food during…			
June 2012 – August 2012	39.5	45.0***	34.5
	(3,352)	(1,675)	(1,677)
August 2012 – October 2012	37.5	43.4***	32.2
	(3,353)	(1,676)	(1,677)
October 2012 – February 2013	38.0	41.9***	34.4
	(3,352)	(1,676)	(1,676)
February 2013 – June 2013	40.8	42.6	39.1
	(3,351)	(1,676)	(1,675)
Mean months of adequate food provisioning	6.6	6.1***	7.1
	(3,349)	(1,675)	(1,674)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

5 Characteristics of mothers

The following section describes the general characteristics and activities of mothers (section 5.1), their health knowledge and practices (sections 5.2 and 5.3), and their health and anthropometric measurements (5.4). For the purposes of this report, mothers were defined as women aged 15 to 49 years who had given birth to a child within the 35 months prior to the survey.

5.1 Maternal characteristics

Table 5-1 shows that the average age of mothers in households with a child aged 0–35 months was 28 years. Only a small proportion of mothers (5%) were younger than 18. Almost all mothers (98%) had a spouse or partner, and a large proportion of them got married before turning 16 (81%) or 18 (94%), resulting in an average age at first marriage of 15 years. The average age at first birth was about two years later at 17 years, and a large majority of mothers had given birth for the first time at an age younger than 20 years (91%). Within their lifetime, 59% of mothers had given birth to 4 children or more.

Table 5-1 also shows that maternal education was mainly related to Islamia education: over 70% of women had received some form of Quranic education, while 87% of mothers had not received any formal, non-Islamia education. Only about 9% of mothers had completed primary school or attended formal education at a higher level. Taken together, about 75% of mothers had received some type of schooling. Mothers' participation rate in local groups or associations was very low: only 4% participated in local groups or associations, of which the majority (about 70%) did not generally meet or had not met within the four weeks prior to the survey.

Table 5-2 reports that one-third of all mothers (31%) reported not being economically active, a much higher percentage than among household heads (see Table 4-6). In contrast to the economic activity of household heads, few mothers were active in subsistence farming (3%). In the main they were self-employed and ran their own business (64%), while only a very small proportion was employed in paid work (1%).

Table 5-1 Maternal characteristics in households with a child 0–35 months			
	Estimate		
Indicator	Full sample	Treatment	Control
Mean age (years)	27.7	27.9	27.5
Median age (years)	27	27	26
	(5,960)	(2,990)	(2,970)
Proportion of mothers under age 18	4.5	3.8	5.1
	(5,960)	(2,990)	(2,970)
Percentage of mothers that have a spouse or partner	98.2	98.2	98.2
	(5,961)	(2,988)	(2,973)
Proportion of mothers married under age 16	80.6	80.3	80.9
	(5,894)	(2,955)	(2,939)
Proportion of mothers married under age 18	93.7	94.0	93.5
	(5,894)	(2,955)	(2,939)
Mean age at first marriage	14.8	14.8	14.8
Median age at first marriage	15	15	15
	(5,894)	(2,955)	(2,939)
Proportion of mothers that have given birth to 4 or more children within their lifetime	58.6	61.3***	56.1
	(5,963)	(2,990)	(2,973)
Mean age at first birth	17.0	17.1***	16.9
Median age at first birth	17	17	17
	(5,764)	(2,889)	(2,875)
Mother's age at first birth			
<20	91.4	91.0	91.7
20 – 34	8.6	9.0	8.3
35 – 49	0.0	0.0	0.0
Total	100.0	100.0	100.0
	(5,764)	(2,889)	(2,875)
Percentage of mothers that have any schooling (incl. Islamia)	75.1	72.6*	77.4
	(5,934)	(2,974)	(2,960)
Educational attainment of mother (non-Islamia)			
No education	86.6	87.3	85.9
Nursery	0.2	0.1	0.2
Primary incomplete	4.6	4.1	5.1
Primary complete	4.3	4.8	3.8
Junior secondary	1.5	1.3	1.8
Senior secondary	2.3	2.1	2.5
More than secondary	0.6	0.3*	0.8
Total	100.0	100.0	100.0
	(5,936)	(2,976)	(2,960)
Quranic educational attainment of mother (Islamia)			
No education	26.5	29.1*	24.2
Quranic	70.0	66.7***	73.1

Table 5-1 Maternal characteristics in households with a child 0–35 months			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Integrated Quranic	3.5	4.2	2.8
Total	100.0	100.0	100.0
	(5,933)	(2,974)	(2,959)
Percentage of mothers that participates in local groups / associations	3.5	3.1	3.9
	(5,939)	(2,976)	(2,963)
Level of community engagement in the last four weeks			
No meetings	43.0	48.8	38.7
Attended 0 meetings	27.4	21.7	31.5
Attended 1–4 meetings	24.2	23.8	24.5
Attended more than four meetings	5.5	5.6	5.4
Total	100.0	100.0	100.0
	(174)	(97)	(77)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Table 5-2 Economic activity of mothers			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Occupation			
Farming / herding mainly for subsistence	3.0	1.1**	4.8
Commercial farming / herding to sell produce	0.8	0.4*	1.2
Paid work	1.2	0.8*	1.6
Own business	64.2	67.2**	61.4
Not working or inactive	30.6	30.4	30.8
Other	0.2	0.2	0.3
Total	100.0	100.0	100.0
	(5,891)	(2,951)	(2,940)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

The survey revealed that mothers were involved in the majority of decision-making processes within households (Table 5-3). The highest level of autonomy in decision making was found to be on the decisions related to the use of mothers' earnings. Almost all such decisions were taken by mothers themselves (61%) or jointly with their husband (34%). Decisions on child health were mostly made jointly (63%), as were decisions on purchases of household items (54%) or food (51%). However, in these three cases, husbands retained a significant amount of decision-making power as they took about 28% to 45% of all decisions without consultation. Among all of the types of decisions asked about, mothers were least likely to be involved in decisions on food purchases.

Mothers were also asked about any permissions that needed to be granted by the husband or household head before they could hypothetically travel alone to the nearest market, the next village and to the nearest health facility (Table 5-3). In all three scenarios, over 90% of mothers reported having to seek permission before travelling alone to these locations. Interestingly, a higher proportion of mothers reported that permissions were required to travel alone to the next village (97%) and to the nearest health facility (97%) than to travel to the nearest food market (91%).

The household survey investigated the degree of acceptance of physical violence towards women by asking mothers if a husband is justified in using physical violence in four different scenarios: if

she goes out without telling him, if she neglects the children, if she argues with him, and if she overcooks or burns the food. This module was adapted from the 2008 Nigeria DHS questionnaire. The degree of acceptance of wife beating varied by scenario with no more than 45% of mothers ever accepting wife beating for any of the scenarios presented. The scenario with the highest proportion of mothers reporting a husband would be justified in beating his wife was if she were to go out without telling him (45%), followed by if she argues with him (41%) and if she neglects the children (39%). The scenario where the lowest proportion of mothers accepted physical violence was if a wife were to overcook the food (29%).

Table 5-3 Mothers' decision-making power

	Estimate		
Indicator	Full sample	Treatment	Control
Decision on control of mother's earnings[+]			
Husband alone	5.6	4.8	6.3
Husband with consultation or joint decision making	33.8	36.3*	31.5
Mother alone	60.5	58.6	62.2
Someone else / other	0.2	0.3	0.1
Total	100.0	100.0	100.0
	(3,811)	(1,970)	(1,841)
Decision on child health care			
Husband alone	34.1	26.9***	40.7
Husband with consultation or joint decision making	62.7	70.5***	55.7
Mother alone	3.1	2.6*	3.6
Someone else / other	0.1	0.0	0.1
Total	100.0	100.0	100.0
	(5,936)	(2,975)	(2,961)
Decision on purchase of major household items			
Husband alone	28.5	25.7***	31.0
Husband with consultation or joint decision making	53.5	58.9***	48.7
Mother alone	17.3	14.7***	19.8
Someone else / other	0.7	0.7	0.6
Total	100.0	100.0	100.0
	(5,938)	(2,977)	(2,961)
Decision on food purchases			
Husband alone	45.7	39.4***	51.5
Husband with consultation or joint decision making	50.7	54.8***	47.0
Mother alone	3.5	5.7***	1.4
Someone else / other	0.1	0.1	0.2
Total	100.0	100.0	100.0
	(5,935)	(2,975)	(2,960)
Percentage of mothers that report they need to seek husband's / head of household's permission to…			
Go alone to the market[++]	91.0	88.6**	93.3
	(3,316)	(1,732)	(1,584)
Go alone to the next village	97.4	95.3***	99.3
	(5,939)	(2,977)	(2,962)
Go alone to the nearest health facility	97.2	95.1***	99.1
	(5,939)	(2,977)	(2,962)

Table 5-3 Mothers' decision-making power (continued)

	Estimate		
Indicator	Full sample	Treatment	Control
Percentage of mothers that feel the husband / head of household is justified to use physical violence if she…			
Goes out without telling him	45.1	49.4***	41.2
	(5,941)	(2,978)	(2,963)
Neglects the children	39.1	43.5***	35.2
	(5,941)	(2,978)	(2,963)
Argues with him	41.5	46.4***	37.1
	(5,939)	(2,978)	(2,961)
Over-cooks / burns the food	28.6	33.8***	23.9
	(5,940)	(2,978)	(2,962)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+]Indicator only calculated for mothers who reported being cash earners or having paid employment.
[++]Indicator only calculated for mothers who reported ever going to the market.

Figure 7 plots the average age of mothers in reference to the categories of a simple decision-making power index. For each of the types of decisions presented in Table 5-3 (mother's earnings, child health, household purchases and food) this index awards a mother two points if the decision is made by her alone or one point if made jointly with her husband and categorises the resulting total points into 'little power' (0–1 points), 'limited power' (2–3 points), 'some power' (4–6), and 'broad power' (7–8). Hence, mothers in the lowest category influence decisions in one issue area at most and mothers in the highest category decide at least three out of four issues by themselves. Clearly, higher decision-making power was associated with significantly higher age: on average, mothers in the broad decision-making power category were 31 years old, while mothers in the lowest category were 26 years old. In addition, it is clear that the number of mothers with broad decision-making power (53) was significantly smaller than the number of mothers in the three other categories.

Figure 8 plots the underlying decision-making score by the number of children a mother has ever given birth to. Again, we see parity was associated with higher decision-making influence by mothers. Of course, both age in years and the total number of children a mother has given birth to are correlated with each other. Additional analyses of the decision-making power of mothers by household wealth quintile, education level of mothers, and education level of the household head did not reveal any additional systematic differences in decision-making processes across households.

Figure 7: Mean age by decision-making power of mothers

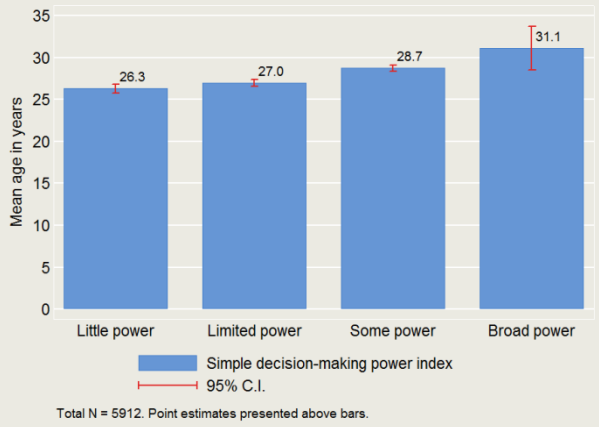
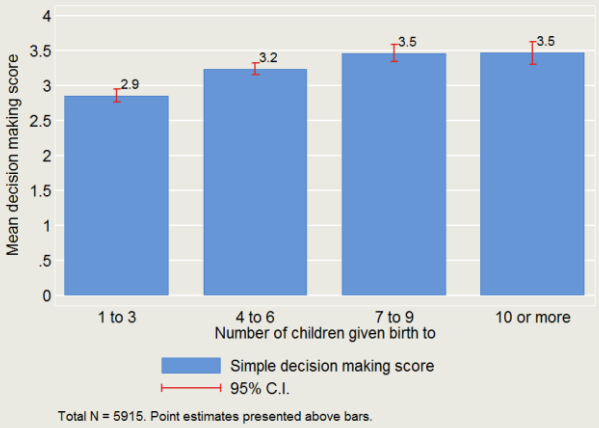


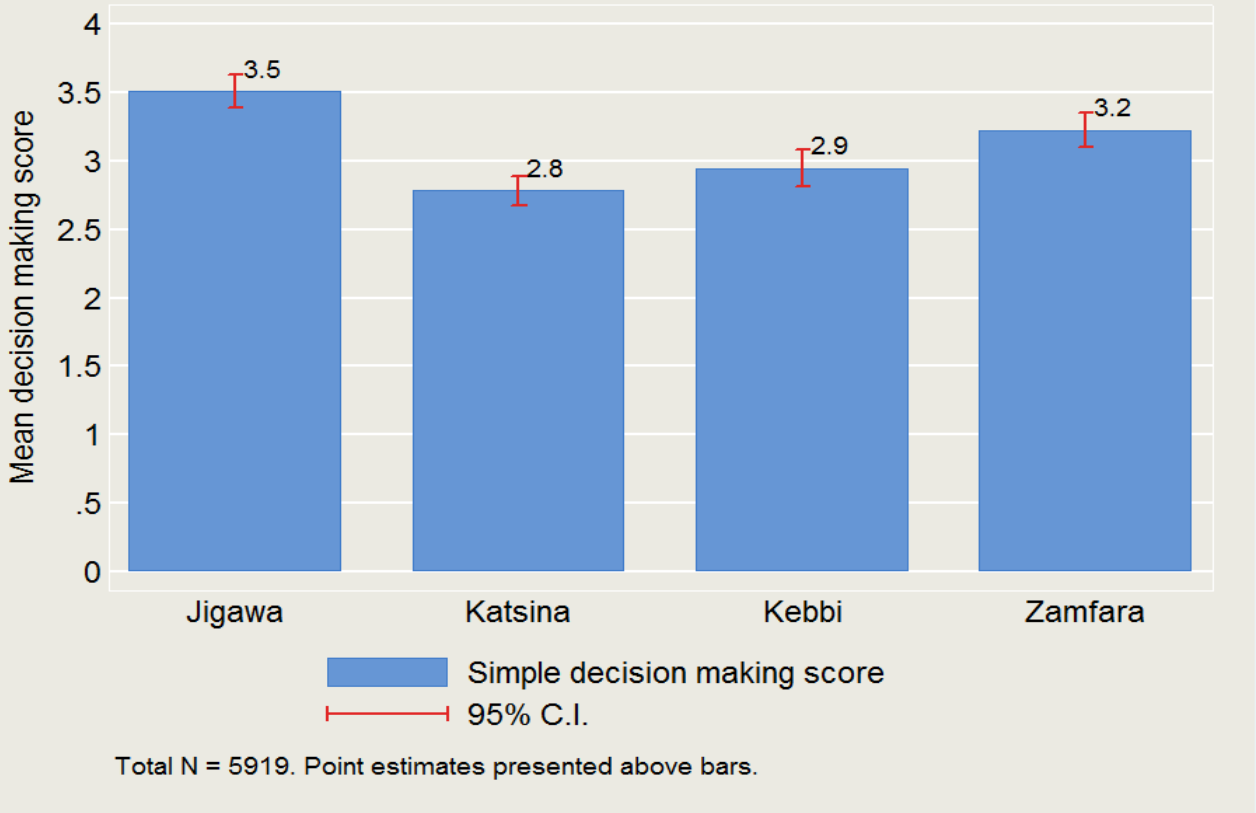
Figure 8: Mean decision-making score by number of children given birth to



Source: ORIE Data

Figure 9 plots the average decision-making score by states in the survey. Interestingly, we see significant differences across states, with mothers in Jigawa having the highest average score and mothers in Katsina having the lowest score. It is interesting to note that this is despite the fact that, as seen in section 4.3, households in Katsina were on average significantly wealthier than in other states.

Figure 9: Mean decision-making score by state



Source: ORIE Data

In general, the level of autonomy of mothers was very low. The majority had to ask for permission to go alone to the market (56%) and virtually all had to ask for permission if they wanted to go to the

next village (97%) or the nearest health facility (97%). Finally, violence originating from the husband was seen as justified by a large proportion of mothers. For example, 45% agreed that beating was justified if they left without informing the husband and 29% reported that this was the case when they burned food.

Cross-reference: Maternal characteristics and decision making

See Annex F.4 for a comparison of indicators on maternal characteristics and decision making from this report with other studies in Nigeria. These indicators include:

- General characteristics (age at first marriage, age at first birth, formal educational attainment, economic activity)
- Decision making processes and attitudes towards wife beating

5.2 Mother's health and child feeding knowledge

Knowledge of best breastfeeding practices was limited among mothers. Only 59% of mothers knew that breastfeeding of infants should start immediately or within the first hour after birth, and 76% knew that colostrum was beneficial for an infant's health and should not be discarded (Table 5-4). Similarly, only 7% of mothers knew that infants should not receive any water in addition to breast milk, even on a particularly hot day. On the other hand, almost all mothers (93%) accepted non-standard feeding times for infants, which is beneficial to a baby's health.

Table 5-4 Breastfeeding knowledge

Indicator	Estimate		
	Full sample	Treatment	Control
Percentage of mothers that knew a baby should start breastfeeding immediately or within the first one hour	58.9	59.4	58.4
	(5,933)	(2,973)	(2,960)
Percentage of mothers that think colostrum is good for the baby and should be given to her/him	75.8	78.3*	73.6
	(5,905)	(2,967)	(2,938)
Percentage of mothers that know that it is not OK to give a young baby under six months some water on a hot day	7.4	8.4	6.6
	(5,898)	(2,953)	(2,945)
Percentage of mothers that think it is OK to feed a young baby under six months whenever he /she wants (non-standard feeding times)	92.5	89.3***	95.4
	(5,925)	(2,967)	(2,958)
Mean number of months mothers think a baby should only receive breast milk	2.4	3.0***	1.8
Median number of months mothers think a baby should only receive breast milk	1	4	1
	(5,922)	(2,970)	(2,952)
Distribution of mothers who responded that a baby should receive breast milk only for …			
0 months	54.9	45.2***	63.9
1 month	2.1	2.2	2.0
2 months	1.6	1.3	1.9
3 months	3.1	2.1**	4.1
4 months	3.3	3.2	3.4
5 months	4.9	4.8	4.9
6 months	25.4	36.7***	15.0
7 or more months	4.7	4.6	4.8
Total	100.0	100.0	100.0
	(5,922)	(2,970)	(2,952)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

In questions about ideal exclusive breastfeeding time, only 25% of mothers knew that children should only receive breast milk for six months after birth. More than half of mothers (55%) reported that children could receive other food or liquids from within one month after birth. These findings are consistent with the results on IYCF practices in Section 6, where evidence for low levels of exclusive breastfeeding and early initiation of complementary feeding among children will be presented.

Breastfeeding knowledge seemed to be related to household wealth. Figure 10 below shows the proportion of mothers who know that exclusive breastfeeding should last six months by treatment status and household wealth quintile. Across both treatment and control areas, a similar trend emerges where a significantly higher proportion of mothers in richer households knew the correct number of months than in poorer households. It is also clear that, in general, treatment areas had a higher proportion of mothers knowing the best age for exclusive breastfeeding.

Figure 11 gives further evidence for the observed positive correlation between breastfeeding knowledge and household wealth. Clearly, both in treatment and control areas mothers living in wealthier households more often knew that colostrum is good for infants and should be fed to them. A similar relationship existed between household wealth and mothers' knowledge of the importance of immediate breastfeeding (graph not presented).

Figure 10: Proportion of mothers knowing best time of exclusive breastfeeding is six months by wealth and treatment

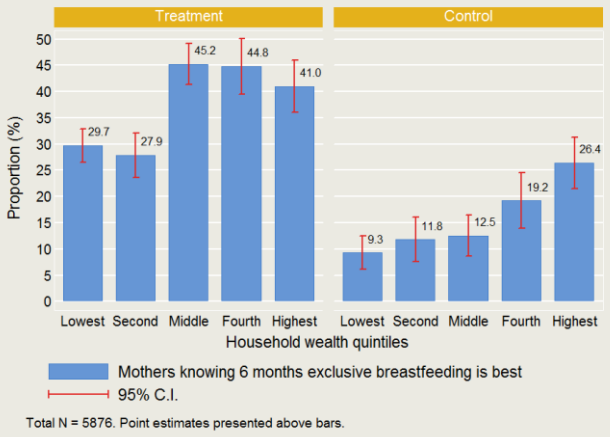
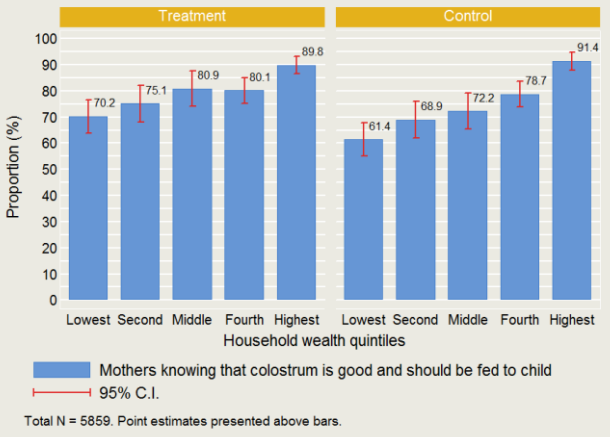


Figure 11: Proportion of mothers who think that colostrum is good and should be fed to child by wealth and treatment



Source: ORIE Data

Table 5-5 Attitudes towards health seeking for infant illness

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of mothers that would advise another woman to take a young baby to the health facility if a baby…			
Was refusing to eat	92.7	93.8	91.8
	(5,939)	(2,979)	(2,960)
Had diarrhoea	95.4	96.5	94.5
	(5,940)	(2,980)	(2,960)
Had a fever	96.0	97.0*	95.0
	(5,937)	(2,977)	(2,960)
Was having convulsions	94.5	95.0	94.0
	(5,940)	(2,980)	(2,960)
Was malnourished	96.1	96.4	95.7
	(5,940)	(2,980)	(2,960)
Had malaria	96.4	97.9***	94.9
	(5,932)	(2,976)	(2,956)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

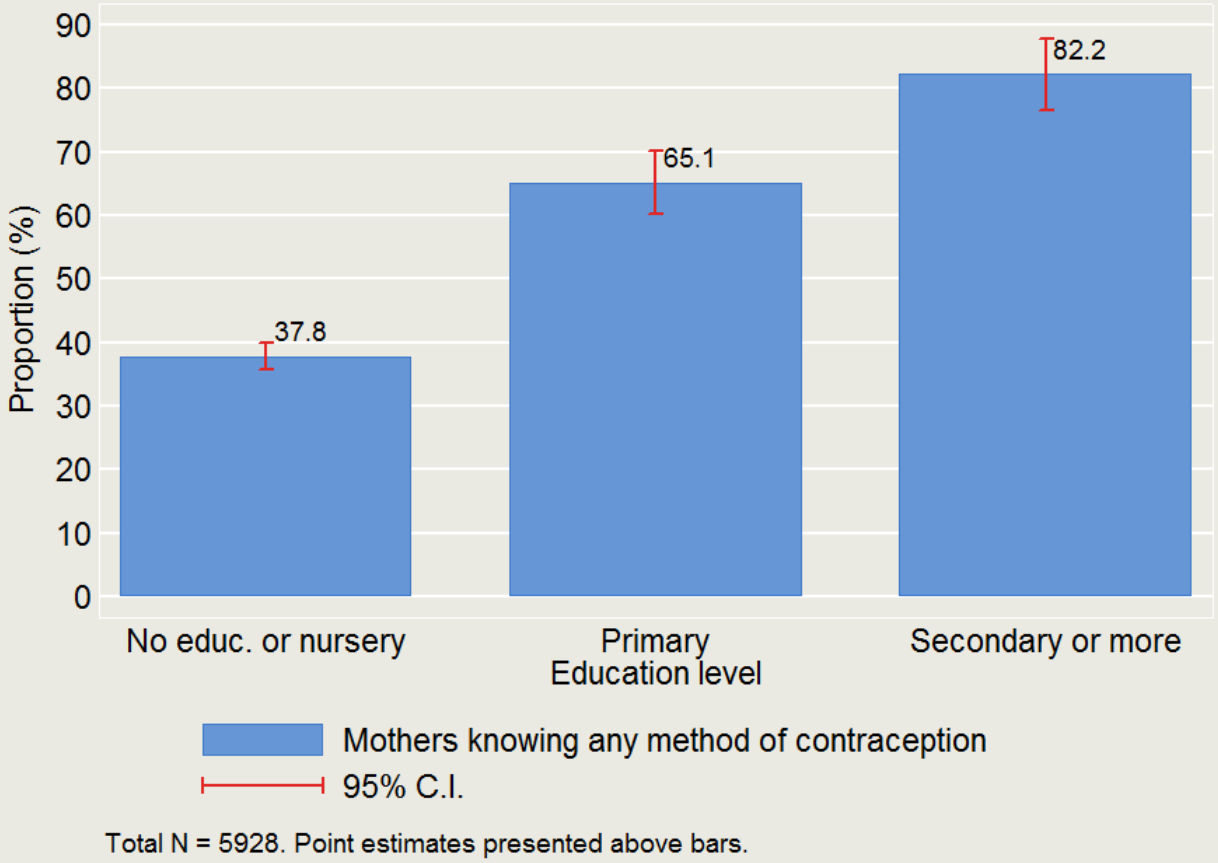
Table 5-6 Knowledge of family planning methods			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of mothers that can name any family planning method	42.2	41.3	43.0
	(5,936)	(2,975)	(2,961)
Percentage of mothers that can name the following family planning methods…			
Exclusive breastfeeding	4.6	5.7**	3.6
Male and female condoms	5.5	6.8**	4.2
Abstinence	1.9	2.7**	1.2
Injectable contraceptives	33.9	33.1	34.6
Oral contraceptives	31.8	32.2	31.3
Implant contraceptives	1.3	1.4	1.1
Diaphragm / IUD / foam / jelly	0.7	0.7	0.7
Tubal ligation / female sterilisation	0.4	0.6	0.3
Vasectomy / male sterilisation	0.1	0.1	0.1
Withdrawal	2.0	3.2***	0.9
Rhythm / calendar / safe period	2.2	2.4	2.0
Other	8.0	6.4**	9.4
	(5,936)	(2,975)	(2,961)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Mothers' attitudes towards seeking health advice were assessed by asking about the advice she would give another. The propensity of mothers to advise others to seek health advice at a health facility was very high at over 90% for all scenarios outlined in in the survey (Table 5-5). For example, 93% of mothers would have advised others to seek health advice if a baby was refusing to eat. Similarly, 96% of mothers would advise a fellow mother to seek advice in the case of a malaria infection.

In contrast, Table 5-6 shows that knowledge of family planning methods was generally low among mothers. Less than half of all mothers knew any method of contraception (42%). The most well-known methods of family planning were injectable contraceptives (34%) and oral contraceptives (32%). For all other methods listed, the percentage of mothers indicating knowledge was lower than 10%. Among these, condoms (6%) were the best-known contraceptives.

Figure 12 demonstrates that knowledge of contraceptive methods was strongly correlated with the education level of mothers, and that the mean value presented in Table 5-6 was dominated by the large group of mothers with low levels of formal education: only about 38% of these mothers (no education or nursery) knew any method of contraception. In contrast, among mothers that had attended primary school (both incomplete and complete) 65% knew about a method of contraception. Similarly, 82% of mothers that had received secondary education (junior or senior) or higher knew about one or more of the methods mentioned in the questionnaire.

Figure 12: Knowledge of family planning methods of mothers by education level



Source: ORIE Data

Cross-reference: Knowledge and utilisation of contraceptives

See Annex F.5 for a comparison of indicators on mothers' knowledge and utilisation of contraceptives from this report with other studies in Nigeria. These indicators include:

- Proportion ever heard of any method of family planning
- Proportion using any method of family planning

5.3 Pre-, Peri-, and Post-natal health care practices of mothers

Table 5-7 Breastfeeding practices of last-born child

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of women that have given birth in the two years previous to the survey	66.6	67.1	66.2
	(7,509)	(3,731)	(3,778)
Percentage of recent mothers…			
That breastfed their last-born child	99.0	99.2	98.9
	(4,267)	(2,112)	(2,155)
That started breastfeeding immediately or within 24 hours	62.3	64.5	60.3
	(4,214)	(2,086)	(2,128)

In order to prevent memory bias, data on the breastfeeding practices of last-born child were collected only for women (aged 15–49 years) who had given birth in the two years preceding the survey, who account for 67% of all women 15–49 years old. Among these mothers, breastfeeding of some form was nearly universal (Table 5-7). In addition, 62% reported that their last child had been put to the breast immediately or within 24 hours of their birth. This proportion is very similar to the percentage of mothers that knew that infants should be put to the breast immediately after birth (see Table 5-4), indicating an important link between knowledge and practice.

Table 5-8 Use of ANC services among mothers of children aged 0–35 months			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of mothers that had any ANC at health facility (%)	42.5	43.3	41.8
	(6,693)	(3,383)	(3,310)
Percentage of mothers who went to ANC…+			
Once	11.6	9.7*	13.4
Twice	12.6	12.7	12.5
Three times	14.6	13.5	15.8
Four times	22.9	22.5	23.2
Five times or more	38.4	41.7*	35.1
Total	100.0	100.0	100.0
	(2,675)	(1,334)	(1,341)
Percentage of antenatal services provided…+			
Blood pressure measured	81.7	80.3	83.1
	(2,765)	(1,379)	(1,386)
Urine sample	72.9	72.3	73.4
	(2,769)	(1,378)	(1,391)
Blood sample	71.6	70.7	72.4
	(2,769)	(1,380)	(1,389)
Weight measured	76.8	78.2	75.5
	(2,768)	(1,380)	(1,388)
Height measured	53.9	55.6	52.3
	(2,765)	(1,379)	(1,386)
Iron supplements	91.5	92.4	90.7
	(2,766)	(1,375)	(1,391)
Folic acid supplements	89.6	90.4	88.7
	(2,766)	(1,376)	(1,390)
Information on pregnancy danger signs	79.5	82.5**	76.6
	(2,765)	(1,379)	(1,386)
Tetanus injection	80.4	84.4***	76.6
	(2,760)	(1,373)	(1,387)
Medicines – for intestinal worms	45.6	53.1***	38.4
	(2,706)	(1,348)	(1,358)
Medicines – for malaria	84.7	86.5	83.0
	(2,765)	(1,377)	(1,388)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
+ Indicators calculated only for children whose mothers did receive ANC during their pregnancy.

Table 5-9 Birth of children in the last 35 months			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of mothers that delivered at…			
Home	90.7	89.8	91.6
A health facility	9.0	10.0	8.1
The home of a traditional birth attendant	0.2	0.2	0.2
Other	0.1	0.1	0.1
Total	100.0	100.0	100.0
	(6,701)	(3,389)	(3,312)
Percentage of births that were assisted by…			
Doctor / nurse / midwife / Community health extension worker (CHEW)	11.9	11.8	12.0
Traditional birth attendant	38.8	38.6	39.0
Family member	32.1	34.4	30.0
Neighbour	3.8	3.5	4.1
No one	13.4	11.7*	15.0
Other	0.0	0.0	0.0
Total	100.0	100.0	100.0
	(6,701)	(3,391)	(3,310)
Percentage of children that were weighed at birth	7.9	9.1*	6.8
	(6,631)	(3,353)	(3,278)
Mother's opinion of birth weight			
Small	16.0	13.6***	18.2
Normal	56.7	52.9***	60.2
Big	27.3	33.5***	21.6
Total	100.0	100.0	100.0
	(6,679)	(3,380)	(3,299)
Percentage of mothers that received Vitamin A after delivery	22.1	21.2	22.9
	(6,651)	(3,367)	(3,284)
Percentage of mothers that received PNC at health facility after giving birth	14.3	16.0*	12.8
	(6,690)	(3,385)	(3,305)
Percentage of mothers who received PNC…[+]			
Once	39.0	35.6	43.0
Twice	32.4	31.5	33.4
Three times	16.7	19.6*	13.3
Four times	8.3	10.1	6.2
Five times or more	3.6	3.2	4.1
Total	100.0	100.0	100.0
	(851)	(457)	(394)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+]Indicator calculated for mothers that did receive PNC at a health facility.

Table 5-8 and Table 5-9 report answers to questions from the questionnaire for children born in the last 35 months, which results in a change of the base population for the indicators presented. In general, the level of coverage of ANC was low, with less than half (43%) of mothers of children that were born in the last 35 months receiving ANC (Table 5-8). Those who did went relatively often, with

almost 40% reporting five or more visits to ANC services. The number of services provided at ANC visits was relatively high: almost all services listed were reported as having been provided in more than 70% of the cases. For example, iron supplements were provided in 92% and folic acid supplements in 90% of the cases. In only two instances was the occurrence of services low: only 46% of mothers received medication for intestinal worms and just 54% of mothers reported that their height was measured as part of their ANC.

Almost all mothers (91%) had delivered their child at home and only 9% had delivered in a health facility. In addition, only 12% of all births had been assisted by a trained health professional, while a larger proportion had been assisted by a traditional birth attendant (39%) or family members (32%). Very few children were weighed at birth (8%), although mothers generally reported that the birth weight of their child had been 'normal' (57%) or 'big' (27%). After birth, few mothers had received Vitamin A supplements (22%) and a very small minority (14%) had gone to a health facility to receive PNC, with most mothers only going once or twice (Table 5-9).

Cross-reference: ANC, place of delivery, and PNC

See Annex F.6 for a comparison of indicators on ANC, place of delivery and PNC from this report with other studies in Nigeria. These indicators include:

- Proportion of mothers not receiving any ANC
- Proportion of mothers that delivered at home or at a health facility
- Proportion of mothers not receiving post-natal check-ups

5.4 Maternal anthropometric measurements

Table 5-10 presents results for anthropometric measurements of all mothers in the survey. On average, non-pregnant mothers weighed 52 kg and measured 157 cm in height. This resulted in an average BMI of 21, a normal measure.

Two different approaches were used to analyse the nutritional status of non-pregnant mothers, depending on their age. For adolescent mothers aged 15-19 years, height, weight, and age measurements were compared to the WHO 2007 growth reference data for children and adolescent individuals aged 5-19 years (WHO, 2007). More precisely, for each adolescent mother a z-score was calculated that expresses each BMI-for-age in terms of standard deviations from the reference median. Depending on this z-score, mothers were then categorised as being underweight (z-score smaller than -1), overweight (z-score larger than 1), or normal (z-score between -1 and 1). This approach follows WHO recommendations (WHO, 2007), but adapts the cut-offs so that they are comparable to the ones used for adult mothers aged 20-49 (Cole *et al.*, 2007). For these, the standard adult BMI cut-offs were used: mothers with BMI lower than 18.5 were categorised as being underweight, with BMI larger or equal to 25 were categorised as overweight, and in between (18.5-24.99) as normal (WHO, 2014a). Indicators for both age groups were then merged, so as to be able to present the data for all mothers aged 15-49 years together.

In general, the majority of mothers had a normal BMI(72%), although a high percentage (18%) was underweight. Only a few mothers were overweight (10%) according to these measures.

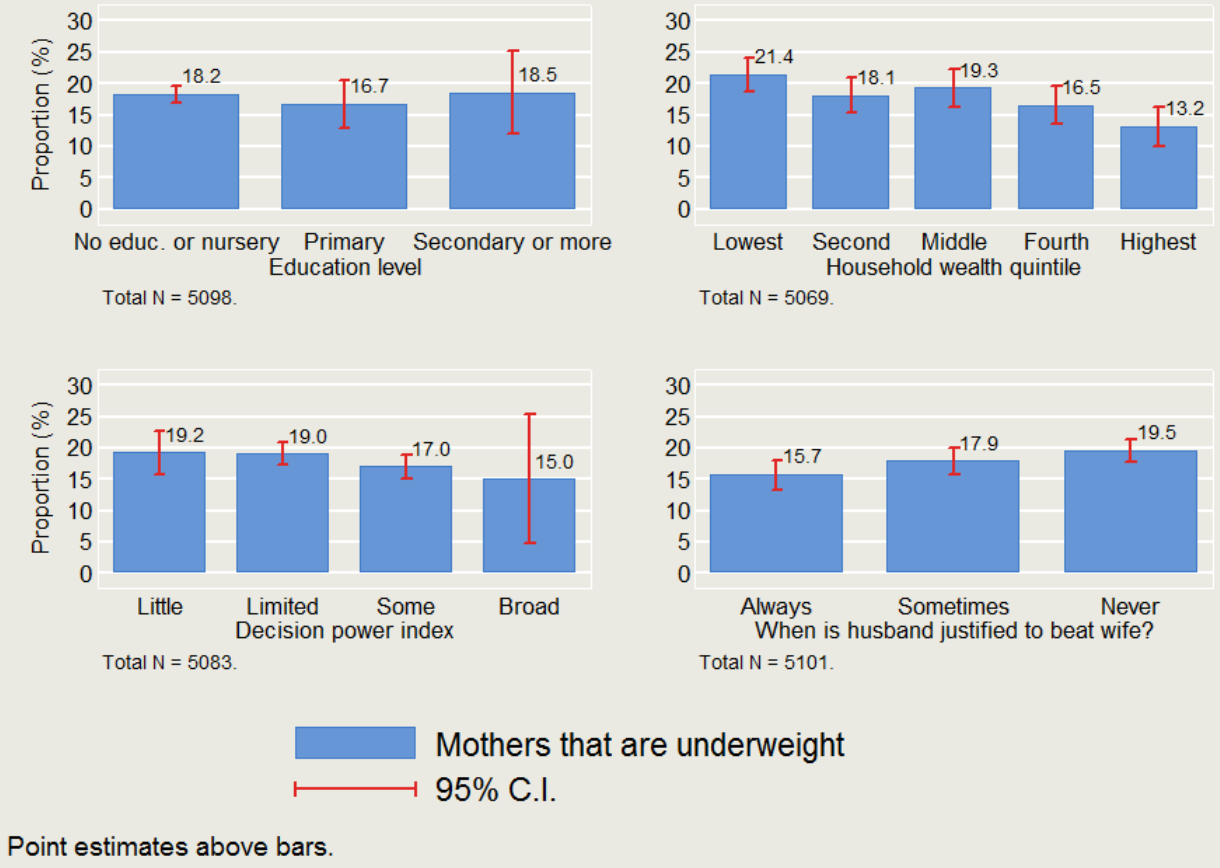
Table 5-10 Maternal anthropometric measurements

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Mean weight (kg)[+]	51.9	51.8	51.9
Median weight (kg)[+]	50.7	50.7	50.7
	(5,125)	(2,568)	(2,557)
Mean height (cm)	156.8	156.6**	157.1
Median height (cm)	156.7	156.4	157.0
	(5,911)	(2,966)	(2,945)
Mean BMI (kg/m^2)[+]	21.1	21.2	21.1
Median BMI (kg/m^2)	20.7	20.7	20.6
	(5,105)	(2,562)	(2,543)
Percentage of mothers that are… [+]			
Underweight[++]	18.1	17.1	19.1
Normal [++]	71.7	71.8	71.7
Overweight [++]	10.1	11.1	9.3
Total	100.0	100.0	100.0
	(5,105)	(2,562)	(2,543)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+]Indicators calculated for mothers that were not currently pregnant only.
[++]For mothers aged 15-19: underweight if BMI-for-age z-score <-1, overweight if BMI-for-age z-score >+1, normal in between those values. For mothers aged 20-49: underweight if BMI < 18.5, Overweight if BMI ≥ 25, normal in between those values.

Figure 13 below plots the proportion of mothers who were underweight by education, household wealth quintile, the simple decision power index, and an index that combines information on mothers' attitudes towards physical violence towards women. This index categorises mothers according to whether they always, sometimes, or never answered 'yes' to the four questions on the acceptance of phyiscal violence listed in Table 5-3. A trend could be observed for the graph by wealth quintiles: unsurprisingly, the proportion of mothers underweight was significantly lower in the richest quintile of households compared to the poorest quintile of households. However, such a trend could not be found for the graphs by education level, decision-making power, or acceptance of physical violence towards women.

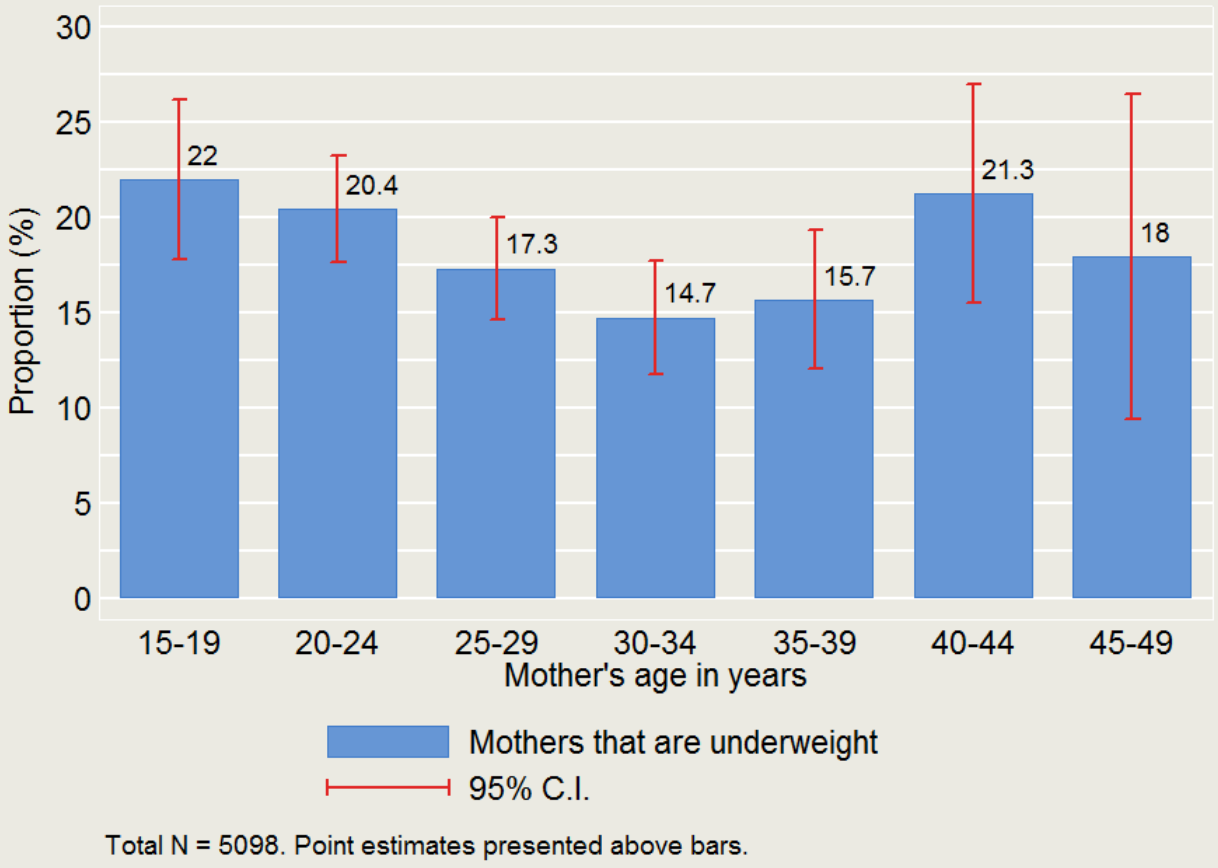
Figure 13: Proportion of mothers underweight by education, wealth, decision-making power, and attitudes towards wife beating



Source: ORIE Data

Figure 14 below plots the proportion of mothers who were underweight by age in years. Up to an age of 30–34 years, the nutritional status of mothers seemed to improve. Significantly fewer mothers were underweight in this age category (15%) than in the youngest age category (22%). However, after that, nutritional status seemed to be worse, as the proportion of mothers underweight was higher at later ages.

Figure 14: Proportion of mothers underweight by age in years



Source: ORIE Data

Cross-reference: Maternal anthropometrics

See Annex F.7 for a comparison of indicators on maternal anthropometrics from this report with other studies in Nigeria. These indicators include:

- Mean BMI
- Proportion of mothers that are underweight, normal, or overweight

6 Characteristics of children

The following section will present the characteristics of the 6,833 children aged 0–35 months in the study. It will first set out their general characteristics (section 6.1), subsequently focusing mainly on IYCF practices (section 6.2), child health (section 6.3), and child nutritional status (section 6.4).

6.1 Child characteristics

Table 6-1 shows that the majority of children surveyed (67%) were between 12 and 35 months old, and distributed almost equally between males (50%) and females (50%). The majority of children were not the first-born children to their mothers and thus had several older siblings. Some 41% were the fourth-born child or even higher in the birth order.

Table 6-1 Child characteristics in households with a child 0–35 months

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Age (months)			
0 – 5	16.9	16.3	17.5
6 – 11	16.5	16.4	16.6
12 – 17	17.3	16.8	17.7
18 – 23	14.4	14.8	14.0
24 – 35	35.0	35.8	34.2
Total	100.0	100.0	100.0
	(6,828)	(3,460)	(3,368)
Sex			
Male	50.3	49.3	51.2
Female	49.7	50.7	48.8
Total	100.0	100.0	100.0
	(6,826)	(3,460)	(3,366)
Birth order			
1	21.2	20.8	21.7
2 – 3	38.0	39.2	37.0
4 – 5	27.2	27.8	26.7
6+	13.5	12.3	14.6
Total	100.0	100.0	100.0
	(6,707)	(3,392)	(3,315)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

6.2 IYCF practices

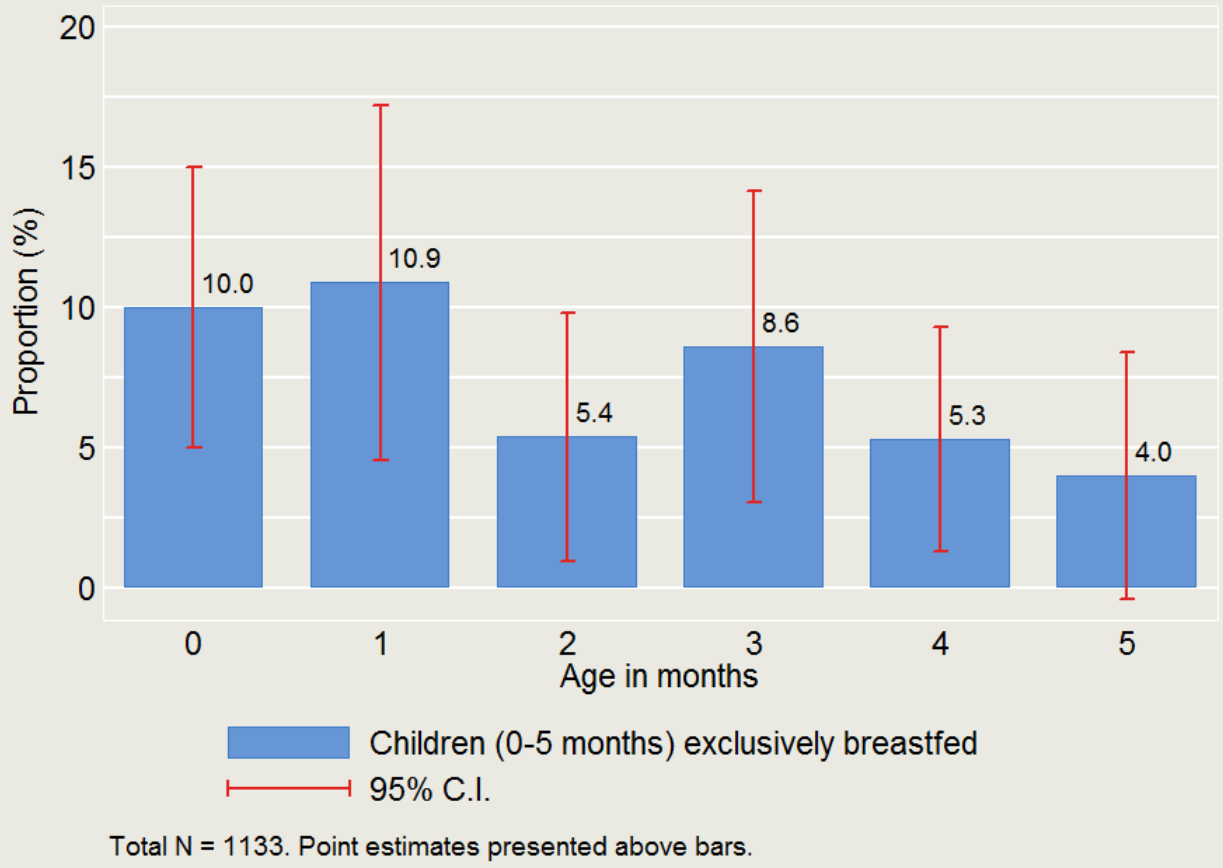
In accordance with WHO guidelines, IYCF indicators are reported for children aged 0–23 months (WHO, 2008). The precise definitions of these indicators are presented in Annex D.

As previously indicated, knowledge of breastfeeding and practice among mothers in the survey was nearly universal. Some 100% of all children aged 0–23 months had been breastfed at some point in their lives (Table 6-2). Age-appropriate breastfeeding measures the proportion of children aged 0–5 months that are exclusively breastfed and the proportion of children aged 6–23 months that are currently breastfed but also receive complementary food. According to this measure, however, only

about half of the surveyed children (55%) were appropriately breastfed. On average, children that were not currently breastfed during the survey had been breastfed for about 19 months. The majority of children were put to the breast within 24 hours of birth (62%), but immediate initiation of breastfeeding was about 20 percentage points lower at 42%.

Table 6-2 also shows that exclusive breastfeeding among children aged 0–5 months was uncommon: only 7% of children in this age range were exclusively breastfed. Figure 15 plots this indicator by age in months. Clearly, the proportion of children exclusively breastfed decreased with age yet it was never substantially higher than 10% when analysed by months and the 95% confidence intervals at all ages overlapped. Hence, exclusive breastfeeding among young infants was rare at all ages.

Figure 15: Proportion of children exclusively breastfed by age in months



Source: ORIE Data

However, as can be seen in Table 6-2, a large majority of children aged 0–5 months were predominantly breastfed (78%), which means that this proportion of children only received breast milk and liquids to drink (water, water-based drinks, ORS, supplements, ritual fluids, and fruit juices). Hence, it seems that exclusive breastfeeding was low because carers gave infants and young children complementary drinks during the first six months of life. Continued breastfeeding was widespread among children aged 12–15 months (94%), but less common for children aged 20–23 months (30%). This indicates that most children stopped being breastfed between one and two years of age.

Milk feeding – i.e. feeding of non-human milk products such as yoghurt – to children not currently breastfed was relatively infrequent, as only 14% received two or more milk feedings during the day previous to the survey. However, complementary feeding of other foods was common among children aged 6–8 months (74%). The nutritional value of this food is questionable. Iron-rich or iron-fortified food, such as meats and fish, was only consumed by 14% of all children. In addition, using the WHO standards for minimum meal frequency (minimum number of times of feeding), minimum dietary diversity (food from four or more food groups), and minimum acceptable diet (combination of meal frequency and dietary diversity), it is clear that very few children were appropriately fed. Only about a quarter of children aged 6–23 months (23%) received food the minimum number of times, and an even lower number (14%) received food from four or more food groups. The combination of both indicators shows that only about 5% of all children received a minimum acceptable diet.

Table 6-2 IYCF practices among children aged 0–23 months

	Estimate		
Indicator[+]	Full sample	Treatment	Control
Breastfeeding indicators			
Child ever breastfed	99.7	99.8	99.7
	(4,409)	(2,193)	(2,216)
Age-appropriate breastfeeding	55.3	55.7	55.0
	(4,410)	(2,193)	(2,217)
Early initiation of breastfeeding (within one hour of birth)	41.9	43.3	40.5
	(4,402)	(2,190)	(2,212)
Early initiation of breastfeeding (within 24 hours of birth)	62.2	64.4	60.2
	(4,402)	(2,190)	(2,212)
Exclusive breastfeeding among children < 6 months	7.2	11.6***	3.5
	(1,133)	(578)	(555)
Predominant breastfeeding among children < 6 months	78.1	76.7	79.2
	(1,041)	(515)	(526)
Continued breastfeeding at one year (12–15 months)	94.2	91.7*	96.4
	(906)	(450)	(456)
Continued breastfeeding at two years (20–23 months)	30.2	29.1	31.3
	(638)	(304)	(334)
Proportion of non-breastfed children (6–23 months) who received at least two milk feedings during previous day (milk feeding frequency)	13.5	13.9	13.1
	(636)	(303)	(333)
Complementary feeding indicators			
Introduction of solid, semi-solid or soft foods (aged 6–8 months)	73.9	74.5	73.3
	(559)	(282)	(277)
Consumption of iron-rich or iron-fortified foods (aged 6–23 months)	13.6	17.4***	10.2
	(3,278)	(1,616)	(1,662)
Minimum meal frequency (aged 6–23 months)	23.3	24.5	22.1
	(3,256)	(1,604)	(1,652)
Minimum dietary diversity (≥ 4 food groups) (aged 6–23 months)	13.7	14.5	12.8
	(3,278)	(1,616)	(1,662)
Minimum acceptable diet (aged 6–23 months)	4.8	5.1	4.5
	(3,277)	(1,615)	(1,662)

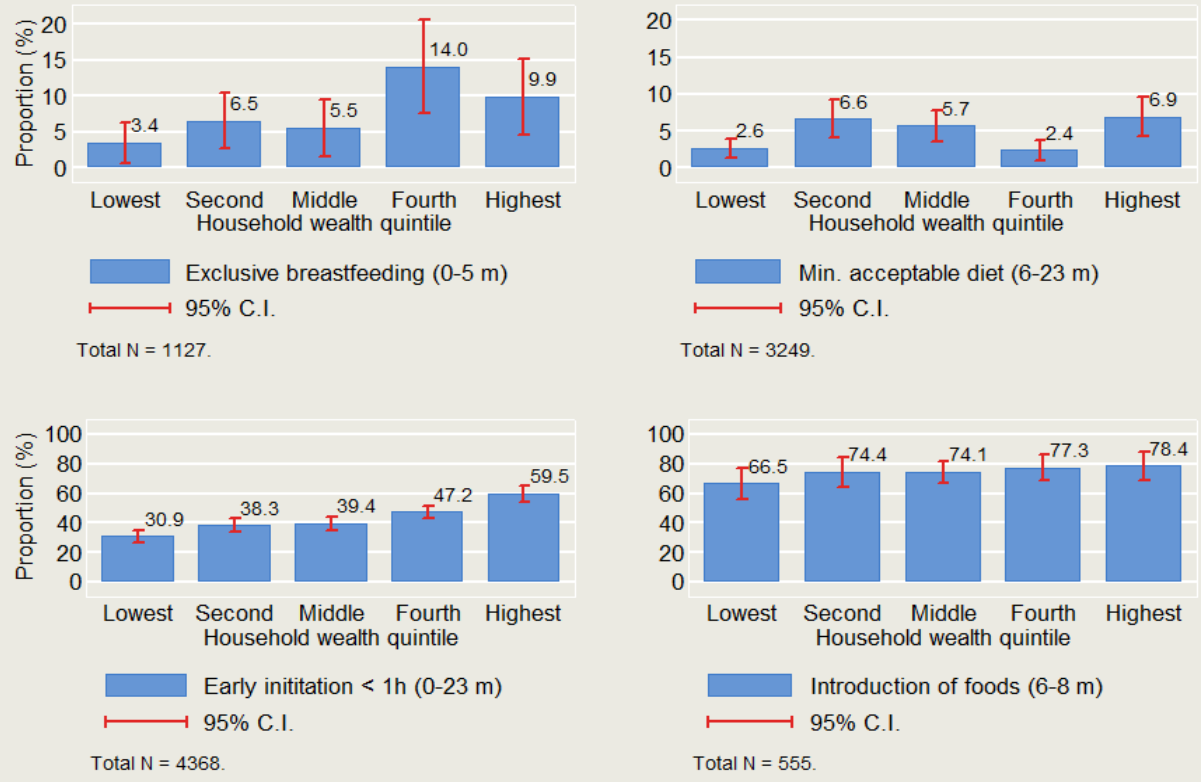
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+] See WHO document on IYCF indicators (WHO, 2008, pp. 32 ff.) for the exact definition of these indicators.

Figure 16, Figure 17, and Figure 18 plot four IYCF practices indicators by household wealth quintile, education level of children's mothers, and age of children's mothers respectively. In Figure 16, two trends can be identified: first, higher household wealth was associated with a higher proportion of children that were put to the breast within one hour of birth. The difference between the lowest quintile (about 31% of all children aged 0–23 months) and the highest quintile (about 60%) is striking. Second, higher wealth tended to be related to slightly higher proportions of exclusive breastfeeding. The differences between the lowest wealth quintile (about 3%) and the fourth (about 14%) and fifth (about 10%) quintile are large, and statistically significant at 95% confidence level in the case of the fourth wealth quintile. However, for both minimum acceptable diet and introduction of solid, semi-solid, or soft foods, no clear relationship could be observed.

Figure 17 demonstrates that a higher education level for the mother was associted with a higher proportion of early breastfeeding and with better feeding in general. For instance, the proportion of children with a minimal acceptable diet was significantly larger among children whose mothers had secondary education or more (about 12%) than among children whose mother had no education (about 4%).

Figure 18 finally demonstrates that the age of mothers was not generally related to differences in implementing IYCF practices, with the exception of exclusive breastfeeding among children with mothers who were aged 40–49 years. In this group, the proportion of children exclusively breastfed was about 1%, which is significantly lower than both in the group of children whose mothers were aged 20–29 (8%) and 30–39 (7%).

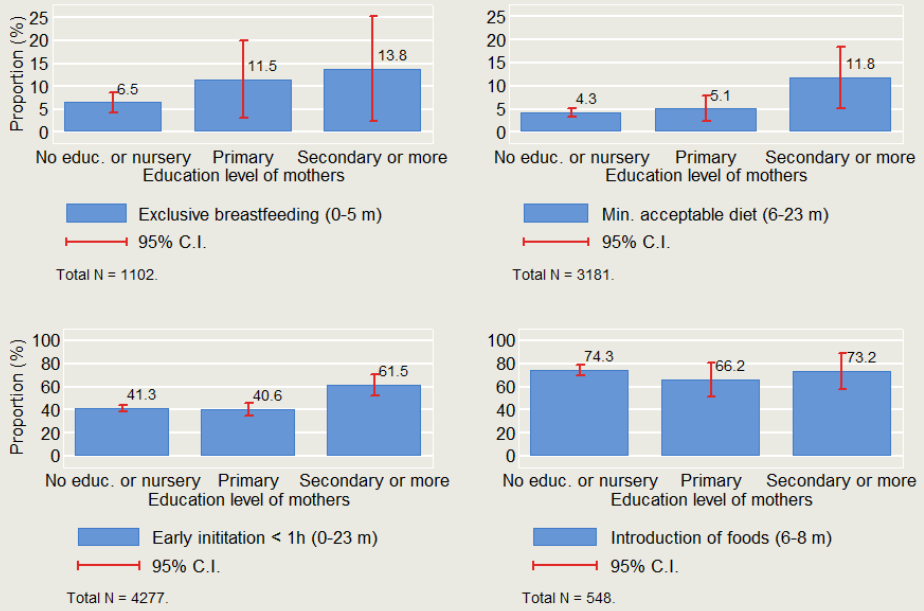
Figure 16: IYCF practices by household wealth quintile



Point estimates above bars. Age range of children in base population in parentheses.

Source: ORIE Data

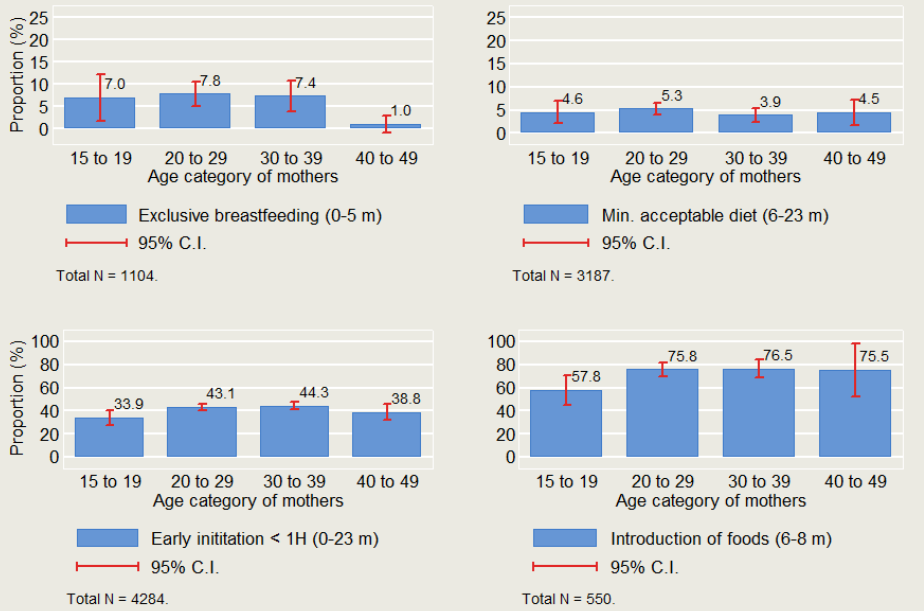
Figure 17: IYCF practices by household education level of mothers



Point estimates above bars. Age range of children in base population in parentheses.

Source: ORIE Data

Figure 18: IYCF practices by age of child's mother



Point estimates above bars. Age range of children in base population in parentheses.

Source: ORIE Data

Cross-reference: IYCF practices

See Annex F.8 for a comparison of indicators on IYCF practices among children from this report with other studies in Nigeria. These indicators include:

- Proportion of children ever breastfed
- Proportion of children put to breast within one day
- Exclusive breastfeeding
- Minimum meal frequency
- Consumption of iron-rich or iron-fortified foods

6.3 Child health

Table 6-3 Preventative health care practices among children aged 0–35 months

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of children that…			
Slept under a mosquito net the previous night	34.8	34.9	34.7
	(6,684)	(3,380)	(3,304)
Ever received a Vitamin A drop (all children)	44.8	41.9*	47.6
	(6,817)	(3,455)	(3,362)
Received a Vitamin A drop in the last six months (all children)	36.7	34.4*	38.9
	(6,794)	(3,443)	(3,351)
Ever received a Vitamin A drop (aged 6–35 months)	48.4	45.3*	51.3
	(5,673)	(2,869)	(2,804)
Received a Vitamin A drop in the last six months (aged 6–35 months)	40.6	37.7**	43.5
	(5,651)	(2,858)	(2,793)
Location where children (aged 0–35 months) received Vitamin A drop[+]			
At home	83.5	77.6***	88.3
At the health facility	16.6	22.4***	11.7
Total	100.0	100.0	100.0
	(2,600)	(1,231)	(1,369)
Percentage of children that received deworming medication in the last six months	7.6	8.2	7.0
	(6,626)	(3,353)	(3,273)
Location where children received deworming medication[++]			
At home	44.4	46.9	41.8
At the health facility	41.6	39.8	43.6
Chemist	13.2	13.1	13.4
Other	0.7	0.2	1.2
Total	100.0	100.0	100.0
	(482)	(263)	(219)
Percentage of children that are fully vaccinated for age (12–23 months)[+++]	2.7	2.3	3.1
	(2,120)	(1,036)	(1,084)

Table 6-3 Preventative health care practices among children aged 0–35 months (continued)

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of children (aged 12–35 months) who have received specific vaccines…			
BCG	21.7	25.9***	17.7
	(4,444)	(2,250)	(2,194)
DPT 1	15.6	18.2**	13.2
	(4,413)	(2,234)	(2,179)
DPT 2	10.5	12.1*	8.8
	(4,413)	(2,234)	(2,179)
DPT 3	4.4	5.2	3.7
	(4,413)	(2,234)	(2,179)
Polio 0	16.6	17.4	15.9
	(4,439)	(2,253)	(2,186)
Polio 1	54.4	54.5	54.3
	(4,387)	(2,213)	(2,174)
Polio 2	53.0	53.3	52.6
	(4,387)	(2,213)	(2,174)
Polio 3	50.6	51.3	49.9
	(4,387)	(2,213)	(2,174)
Penta 1[++++]	13.5	17.1	9.4
	(280)	(150)	(130)
Penta 2[++++]	9.2	11.1	7.1
	(280)	(150)	(130)
Penta 3[++++]	8.6	10.8	6.0
	(280)	(150)	(130)
Measles	16.3	16.8	15.9
	(4,448)	(2,251)	(2,197)
All basic vaccinations (BCG, measles, three doses of DPT, three doses of polio – excluding polio vaccine given at birth) (aged 12–35 months)	2.5	2.7	2.3
	(4,347)	(2,194)	(2,153)
No vaccinations (aged 12–35 months)	41.7	41.2	42.1
	(4,466)	(2,260)	(2,206)
Percentage of children who have ever had MUAC measured	8.5	10.8***	6.4
	(6,666)	(3,370)	(3,296)
Percentage of children who have ever had weight and / or height measured	9.4	12.0***	7.1
	(6,671)	(3,375)	(3,296)
Percentage of children who have had weight and / or height measured in the last six months[+++++]	49.2	50.7	46.9
	(587)	(346)	(241)

Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

[+] Indicator calculated for children that received Vitamin A supplements in the last six months only.

[++] Indicator calculated for children who received deworming medication in the last six months only.

[+++] In Nigeria, children are considered fully vaccinated if they received one dose of BCG vaccine, three doses of DPT vaccine, three doses of polio vaccine (excluding at birth), and one dose of measles vaccine (NDHD, 2008, p.145). This indicator counts pentavalent vaccination as equivalent to a DPT vaccination. Pentavalent vaccinations were introduced in Nigeria in May 2013 (NDHS, 2013, p.23).

[++++] Indicator calculated for children that had a vaccination card only.

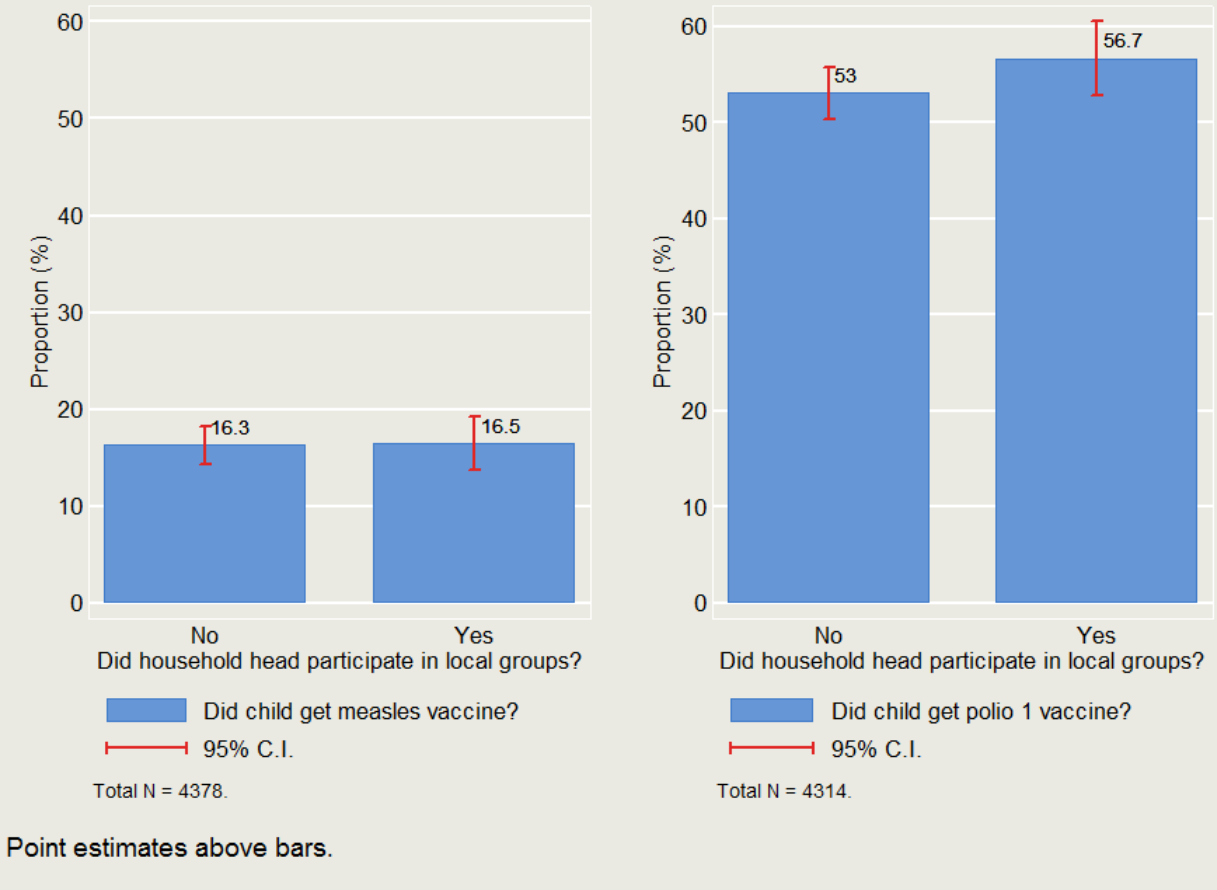
[+++++] Indicator calculated for children that had ever had their weight/height measured.

Regular implementation of preventive health care practices was uncommon among the children surveyed in the study (Table 6-3). Only about a third (35%) had slept under a mosquito net the previous night and only 37% had received a Vitamin A drop in the six months preceding the survey, although this figure was slightly higher among children aged 6–35 months (41%). Predominantly, children received Vitamin A drops at home (84%), indicating the importance of Immunisation Plus Days in Northern Nigeria where Vitamin A is distributed house to house. The proportion of children that had ever received deworming medication was significantly lower at 7%.

Similarly, vaccination levels were low: only 3% of children aged 12–23 months could be considered fully vaccinated according to the standard set out in the NDHS. The highest level of vaccination among children aged 12–35 months could be observed for Polio 1 (54%), Polio 2 (53%), and Polio 3 (51%). The lowest level of vaccination was reported for DPT 3 (4%). In total, a high proportion of all children aged 12–35 months (41%) had not received any vaccination, which is evidence for the low level of preventive health care in the area of the study. Finally, under a tenth of all children had ever had their MUAC (9%) or weight/height measured (9%).

Child immunisation could be influenced by the way in which households are involved in community activities. However, Figure 19 shows that child immunisation for two main vaccines (Measles and Polio 1) was not related to the household heads' participation in local groups.

Figure 19: Immunisation among children aged 12–23 months by household head's group participation



Source: ORIE Data

Table 6-4 presents data collected on household exposure to CMAM screening and growth-monitoring activities. There were large differences across states in the coverage of such monitoring activities, with exposure to these in Kebbi and Zamfara being much less than in Jigawa and Katsina.

Table 6-4 Preventive health care practices among children aged 0–35 months by state

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of children who have ever had MUAC measured			
Jigawa	10.2	13.2*	7.8
Katsina	13.0	15.4**	9.7
Kebbi	3.6	4.0	3.3
Zamfara	7.0	8.9*	5.4
	(6,666)	(3,370)	(3,296)
Percentage of children who have ever had weight and / or height measured			
Jigawa	11.2	13.2	9.5
Katsina	15.0	16.0	13.7
Kebbi	2.5	3.8*	1.5
Zamfara	8.5	12.3***	5.1
	(6,671)	(3,375)	(3,296)
Percentage of children who have had weight and / or height measured in the last six months[+]			
Jigawa	46.9	44.1	50.0
Katsina	45.2	48.9	39.4
Kebbi	44.4	58.2**	14.2
Zamfara	58.6	57.4	61.1
	(587)	(346)	(241)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+] Indicator calculated for children that had ever had their weight/height measured.

Illness or injury was common among the children surveyed, as 38% of children surveyed had suffered from either in the 30 days preceding the study (Table 6-5). Of these children, a very large majority (87%) went for treatment. Mostly, this meant seeking care from a dispensary or shop (43%) and, to a lesser extent, from a health centre (25%) or hospital (22%). The majority of carers of children who suffered from illness or injury spent more than NGN 250 for treatment and between NGN 0 and NGN 100 for transport to health facilities in the months preceding the survey. The percentage of children hospitalised in the year preceding the study was very low (3%), which might partly be influenced by the high cost associated with hospitalisation – 44% of carers spent NGN 4,000 or more on overnight hospitalisation.

Table 6-5 Child illness, access to health care, and health care seeking (0–35 months)

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of children who suffered from any illness or injury in the 30 days preceding the study	37.9	34.8***	41.0
	(6,697)	(4,470)	(4,470)
Percentage of children who suffered from illness or injury in the 30 days preceding that study and went for treatment	87.3	88.7	86.2
	(2,684)	(1,265)	(1,419)
Ill or injured children that sought care from…[+]			
Neighbour / family friend	1.0	0.9	1.0
Traditional practitioner	5.5	5.2	5.9
Dispensary / chemist / shop	43.2	41.8	44.3
Private medical clinic	3.6	1.8***	5.1
Primary health centre / health post / mobile clinic	25.1	26.5	23.9
Hospital	21.6	23.9	19.8
Total	100.0	100.0	100.0
	(2,358)	(1,122)	(1,236)
Expenditure on treatment for ill or injured children during month preceding the survey:[++]			
NGN 0	11.4	11.7	11.3
NGN 1 – NGN 250	17.8	15.3*	19.7
NGN 251 – NGN 500	26.3	26.1	26.5
NGN 501 – NGN 1000	24.0	25.8	22.7
NGN 1001 or more	20.4	21.1	19.9
Total	100.0	100.0	100.0
	(2,459)	(1,141)	(1,318)
Proportion of carers that spent NGN 100 or more on travel to health facility during month preceding the survey[++]	33.5	33.4	33.6
	(2,557)	(1,191)	(1,366)
Percentage of children who have been hospitalised in the 12 months preceding the survey	3.3	3.2	3.4
	(6,695)	(3,383)	(3,312)
Proportion of carers that spent NGN 4000 or more on overnight hospitalisation[+++]	44.1	40.5	47.3
	(201)	(98)	(103)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+] Indicator calculated for children that suffered from illness or injury and did go for treatment.
[++] Indicators calculated for children that suffered from illness only.
[+++] Indicator calculated for children that were hospitalised only.

Cross-reference: Child vaccination status

See Annex F.9 for a comparison of indicators on the vaccination status of children from this report with other studies in Nigeria. These indicators include:

- Proportion of children not having any vaccination
- Proportion of children aged 12-23 months having all basic vaccinations

6.4 Children's anthropometric analysis

This section presents an analysis of the anthropometric indices of all children 0-35 months in the study. Section 2.2.9 above describes the methods and specialist equipment used to obtain anthropometric measurements and age determination of young children. These data are used to calculate three standard indices of child anthropometric status – namely, height-for-age, weight-for-age, and weight-for-height. Each of these indices provides different information about growth and body composition which can be used to assess nutritional status. In order to do so, a child's anthropometric measurements are compared to the new international growth standards published by the WHO in 2006. These growth standards were collected in the WHO Multicentre Growth Reference Study that was designed to be used as the gold-standard approach to the assessment of child growth internationally (WHO, 2006). Each of the three anthropometric indices is expressed in standard deviation units (or a z-score) from the median of the Multicentre Growth Reference Study sample of children of the same age and sex. The estimated nutritional status of the survey population is expressed as the proportion of children with z-scores below a certain cut-off point (WHO, 1995, p. 161). The three anthropometric indices are further described below.

Length-for-age / leight-for-age reflects linear growth of children. For children below 2 years of age, the term used for this index is length-for-age because such young children are measured laying down, whereas the term height-for-age is used children above 2 years old as they are measured while standing using a stadiometer. Having a low length-for-age / height-for-age is referred to as stunting. This index identifies past or chronic malnutrition which is the effect of long-term poor health and inadequate diet which leads to poor linear growth, in particular for children younger than two years old (WHO, 1995, p. 164). Children are classified as stunted when their length-for-age / height-for-age z-score (LAZ / HAZ) is less than -2. Following WHO guidelines, observations with z-scores smaller than -6 or larger than 6 were dropped.

Weight-for-length / weight-for-height reflects body weight relative to length height. Having a low weight-for-length (in children under 2) or weight-for-height (in children over 2) is referred to as wasting and is attributed to acute malnutrition which is a 'recent and severe process that has led to significant weight loss, usually as a consequence of acute starvation and/or disease' (WHO, 1995, p. 165). Children are classified as wasted when their weight-for-length or weight-for-height z-score (WLZ / WHZ) is less than -2 and severely wasted when WLZ / WHZ is less than -3. Observations with z-scores smaller than -5 or larger than 5 were dropped.

Weight-for-age reflects body mass relative to chronological age. It reflects both children's height-for-age and their weight-for-height, which makes interpretation complex. Children with a low weight-for-age are classified as underweight when their weight-for-age z score (WAZ) is less than -2. This index reflects both past (chronic) and / or present (acute) undernutrition although it is unable to distinguish between the two. Observations with z-scores smaller than -6 or larger than 5 were dropped.

For all three indices, the age range was defined from age 0 to 35 months. As suggested by the WHO, prevalences were calculated for both overall and for different age groups (WHO, 1995, p. 219). Although the WHO generally suggests reporting anthropometric indices for children starting at birth, some reports limit the analysis of weight-for-height to children aged six months or older. Hence, z-scores and related prevalences were also tabulated among children aged 6–35 months. It is important to note that most surveys, such as the NDHS and SMART surveys report anthropometric indices for children 0-59 months. As most malnutrition occurs among children less than 2 years and the estimates of these indeces from this baseline survey is only calculated for children 0-35 months, it is likely that this baseline will have higher prevalence estimates when compared to other surveys

that presents results for children 0-59 months. As such, any comparisons to other surveys should be done with caution.

Table 6-6 and Table 6-7 present a complete anlaysis of anthropometric indeces – first overall and then by 5 month age categories. Figure 20 and Figure 21 plot the three anthropometric indeces and prevalence of stunting, wasting and underweight against children's age in months respectively.

The overall prevalence of stunting (LAZ/HAZ < -2) was very high at 58% among children 0-35 months. The prevalence of stunting was already very high in the youngest group of children (0-5 months) with a prevalence of 33%. Growth continued to falter reaching a prevalence of 69% among children 24-35 months.

The overall prevalence of wasting (WLZ/WHZ < -2) was 16% with a mean WLZ/WHZ of -0.6 SD. This initially drops to a low of -1 SD among children 10 months before steadily increasing to a mean of -0.4 SD for children 35 months old. This corresponds to the highest prevalence of wasting of 25% found among children 6-11 months old. This trend might be expected as wasting is more common at younger ages when complementary foods are first introduced and children are more susceptible to disease.

The overall prevalence of underweight (WAZ < -2) was 41%. WAZ dropped in the initial 10 months of life before stabilising at an overall mean of -1.7 SD. The highest prevalence of underweight was found to be among children 18-23 months where nearly half of all children in this age group were underweight.

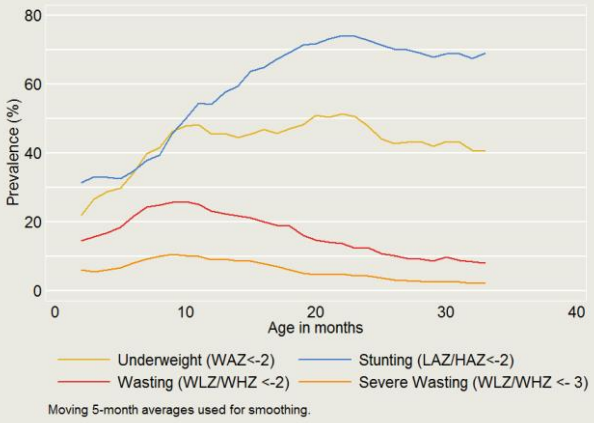
Table 6-6 Anthropometric measurements of children aged 0–35 months

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Mean age (months)	17.2	17.5	17.0
Median age (months)	17	18	17
Percentage female	49.7	50.7	48.8
	(6,826)	(3,460)	(3,366)
Mean length/height-for-age z-score (LAZ/HAZ)+	-2.2	-2.2	-2.3
Median LAZ/HAZ+	-2.4	-2.3	-2.4
Percentage stunted (LAZ/HAZ < -2SD)+	57.5	56.6	58.4
	(6,388)	(3,306)	(3,082)
Mean WAZ+	-1.7	-1.7	-1.7
Median WAZ+	-1.7	-1.7	-1.7
Percentage underweight (WAZ < -2SD)+	41.2	41.1	41.4
	(6,527)	(3,328)	(3,199)
Mean WLZ/WHZ+	-0.6	-0.7	-0.6
Median WLZ/WHZ+	-0.7	-0.7	-0.7
Percentage wasted (WLZ/WHZ < -2SD)+	16.2	15.1	17.3
Percentage severely wasted (WLZ/WHZ < -3SD)	5.8	5.5	6.2
	(6,278)	(3,260)	(3,018)
Percentage wasted among children aged 6–35 months	16.2	14.9**	17.5
	(5,306)	(2,726)	(2,580)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
+In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.

Figure 20: Mean z-scores by age

Figure 21: Prevalence of underweight, stunting, wasting and severe wasting by age



Source: ORIE Data

Table 6-7 Anthropometric measurements of children aged 0–35 months by age categories			
	Estimate		
Indicator by age group of children	Full sample	Treatment	Control
Percentage stunted (LAZ / HAZ < -2SD)⁺			
0 to 5 months	32.7	26.5***	38.3
6 to 11 months	43.1	46.7	39.6
12 to 17 months	59.6	57.7	61.4
18 to 23 months	72.1	70.8	73.5
24 to 35 months	69.4	68.6	70.3
	(6,388)	(3,306)	(3,082)
Percentage underweight (WAZ < -2SD)⁺			
0 to 5 months	24.8	25.1	24.5
6 to 11 months	43.9	43.5	44.3
12 to 17 months	44.2	41.4	46.8
18 to 23 months	50.4	47.5	53.3
24 to 35 months	42.6	44.4	40.8
	(6,527)	(3,328)	(3,199)
Percentage wasted (WLZ / WHZ < -2SD)⁺			
0 to 5 months	16.1	16.1	16.1
6 to 11 months	25.0	23.2	26.9
12 to 17 months	21.5	20.9	22.0
18 to 23 months	14.9	13.3	16.6
24 to 35 months	9.9	8.8	11.0
	(6,278)	(3,260)	(3,018)
Percentage severely wasted (WLZ < -3SD)⁺			
0 to 5 months	5.9	6.5	5.3
6 to 11 months	10.5	10.8	10.2
12 to 17 months	8.1	6.4	9.6
18 to 23 months	4.9	4.8	5.1
24 to 35 months	2.8	2.3	3.3
	(6,278)	(3,260)	(3,018)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
⁺In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.

Anthropometric measures were also analysed by sex and reveal that stunting, underweight, wasting, and severe wasting were consistently more prevalent among boys than girls (Table 6-8).

Table 6-8 Anthropometric measurements of children aged 0–35 months by sex			
	Estimate		
Indicator	Full sample	Male	Female
Mean LAZ / HAZ+	-2.2	-2.3***	-2.1
Median LAZ/HAZ+	-2.4	-2.5	-2.2
Percentage stunted (LAZ / HAZ < -2SD)+	57.5	59.6**	55.4
	(6,388)	(3,219)	(3,169)
Mean WAZ+	-1.7	-1.8***	-1.6
Median WAZ+	-1.7	-1.8	-1.6
Percentage underweight (WAZ < -2SD)+	41.2	43.8***	38.7
	(6,527)	(3,302)	(3,225)
Mean WLZ / WHZ+	-0.6	-0.7**	-0.6
Median WLZ / WHZ+	-0.	-0.7	-0.6
Percentage wasted (WLZ / WHZ < -2SD)+	16.2	17.6*	14.8
Percentage severely wasted (WLZ / WHZ < -3SD) +	5.8	6.7**	4.8
	(6,278)	(3,184)	(3,094)
Percentage wasted among children aged 6–35 months	16.2	17.9**	14.5
	(5,306)	(2,676)	(2,630)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9% +In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.			

In Table 6-9, seven anthropometric groups are identified including stunted only, under-weight only, wasted only, wasting and underweight, stunted and underwegith and lastly wasted, underweight and stunted. Only about a third (34%) of all children sampled had a length / height and weight appropriate for their age and sex. About one-quarter (26%) were both underweight and stunted, and 23% were stunted only.

Table 6-9 Combined anthropometric indicators for children			
	Estimate		
Indicator	Full sample	Male	Female
Combined indicator for malnutrition+			
Not wasted, not stunted, and not underweight	33.7	35.0	32.4
Wasted, underweight, and stunted	8.8	8.3	9.3
Underweight and wasted, not stunted	4.6	4.4	4.9
Underweight and stunted, not wasted	25.6	25.9	25.2
Stunted only	22.9	22.1	23.7
Underweight only	1.8	2.1	1.5
Wasted only	2.6	2.2	3.0
Total	100.0	100.0	100.0
	(6,133)	(3,207)	(2,926)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9% +In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.			

Surprisingly, Figure 22 below shows that the prevalence of stunting, wasting and underweight did not differ much across household wealth quintiles. Figure 23 displays how such prevalences vary by

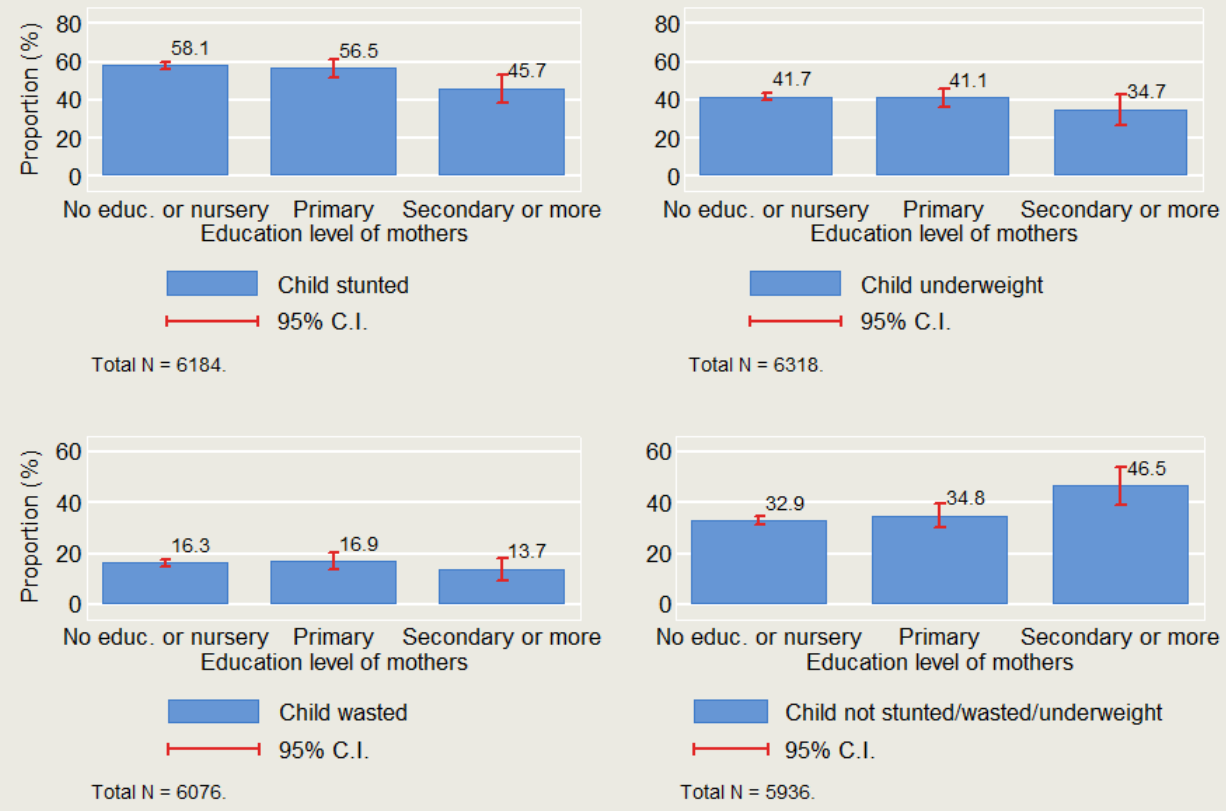
the level of education of the mother. On average, the prevalence of stunting among children that were born to mothers with a secondary education or higher was lower (about 46%) than the prevalence of stunting among children born to mothers with no education or primary education only (58%). Similarily, there is a higher proportion of children without any form of undernutrition born to mothers with a secondary education or more (47%) compared to children born to mothers without any education (33%).

Figure 22: Anthropometric indicators of children (aged 0–35 months) by household wealth quintile

Point estimates above bars.

Source: ORIE Data

Figure 23: Anthropometric indicators of children (aged 0–35 months) by education level of mother



Point estimates above bars.

Source: ORIE Data

Cross-reference: Child anthropometric analysis

See Annex F.10 for anthropometric analysis from other studies in Nigeria. These indicators include:

- Mean z-scores
- Prevalence of malnutrition (stunting, underweight, wasting, and severe wasting)

It is important to note that caution must be used when comparing ORIE survey results to other surveys due to the fact that the results from this survey are restricted to a sample of children 0-35 months whereas standard surveys such as the NDHS and SMART surveys use a much larger sample of children 0-59 months. As most malnutrition occurs within the first 2 years of life, the results of the ORIE survey are likely to be higher when compared to anthropometric analysis from other surveys. Therefore, data from other surveys is only presented as a point of reference as opposed to direct comparison.

7 Experience of WINNN and other nutrition interventions

The following section describes how respondents in the survey experienced IYCF interventions (section 7.1), MNCH weeks (section 7.2), and CMAM interventions (section 7.3). It should be noted here that interviewers explained distinguishing features of each of the WINNN interventions (IYCF, MNCH weeks and CMAM) and used picture cards to help the respondent accurately identify the intervention in question. For example, the picture cards developed by the WINNN Programme were displayed to identify the IYCF intervention. MNCH Weeks were described using pictures of Vitamin A capsules which were explained to be distributed at health facilities during MNCH Weeks (which is the primary source of distribution of these blue and red capsules). Finally, CMAM was identified by pictures of an OTP clinic day at a primary health care facility and by characteristic pictures of RUTF being used.

7.1 Experience of IYCF interventions

Table 7-1 Community awareness of IYCF interventions

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of communities reporting that…			
The nearby health facility conducts information sessions for pregnant women and mothers	39.2	46.8***	32.9
	(836)	(418)	(418)
There are community-based information sessions for pregnant women and mothers	24.4	28.4*	21.1
	(833)	(418)	(415)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%			

Table 7-1 shows that under half (40%) of all informant groups that responded to the community questionnaires in this study reported that a nearby health facility conducted IYCF information sessions. Community-based information sessions were even less common: only 24% of all respondents reported that their communities conducted these.

The survey investigated the various modes through which a household might be exposed to the IYCF intervention. From a preliminary understanding of the IYCF intervention, exposure is divided into IYCF training received at health facilities, received in communities and received through mother or community support groups.

The percentage of mothers that had participated in IYCF sessions was generally low. On average, about 18% of mothers had received IYCF training at *health facilities*. Those who did mostly went 3 times or less in total and less than once in the month preceding the survey (Table 7-2). Medical staff conducted the large majority of training sessions (88%). At these sessions, information was mainly given on breastfeeding practices (76%), hygiene practices (71%), and managing sick babies (23%). Only rarely did mothers receive information on topics such as small animal breeding (0%) or HIV and breastfeeding (8%).

A significantly lower proportion of mothers (5%) received *community-based* IYCF training (Table 7-3). Those who did went mostly 3 times or less. About half received this type of training in the month preceding the survey. Again, medical staff conducted most of these training sessions (54%), although a large proportion was also conducted by NGO volunteers (20%). Again, information was mainly given on breastfeeding (69%) and hygiene (65%) practices.

Finally, IYCF training sessions at *community support groups* were very uncommon. Table 7-4 shows that only 3% of mothers interviewed knew of any support groups that met to discuss IYCF topics and only 1% of women had ever attended such sessions. The types of information received during this training were similar to those at health facilities or community-based training, with 73% of women that had ever participated receiving information on breastfeeding practices and 77% receiving information on hygiene practices.

Table 7-2 Household exposure to IYCF interventions: health facility-based

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Training on breastfeeding and feeding practices of infants and young children			
Percentage of mothers that received this training at a health facility	18.2	19.6	17.0
	(5,939)	(2,978)	(2,961)
Number of times mothers received this training – in total:⁺			
1	18.1	19.9	16.2
2	23.5	25.3	21.7
3	22.1	22.1	22.0
4	13.0	12.4	13.7
5	11.1	9.7	12.6
6	5.5	5.3	5.7
7 or more	6.7	5.2	8.2
Total	100.0	100.0	100.0
	(990)	(511)	(479)
Percentage of mothers that received this training in the last month⁺	31.7	32.6	30.7
	(1,010)	(519)	(491)
Type of staff that led this training⁺			
NGO volunteer	9.9	14.2***	5.5
Medical staff	87.5	82.9***	92.5
Someone else	2.5	3.0	2.1
Total	100.0	100.0	100.0
	(1,012)	(524)	(488)
Types of information received at the training⁺			
Breastfeeding practices	76.4	85.8***	66.5
Hygiene practices	71.0	69.7	72.3
Complementary feeding	23.1	30.7***	15.1
How to manage a sick baby	53.7	56.9	50.3
Birth spacing / family planning	29.4	25.7	33.2
Kitchen gardens	8.4	10.3*	6.3
Small animal breeding	0.3	0.2	0.5
HIV and breastfeeding	7.6	10.0*	5.1
Other	1.9	0.9*	3.0
	(1,020)	(526)	(494)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
⁺ These indicators were calculated for those mothers that had ever received IYCF training at a health facility only.

Table 7-3 Household exposure to IYCF interventions: community-based

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Training on breastfeeding and feeding practices of infants and young children			
Percentage of mothers that received this training in the community	5.4	7.2***	3.9
	(5,939)	(2,977)	(2,962)
Number of times mothers received this training – in total:⁺			
1	24.6	18.8	35.4
2	30.3	37.0	17.7
3	24.9	25.2	24.3
4	11.4	10.3	13.3
5	4.7	4.7	4.7
6	3.2	2.8	3.8
7 or more	1.0	1.1	0.8
Total	100.0	100.0	100.0
	(295)	(198)	(97)
Percentage of mothers that received this training in the last month⁺	45.0	48.2	39.8
	(310)	(204)	(106)
Type of staff that led this training⁺			
NGO volunteer	19.8	27.6***	6.4
Medical staff	54.0	52.5	56.7
Someone else	26.2	19.9*	37.0
Total	100.0	100.0	100.0
	(309)	(205)	(104)
Types of information received at the training⁺			
Breastfeeding practices	68.8	81.3	47.7
Hygiene practices	65.3	64.0	67.4
Complementary feeding	26.2	34.1	12.9
How to manage a sick baby	48.4	51.5	43.1
Birth spacing / family planning	24.0	30.9	12.3
Kitchen gardens	7.0	7.2	6.7
Small animal breeding	0.4	0.5	0.3
HIV and breastfeeding	6.6	8.2	3.9
Other	2.3	1.1	4.3
Total	(314)	(207)	(107)
Percentage of mothers that have heard / seen any IYCF messages on the radio or TV in the last six months	29.4	22.2***	35.9
	(5,938)	(2,976)	(2,962)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
⁺ Indicators tabulated for mothers that did receive IYCF training in the community only.

Table 7-4 Household exposure to IYCF interventions: community support groups			
	Estimate		
Indicator	Full sample	Treatment	Control
Percentage of mothers that know of any support groups in the community that meet to discuss IYCF issues	3.1	3.1	3.1
	(5,942)	(2,979)	(2,963)
Training on breastfeeding and feeding practices of infants and young children			
Percentage of mothers that have ever attended IYCF training at support group	1.2	1.8**	0.7
	(5,942)	(2,979)	(2,963)
Number of times mothers received this training – in total:+			
1	12.9	13.7	10.9
2	33.5	34.3	31.4
3	11.5	12.3	9.6
4	23.3	18.6	34.4
5	6.1	8.6	0.0
6	1.4	1.9	0.0
7 or more	11.5	10.6	13.6
Total	100.0	100.0	100.0
	(55)	(41)	(14)
Percentage of mothers that received this training in the last month+	65.6	69.9	55.7
	(61)	(45)	(16)
Types of information received at the training+			
Breastfeeding practices	73.2	86.4	42.6
Hygiene practices	76.6	72.6	86.0
Complementary feeding	34.6	39.0	24.3
How to manage a sick baby	64.1	64.3	63.6
Birth spacing / family planning	26.5	26.1	27.4
Kitchen gardens	8.1	7.3	9.9
Small animal breeding	0.9	1.3	0.0
HIV and breastfeeding	7.2	9.6	1.7
Other	2.1	3.0	0.0
	(61)	(45)	(16)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
+ Indicators only tabulated for mothers that did attend IYCF training at support groups.

Table 7-5 reports respondents' attitudes towards IYCF training. It is clear that mothers who participated in any IYCF training universally recognised the importance of these sessions; for example, 99% reported that it is important to attend IYCF training sessions at health facilities.

Table 7-5 Attitudes towards IYCF interventions			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of mothers that think it is important to attend			
IYCF – health facility-based+	98.9	99.2	98.5
	(976)	(504)	(472)
IYCF – community based+	99.7	100.0	99.2
	(296)	(194)	(102)
IYCF – community support groups+	100.0	100.0	100.0
	(61)	(45)	(16)
Mothers whose husbands think IYCF interventions at support groups are important to attend+			
Important	98.5	100.0	95.1
Not important	0.0	0.0	0.0
He does not have an opinion about them	1.5	0.0	4.9
Total	100.0	100.0	100.0
	(61)	(45)	(16)
Notes: + Indicators only calculated for mothers that received the respective training.			

7.2 Experience of MNCH weeks

The survey investigated both community and household exposure to and experience of MNCH weeks. As MNCH weeks are not conducted in Kebbi, the data presented in this section refer only to respondents from Jigawa, Katsina and Zamfara.

About half (53%) of all respondent groups to the community questionnaires, who, as specified above, were mainly made up of educated, male, and well-informed members of the communities, had ever heard of MNCH weeks (Table 7-6). In 76% of these cases, respondents indicated that an MNCH day had been held at a health facility close by. In 88% of the communities where an MNCH day had been held, community questionnaire respondents reported that there was an MNCH day during the last round of MNCH weeks immediately preceding the study in May 2013.

Table 7-6 Community awareness of MNCH weeks			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of communities that report…			
They have heard of MNCH weeks	52.7	50.6	54.5
	(834)	(416)	(418)
There was ever an MNCH day at a health facility close by+	76.4	81.5*	72.4
	(454)	(213)	(241)
There was an MNCH day at a health facility close by in May 2013++	87.5	88.5	86.6
	(338)	(165)	(173)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9% + Indicator only calculated for communities that knew of MNCH weeks. ++ Indicator only calculated for communities that ever had an MNCH day at a health facility close by.			

Table 7-7 reports mothers' awareness and participation in the MNCH weeks intervention. Only about a tenth (12%) of all mothers had ever heard of MNCH weeks, and a very small proportion of mothers (5%) had attended the last MNCH day in May 2013. This is a large difference in awareness of the

intervention and indicates a clear information gap between mothers and prominent members of the community. Information received by mothers during this MNCH week was similar to the IYCF interventions mentioned in section 7.1. For instance, 61% of mothers that had attended an MNCH day received information on breastfeeding, 56% received information on hygiene practices, and 54% on how to manage sick babies. In addition, almost all mothers had received Vitamin A supplements on that day (93%). The overwhelming reason for non-attendance of mothers (93%) was clearly that they did not know of the MNCH weeks.

Table 7-7 MNCH weeks

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of mothers that have heard of MNCH weeks	11.7	13.0	10.4
	(4,289)	(2,108)	(2,181)
Percentage of mothers that attended the MNCH day in May 2013	4.9	5.0	4.9
	(4,288)	(2,107)	(2,181)
Types of information received at MNCH day[+]			
Breastfeeding practices	61.2	70.5	50.9
Hygiene practices	56.2	58.8	53.4
Complementary feeding	33.2	56.2	7.8
How to manage a sick baby	54.0	70.8	35.5
Birth spacing / family planning	18.7	20.2	17.1
Kitchen gardens	4.3	5.6	3.0
Small animal breeding	0.4	0.0	0.8
HIV and breastfeeding	5.1	5.8	4.4
Other	2.6	0.6	4.7
	(190)	(101)	(89)
Percentage that received Vitamin A at the MNCH day[+]	92.8	92.4	93.2
Percentage of mothers that think it is important to attend this type of training[+]	100.0	100.0	100.0
	(197)	(102)	(95)
Reasons why mother did not attend the MNCH day in May 2013[++]			
Have not ever heard of MNCH days	93.0	91.7*	94.2
No time	2.4	3.2**	1.7
Too far / too expensive	0.6	0.8	0.5
Not useful	0.2	0.3	0.2
Did not have permission to go	1.1	1.2	1.0
Did not know it was happening	2.0	2.1	2.0
Other	0.6	0.7	0.4
Total	100.0	100.0	100.0
	(4,084)	(2,002)	(2,082)

Notes: Indicators in this table have only been calculated for mothers not in Kebbi state, as MNCH weeks had not started in that state at the time of the survey.

Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

[+] Indicators calculated for mothers that attended MNCH day only.

[++] Indicators calculated for mothers that did not attend MNCH day only.

Table 7-8 reports how husbands to mothers who did attend MNCH interventions valued these days. Clearly, almost all husbands (99%) did think that MNCH weeks were important to attend.

Table 7-8 Husband's opinion on MNCH weeks

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Mothers whose husbands think MNCH weeks are important to attend⁺			
Important	99.3	99.2	99.3
Not important	0.4	0.8	0.0
He does not know about them	0.3	0.0	0.7
Total	100.0	100.0	100.0
	(197)	(102)	(95)

Notes:
⁺ Indicator calculated for mothers who had attended an MNCH day only.

7.3 Experience of CMAM interventions

Roughly one-third (30%) of all respondents to community questionnaires in the study reported that their community had a community mobiliser that identifies malnourished children using MUAC (Table 7-9). Similarly, just over a third (32%) of all respondents reported living in a community that had a health facility nearby in which severely malnourished children could receive special treatment with ready-to-use therapeutic food (RUTF).

Table 7-9 Community awareness of CMAM interventions

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of communities reporting that…			
They are aware of a community worker that identifies malnourished children using a MUAC	29.8	35.4**	25.1
	(836)	(418)	(418)
There is a health facility nearby where severely malnourished children can receive special treatment with RUTF	32.2	45.5***	21.1
	(836)	(417)	(419)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

The general level of awareness of CMAM interventions among households was significantly lower: only 6% of all households reported being aware of a community mobiliser in their community (Table 7-10). Similarly, only 4% of all carers to children in the survey were aware of a community health mobiliser in their community. Consequently, the number of children that have ever had their nutritional status monitored was very small. Only 34% of a total of 250 children with carers that were aware of community health workers had ever been examined for malnutrition at home. Hence, indicators related to MUAC measurement were similarly low.

A very low number of all children had ever been taken to a health facility to receive RUTF in order to treat severe malnutrition – just 5%. Of these children, only about one tenth (13%) were referred for in-patient care. About 52% were taken to health facilities for CMAM treatment 5 times or more. In order to reach these facilities, most respondents had to walk more than one hour for a return journey (80%) and slightly more than one-quarter (27%) had to walk more than four hours. The majority of respondents (68%) had spent NGN 100 or more on travel expenses to health facilities. At health

facilities, the majority of respondents (68%) spent about one to five hours waiting for RUTF treatment to be implemented. Among mothers whose children had ever been taken to a health facility for RUTF treatment, a significant proportion did not know how to prepare and feed this therapeutic food correctly: only 67% of mothers knew that RUTF does not need preparation and 81% knew that it is not OK to share RUTF with other children.

Table 7-11 shows that almost universally mothers and husbands acknowledged the importance of RUTF treatment for severely malnourished children, with 98% of mothers and 96% of their partners answering positively to this question.

Table 7-10 CMAM

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of households aware of a community health worker / volunteer that uses MUAC to identify malnourished children	5.5	8.3***	3.0
	(3,352)	(1,675)	(1,677)
Percentage of children whose mother/carer is aware of a community health worker/ volunteer that uses MUAC to identify malnourished children	3.9	5.7***	2.2
	(6,691)	(3,380)	(3,311)
Percentage of children who have ever been examined for malnutrition by community health worker at home‡	34.0	33.9	34.3
	(250)	(192)	(58)
Percentage of children who have had MUAC measured in the last 30 days+	58.7	66.4	40.3
	(87)	(63)	(24)
Percentage of children who have had MUAC measured twice or more in the last 30 days++	47.5	34.1	100.0
	(46)	(37)	(9)
Percentage of children where carer took any action as a result of MUAC measurement++	35.8	28.0	66.4
	(46)	(37)	(9)
Percentage of mothers / carers that received information when MUAC was measured+	49.0	47.9	51.5
	(87)	(63)	(24)
Percentage of children ever taken to a health facility to receive RUTF	5.2	6.7***	3.7
	(6,695)	(3,383)	(3,312)
Percentage of children that were required to stay overnight at a health facility when receiving RUTF+++	13.4	13.0	14.0
	(338)	(211)	(127)
Times child has been taken to health facility to be treated with RUTF+++			
1	15.2	13.1	18.6
2	12.0	10.7	14.1
3	10.6	8.4	14.2
4	10.3	9.7	11.2
5	8.8	7.3	11.2
6	5.8	5.8	5.9
7	7.5	8.7	5.5
8	10.8	11.7	9.5
9 or more	19.0	24.6**	9.9
Total	100.0	100.0	100.0
	(325)	(203)	(122)

Table 7-10 CMAM (continued)

Indicator	Estimate		
	Full sample	Treatment	Control
Time taken to walk to health facility where child received RUTF (two-way) +++			
0 min – 59min	20.4	24.1	14.2
1h – >2h	21.2	21.6	20.6
2h – >4h	31.7	31.5	32.0
4h+	26.7	22.8	33.3
Total	100.0	100.0	100.0
	(331)	(208)	(123)
Proportion of carers that spent NGN 100 or more to travel to health facility where child received RUTF (two-way) +++	68.2	62.8**	78.0
	(317)	(202)	(115)
Time taken at health facility to receive RUTF treatment +++			
0 hours – less than 1 hour	13.2	15.3	9.6
1 hour – less than 2 hours	17.3	17.5	17.1
2 hours – less than 3 hours	18.1	15.9	21.8
3 hours – less than 4 hours	17.4	20.1	12.7
4 hours – less than 5 hours	15.0	11.9	20.3
More than 6 hours	19.0	19.3	18.5
Total	100.0	100.0	100.0
	(336)	(211)	(125)
Percentage of mothers that responded correctly when asked…+++			
Does RUTF need preparation before it can be fed to child? (No)	67.2	67.0	67.4
	(333)	(209)	(124)
Is it OK to share RUTF with other children? (No)	80.9	80.4	81.6
	(334)	(210)	(124)

Note:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
‡ Indicator calculated for children whose carer is aware of community worker only.

+ Indicators calculated for children that were ever examined for malnutrition at home.
++ Indicators calculated for children that were examined in the last 30 days only.
+++ Indicators calculated for children that were ever taken to a health facility for treatment with RUTF only.

Table 7-11 Opinions on CMAM treatment

Indicator	Estimate		
	Full sample	Treatment	Control
Mothers / carers who think it is important to take their child to the health facility to receive treatment with RUTF+			
Not important	1.1	0.3	2.6
Important	98.3	98.9	97.4
No opinion	0.6	0.9	0.0
Total	100.0	100.0	100.0
Husband / household heads who think it is important to take their child to the health facility to receive treatment with RUTF+			
Important	96.1	94.7	98.5
Not important	2.1	2.4	1.5
He does not know about them	0.2	0.3	0.0
He does not have an opinion about them	1.7	2.7*	0.0
Total	100.0	100.0	100.0
	(333)	(209)	(124)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
+ Indicator only calculated for children that were ever taken to health facility for RUTF treatment.

8 Discussion

8.1 Baseline findings

While the impact of the WINNN Programme package of interventions can only be assessed after the end line survey in June 2016, there are a number programmatic and policy implications that emerge from the baseline study. This section presents a brief discussion of these findings.

Stunting begins in the womb

One of the most striking findings of the baseline study was that nearly a third of children 0-5 months old were stunted. Given that stunting is a result of chronic malnutrition, this indicates that a number of these children were born stunted and were exposed to chronic nutritrient deprivation during pregnancy in the womb (intrauterine growth retardation).

Adequate nutrition for mothers during pregnancy is essential

Furthermore, both the prevalence of stunting and underweight was significantly higher among children whose mother was underweight indicating a correlation between maternal and childhood malnutrition. Analysis of maternal malnutrition indicated that on average younger mothers were more likely to be classified as underweight.

Stunting rates are unacceptably high – potentially leading to low IQ, poor school achievement and low-skilled employment

With such a high prevalence of stunting among children aged 0-35 months, it is imperative to improve child health and nutrition. Malnutrition during pregnancy and infancy does not only affect height but can also affect cognitive capacity, educational attainment, and thus future adult earnings. There is strong evidence that children with restricted development during this period are at risk of poor school achievement, early school drop out, and low-skilled employment, which ultimately contributes to the intergenerational transmission of poverty (Grantham-McGregor *et al*., 2007).

Educated mothers had children less likely to be malnourished

Further investigation into maternal characteristics revealed that mothers with a secondary education or higher were significantly less likely to have a stunted child or a child with any form of malnutrition.

It is clear that preventative interventions such as ANC and IYCF, and improving girls in education have an important role to play.

IYCF interventions must reach communities as health facility access is low

With regards to ANC and IYCF interventions, coverage was found to be very low with less than half of mothers with children born in the last 35 months having received any ANC. Coverage of IYCF was also very low, although this might be expected given this was a baseline study and IYCF training has only recently been rolled out across WINNN states. Nevertheless, with such poor access to health facilities, these findings indicate the importance of IYCF interventions reaching beyond the health facility to communities. This could be done through a combination of outreach activities or community volunteers, but either way, reaching mothers within their communities will be an important factor in enhancing the impact of the programme.

Community leaders could be an important mobiliser

The importance of working with communities is further illustrated by the survey's findings in relation to exposure to IYCF, MNCH weeks and CMAM interventions. The baseline suggests that community members consistently showed higher levels of awareness of these interventions than mothers. Perhaps the most striking discrepancy is for MNCH weeks where 53% of community informants reported being aware of the MNCH weeks intervention whereas only 12% of mothers reported the same. Given the MNCH weeks intervention had been operating long before the baseline survey was conducted, one would expect higher levels of awareness at the level of the household. Such a discrepancy certainly warrants further work using community leaders as an important mobiliser of communities.

IYCF Interventions seem to hold promise for improving child nutrition

Given that almost all women felt that it was important to attend IYCF sessions, these seem to provide an important entry point to improving child nutrition. Tailoring IYCF messages based on findings in the baseline survey - for example focusing on not giving water or other liquids to infants under 6 months will improve the effectiveness of WINNN's messages.

Coordination of the scale-up and roll-out of nutrition evaluations to preserve the rigour of the impact evaluation

Finally, it must be reiterated that this baseline study has been designed to provide evidence of impact of the WINNN package of interventions in a 'real-world' setting thereby providing practical evidence for the scale-up of similar or indeed replicated models of the WINNN interventions. Careful attention must be taken to coordinate the implementation of any new or scaled-up nutrition specific or nutrition sensitive programmes in the evaluation areas, both treatment and control LGAs, so as to preserve the rigour of the impact evaluation design until June 2016.

8.2 Impact evaluation design

As explained in Section 3.1, point estimates for both the treatment and control group are presented in this report. While some statistical differences exist in estimates between treatment and control groups, this was expected as treatment was not randomly assigned but purposely selected. Furthermore, some elements of the WINNN intervention began implementation before the ORIE baseline study could be conducted. This also accounts for some observed differences, particularly in those indicators that relate to community and household experiences of IYCF, CMAM and MNCH interventions, i.e. WINNN interventions (Section 7).

Other notable differences between treatment and control groups include: lower accessibility and higher experiences of flooding in treatment communities (section 4.1), lower quality of housing in treatment areas (section 4.3), more farming activity in treatment areas (Table 4-6), lower levels of drinking water and poorer hygiene practices (Table 4-8 and Table 4-10) in treatment areas, and lower levels of food security in treatment areas (Table 4-12). These differences can, at least partly, be explained by the fact that treatment was purposely assigned to areas that were deemed in particular need of improved health infrastructure, which is the case in more rural and less accessible areas.

Notable differences in maternal characteristics can be found, among others, in higher involvement of mothers in decision making in treatment areas (Table 5-3) and better levels of breastfeeding knowledge among mothers in treatment areas (Table 5-4).

Finally, child characteristics differ in terms of higher levels of exclusive breastfeeding in treatment areas (Table 6-2), slightly higher levels of health MUAC monitoring in treatment areas (Table 6-4), and lower levels of illness or injury in treatment areas (Table 6-5).

Yet, despite these pre-existing differences between the two groups at baseline, the quasi-experimental design will allow a robust assessment of the impact of the WINNN interventions by using a difference-in-difference approach. With this method, pre-existing differences between treatment and control groups are accounted for and are factored out of the impact analysis. Therefore, the control group is an acceptable counter-factual for this study design provided that any changes over time are only due to the implementation of the WINNN program and not due to the scale-up or roll-out of nutrition-related programmes in or around the evaluation areas (as discussed in section 2.2.11).

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Annex A Original ORIE Terms of Reference

Terms of Reference for Nutrition programme: Operational research and impact evaluation (ORIE)

Introduction

DFID is seeking proposals from research and academic institutions to plan, manage and implement an operational research and impact evaluation (ORIE) component of a large programme to tackle undernutrition in Northern Nigeria.

The £50 million overarching Improving Maternal, Newborn and Child Nutrition in Northern Nigeria programme will be implemented by Government of Nigeria, UNICEF, Save the Children and Action Against Hunger across 5 states, over 6 years and focuses on scaling up direct nutrition interventions known to be effective in tackling undernutrition and reducing mortality.

The ORIE component would work closely with those implementing the programme, and also link with DFID funded research programmes in Nutrition. In addition, the selected supplier will be responsible for tracking and coordinating for onward transmission to DFID, progress reports from all the implementing partners delivering programme outputs.

Background:

There is a high prevalence of undernutrition amongst children under five in Nigeria, and particularly in the north: in this part of the country, half of all children under five are stunted, and one in five suffers from acute malnutrition. This has profound implications for health and for human development, and presents a major obstacle to attainment of the Millennium Development Goals in the country as well as globally.

The nutrition programme will provide a number of evidence-based, highly cost-effective direct interventions for the prevention and treatment of malnutrition, including community-based management of acute malnutrition (CMAM), Vitamin A supplementation and deworming, and promotion of improved infant and young child feeding (IYCF) practices. Delivery of these interventions will be used to raise the profile of undernutrition on the political and development agenda in Nigeria, and to enhance the commitment and capacity of government and others to address its immediate, basic and underlying causes. The log frame for the nutrition programme can be found in annex 1.

Objective

The objective of the ORIE component is to determine the impact of DFID Nigeria's Nutrition programme and address key evidence gaps on solutions to under nutrition in Northern Nigeria.

Methodology and Scope of Work

The ORIE component should focus on four areas (outlined below). Proposals should focus on: further developing these ideas and how to take them forward; as well as on how to plan and implement the component in support of the wider programme.

Major outputs of the ORIE component

1. **Evidence on the best approaches to scaling up interventions known to be effective in reducing undernutrition in the Northern Nigeria context.** This will include designing and implementing studies to test different implementation strategies, and ensuring the findings are used to adjust programme design in order to maximise impact and programme efficiency. This

may include for example: testing various delivery platforms for therapeutic zinc supplementation; testing approaches to developing and maintaining a strong community based work force to support the delivery of direct nutrition services; testing approaches for empowering women to demand better health services from ward and local government; and developing methods for measuring value for money of various implementation strategies.

2. **Evaluation of the cost effectiveness and DFID-attributable impact of the nutrition programme.** This will include designing an evaluation strategy which allows DFID to be fully accountable for funds committed to the programme and which generates a clear evidence base on what the programme has achieved in accordance with the log frame. The design should include consideration of elements of the programme which already have a strong evidence of impact and those which do not and propose a strategy which delivers best value for money. The programme implementers (UNICEF, Save the Children and Action Against Hunger) will design the programme monitoring component to support the impact evaluation plan. The evaluation should also allow the cost effectiveness of the programme to be judged.

3. **Evidence on complementary solutions to stunting.** This will include researching the causes of undernutrition and designing and evaluating 2–3 innovative pilots, which go beyond direct nutrition interventions, to tackle stunting. These pilots will be nested within the wider programme. The results of these pilots will be used to inform future DFID investments to tackling undernutrition. Areas of intervention could include: exploring and tackling the gender-related barriers to good nutrition; exploring and tackling the economic barriers to good nutrition; exploring the seasonal dimension of undernutrition and interventions to mitigate seasonal deterioration. Pilots could be implemented by existing programme partners or others and should take place within years 3–5 of the programme. Pilots could also be potentially nested within other programmes operating within Northern Nigeria.

4. **Dissemination and uptake of evidence.** This will include publication of results from outputs 1–3 in a range of products suitable for programme partners and policy makers in Nigeria and beyond. It will also include publications for peer-reviewed journals. A strategy for dissemination will include meetings, events and conferences in Nigeria and (where appropriate) beyond.

Recipient
The recipient of this work will be the Government of Nigeria, the Government of Jigawa, Katsina, Kebbi, Yobe and Zamfara States and DFID Nigeria Abuja and Kano Offices

Timeframe
The timing of the Operational Research and Impact Evaluation work will start as soon as possible after finalising the contract details but the aim is to commence the service no later than the end of February 2012. DFID intends to let the contract for an initial period of 5 years, with a possible extension of up to 1 year.

Reporting
Reporting will be direct to DFID Nigeria with a copy to the Project Management Board.

DFID co-ordination
DFID Nigeria is the sole funder of the ORIE component and the Health Adviser for Northern Nigeria will be responsible for ensuring the component is implemented according to plan.

Further Background

What need are we trying to address?
One million children under five die every year in Nigeria, 35% of them due to causes attributed to malnutrition. This makes Nigeria one of the six countries that accounts for half of all child deaths

from malnutrition worldwide. In the north, half of all children under five are stunted, and one in five suffers from acute malnutrition. This has profound implications for health and for human development, and presents a major obstacle to attainment of Millennium Development Goals in the country and globally. To date, the Nigerian government has not provided the necessary leadership or response to the crisis. Coupled with this, is a weak and fragmented health system which is unable to provide the most basic, cost-effective services for the prevention and management of common health problems. Primary health care level remains the weakest link in effective health delivery.

What will we do to tackle this problem?

The programme will deliver a number of evidence-based, highly cost-effective direct interventions for the prevention and treatment of malnutrition, including community-based management of acute malnutrition (CMAM), Vitamin A supplementation and deworming, and promotion of improved infant and young child feeding (IYCF) practices. The scaled up delivery will be used to raise the political profile of undernutrition in Nigeria and leverage government to coordinate and fund nutrition programmes. Independent operational research will examine the wider determinants and structural barriers of undernutrition. Impact evaluation will measure progress, quality and advise on critical elements required for a sustainable strategy.

Who will be implementing the support we provide?

A UNICEF and an INGO consortium of Save the Children (SC UK) and Action Against Hunger / Action Against Hunger (AAH/ACF) will deliver the interventions. Operational research and impact evaluation will be conducted by independent nutrition researchers and evaluation experts.

Annex B Selection of the control group

Selection of the control group

Matching was implemented by calculating dissimilarity measures between the treatment LGA and all other non-treatment LGAs within the same state. A squared Euclidian distance was used as the dissimilarity measure:

$$L(2)^2 = \sum_a \left(x_{ia} - x_{ja}\right)^2.$$

where:

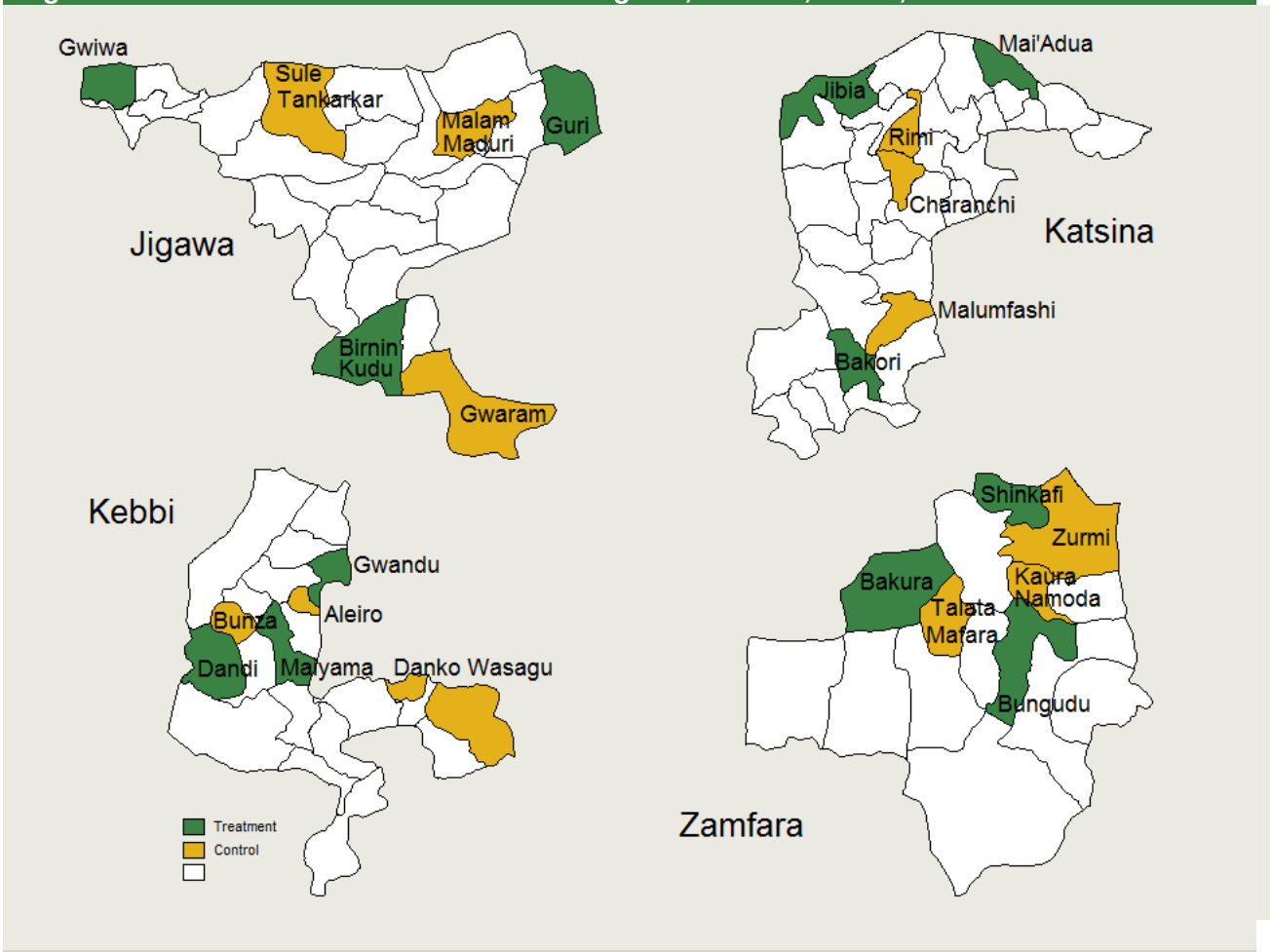
- $L(2)^2$ is the squared Euclidian distance;
- x_{ia} is the characteristic a for LGA i; and
- x_{ja} is the characteristic a for LGA j.

All variables apart from geographic latitude were given an equal weight in the dissimilarity estimation. Geographical, environmental, and ecological conditions vary widely between the northern and southern part of Nigeria's northern states, with increasing Sahel conditions in the north. Thus, geographic latitude was given a weight of 2, resulting in any latitudinal (north – south) distance from a treatment LGA giving a bigger dissimilarity score than any longitudinal (east – west) distance.

Moreover, all LGAs where CMAM operations that pre-existed the WINNN Programme were being implemented were excluded from the analysis, in order to prevent contamination of control areas with secondary interventions.

Based on these measures and criteria, a set of closely matched LGAs were chosen as controls to previously identified treatment LGAs, which were then shared with the WINNN Programme and respective state governments for validation.

Figure 24: Treatment and control LGAs in Jigawa, Katsina, Kebbi, and Zamfara



Source: ORIE Data

Annex C Sampling strategy, sample size and power calculations

This annex outlines the sampling strategy used, the achieved sample size, the weights used, and the related power calculations for the present survey.

C.1 Sampling strategy

The primary aim of this quantitative impact evaluation is to estimate the impact of the WINNN interventions, as a package, on child nutrition, IYCF practices, and IYCF knowledge, in the four states of Jigawa, Katsina, Kebbi, and Zamfara. In order to do so, several indicators need to be estimated at baseline and follow-up, both in treatment and control LGAs.

The sampling strategy used to collect data for this study was a multistage random sampling method. As previously explained, treatment was not allocated randomly to LGAs. Rather, state officials and WINNN IPs selected certain LGAs for treatment. Hence, control LGAs were also not chosen at random, but matched to the treatment LGAs based on a list of observable variables (see Section 2.2.4). In each state, three treatment and three control LGAs were selected for this study.

Within this total number of 24 LGAs, the PSUs were EAs as defined by the 2006 Nigerian Census. In the context of this report, these EAs are referred to as 'communities'. A sampling frame was not available at the outset of the evaluation. Hence, a list of all EAs across treatment and control LGAs was prepared. Thirty-five EAs were then sampled per LGA using a random draw, with each EA in the same LGA having the same probability of being selected. This is the first stage of sampling.

The second sampling stage occurred within each EA, wherein the secondary sampling units were households with at least one child under the age of three. The definition of the household used was 'a person or group of related or un-related persons that live together in the same dwelling unit and acknowledge one adult male or female as the head of the household' (see Section 2.2.6 for details on the rationale for this definition). These secondary sampling units were selected because it is assumed that the WINNN interventions, aimed at infants and young children, are most likely to affect children aged 0–2 years. Hence, the aim was to obtain a sample in which there would be a high number of children within this age range. Where a sampled EA did not contain at least 10 households with at least one child under the age of three, an adjacent EA was linked to it.

Again, no sampling frame was available for this stage of the survey. Therefore, a listing exercise was conducted within each EA, during which a census of all households was collected. Detailed maps of the EA were prepared to enable the baseline and follow-up survey teams to identify sampled households. Listing was implemented using brief interviews aimed at collecting basic household information to identify households as well as the nature of their composition.

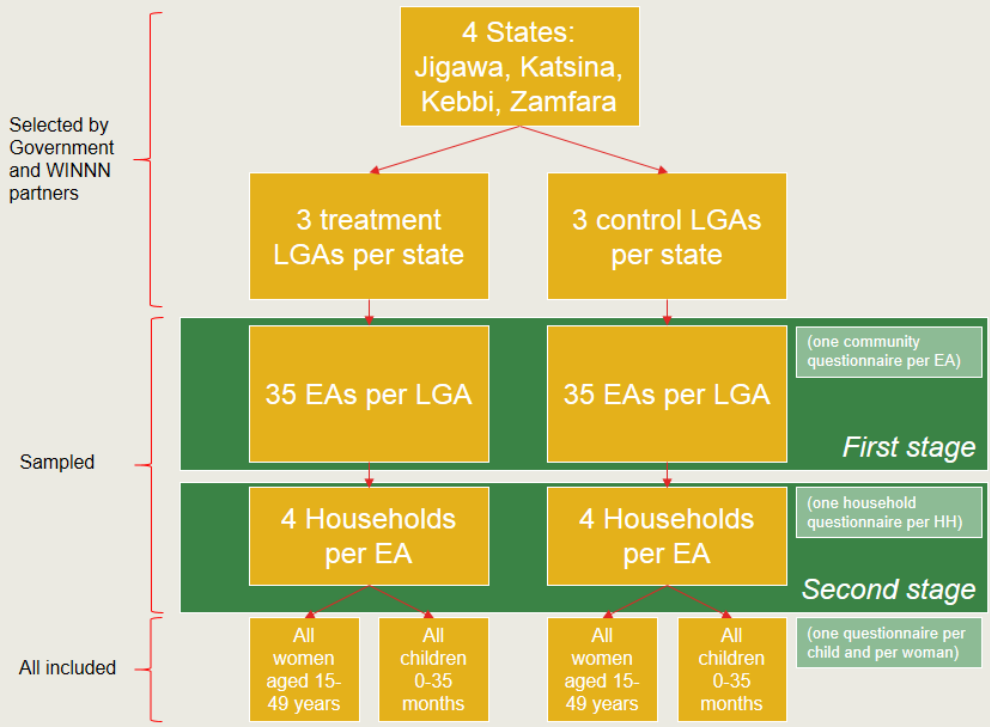
Due to the brevity of the listing interview, only an estimated number of children aged 0–2 years could be collected for each household. Such information may often be unreliable due to large households and non-accurate perception of the age of children by respondents. Hence, a sample unit replacement protocol was implemented at the level of the EA.

The sampling was done independently by OPM consultants and provided to each of the supervisors of the data-collection teams. For each EA, a random sample of four eligible households identified in the listing was drawn as the main sample. At the same time, a random sample of replacement households within the same EA was drawn and contained in sealed envelopes by the baseline team supervisor.

The target sample size was therefore a total of 3,360 households (4 states × 6 LGAs × 35 EAs × 4 households). The aim was to collect data on all children aged 0–35 months and all women aged 15–49 years (child-bearing age) in these households. In addition, one household questionnaire for data

on the household itself and one community questionnaire per EA was also administered. Figure 25 outlines the rough steps of this sampling strategy. For follow-up, data from the same EAs and households will be collected.

Figure 25: Overview of sampling strategy



Source: Authors

C.2 Sample size

As expected, not all of the households initially surveyed were included in the final analysis. About 3% of the total initially surveyed (N = 102) were either replaced during data collection or dropped during data cleaning. This was due to two reasons: first, enumerators identified some households as not eligible for the survey as no children under the age of three could be identified at the time of the interview. In this case, a replacement household from the same EA was selected from the replacement data.

Second, at the stage of data cleaning, a cleaned child age variable identified some instances where households did not actually include a child under the age of three. Often, cleaning of the age variable revealed that one child in the household was just over the three-year cut-off by a matter of months and thus not eligible for the study. These households were dropped from the analysis. We do not expect this to have any effect on our overall design as the baseline survey achieved 99.9% of the expected sample. A total of 3,355 households with 6,833 children under the age of three were included in the final dataset. Table C-1 gives a detailed breakdown of the baseline sample after data collection and cleaning. Similarly, Table C-2 presents the weighted sample sizes when using the weights as defined below in Annex 0. Notice how weighting increases sample size in the control areas.

Table C-1 Sample size by location and treatment status			
	N		
	Full Sample	Treatment	Control
LGAs			
Jigawa	6	3	3
Katsina	6	3	3
Kebbi	6	3	3
Zamfara	6	3	3
Total	**24**	**12**	**12**
Communities			
Jigawa	210	105	105
Katsina	210	105	105
Kebbi	210	105	105
Zamfara	210	105	105
Total	**840**	**420**	**420**
Households			
Jigawa	839	419	420
Katsina	837	418	419
Kebbi	840	420	420
Zamfara	839	420	419
Total	**3,355**	**1,677**	**1,678**
Mothers with children under 3 years old			
Jigawa	1,457	675	782
Katsina	1,335	665	670
Kebbi	1,647	870	777
Zamfara	1,528	783	745
Total	**5,967**	**2,993**	**2,974**
Children under 3 years old			
Jigawa	1,652	771	881
Katsina	1,590	813	777
Kebbi	1,879	997	882
Zamfara	1,712	882	830
Total	**6,833**	**3,463**	**3,370**

Table C-2 Weighted sample size by location and treatment status			
	N		
	Full Sample	Treatment	Control
Communities			
Jigawa	192	98	94
Katsina	223	115	107
Kebbi	193	82	111
Zamfara	233	87	146
Total	**840**	**382**	**458**
Households			
Jigawa	838	406	432
Katsina	837	473	363
Kebbi	675	270	405
Zamfara	1,006	452	554
Total	**3,356**	**1,601**	**1,755**
Mothers with children under 3 years old			
Jigawa	1,459	660	800
Katsina	1,343	746	598
Kebbi	1,265	556	709
Zamfara	1,788	833	955
Total	**5,856**	**2,795**	**3,061**
Children under 3 years old			
Jigawa	1,631	738	894
Katsina	1,622	930	692
Kebbi	1,456	636	819
Zamfara	2,016	944	1,072
Total	**6,725**	**3,248**	**3,477**

C.3 Precision of estimates

In the following tables point estimates and 95% confidence intervals are presented for some key indicators, with the aim of giving an indication for the precision of estimates presented in the report.

Table C-3 Breastfeeding knowledge

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of mothers that knew a baby should start breastfeeding immediately or within the first one hour	58.9	59.4	58.4
95% Confidence Interval	[56.6,61.2]	[56.0,62.7]	[55.2,61.6]
	(5,933)	(2,973)	(2,960)
Percentage of mothers that think colostrum is good for the baby and should be given to her/him	75.8	78.3*	73.6
95% Confidence Interval	[74.0,77.7]	[75.9,80.7]	[70.8,76.4]
	(5,905)	(2,967)	(2,938)
Percentage of mothers that know that it is not OK to give a young baby under six months some water on a hot day	7.4	8.4	6.6
95% Confidence Interval	[6.3,8.5]	[6.7,10.1]	[5.1,8.0]
	(5,898)	(2,953)	(2,945)
Percentage of mothers that think it is OK to feed a young baby under six months whenever he /she wants (non-standard feeding times)	92.5	89.3***	95.4
95% Confidence Interval	[91.6,93.4]	[87.8,90.9]	[94.3,96.5]
	(5,925)	(2,967)	(2,958)
Mean number of months mothers think a baby should only receive breast milk	2.4	3.0***	1.8
95% Confidence Interval	[2.2,2.5]	[2.8,3.2]	[1.6,2.0]
	(5,922)	(2,970)	(2,952)
Distribution of mothers who responded that a baby should receive breast milk only for …			
0 months	54.9	45.2***	63.9
95% Confidence Interval	[52.4,57.5]	[42.0,48.3]	[60.3,67.5]
1 month	2.1	2.2	2.0
95% Confidence Interval	[1.5,2.6]	[1.2,3.1]	[1.4,2.6]
2 months	1.6	1.3	1.9
95% Confidence Interval	[1.2,2.1]	[0.7,1.9]	[1.3,2.6]
3 months	3.1	2.1**	4.1
95% Confidence Interval	[2.4,3.8]	[1.4,2.8]	[2.9,5.2]
4 months	3.3	3.2	3.4
95% Confidence Interval	[2.7,4.0]	[2.3,4.1]	[2.5,4.3]
5 months	4.9	4.8	4.9
95% Confidence Interval	[4.1,5.7]	[3.8,5.9]	[3.7,6.1]
6 months	25.4	36.7***	15.0
95% Confidence Interval	[23.3,27.5]	[33.5,40.0]	[12.9,17.2]
7 or more months	4.7	4.6	4.8
95% Confidence Interval	[3.7,5.7]	[3.4,5.7]	[3.1,6.4]
Total	100.0	100.0	100.0
	(5,922)	(2,970)	(2,952)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

Table C-4 IYCF practices among children aged 0–23 months

Indicator+	Estimate		
	Full sample	Treatment	Control
Breastfeeding indicators			
Child ever breastfed	99.7	99.8	99.7
95% Confidence Interval	[99.5,99.9]	[99.5,100.0]	[99.4,100.0]
	(4,409)	(2,193)	(2,216)
Age-appropriate breastfeeding	55.3	55.7	55.0
95% Confidence Interval	[53.5,57.1]	[53.2,58.1]	[52.4,57.6]
	(4,410)	(2,193)	(2,217)
Duration of breastfeeding for children currently not breastfed	18.8	18.8	18.8
95% Confidence Interval	[18.5,19.0]	[18.4,19.2]	[18.4,19.1]
	(509)	(235)	(274)
Early initiation of breastfeeding (within one hour of birth)	41.9	43.3	40.5
95% Confidence Interval	[39.6,44.1]	[40.1,46.5]	[37.3,43.7]
	(4,402)	(2,190)	(2,212)
Early initiation of breastfeeding (within 24 hours of birth)	62.2	64.4	60.2
95% Confidence Interval	[59.6,64.7]	[60.9,67.8]	[56.5,63.8]
	(4,402)	(2,190)	(2,212)
Exclusive breastfeeding among children < 6 months	7.2	11.6***	3.5
95% Confidence Interval	[5.1,9.3]	[7.9,15.2]	[1.4,5.5]
	(1,133)	(578)	(555)
Predominant breastfeeding among children < 6 months	78.1	76.7	79.2
95% Confidence Interval	[74.8,81.3]	[71.6,81.7]	[74.9,83.4]
	(1,041)	(515)	(526)
Continued breastfeeding at one year (12–15 months)	94.2	91.7*	96.4
95% Confidence Interval	[92.4,96.0]	[88.7,94.8]	[94.4,98.5]
	(906)	(450)	(456)
Continued breastfeeding at two years (20–23 months)	30.2	29.1	31.3
95% Confidence Interval	[25.7,34.7]	[22.6,35.6]	[25.1,37.4]
	(638)	(304)	(334)
Proportion of non-breastfed children (6–23 months) who received at least two milk feedings during previous day (milk feeding frequency)	13.5	13.9	13.1
95% Confidence Interval	[10.1,16.8]	[8.7,19.0]	[8.9,17.3]
	(636)	(303)	(333)

Table C-4 IYCF practices among children aged 0–23 months (continued)			
Indicator⁺	**Indicator⁺**	**Indicator⁺**	**Indicator⁺**
Complementary feeding indicators			
Introduction of solid, semi-solid or soft foods (aged 6–8 months)	73.9	74.5	73.3
95% Confidence Interval	[69.5,78.3]	[68.8,80.1]	[66.6,80.0]
	(559)	(282)	(277)
Consumption of iron-rich or iron-fortified foods (aged 6–23 months)	13.6	17.4***	10.2
95% Confidence Interval	[12.1,15.2]	[14.9,19.8]	[8.3,12.1]
	(3,278)	(1,616)	(1,662)
Minimum meal frequency (aged 6–23 months)	23.3	24.5	22.1
95% Confidence Interval	[21.5,25.1]	[21.8,27.2]	[19.7,24.5]
	(3,256)	(1,604)	(1,652)
Minimum dietary diversity (≥ 4 food groups) (aged 6–23 months)	13.7	14.5	12.8
95% Confidence Interval	[12.1,15.2]	[12.1,16.9]	[10.9,14.8]
	(3,278)	(1,616)	(1,662)
Minimum acceptable diet (aged 6–23 months)	4.8	5.1	4.5
95% Confidence Interval	[3.9,5.7]	[3.7,6.5]	[3.4,5.7]
	(3,277)	(1,615)	(1,662)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
⁺ See WHO document on IYCF indicators (WHO, 2008, pp. 32 ff.) for the exact definition of these indicators.

Table C-5 Preventative health care practices among children aged 0–35 months			
	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Percentage of children that are fully vaccinated for age (12–23 months)[+++]	2.7	2.3	3.1
95% Confidence Interval	[1.9,3.6]	[1.1,3.4]	[1.8,4.4]
	(2,120)	(1,036)	(1,084)
Percentage of children (aged 12–35 months) who have received specific vaccines…			
BCG	21.7	25.9***	17.7
95% Confidence Interval	[19.7,23.7]	[22.8,28.9]	[15.4,20.0]
	(4,444)	(2,250)	(2,194)
DPT 1	15.6	18.2**	13.2
95% Confidence Interval	[13.9,17.3]	[15.5,20.8]	[11.1,15.3]
	(4,413)	(2,234)	(2,179)
DPT 2	10.5	12.1*	8.8
95% Confidence Interval	[8.9,12.0]	[9.6,14.6]	[7.1,10.6]
	(4,413)	(2,234)	(2,179)
DPT 3	4.4	5.2	3.7
95% Confidence Interval	[3.4,5.3]	[3.6,6.7]	[2.5,4.8]
	(4,413)	(2,234)	(2,179)
Polio 0	16.6	17.4	15.9
95% Confidence Interval	[15.1,18.2]	[14.9,19.9]	[13.9,17.9]
	(4,439)	(2,253)	(2,186)
Polio 1	54.4	54.5	54.3
95% Confidence Interval	[52.3,56.6]	[51.5,57.5]	[51.3,57.4]
	(4,387)	(2,213)	(2,174)
Polio 2	53.0	53.3	52.6
95% Confidence Interval	[50.8,55.1]	[50.3,56.4]	[49.6,55.6]
	(4,387)	(2,213)	(2,174)
Polio 3	50.6	51.3	49.9
95% Confidence Interval	[48.5,52.7]	[48.3,54.4]	[47.0,52.9]
	(4,387)	(2,213)	(2,174)
Penta 1[++++]	13.5	17.1	9.4
95% Confidence Interval	[7.6,19.4]	[7.7,26.6]	[3.3,15.4]
	(280)	(150)	(130)
Penta 2[++++]	9.2	11.1	7.1
95% Confidence Interval	[3.7,14.7]	[2.0,20.1]	[1.6,12.6]
	(280)	(150)	(130)
Penta 3[++++]	8.6	10.8	6.0
95% Confidence Interval	[3.2,13.9]	[2.1,19.6]	[0.6,11.4]
	(280)	(150)	(130)
Measles	16.3	16.8	15.9
95% Confidence Interval	[14.7,17.9]	[14.5,19.1]	[13.6,18.1]
	(4,448)	(2,251)	(2,197)
All basic vaccinations (BCG, measles, three doses of DPT, three doses of polio – excluding polio vaccine given at birth) (aged 12–35 months)	2.5	2.7	2.3
95% Confidence Interval	[1.8,3.2]	[1.6,3.8]	[1.5,3.1]
	(4,347)	(2,194)	(2,153)

Table C-5 Preventative health care practices among children aged 0–35 months

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
No vaccinations (aged 12–35 months)	41.7	41.2	42.1
95% Confidence Interval	[39.4,43.9]	[38.0,44.3]	[38.9,45.3]
	(4,466)	(2,260)	(2,206)
Percentage of children who have ever had MUAC measured	8.5	10.8***	6.4
95% Confidence Interval	[7.6,9.5]	[9.3,12.3]	[5.2,7.5]
	(6,666)	(3,370)	(3,296)
Percentage of children who have ever had weight and / or height measured	9.4	12.0***	7.1
95% Confidence Interval	[8.4,10.4]	[10.4,13.5]	[5.9,8.3]
	(6,671)	(3,375)	(3,296)
Percentage of children who have had weight and / or height measured in the last six months+++++	49.2	50.7	46.9
95% Confidence Interval	[44.4,54.1]	[44.6,56.8]	[39.0,54.7]
	(587)	(346)	(241)

Notes:

Significance asterisks: * = 95%, ** = 99%, *** = 99.9%

+ Indicator calculated for children that received Vitamin A supplements in the last six months only.

++ Indicator calculated for children who received deworming medication in the last six months only.

+++ In Nigeria, children are considered fully vaccinated if they received one dose of BCG vaccine, three doses of DPT vaccine, three doses of polio vaccine (excluding at birth), and one dose of measles vaccine (NDHD, 2008, p.145). This indicator counts pentavalent vaccination as equivalent to a DPT vaccination. Pentavalent vaccinations were introduced in Nigeria in May 2013 (NDHS, 2013, p.23).

++++ Indicator calculated for children that had a vaccination card only.

+++++ Indicator calculated for children that had ever had their weight/height measured.

Table C-6 Anthropometric measurements of children aged 0–35 months

	Estimate		
Indicator	**Full sample**	**Treatment**	**Control**
Mean length/height-for-age z-score (LAZ/HAZ)+	-2.2	-2.2	-2.3
95% Confidence Interval	[-2.3,-2.2]	[-2.3,-2.1]	[-2.3,-2.2]
Percentage stunted (LAZ/HAZ < -2SD)+	57.5	56.6	58.4
95% Confidence Interval	[55.8,59.2]	[54.2,59.0]	[56.0,60.7]
	(6,388)	(3,306)	(3,082)
Mean WAZ+	-1.7	-1.7	-1.7
95% Confidence Interval	[-1.7,-1.6]	[-1.8,-1.6]	[-1.8,-1.6]
Percentage underweight (WAZ < -2SD)+	41.2	41.1	41.4
95% Confidence Interval	[39.5,43.0]	[38.7,43.5]	[38.9,43.8]
	(6,527)	(3,328)	(3,199)
Mean WLZ/WHZ+	-0.6	-0.7	-0.6
95% Confidence Interval	[-0.7,-0.6]	[-0.7,-0.6]	[-0.7,-0.5]
Percentage wasted (WLZ/WHZ < -2SD)+	16.2	15.1	17.3
95% Confidence Interval	[15.1,17.3]	[13.4,16.8]	[15.7,18.8]
Percentage severely wasted (WLZ/WHZ < -3SD)	5.8	5.5	6.2
95% Confidence Interval	[5.1,6.5]	[4.4,6.6]	[5.2,7.1]
	(6,278)	(3,260)	(3,018)
Percentage wasted among children aged 6–35 months	16.2	14.9**	17.5
95% Confidence Interval	[14.9,17.5]	[13.0,16.8]	[15.8,19.2]
	(5,306)	(2,726)	(2,580)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
+In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.

Table C-7 Anthropometric measurements of children aged 0–35 months by sex			
	Estimate		
Indicator	Full sample	Male	Female
Mean LAZ/HAZ+	-2.2	-2.3***	-2.1
95% Confidence Interval	[-2.3,-2.2]	[-2.4,-2.3]	[-2.2,-2.0]
Percentage stunted (LAZ/HAZ < -2SD)+	57.5	59.6**	55.4
95% Confidence Interval	[55.8,59.2]	[57.4,61.8]	[53.2,57.6]
	(6,382)	(3,214)	(3,168)
Mean WAZ+	-1.7	-1.8***	-1.6
95% Confidence Interval	[-1.7,-1.6]	[-1.9,-1.7]	[-1.7,-1.5]
Percentage underweight (WAZ < -2SD)+	41.2	43.8***	38.7
95% Confidence Interval	[39.5,43.0]	[41.4,46.1]	[36.7,40.8]
	(6,527)	(3,302)	(3,225)
Mean WLZ/WHZ+	-0.6	-0.7**	-0.6
95% Confidence Interval	[-0.7,-0.6]	[-0.8,-0.6]	[-0.6,-0.5]
Percentage wasted (WLZ/WHZ < -2SD)+	16.2	17.6*	14.8
95% Confidence Interval	[15.1,17.3]	[16.0,19.1]	[13.2,16.4]
Percentage severely wasted (WLZ/WHZ < -3SD) +	5.8	6.7**	4.8
95% Confidence Interval	[5.1,6.5]	[5.7,7.8]	[3.9,5.8]
	(6,278)	(3,184)	(3,094)
Percentage wasted among children aged 6–35 months	16.2	17.9**	14.5
95% Confidence Interval	[14.9,17.5]	[16.2,19.7]	[12.8,16.2]
	(5,306)	(2,676)	(2,630)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9% +In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.			

C.4 Sampling weights

In order to obtain estimates of key indicators that are representative for WINNN intervention areas, the observed values were analysed using sampling weights that were equal to the inverse of the probabilities of the observations to be selected into the sample.

EAs

In analyses at the community level, the first sampling stage, this meant that observations were weighted by the inverse of the probability of an EA to be selected within a certain LGA:

$$p_i^{EA} = \frac{35}{N_i^{EA}};$$

where 35 is the total number of EAs to be selected in each LGA, N_i^{EA} is the total number of EAs listed in LGA i, and p_i^{EA} is hence the probability of selection in LGA i. Analyses at the community level were implemented using appropriately normalised values of weights derived from these probabilities.

HHs

At the household level – i.e. the second sampling stage – the probability of selection was given as follows:

$$p_{ij}^{HH} = p_i^{EA} \times \frac{4}{N_j^{HH}};$$

where p_i^{EA} is defined as above, 4 is the total number of households to be selected within each EA, N_j^{HH} is the total number of households listed in EA j, and p_{ij}^{HH} is therefore the probability of selection of the four households in EA j and LGA i.

Analyses at household and individual level (mothers and children) were implemented using appropriately normalised inverse values of these probabilities as weights. Note that each individual within a household had the household's probability of being selected, as all children and all women of the relevant age were interviewed in each household.

C.5 Power calculations, design effects and minimum detectable effects

The purpose of this subsection is to present estimates of the precision with which the quantitative impact evaluation will be able to identify the impact of the WINNN interventions. It is important to emphasise that these are estimates that rely on a variety of assumptions explicitly laid out below. As previously explained, the aim of the quantitative impact evaluation is to estimate the effect of the WINNN intervention as a package in treatment LGAs versus no intervention in control LGAs. The following paragraphs will give an estimate of the size of the effect of the intervention that this study will be able to detect.

Following standard results from theory on statistical testing, it is possible to identify, before the implementation of a survey, the sample size needed to test certain hypotheses on expected differences in means (or proportions) between two groups in a sample. In the present case, this could be to test whether the proportion of children malnourished in WINNN intervention areas before the intervention is statistically significantly different from the proportion after the WINNN intervention (SMART 2012b).

The needed sample size will depend on the difference in the values to be tested, the standard errors of the estimators, the required power of the test (i.e. the probability of correctly rejecting the hypothesis of no difference between values) and the required significance level of the test (i.e. the probability of falsely rejecting the hypothesis of no difference). Conversely, using a given sample size, a given estimate (mean or proportion) of an indicator, a required power of the test, and a significance level, it is possible to find the minimal difference to the given estimate that a statistical test will be able to identify (SMART, 2012b; Grosh and Munoz, 1996). In the context of a treatment versus control comparison, this is the minimum change in the outcome variable at which a statistically significant impact will be measured.

In addition to these standard procedures, clustered sampling needs to be taken into account in the present context. Because households and individuals within EAs are likely to have similar characteristics, and hence indicators will be correlated within these clusters, the standard errors of estimators will be larger than under simple random sampling (SMART, 2012b, p. 16 ff.). The factor by which standard errors using the clustered sampling method are inflated over standard errors using simple random sampling is called the Design Effect (DEFF), which for each indicator i is generally defined as follows:

$$DEFF_i = 1 + (m - 1)\rho_i;$$

where m is the cluster size and ρ_i is the ICC coefficient for indicator i, a measure of how much indicators are correlated with each other within clusters. When estimating the size of the detectable effect, inflated standard errors, and therefore the DEFF, need to be taken into account as well.

As can be seen, the size of the DEFF will generally depend on two factors: cluster size and the ICC. The formula above assumes constant cluster sizes. In the present context, however, cluster sizes

vary. In some EAs, more children were interviewed than in others. In such instances, the DEFF should be defined differently so as to accommodate the varying cluster sizes.

There are several proposals in the literature setting out how this can be achieved, e.g. ESSEduNet (2013), Gabler et al. (2006), and Eldridge et al. (2006). We follow the approach suggested by Hemming et al. (2011), who recommend a procedure to adapt the DEFF to varying cluster sizes and who have developed a command to implement this procedure in Stata (Hemming and Marsh, 2013).

According to this approach, the DEFF with varying cluster sizes can be defined as follows:

$$DEFF_i^{var} = 1 + \{(cv^2 + 1)\bar{m} - 1\}\rho_i.$$

Here, cv is the coefficient of variation of cluster size, defined as the ratio of the standard deviation of cluster sizes to the mean cluster size, $\bar{m}$ (Eldridge et al., 2006, p. 1293). The other terms are defined as before. When the sample size is known, the number of clusters is fixed but when the number of individuals might vary across clusters, which is the case in the present survey, the detectable difference, compared to simple random sampling, between two groups will be inflated by the square root of this DEFF (Hemming et al., 2011, p. 3).

For the following results we use the Stata command 'clustersampsi', developed by Hemming and Marsh (2013), in order to estimate the minimal detectable difference of indicators used in the WINNN survey for individuals in the treatment group. For example, we want to estimate the minimal difference in stunting prevalence in treatment and control areas that we will be able to statistically detect after the implementation of the WINNN Programme.

For this exercise, we will assume that indicators will stay at baseline level in control areas, even after WINNN has been rolled out. In addition, we will assume that cluster sizes and ICCs will be the same. The ICC is estimated using the ANOVA estimator, implemented by 'l1way' in Stata, and allowing for varying cluster sizes and weights. The significance level is always set at 0.05% and power at 80%.

Throughout this baseline report, clusters have been set at the level of the PSUs, i.e. the EA level, of which there were 420 in the treatment group. The average cluster size and the coefficient of variation of cluster size vary depending on the indicator analysed, and are hence presented below. For comparison purposes, the DEFF calculated using the approach outlined in Kish (1965), which is implemented using the Stata 'estat eff' command, is presented as well. Note also that for proportions of malnutrition the minimal detectable difference downwards, i.e. for a decreasing proportion, is reported. For the other indicators, the minimal difference detectable for an increasing outcome is reported in the table.

Table C-8 Design effects and minimum detectable differences for clusters at EA level

Indicator	Estimate	Average cluster size	Variation of cluster size	ICC at baseline	DEFF	Detectable difference	Alternative DEFF
Percentage stunted (0–35, LAZ/HAZ < -2SD)	58%	8	0.46	0.09	1.8	5 (58% to 53%)	1.9
Percentage underweight (0–35, WAZ < -2SD)	41%	8	0.45	0.13	2.1	5 (41% to 36%)	2.0
Percentage wasted (0–35, WLZ/WHZ < -2SD)	16%	7	0.46	0.02	1.2	3 (16% to 13%)	1.5
Exclusive breastfeeding among children aged < 6 months	7%	1	0.80	0.38	1.2	7 (7% to 14%)	1.8
Proportion of children with minimum dietary diversity (≥ 4 food groups) (aged 6–23 months)	14%	4	0.55	0.17	1.7	5 (14% to 19%)	1.7
Proportion of children receiving minimum acceptable diet (aged 6–23 months)	5%	4	0.55	0.11	1.5	3 (5% to 8%)	1.5
Percentage of children that are fully vaccinated for age (aged 12–23 months)	3%	3	0.61	0.19	1.6	3 (3% to 6%)	1.5

Notes: Estimates for the treatment areas only. Clusters are EAs.

Table C-8 above shows the sampling parameters for seven key indicators. Taking stunting for example, with an ICC of 0.09, an average cluster size of 8, a coefficient of variation of cluster size of about 0.5, and a DEFF of 1.8, the present sample will be sufficient to detect a decrease in stunting by four percentage points from 57% to 53%. Similarly, it will be sufficient to detect a decrease in underweight by four percentage points from 41% to 37% and by three percentage points in wasting from 15% to 12%. It will also be able to detect an increase in exclusive breastfeeding among children aged 0–5 months by eight percentage points (from 12% to 20%). The remaining estimates can be interpreted in an analogous way.

Clustering

As mentioned above, throughout this report estimates were clustered at the level of EAs (PSUs). The rationale is that for this baseline study, and for the purposes of comparing treatment and control areas, the report is simply presenting estimates for two separate populations for which the externally given LGAs are the universes.

However, when estimating impact at the follow-up, the clusters need to be defined at the level of allocation of treatment. In this case, these are the 24 LGAs in the study. Again, the 12 treatment LGAs were purposefully chosen by state governments and WINNN IPs, so no random allocation of treatment was possible and the number of treatment areas was fixed. Table C-9 below shows how the precision estimates change when defining LGAs as clusters. As might be expected, because individuals within any LGA are more heterogeneous than within an EA, the ICC decreases. However, the DEFF for all indicators increases as well, due to increased average cluster size. This will increase standard errors and inflates the estimated minimal detectable difference. This means that estimates are less precise than identified above.

The design of the quantitative impact evaluation aims at mitigating this effect by using a panel of households and dispersing EAs randomly across LGAs, i.e. having a heterogeneous sample within LGAs. The magnitude by which this will increase precision of the impact estimates will be addressed by future research.

Table C-9 Design effects and minimum detectable differences with clustering at LGA level

Indicator	Estimate	Average cluster size	Variation of cluster size	ICC at baseline	DEFF	Detectable difference	Alternative DEFF
Percentage stunted (0–35, LAZ/HAZ < -2SD)	58%	266	0.17	0.05	14.6	14 (58% to 44%)	14.6
Percentage underweight (0–35, WAZ < -2SD)	41%	272	0.16	0.07	20.5	15 (41% to 26%)	18.7
Percentage wasted (0–35, WLZ/WHZ < -2SD)	16%	262	0.17	0.00	2.1	4 (16% to 12%)	2.1
Exclusive breastfeeding among children aged < 6 months	7%	47	0.26	0.07	4.4	12 (7% to 19%)	5.8
Proportion of children with minimum dietary diversity (≥ 4 food groups) (aged 6–23 months)	14%	138	0.19	0.06	9.5	12 (14% to 26%)	10.5
Proportion of children receiving minimum acceptable diet (aged 6–23 months)	5%	137	0.19	0.02	3.8	5 (5% to 10%)	3.7
Percentage of children that are fully vaccinated for age (aged 12–23 months)	3%	88	0.21	0.07	7.4	9 (3% to 12%)	7.6

Notes: Estimates for the treatment areas only. Clusters are LGAs.

C.6 Response Rates

Table C-10 below summarises household and individual response rates for the present survey. A total of 3,457 households were approached by the field teams of which 3,355 could be interviewed as there were 102 households that either refused participation in the study, were not eligible because they didn't have a child between the ages of 0-35 months, or were absent despite multiple call-backs. In summary, the baseline survey had a response rate of 98%.

According to the household roster, there was a total of 8,585 women aged 15-49 and 6,833 children between the ages of 0-35 months amongst the households that participated in the survey. A response rate of 98% was achieved for both women and children as displayed in the table below. The most common reason for non-response of women and children is because the mother and her child were not in the house at the time of the interview.

Table C-10: Response Rates for Households, Women, Mothers, and Children (unweighted)	
Households	
Households approached[+]	3,457
Of these….	
Households without children under the age of 3[++]	53
Entire household absent or dwelling destroyed	7
Refusal to respond or other unspecified reason for non-response	42
Total of households *not* included in analysis	102
Households included in analysis	3,355
Response rate (households included over households approached)	97.5
Women aged 15-49 years	
Total number of…	
Women in eligible households[+++]	8,585
Woman questionnaires completed in eligible households[++++]	8,425
Response rate (number of women questionnaires over total number of women)	98.1
Children	
Total number of …	
Children aged 0-35 months in eligible households[+++]	6,833
Child questionnaires completed in eligible households[++++]	6,709
Response rate (child questionnaires completed over total number of children)	98.2

Notes:

[+] Households approached include the total number of households that the field teams contacted during data collection with the aim of conducting interviews, i.e. both households for which successful interviews were conducted and households where interviews were not successful and which were replaced.

[++] This is the total number of households that were excluded from the analysis with the sole reason that no children aged 0-35 months could be identified as household members, either while the interview was being conducted or during data cleaning.

[+++] Eligible households are defined as households with at least one child aged 0-35 months. These are the total 3,355 households included in the analysis.

[++++]These are the actual numbers of the respective questionnaires that were included in the analysis. Note that item non-response below is calculated over the total number of individuals in the sample, not only completed questionnaires.

C.7 Item non-response

The following tables present item non-response rates for selected key indicators presented in this report. The base population for all indicators are the total number of individuals (of a certain age or sex) for which questionnaires were completed. The non-response is defined as one minus the quotient of observations included in the analysis over the base population.

For most indicators, the item non-response rate is below 2%. For indicators above this threshold, a brief explanation is provided following the table.

Table C-11 Breastfeeding knowledge of mothers

Indicator	Observations included in analysis	Base population	Non-response (%)
Percentage of mothers that knew a baby should start breastfeeding immediately or within the first one hour	5,933	5,946	0.2
Percentage of mothers that think colostrum is good for the baby and should be given to her/him	5,905	5,946	0.7
Percentage of mothers that know that it is not OK to give a young baby under six months some water on a hot day	5,898	5,946	0.8
Percentage of mothers that think it is OK to feed a young baby under six months whenever he /she wants (non-standard feeding times)	5,925	5,946	0.4
Number of months mothers think a baby should only receive breast milk	5922	5,946	0.4

Table C-12 IYCF practices among children aged 0–23 months

Indicator[+]	Observations included in analysis	Base population	Non-response (%)
Breastfeeding indicators			
Child ever breastfed	4,409	4,411	0.1
Age-appropriate breastfeeding	4,410	4,411	0.0
Duration of breastfeeding for children currently not breastfed	509	640	20.5
Early initiation of breastfeeding (within one hour of birth)	4,402	4,411	0.2
Early initiation of breastfeeding (within 24 hours of birth)	4,402	4,411	0.2
Exclusive breastfeeding among children < 6 months	1,133	1,133	0.0
Predominant breastfeeding among children < 6 months	1,041	1,133	8.1
Continued breastfeeding at one year (12–15 months)	906	907	0.1
Continued breastfeeding at two years (20–23 months)	638	638	0.0
Proportion of non-breastfed children (6–23 months) who received at least two milk feedings during previous day (milk feeding frequency)	636	636	0.0
Complementary feeding indicators			
Introduction of solid, semi-solid or soft foods (aged 6–8 months)	559	559	0.0
Consumption of iron-rich or iron-fortified foods (aged 6–23 months)	3,278	3,278	0.0
Minimum meal frequency (aged 6–23 months)	3,256	3,278	0.7
Minimum dietary diversity (≥ 4 food groups) (aged 6–23 months)	3,278	3,278	0.0
Minimum acceptable diet (aged 6–23 months)	3,277	3,278	0.0

Notes:
[+] See WHO document on IYCF indicators (WHO, 2008, pp. 32 ff.) for the exact definition of these indicators.

- The item non-response rate for 'duration of breastfeeding for children currently not breastfed' is likely to be driven by a problem in the questionnaire. The indicator is set to missing when a contradictory response is given by the respondent. An example of this is when the respondent reports that the child is currently not breastfed but then later in the 24 hour dietary recall claims the child had breast milk in the last 24 hours. It appears that in 20% of such

occasions the interviewer was not able to consolidate the discrepant responses resulting in a high item non-response rate. This indicator is not presented in the main text of the report.

- The item non-response rate for 'predominant breastfeeding among children <6months' is likely to be driven by the fact that this indicator is constructed from a number of individual variables. Any missing values in any of the individual variables will result in a non-response for the aggregate indicator.

Table C-13 Preventative health care practices among children aged 0–35 months

Indicator	Observations included in analysis	Base population	Non-response (%)
Percentage of children that slept under a mosquito net the previous night	6,684	6,709	0.4
Percentage of children that are fully vaccinated for age (12–23 months)[+]	2,120	2,175	2.5
Percentage of children that got polio 1 vaccination (12-35 months)	4,387	4,473	1.9
Percentage of children that got measles vaccination (12 – 35 months)	4,448	4,473	0.6
No vaccinations (aged 12–35 months)	4,466	4,473	0.2
Percentage of children who have ever had MUAC measured	6,666	6,709	0.6
Percentage of children who have ever had weight and / or height measured	6,671	6,709	0.6
Percentage of children who have had weight and / or height measured in the last six months[++]	587	595	1.3

Notes:
[+] In Nigeria, children are considered fully vaccinated if they received one dose of BCG vaccine, three doses of DPT vaccine, three doses of polio vaccine (excluding at birth), and one dose of measles vaccine (NDHD, 2008, p.145). This indicator counts pentavalent vaccination as equivalent to a DPT vaccination. Pentavalent vaccinations were introduced in Nigeria in May 2013 (NDHS, 2013, p.23).
[++] Indicator calculated for children that had ever had their weight/height measured.

- The item non-response rate for 'percentage of children that are fully vaccinated for age (12-23 months)' is likely to be driven by the fact that this indicator is constructed from a number of individual variables. Any missing values in any of the individual variables will result in a non-response for the aggregate indicator.

Table C-14 Anthropometric measurements of children aged 0–35 months

Indicator	Observations included in analysis	Observations not included due to WHO outlier rule[+]	Base population	Non-response after excluding outliers (%)
Length/height-for-age z-score (LAZ/HAZ)[+]	6,388	281	6,709	4.9
Weight-for-age z-score (WAZ)[+]	6,527	134	6,709	2.7
Weight-for-length z-score (WLZ/WHZ)[+]	6,278	249	6,709	6.4
Wasting among children aged 6–35 months[+]	5,306	161	5,576	4.8

Notes:
[+]In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators. Please see section 6.4 for more details.

- The item non-response rate for all anthropometric indicators is driven by extreme measurement biases that are filtered out of the anthropometric analysis as suggested by WHO methodology. For length/height-for-age, observations with z-scores smaller than -6 or larger than 6 were dropped. For weight-for-height/length, observations with z-scores smaller than -5 or larger than 5 were dropped. Finally, for weight-for-age, observations with z-scores smaller than -6 or larger than 5 were dropped from the analysis. See section 6.4 for more details.

Annex D Definition of key indicators

This annex will present the definitions of key indicators presented in this survey. Most of these indicators are outcome variables that are relevant for the estimation of the impact of the WINNN interventions, such as nutritional status of children or IYCF indicators. Some covariates that require explanation have also been included. All indicators that are presented in the report but are not included in this annex follow straightforwardly from questions in the questionnaire, and hence do not require detailed explanation.

Table D-1 Definition of key indicators

Indicator	Numerator	Denominator (Population)	Comment	Source
Dependent variables: IYCF indicators				
Proportion of children ever breastfed	Children aged 0–23 months that were ever breastfed	All children aged 0–23 months		WHO (2008, p. 10)
Age-appropriate breastfeeding	Infants aged 0–5 months who received only breast milk during the previous day and children aged 6–23 months who received breast milk, as well as solid, semi-solid, or soft foods, during the previous day	All children aged 0–23 months		WHO (2008, p.10)
Early initiation of breastfeeding (<1h)	Proportion of children born in the last 24 months who were put to the breast within one hour of birth	All children aged 0–23 months		WHO (2008, p. 5)
Early initiation of breastfeeding (<24h)	Proportion of children born in the last 24 months that were put to the breast within 24 hours of birth	All children aged 0–23 months		
Exclusive breastfeeding among children aged < 6 months	Infants aged 0–5 months who received only breast milk during the previous day	All infants aged 0–5 months	Note that ORS and other medicines are allowed under exclusive breastfeeding. Nothing else is allowed, e.g. no water	WHO (2008, p. 5)
Continued breastfeeding at one year (aged 12–15 months)	Children aged 12–15 months who received breast milk during the previous day	All children aged 12–15 months		WHO (2008, p. 6)
Continued breastfeeding at two years (aged 20–23 months)	Children aged 20–23 months who received breast milk during the previous day	All children aged 20–23 months		WHO (2008, p. 10)
Milk feeding frequency: Proportion of non-breastfed children (6–23 months) who received at least two milk feedings during previous day	Currently non-breastfed children aged 6–23 months who received at least two milk feedings during the previous day	All children aged 6–23 months who were currently not breastfed		WHO (2008, p. 11)
Introduction of solid, semi-solid or soft foods (6–8 months)	Infants aged 6–8 months who received solid, semi-solid, or soft foods during the previous day	Infants aged 6–8 months		WHO (2008, p.6)
Consumption of iron-rich or iron-fortified foods (aged 6–23 months)	Children aged 6–23 months who received an iron-rich food or a food that was specially designed for infants and young children and was fortified with iron, or a food that was fortified in the home with a product that included iron during the previous day	All children aged 6–23 months		WHO (2008, p. 9)
Minimum meal frequency (aged 6–23 months)	Breastfed children aged 6–23 months who received solid, semi-solid, or soft foods the minimum number of times or more during the previous day and non-breastfed children aged 6–23 months who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day	All children aged 6–23 months	Minimum is defined as: two times for breastfed children aged 6–8 months, three times for breastfed children aged 9–23 months, and four times for non-breastfed children aged 6–23 months	WHO (2008, p. 8)
Minimum dietary diversity (≥ 4 food groups) (aged 6–23 months)	Children aged 6–23 months who received foods from >= 4 food groups during the previous day	All children aged 6–23 months		WHO (2008, p. 7)

Table D-1 Definition of key indicators

Indicator	Numerator	Denominator (Population)	Comment	Source
Minimum acceptable diet (aged 6–23 months)	Breastfed children aged 6–23 months who had at least the minimum dietary diversity and the minimum meal frequency during the previous day and non-breastfed children aged 6–23 months who received at least two milk feedings and had at least the minimum dietary diversity (not including milk feeds) and the minimum meal frequency during the previous day	All children aged 6–23 months		WHO (2008, p. 8)
Dependent variables: preventive health care				
Percentage of children that are fully vaccinated for age (aged 12–23 months)	Children aged 12–23 months who received at least one dose of BCG vaccine, three doses of DPT vaccine, three doses of polio vaccine (excluding polio at birth), and one dose of measles vaccine	All children aged 12–23 months	Note that in May 2013 pentavalent vaccines were introduced in Nigeria. The present survey accounts for this and counts pentavalent vaccines equivalent to DPT vaccines	NDHS (2008, p. 145) and NDHS (2013, p. 23)
Dependent variables: child anthropometry				
Percentage of children stunted (aged 0–35 months)	Children aged 0–35 months who have a height/length-for-age z-score below -2 SD of the WHO reference	All children aged 0–35 months	The WHO macro available at http://www.who.int/childgrowth/software/en/ was used to calculate this indicator	WHO (1995, p. 164)
Percentage of children underweight	Children aged 0–35 months who have a WAZ below -2 SD of the WHO reference	All children aged 0–35 months	The WHO macro available at http://www.who.int/childgrowth/software/en/ was used to calculate this indicator	WHO (1995, p. 170)
Percentage of children wasted	Children 0–35 months who have a WHZ/WLZ below -2 SD of the WHO reference	All children aged 0–35 months	The WHO macro available at http://www.who.int/childgrowth/software/en/ was used to calculate this indicator	WHO (1995, p. 165)
Percentage of children severely wasted	Children 0–35 months who have a WHZ/WLZ below -3 SD of the WHO reference	All children aged 0–35 months	The WHO macro available at http://www.who.int/childgrowth/software/en/ was used to calculate this indicator	WHO (1995, p. 165)

Table D-1 Definition of key indicators

Indicator	Numerator	Denominator (Population)	Comment	Source
Explanatory variables: additional key indicators				
Household poverty score	Household poverty score developed using information on household size, housing and sanitary situation, asset ownership, and educational attainment of household members	Indicator calculated for all households	The household wealth quintiles were derived from this score	Shiyuan et al. (2008)
Household dependency ratio	Number of individuals per household under the age of 15 and over 64	Number of individuals per household aged 15–64 years	Indicator at household level. When denominator is 0, the household is dropped from analysis	http://data.worldbank.org/indicator/SP.POP.DPND.OL/countries?display=map
Proportion of households with access to improved drinking source	Households that obtain water from: piped water into dwelling or yard/plot, public tap or standpipe, tube well or borehole, protected dug well, protected spring, or rainwater	All households		http://www.wssinfo.org/definitions-methods/watsan-categories/
Proportion of households using appropriate water treatment method	Households that use boiling, bleaching, chlorine, straining through cloth, straining through water filer, or solar disinfection as treatment method	All households	This indicator follows the definition from NDHS (2008, p. 21) in order to ensure comparability. It differs from WHO indicators in that it accepts straining as a filtering method	NDHS (2008, p.21)
Percentage of mothers underweight	Non-pregnant women aged 15–49 years that have given birth in the 35 months preceding the survey and that have a BMI below 18.5	All non-pregnant women aged 15–49 years that have given birth in the 35 months preceding the survey	BMI is defined as weight in kilograms over squared height in metres	http://apps.who.int/bmi/index.jsp?introPage=intro_3.html

Annex E State-level estimates of key indicators

This annex presents state-level dissaggregations of all key indicators presented in the main report. All indicators presented here must be interpreted carefully as the original sample size calculations for the baseline survey were not intended to provide state-level dissaggregations for all indicators.

E.1 Maternal characteristics

Table E-1 Maternal characteristics in households with a child aged 0–35 months

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Mean age (years)	28.1	28.1	27.0	27.5	27.7
Median age (years)	28	27	25	26	27
	(1,453)	(1,333)	(1,646)	(1,528)	(5,960)
Proportion of mothers under age 18	3.7	3.8	4.6	5.7	4.5
	(1,453)	(1,333)	(1,646)	(1,528)	(5,960)
Percentage of mothers that have a spouse or partner	97.9	97.8	99.0	98.2	98.2
	(1,457)	(1,334)	(1,644)	(1,526)	(5,961)
Proportion of mothers married under age 16	81.7	76.6	79.5	83.5	80.6
	(1,435)	(1,327)	(1,631)	(1,501)	(5,894)
Proportion of mothers married under age 18	96.0	91.4	93.6	93.7	93.7
	(1,435)	(1,327)	(1,631)	(1,501)	(5,894)
Mean age at first marriage	14.9	14.9	15.0	14.5	14.8
Median age at first marriage	15	15	15	14	15
	(1,435)	(1,327)	(1,631)	(1,501)	(5,894)
Proportion of mothers that have given birth to 4 or more children within their lifetime	58.6	60.5	57.6	57.9	58.6
	(1,457)	(1,333)	(1,645)	(1,528)	(5,963)
Mean age at first birth	17.2	17.0	16.9	16.8	17.0
Median age at first birth	17	17	17	16	17
	(1,396)	(1,297)	(1,593)	(1,478)	(5,764)
Mother's age at first birth					
<20	91.9	90.9	92.3	90.7	91.4
20–34	8.1	9.1	7.7	9.3	8.6
35–49	0.0	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0
	(1,396)	(1,297)	(1,593)	(1,478)	(5,764)
Percentage of mothers that have any schooling	62.2	86.9	71.7	79.1	75.1
	(1,448)	(1,329)	(1,638)	(1,519)	(5,934)
Educational attainment of mother (non-Islamia)					
No education	85.4	76.9	89.1	92.9	86.6
Nursery	0.2	0.2	0.0	0.3	0.2
Primary incomplete	7.1	6.3	3.6	2.0	4.6
Primary complete	3.8	8.3	4.9	1.2	4.3
Junior secondary	1.3	3.3	0.9	0.8	1.5
Senior secondary	1.5	4.5	1.4	2.1	2.3
More than secondary	0.7	0.5	0.3	0.7	0.6
Total	100.0	100.0	100.0	100.0	100.0
	(1,449)	(1,329)	(1,638)	(1,520)	(5,936)

Table E-1 Maternal characteristics in households with a child aged 0–35 months (continued)					
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Quranic educational attainment of mother					
No education	40.7	14.3	30.5	21.3	26.5
Quranic	53.0	78.6	68.4	78.6	70.0
Integrated Quranic	6.4	7.1	1.1	0.1	3.5
Total	100.0	100.0	100.0	100.0	100.0
	(1,448)	(1,328)	(1,639)	(1,518)	(5,933)
Percentage of mothers that participate in local groups / associations	3.0	4.0	6.0	1.8	3.5
	(1,447)	(1,329)	(1,643)	(1,520)	(5,939)
Level of community engagement in the last four weeks					
No meetings	71.8	44.2	29.9	34.9	43.0
Attended 0 meetings	9.9	27.3	38.3	24.1	27.4
Attended 1–4 meetings	14.5	23.0	24.5	37.8	24.2
Attended more than four meetings	3.8	5.5	7.4	3.2	5.5
Total	100.0	100.0	100.0	100.0	100.0
	(47)	(51)	(56)	(20)	(174)

Table E-2 Economic activity of mothers					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Occupation					
Not working or inactive	35.3	33.4	25.5	28.4	30.6
Farming / herding mainly for subsistence	1.2	1.0	10.7	0.6	3.0
Commercial farming / herding to sell produce	0.9	1.5	0.6	0.5	0.8
Paid work	1.0	0.8	1.5	1.6	1.2
Own business	61.7	63.2	61.4	68.9	64.2
Other	0.0	0.2	0.4	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0
	(1,442)	(1,310)	(1,631)	(1,508)	(5,891)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%					

Table E-3 Mother's decision-making power					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Decision on control of mother's earnings[+]					
Husband alone	2.8	7.7	4.5	7.1	5.6
Husband with consultation or joint decision making	16.9	33.3	41.3	41.5	33.8
Mother alone	80.3	58.8	53.6	51.4	60.5
Someone else / other	0.0	0.2	0.6	0.0	0.2
Total	100.0	100.0	100.0	100.0	100.0
	(924)	(766)	(1,111)	(1,010)	(3,811)
Decision on child health care					
Husband alone	23.5	38.4	49.2	28.9	34.1
Husband with consultation or joint decision making	71.2	57.4	48.3	70.0	62.7
Mother alone	5.3	4.1	2.6	1.0	3.1
Someone else / other	0.1	0.1	0.0	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0
	(1,449)	(1,329)	(1,640)	(1,518)	(5,936)
Decision on purchase of major household items					
Husband alone	24.3	35.0	32.5	24.1	28.5
Husband with consultation or joint decision making	59.7	44.9	36.8	66.9	53.5
Mother alone	15.6	19.0	29.8	8.7	17.3
Someone else / other	0.5	1.1	1.0	0.3	0.7
Total	100.0	100.0	100.0	100.0	100.0
	(1,449)	(1,330)	(1,641)	(1,518)	(5,938)
Decision on food purchases					
Husband alone	35.2	58.4	59.4	35.1	45.7
Husband with consultation or joint decision making	61.1	39.0	38.6	59.6	50.7
Mother alone	3.3	2.6	1.9	5.3	3.5
Someone else / other	0.4	0.1	0.0	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0
	(1,449)	(1,328)	(1,641)	(1,517)	(5,935)
Percentage of mothers that report they need to seek husband's / head of household's permission to…					
Go alone to the market[++]	95.8	97.2	96.9	78.3	91.0
	(829)	(855)	(774)	(858)	(3,316)
Go alone to the next village	99.8	99.0	98.6	93.5	97.4
	(1,450)	(1,329)	(1,641)	(1,519)	(5,939)
Go alone to the nearest health facility	99.5	98.5	98.2	93.5	97.2
	(1,450)	(1,329)	(1,641)	(1,519)	(5,939)

Table E-3 Mother's decision-making power (continued)

	Estimate				
Indicator	Jigawa	Katsina	Kebbi	Zamfara	Total
Percentage of mothers that feel the husband / head of household is justified to beat her if she…					
Goes out without telling him	31.1	51.5	44.0	52.5	45.1
	(1,450)	(1,330)	(1,643)	(1,518)	(5,941)
Neglects the children	26.7	44.1	36.4	47.5	39.1
	(1,450)	(1,330)	(1,643)	(1,518)	(5,941)
Argues with him	34.9	43.4	41.4	45.6	41.5
	(1,450)	(1,330)	(1,642)	(1,517)	(5,939)
Over-cooks / burns the food	23.8	31.1	29.1	30.3	28.6
	(1,450)	(1,330)	(1,642)	(1,518)	(5,940)

Notes:
[+]Indicator only calculated for mothers who reported being cash earners or having paid employment.
[++]Indicator only calculated for mothers who reported ever going to the market.

Table E-4 Breastfeeding knowledge

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of mothers that knew a baby should start breastfeeding immediately or within the first one hour after birth	62.3	56.4	52.8	62.2	58.9
	(1,446)	(1,328)	(1,640)	(1,519)	(5,933)
Percentage of mothers that think colostrum is good for the baby and should be given to her/him	79.9	80.5	53.7	84.4	75.8
	(1,446)	(1,316)	(1,622)	(1,521)	(5,905)
Percentage of mothers that know that it is not OK to give a young baby under six months old some water on a hot day	3.7	12.6	8.0	6.2	7.4
	(1,441)	(1,325)	(1,619)	(1,513)	(5,898)
Percentage of mothers that think it is OK to feed a young baby under six months whenever he /she wants (non-standard feeding times)	97.2	81.3	94.7	95.6	92.5
	(1,445)	(1,328)	(1,633)	(1,519)	(5,925)
Mean number of months mothers think a baby should only receive breast milk	2.7	2.9	1.4	2.4	2.4
Median number of months mothers think a baby should only receive breast milk	4	4	1	1	1
	(1,444)	(1,325)	(1,634)	(1,519)	(5,922)
Mean age (months) mothers think it is OK to start feeding a baby foods in addition to breast milk (including water, semi-solid and solid foods)	5.5	5.4	6.5	6.0	5.8
	(1,444)	(1,324)	(1,631)	(1,517)	(5,916)
Percentage of mothers who know best age to start feeding baby other food in addition to breast milk is six months[+]	20.7	38.6	7.7	26.5	23.8
	(1,444)	(1,325)	(1,634)	(1,519)	(5,922)

Notes:
Significance asterisks: * = 95%, ** = 99%, *** = 99.9%
[+]This indicator combines the information from the two previous indicators. Mothers were coded as knowing the best age of feeding additional food if they consistently answered that a baby should receive breast milk only for six months and that additional food should only be fed to children aged six or seven months.

Table E-5 Attitudes towards health seeking for infant illness					
	Estimate				
Indicator	Jigawa	Katsina	Kebbi	Zamfara	Total
Percentage of mothers that would advise another woman to take a young baby to the health facility if a baby…					
Was refusing to eat	98.2	90.7	92.9	89.7	92.7
	(1,447)	(1,328)	(1,643)	(1,521)	(5,939)
Had diarrhoea	99.0	97.2	93.5	92.6	95.4
	(1,447)	(1,329)	(1,643)	(1,521)	(5,940)
Had a fever	99.5	97.4	94.3	93.2	96.0
	(1,447)	(1,327)	(1,642)	(1,521)	(5,937)
Was having convulsions	97.3	97.2	91.9	91.8	94.5
	(1,447)	(1,329)	(1,643)	(1,521)	(5,940)
Was malnourished	98.6	97.6	94.8	93.7	96.1
	(1,447)	(1,329)	(1,643)	(1,521)	(5,940)
Had malaria	99.4	98.2	94.7	93.8	96.4
	(1,444)	(1,327)	(1,641)	(1,520)	(5,932)
Notes: Significance asterisks: * = 95%, ** = 99%, *** = 99.9%					

Table E-6 Knowledge of family planning methods					
	Estimate				
Indicator	Jigawa	Katsina	Kebbi	Zamfara	Total
Percentage of mothers that can name any family planning method	52.1	63.4	40.8	19.3	42.2
	(1,446)	(1,330)	(1,639)	(1,521)	(5,936)
Percentage of mothers that can name the following family planning methods…					
Exclusive breastfeeding	3.9	6.8	2.0	5.5	4.6
Male and female condoms	6.2	5.1	4.7	5.7	5.5
Abstinence	3.2	3.4	0.9	0.4	1.9
Injectable contraceptives	38.0	58.1	30.8	14.5	33.9
Oral contraceptives	39.6	50.7	27.8	14.1	31.8
Implant contraceptives	0.6	1.5	1.0	1.8	1.3
Diaphragm / IUD / foam / jelly	0.5	1.1	0.7	0.6	0.7
Tubal ligation / female sterilisation	0.4	0.5	0.0	0.7	0.4
Vasectomy / male sterilisation	0.1	0.1	0.2	0.0	0.1
Withdrawal	2.3	5.1	0.5	0.5	2.0
Rhythm / calendar / safe period	3.0	1.1	1.4	2.9	2.2
Other	14.9	5.4	13.6	0.4	8.0
	(1,447)	(1,329)	(1,639)	(1,521)	(5,936)

Table E-7 Breastfeeding practices of last-born child					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of women that have given birth in the two years previous to the survey	68.8	71.4	64.3	63.5	66.6
	(1,765)	(1,588)	(2,170)	(1,986)	(7,509)
Percentage of recent mothers…					
That breastfed their last-born child	99.4	99.0	98.6	99.0	99.0
	(1,055)	(953)	(1,163)	(1,096)	(4,267)
That started breastfeeding immediately or within 24 hours	64.8	64.0	55.9	63.3	62.3
	(1,046)	(938)	(1,151)	(1,079)	(4,214)

Table E-8 Use of ANC services among mothers of children aged 0–35 months					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of mothers that had any ANC at health facility (%)	52.5	53.8	39.1	27.6	42.5
	(1,619)	(1,573)	(1,828)	(1,673)	(6,693)
Percentage of mothers who went to ANC…⁺					
Once	8.7	3.9	24.6	15.4	11.6
Twice	14.1	6.5	23.2	9.2	12.6
Three times	15.6	15.0	13.9	13.2	14.6
Four times	23.7	29.3	10.9	23.2	22.9
Five times or more	37.9	45.3	27.4	39.0	38.4
Total	100.0	100.0	100.0	100.0	100.0
	(824)	(798)	(679)	(374)	(2,675)
Percentage of antenatal services provided…⁺					
Blood pressure measured	86.1	82.6	70.1	85.5	81.7
	(842)	(814)	(715)	(394)	(2,765)
Urine sample	81.0	71.0	59.1	77.3	72.9
	(840)	(817)	(717)	(395)	(2,769)
Blood sample	75.8	71.8	58.3	78.2	71.6
	(842)	(817)	(715)	(395)	(2,769)
Weight measured	84.9	84.8	50.9	78.3	76.8
	(842)	(816)	(715)	(395)	(2,768)
Height measured	62.1	51.0	32.8	67.5	53.9
	(842)	(815)	(714)	(394)	(2,765)
Iron supplements	93.7	95.5	79.2	94.3	91.5
	(841)	(816)	(715)	(394)	(2,766)
Folic acid supplements	92.6	94.4	73.1	94.0	89.6
	(842)	(815)	(714)	(395)	(2,766)
Information on pregnancy danger signs	86.1	84.8	55.0	86.0	79.5
	(841)	(816)	(714)	(394)	(2,765)
Tetanus injection	84.0	87.2	62.6	82.3	80.4
	(842)	(812)	(713)	(393)	(2,760)
Medicines – for intestinal worms	56.6	43.4	22.2	56.3	45.6
	(823)	(791)	(702)	(390)	(2,706)
Medicines – for malaria	93.2	80.3	76.5	86.8	84.7
	(841)	(812)	(717)	(395)	(2,765)

Notes:
⁺ Indicators calculated only for children whose mothers did receive ANC during their pregnancy.

Table E-9 Birth of children in the last 35 months					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of mothers that delivered at…					
Home	92.2	84.0	92.6	93.6	90.7
A health facility	7.6	15.6	7.1	6.1	9.0
The home of a traditional birth attendant	0.1	0.3	0.1	0.3	0.2
Other	0.1	0.1	0.2	0.0	0.1
Total	100.0	100.0	100.0	100.0	100.0
	(1,619)	(1,574)	(1,835)	(1,673)	(6,701)
Percentage of births that were assisted by…					
Doctor / nurse / midwife / CHEW	9.3	16.1	10.9	11.3	11.9
Traditional birth attendant	63.1	45.2	19.6	27.6	38.8
Family member	21.7	21.9	46.5	38.5	32.1
Neighbour	2.4	2.1	7.1	4.0	3.8
No one	3.5	14.7	15.9	18.5	13.4
Other	0.0	0.0	0.0	0.1	0.0
Total	100.0	100.0	100.0	100.0	100.0
	(1,619)	(1,575)	(1,834)	(1,673)	(6,701)
Percentage of children that were weighed at birth	8.5	11.3	3.5	8.0	7.9
	(1,607)	(1,546)	(1,810)	(1,668)	(6,631)
Mother's opinion of birth weight					
Small	14.0	16.2	20.7	14.1	16.0
Normal	60.6	53.4	55.4	57.1	56.7
Big	25.4	30.5	23.9	28.8	27.3
Total	100.0	100.0	100.0	100.0	100.0
	(1,618)	(1,574)	(1,815)	(1,672)	(6,679)
Percentage of mothers that received Vitamin A after delivery	13.8	30.3	14.0	28.0	22.1
	(1,611)	(1,562)	(1,815)	(1,663)	(6,651)
Percentage of mothers that received PNC at health facility after giving birth	13.6	23.5	10.1	10.5	14.3
	(1,619)	(1,573)	(1,829)	(1,669)	(6,690)
Percentage of mothers who received PNC…[+]					
Once	42.3	38.5	41.5	34.4	39.0
Twice	27.8	34.9	33.8	31.7	32.4
Three times	19.8	17.5	19.0	9.9	16.7
Four times	8.1	5.2	4.0	17.7	8.3
Five times or more	2.1	3.8	1.8	6.3	3.6
Total	100.0	100.0	100.0	100.0	100.0
	(231)	(339)	(168)	(113)	(851)

Notes:
[+]Indicator calculated for mothers that did receive PNC at a health facility.

Table E-10 Maternal anthropometric measurements

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Mean weight (kg)[+]	50.0	51.7	53.8	52.2	51.9
Median weight (kg)[+]	49.0	50.2	52.4	51.2	50.7
	(1,232)	(1,118)	(1,440)	(1,335)	(5,125)
Mean height (cm)	156.0	156.4	158.1	156.9	156.8
Median height (cm)	156.0	156.2	158.1	156.8	156.7
	(1,446)	(1,324)	(1,626)	(1,515)	(5,911)
Mean BMI (kg/m^2)[+]	20.5	21.1	21.6	21.2	21.1
Median BMI (kg/m^2)[+]	20.2	20.7	21.0	20.8	20.7
	(1,231)	(1,114)	(1,429)	(1,331)	(5,105)
Percentage of mothers that are… [+]					
Underweight[++]	26.3	19.9	12.7	14.2	18.1
Normal[++]	65.2	68.5	74.3	77.4	71.7
Overweight[++]	8.5	11.6	13.0	8.4	10.1
Total	100.0	100.0	100.0	100.0	100.0
	(1,231)	(1,114)	(1,429)	(1,331)	(5,105)

Notes:

[+]Indicators calculated for mothers that were not currently pregnant only.

[++]For mothers aged 15-19: underweight if BMI-for-age z-score <-1, overweight if BMI-for-age z-score >+1, normal in between those values. For mothers aged 20-49: underweight if BMI < 18.5, Overweight if BMI ≥ 25, normal in between those values.

E.2 Characteristics of children

Table E-11 Children's characteristics in households with a child aged 0–35 months

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Age (months)					
0 – 5	15.8	14.7	17.3	19.3	16.9
6 – 11	16.5	16.2	15.7	17.3	16.5
12 – 17	18.1	17.3	17.9	16.1	17.3
18 – 23	16.0	14.5	13.4	13.7	14.4
24 – 35	33.5	37.4	35.7	33.7	35.0
Total	100.0	100.0	100.0	100.0	100.0
	(1,650)	(1,590)	(1,876)	(1,712)	(6,828)
Sex					
Male	49.0	52.4	50.1	49.8	50.3
Female	51.0	47.6	49.9	50.2	49.7
Total	100.0	100.0	100.0	100.0	100.0
	(1,652)	(1,590)	(1,874)	(1,710)	(6,826)
Birth order					
1	20.3	20.2	21.7	22.5	21.2
2 – 3	38.5	36.8	37.6	39.0	38.0
4 – 5	28.4	28.4	27.0	25.5	27.2
6+	12.9	14.7	13.7	13.0	13.5
Total	100.0	100.0	100.0	100.0	100.0
	(1,620)	(1,561)	(1,836)	(1,690)	(6,707)

Table E-12 IYCF practices among children aged 0–23 months

	Estimate				
Indicator[+]	Jigawa	Katsina	Kebbi	Zamfara	Total
Breastfeeding indicators					
Child ever breastfed	99.8	99.7	99.6	99.8	99.7
	(1,074)	(998)	(1,219)	(1,118)	(4,409)
Age-appropriate breastfeeding	59.6	51.8	54.6	55.0	55.3
	(1,075)	(998)	(1,219)	(1,118)	(4,410)
Duration of breastfeeding for children currently not breastfed	18.8	18.8	18.5	18.9	18.8
	(136)	(152)	(126)	(95)	(509)
Early initiation of breastfeeding (within one hour of birth)	39.4	35.7	44.8	46.5	41.9
	(1,074)	(996)	(1,215)	(1,117)	(4,402)
Early initiation of breastfeeding (within 24 hours of birth)	64.4	63.9	55.9	63.5	62.2
	(1,074)	(996)	(1,215)	(1,117)	(4,402)
Exclusive breastfeeding among children aged < 6 months	9.4	4.4	6.4	8.0	7.2
	(262)	(236)	(296)	(339)	(1,133)
Predominant breastfeeding among children aged < 6 months	69.4	73.1	85.1	82.4	78.1
	(240)	(214)	(270)	(317)	(1,041)
Continued breastfeeding at one year (aged 12–15 months)	94.0	90.6	96.8	95.4	94.2
	(211)	(213)	(259)	(223)	(906)
Continued breastfeeding at two years (aged 20–23 months)	31.2	19.5	37.3	34.9	30.2
	(172)	(167)	(162)	(137)	(638)
Proportion of non-breastfed children (aged 6–23 months) who received at least two milk feedings during previous day (milk feeding frequency)	6.7	16.5	27.9	6.4	13.5
	(154)	(196)	(158)	(128)	(636)
Complementary feeding indicators					
Introduction of solid, semi-solid or soft foods (6–8 months)	80.6	76.9	62.2	74.5	73.9
	(141)	(125)	(161)	(132)	(559)
Consumption of iron-rich or iron-fortified foods (aged 6–23 months)	12.7	8.0	16.2	17.3	13.6
	(813)	(763)	(923)	(779)	(3,278)
Minimum meal frequency (aged 6–23 months)	18.6	30.6	21.3	22.8	23.3
	(809)	(756)	(915)	(776)	(3,256)
Minimum dietary diversity (≥ 4 food groups) (aged 6–23 months)	7.6	15.7	9.6	20.2	13.7
	(813)	(763)	(923)	(779)	(3,278)
Minimum acceptable diet (aged 6–23 months)	2.1	7.2	3.3	6.2	4.8
	(813)	(762)	(923)	(779)	(3,277)

Notes:
[+] See WHO document on IYCF indicators (WHO, 2008, pp. 32 ff.) for the exact definition of these indicators.

Table E-13 Preventative health care practices among children aged 0–35 months					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of children that…					
Slept under a mosquito net the previous night	43.3	32.3	35.6	29.3	34.8
	(1,613)	(1,573)	(1,830)	(1,668)	(6,684)
Ever received a Vitamin A drop (all children)	34.9	58.6	36.5	47.7	44.8
	(1,648)	(1,588)	(1,872)	(1,709)	(6,817)
Received a Vitamin A drop in the last six months (all children)	26.2	48.8	28.2	41.6	36.7
	(1,642)	(1,584)	(1,863)	(1,705)	(6,794)
Ever received a Vitamin A drop (aged 6–35 months)	38.3	63.3	40.3	50.2	48.4
	(1,383)	(1,350)	(1,572)	(1,368)	(5,673)
Received a Vitamin A drop in the last 6 months (aged 6–35 months)	29.1	53.6	32.6	45.2	40.6
	(1,377)	(1,346)	(1,564)	(1,364)	(5,651)
Location where children (aged 0–35 months) received Vitamin A drop[+]					
At home	78.0	81.4	92.5	83.8	83.5
At the health facility	22.1	18.6	7.5	16.2	16.6
Total	100.0	100.0	100.0	100.0	100.0
	(428)	(796)	(614)	(762)	(2,600)
Percentage of children that received deworming medication in the last six months	8.1	11.5	6.0	5.1	7.6
	(1,601)	(1,557)	(1,824)	(1,644)	(6,626)
Location where children received deworming medication[++]					
At home	42.7	50.8	23.7	52.7	44.4
At the health facility	43.5	45.3	35.1	37.9	41.6
Chemist	13.0	3.6	41.3	7.4	13.2
Other	0.7	0.3	0.0	2.1	0.7
Total	100.0	100.0	100.0	100.0	100.0
	(126)	(179)	(105)	(72)	(482)
Percentage of children that are fully vaccinated for age (aged 12–23 months)[+++]	1.4	8.5	0.5	0.7	2.7
	(529)	(491)	(606)	(494)	(2,120)
Percentage of children (aged 12–35 months) who have received specific vaccines…					
BCG	21.1	39.8	8.0	16.4	21.7
	(1,082)	(1,087)	(1,227)	(1,048)	(4,444)
DPT 1	14.5	30.5	5.6	10.9	15.6
	(1,080)	(1,068)	(1,228)	(1,037)	(4,413)
DPT 2	7.0	22.8	2.9	8.3	10.5
	(1,080)	(1,068)	(1,228)	(1,037)	(4,413)
DPT 3	2.8	11.1	0.8	2.6	4.4
	(1,080)	(1,068)	(1,228)	(1,037)	(4,413)
Polio 0	18.1	29.4	7.8	10.7	16.6
	(1,080)	(1,076)	(1,229)	(1,054)	(4,439)
Polio 1	76.7	83.5	29.3	28.7	54.4
	(1,058)	(1,055)	(1,227)	(1,047)	(4,387)
Polio 2	75.5	82.2	27.5	27.1	53.0
	(1,058)	(1,055)	(1,227)	(1,047)	(4,387)

Table E-13 Preventative health care practices among children aged 0–35 months

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Polio 3	73.4	79.9	25.6	24.3	50.6
	(1,058)	(1,055)	(1,227)	(1,047)	(4,387)
Penta 1++++	41.8	4.0	10.6	1.9	13.5
	(66)	(136)	(32)	(46)	(280)
Penta 2++++	32.0	1.5	6.1	0.7	9.2
	(66)	(136)	(32)	(46)	(280)
Penta 3++++	29.0	1.5	8.7	0.0	8.6
	(66)	(136)	(32)	(46)	(280)
Measles	13.8	33.4	8.6	9.3	16.3
	(1,083)	(1,078)	(1,233)	(1,054)	(4,448)
All basic vaccinations (BCG, measles, three doses of DPT, three doses of polio – excluding polio vaccine given at birth) (aged 12–35 months)	1.8	7.2	0.4	0.5	2.5
	(1,049)	(1,041)	(1,218)	(1,039)	(4,347)
No vaccinations (aged 12–35 months)	18.8	10.1	66.8	68.5	41.0
	(1,087)	(1,090)	(1,235)	(1,058)	(4,470)
Percentage of children who have ever had MUAC measured	10.2	13.0	3.6	7.0	8.5
	(1,613)	(1,562)	(1,823)	(1,668)	(6,666)
Percentage of children who have ever had weight and / or height measured	11.2	15.0	2.5	8.5	9.4
	(1,614)	(1,570)	(1,822)	(1,665)	(6,671)
Percentage of children who have had weight and / or height measured in the last six months+++++	46.9	45.2	44.4	58.6	49.2
	(195)	(237)	(43)	(112)	(587)

Notes:

+ Indicator calculated for children that received Vitamin A supplements in the last six months only.

++ Indicator calculated for children who received deworming medication in the last six months only.

+++ In Nigeria, children are considered fully vaccinated if they received one dose of BCG vaccine, three doses of DPT vaccine, three doses of polio vaccine (excluding at birth), and one dose of measles vaccine (NDHD, 2008, p.145). This indicator counts pentavalent vaccination as equivalent to a DPT vaccination. Pentavalent vaccinations were introduced in Nigeria in May 2013. (NDHS, 2013, p.23)

++++ Indicator calculated for children that had a vaccination card only.

+++++ Indicator calculated for children that had ever had their weight/height measured.

Table E-14 Child illness, access to health care, and health care seeking (0–35 months)					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of children who suffered from any illness or injury in the 30 days preceding the study	36.1	41.7	45.9	30.3	37.9
	(1,618)	(1,574)	(1,834)	(1,671)	(6,697)
Percentage of children who suffered from illness or injury in the 30 days preceding that study and went for treatment	83.1	89.5	89.3	86.8	87.3
	(626)	(678)	(855)	(525)	(2,684)
Ill or injured children that sought care from…[+]					
Neighbour / family friend	1.6	1.1	1.1	0.0	1.0
Traditional practitioner	6.1	3.4	8.2	4.4	5.5
Dispensary / chemist / shop	29.6	44.9	56.3	38.9	43.2
Private medical clinic	0.6	0.3	0.2	14.3	3.6
Primary health centre / health post / mobile clinic	40.9	36.9	12.9	10.4	25.1
Hospital	21.2	13.3	21.2	32.1	21.6
Total	100.0	100.0	100.0	100.0	100.0
	(532)	(609)	(767)	(450)	(2,358)
Expenditure on treatment for ill or injured children during month preceding the survey:[++]					
NGN 0	16.6	12.3	9.3	7.8	11.4
NGN 1 – NGN 250	20.0	22.4	14.5	14.2	17.8
NGN 251 – NGN 500	26.8	27.4	23.8	27.3	26.3
NGN 501 – NGN 1000	18.8	19.2	29.4	28.7	24.0
NGN 1001 or more	17.9	18.8	23.1	22.0	20.4
Total	100.0	100.0	100.0	100.0	100.0
	(588)	(605)	(749)	(517)	(2,459)
Proportion of carers that spent NGN 100 or more on travel to health facility during month preceding the survey[++]	35.1	24.7	37.9	37.3	33.5
	(610)	(654)	(781)	(512)	(2,557)
Percentage of children who have been hospitalised in the 12 months preceding the survey	1.5	7.0	2.9	2.0	3.3
	(1,617)	(1,574)	(1,832)	(1,672)	(6,695)
Proportion of carers that spent NGN 4000 or more on overnight hospitalisation[+++]	35.7	39.0	59.9	46.2	44.1
	(28)	(102)	(41)	(30)	(201)

Notes:
[+] Indicator calculated for children that suffered from illness or injury and did go for treatment.
[++] Indicators calculated for children that did suffer from illness only.
[+++] Indicator calculated for children that were hospitalised only.

Table E-15 Anthropometric measurements of children aged 0–35 months

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Mean age (months)	17.3	18.0	17.0	16.6	17.2
Median age (months)	17	18	17	16	17
Percentage female	51.0	47.6	49.9	50.2	49.7
	(1,652)	(1,590)	(1,874)	(1,710)	(6,826)
Mean LAZ/HAZ+	-2.4	-2.5	-2.0	-2.0	-2.2
Median LAZ/HAZ+	-2.6	-2.6	-2.1	-2.0	-2.4
Percentage stunted (LAZ/HAZ < -2SD)+	64.4	63.8	51.0	51.0	57.5
	(1,591)	(1,519)	(1,659)	(1,619)	(6,388)
Mean WAZ+	-1.9	-1.9	-1.5	-1.5	-1.7
Median WAZ+	-1.9	-1.9	-1.6	-1.5	-1.7
Percentage underweight (WAZ < -2SD)+	46.0	47.5	38.2	34.3	41.2
	(1,590)	(1,551)	(1,743)	(1,643)	(6,527)
Mean WLZ/WHZ+	-0.7	-0.6	-0.7	-0.6	-0.6
Median WLZ/WHZ+	-0.7	-0.7	-0.8	-0.5	-0.7
Percentage wasted (WLZ/WHZ < -2SD)+	14.4	15.3	18.8	16.7	16.2
Percentage severely wasted (WLZ/WHZ < -3SD)	4.9	5.8	6.4	6.1	5.8
	(1,555)	(1,514)	(1,633)	(1,576)	(6,278)
Percentage wasted among children aged 6–35 months	15.5	14.6	18.4	16.7	16.2
	(1,322)	(1,309)	(1,390)	(1,285)	(5,306)

Notes:
+In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.

Table E-16 Anthropometric measurements of children aged 0–35 months by age categories					
	Estimate				
Indicator by age group of children	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage stunted (LAZ/HAZ < -2SD)⁺					
0 to 5 months	35.6	40.6	29.6	27.8	32.7
6 to 11 months	47.5	53.8	33.1	37.9	43.1
12 to 17 months	62.8	74.9	47.4	52.4	59.6
18 to 23 months	79.9	75.8	64.7	66.6	72.1
24 to 35 months	80.1	67.0	67.2	64.2	69.4
	(1,591)	(1,519)	(1,659)	(1,619)	(6,388)
Percentage underweight (WAZ < -2SD)⁺					
0 to 5 months	25.0	28.9	22.3	23.7	24.8
6 to 11 months	46.8	46.3	33.1	46.6	43.9
12 to 17 months	44.4	51.4	39.0	41.9	44.2
18 to 23 months	61.9	55.4	47.7	37.4	50.4
24 to 35 months	49.1	50.2	44.0	28.7	42.6
	(1,590)	(1,551)	(1,743)	(1,643)	(6,527)
Percentage wasted (WLZ/WHZ < -2SD)⁺					
0 to 5 months	8.0	19.5	21.0	16.5	16.1
6 to 11 months	20.7	25.7	23.0	29.1	25.0
12 to 17 months	21.9	13.5	23.9	26.3	21.5
18 to 23 months	15.2	14.8	16.8	13.4	14.9
24 to 35 months	9.6	10.4	13.9	6.9	9.9
	(1,555)	(1,514)	(1,633)	(1,576)	(6,278)
Percentage severely wasted (WLZ/WHZ < -3SD)⁺					
0 to 5 months	1.7	9.4	6.0	6.4	5.9
6 to 11 months	8.5	10.5	7.2	14.0	10.5
12 to 17 months	8.5	6.3	10.1	7.7	8.1
18 to 23 months	5.6	5.9	4.6	3.6	4.9
24 to 35 months	2.3	2.3	5.0	2.1	2.8
	(1,555)	(1,514)	(1,633)	(1,576)	(6,278)

Notes:
⁺In accordance with WHO guidelines, extreme outliers were excluded when calculating these indicators.

E.3 Experience of WINNN interventions

Table E-17 Community awareness of IYCF interventions					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of communities reporting that…					
The nearby health facility conducts information sessions for pregnant women and mothers	59.8	31.0	19.3	46.5	39.2
	(209)	(208)	(210)	(209)	(836)
There are community-based information sessions for pregnant women and mothers	31.1	23.5	8.1	33.2	24.4
	(207)	(208)	(209)	(209)	(833)

Table E-18 Household exposure to IYCF interventions: health facility-based					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Training on breastfeeding and feeding practices of infants and young children					
Percentage of mothers that received this training at a health facility	25.1	28.3	8.3	12.2	18.2
	(1,450)	(1,328)	(1,643)	(1,518)	(5,939)
Number of times mothers received this training – in total:+					
1	16.7	22.3	25.2	9.8	18.1
2	26.6	22.7	27.9	17.5	23.5
3	20.6	25.9	24.3	16.6	22.1
4	15.3	11.8	3.1	16.0	13.0
5	12.2	10.2	10.2	11.3	11.1
6	2.8	3.2	2.8	15.6	5.5
7 or more	5.8	3.9	6.6	13.3	6.7
Total	100.0	100.0	100.0	100.0	100.0
	(356)	(359)	(137)	(138)	(990)
Percentage of mothers that received this training in the last month+	25.3	25.9	43.9	46.5	31.7
	(359)	(366)	(142)	(143)	(1,010)
Type of staff that led this training+					
NGO volunteer	5.7	15.5	14.7	5.1	9.9
Medical staff	92.9	80.9	77.7	95.0	87.5
Someone else	1.4	3.6	7.6	0.0	2.5
Total	100.0	100.0	100.0	100.0	100.0
	(359)	(365)	(144)	(144)	(1,012)
Types of information received at the training+					
Breastfeeding practices	71.8	75.3	75.5	86.6	76.4
Hygiene practices	60.3	71.8	75.8	85.1	71.0
Complementary feeding	17.5	25.9	16.9	30.5	23.1
How to manage a sick baby	63.6	43.5	65.1	49.2	53.7
Birth spacing / family planning	39.4	23.9	11.2	30.7	29.4
Kitchen gardens	6.5	10.6	13.8	5.0	8.4
Small animal breeding	0.5	0.2	0.0	0.5	0.3
HIV and breastfeeding	11.3	3.2	6.1	9.9	7.6
Other	4.6	0.5	1.5	0.0	1.9
	(364)	(366)	(146)	(144)	(1,020)

Notes:
+ These indicators were calculated for those mothers that ever received IYCF training at a health facility only.

Table E-19 Household exposure to IYCF interventions: community-based					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Training on breastfeeding and feeding practices of infants and young children					
Percentage of mothers that received this training in the community	3.4	11.4	5.4	2.6	5.4
	(1,450)	(1,329)	(1,643)	(1,517)	(5,939)
Number of times mothers received this training – in total:+					
1	27.4	22.0	35.5	17.8	24.6
2	44.4	27.3	39.9	15.4	30.3
3	15.6	28.3	19.4	29.3	24.9
4	5.9	14.2	0.0	20.2	11.4
5	3.5	6.1	1.5	4.8	4.7
6	3.3	1.9	3.0	7.7	3.2
7 or more	0.0	0.3	0.7	4.8	1.0
Total	100.0	100.0	100.0	100.0	100.0
	(49)	(150)	(66)	(30)	(295)
Percentage of mothers that received this training in the last month+	49.2	35.4	62.0	48.1	45.0
	(53)	(149)	(77)	(31)	(310)
Type of staff that led this training+					
NGO volunteer	32.3	11.8	34.5	12.5	19.8
Medical staff	38.7	64.6	27.6	72.3	54.0
Someone else	29.1	23.7	38.0	15.2	26.2
Total	100.0	100.0	100.0	100.0	100.0
	(52)	(150)	(76)	(31)	(309)
Types of information received at the training+					
Breastfeeding practices	64.1	73.4	68.0	60.1	68.8
Hygiene practices	67.5	57.2	69.3	83.3	65.3
Complementary feeding	9.6	32.3	19.2	33.7	26.2
How to manage a sick baby	52.2	42.3	61.0	45.7	48.4
Birth spacing / family planning	29.9	27.6	5.3	33.1	24.0
Kitchen gardens	10.1	3.0	12.6	8.5	7.0
Small animal breeding	2.0	0.0	0.5	0.0	0.4
HIV and breastfeeding	14.7	5.4	1.1	9.8	6.6
Other	3.7	3.6	0.0	0.0	2.3
Total	(53)	(151)	(79)	(31)	(314)
Percentage of mothers that have heard / seen any IYCF messages on the radio or TV in the last six months	26.3	37.6	34.3	22.2	29.4
	(1,445)	(1,330)	(1,643)	(1,520)	(5,938)

Notes:
+ Indicators tabulated for mothers that did receive IYCF training in the community only.

Table E-20 Household exposure to IYCF interventions: community support groups					
	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of mothers that know of any support groups in the community that meet to discuss IYCF issues	2.1	6.4	2.9	1.6	3.1
	(1,450)	(1,330)	(1,643)	(1,519)	(5,942)
Training on breastfeeding and feeding practices of infants and young children					
Percentage of mothers that have ever attended IYCF training at support group	0.9	2.1	0.9	1.0	1.2
	(1,450)	(1,330)	(1,643)	(1,519)	(5,942)
Number of times mothers received this training – in total:+					
1	38.5	13.6	0.0	0.0	12.9
2	12.2	21.3	53.6	54.8	33.5
3	19.8	12.5	19.0	0.0	11.5
4	3.9	40.1	0.0	27.2	23.3
5	11.5	6.1	0.0	5.2	6.1
6	6.7	0.0	0.0	0.0	1.4
7 or more	7.4	6.4	27.4	12.8	11.5
Total	100.0	100.0	100.0	100.0	100.0
	(12)	(21)	(11)	(11)	(55)
Percentage of mothers that received this training in the last month+	56.9	76.5	68.1	53.1	65.6
	(12)	(24)	(14)	(11)	(61)
Types of information received at the training+					
Breastfeeding practices	75.5	71.6	78.5	70.4	73.2
Hygiene practices	86.4	65.1	79.3	85.8	76.6
Complementary feeding	0.0	46.6	54.3	27.7	34.6
How to manage a sick baby	65.6	56.5	84.5	60.9	64.1
Birth spacing / family planning	6.7	44.5	11.1	23.2	26.5
Kitchen gardens	4.5	9.5	20.6	0.0	8.1
Small animal breeding	0.0	0.0	5.2	0.0	0.9
HIV and breastfeeding	23.0	3.4	9.7	0.0	7.2
Other	0.0	5.3	0.0	0.0	2.1
	(12)	(24)	(14)	(11)	(61)

Notes:
+ Indicators only tabulated for mothers that did attend IYCF training at support groups.

Table E-21 Attitudes towards IYCF interventions

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of mothers that think it is important to attend…					
IYCF – health facility-based+	100.0	99.1	96.8	97.6	98.9
	(346)	(359)	(136)	(135)	(976)
IYCF – community based+	100.0	99.6	99.4	100.0	99.7
	(47)	(143)	(75)	(31)	(296)
IYCF – community support groups+	100.0	100.0	100.0	100.0	100.0
	(12)	(24)	(14)	(11)	(61)
Mothers whose husbands think IYCF interventions at support groups are important to attend+					
Important	100.0	96.3	100.0	100.0	98.5
Not important	0.0	0.0	0.0	0.0	0.0
He does not have an opinion about them	0.0	3.7	0.0	0.0	1.5
Total	100.0	100.0	100.0	100.0	100.0
	(12)	(24)	(14)	(11)	(61)

Notes:
+ Indicators only calculated for mothers that received the respective training.

Table E-22 Community awareness of MNCH weeks

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of communities that report…					
They have heard of MNCH weeks	57.9	59.9	28.8	61.2	52.7
	(210)	(210)	(207)	(207)	(834)
There was ever an MNCH day at a health facility close by+	92.1	72.4	37.5	82.8	76.4
	(130)	(128)	(64)	(132)	(454)
There was an MNCH day at a health facility close by in May 2013++	83.6	89.0	61.5	94.1	87.5
	(116)	(91)	(26)	(105)	(338)

Notes:
+ Indicator only calculated for communities that knew of MNCH weeks.
++ Indicator only calculated for communities that ever had MNCH day at a health facility close by.

Table E-23 MNCH weeks				
	Estimate			
Indicator	Jigawa	Katsina	Zamfara	Total
Percentage of mothers that have heard of MNCH weeks	10.2	14.6	10.7	11.7
	(1,446)	(1,326)	(1,517)	(4,289)
Percentage of mothers that attended the MNCH day in May 2013	3.3	7.3	4.5	4.9
	(1,446)	(1,326)	(1,516)	(4,288)
Types of information received at MNCH day+				
Breastfeeding practices	59.0	59.6	64.9	61.2
Hygiene practices	44.6	58.0	61.2	56.2
Complementary feeding	11.5	47.5	27.1	33.2
How to manage a sick baby	40.6	61.7	51.8	54.0
Birth spacing / family planning	13.9	25.5	12.3	18.7
Kitchen gardens	5.2	7.0	0.0	4.3
Small animal breeding	0.0	0.8	0.0	0.4
HIV and breastfeeding	0.0	10.2	1.3	5.1
Other	4.8	3.4	0.0	2.6
	(56)	(87)	(47)	(190)
Percentage that received Vitamin A at the MNCH day+	86.6	94.8	93.9	92.8
Percentage of mothers that think it is important to attend this type of training+	100.0	100.0	100.0	100.0
	(57)	(85)	(55)	(197)
Reasons why mother did not attend the MNCH day in May 2013++				
Have not ever heard of MNCH days	93.0	92.2	93.6	93.0
No time	2.5	3.6	1.5	2.4
Too far / too expensive	0.9	0.9	0.2	0.6
Not useful	0.3	0.0	0.3	0.2
Did not have permission to go	1.3	2.0	0.3	1.1
Did not know it was happening	1.1	0.5	3.9	2.0
Other	0.9	0.8	0.2	0.6
Total	100.0	100.0	100.0	100.0
	(1,385)	(1,238)	(1,461)	(4,084)

Notes:
Indicators in this table have only been calculated for mothers not in Kebbi state, as MNCH weeks had not started in that state at the time of the survey.
+ Indicators calculated for mothers that attended MNCH day only.
++ Indicators calculated for mothers that did not attend MNCH day only.

Table E-24 Husband's opinion on MNCH weeks

	Estimate			
Indicator	**Jigawa**	**Katsina**	**Zamfara**	**Total**
Mothers whose husbands think MNCH weeks are important to attend[+]				
Important	98.1	99.2	100.0	99.3
Not important	1.9	0.0	0.0	0.4
He does not know about them	0.0	0.8	0.0	0.3
Total	100.0	100.0	100.0	100.0
	(57)	(85)	(55)	(197)

Notes:
[+] Indicator calculated for mothers who did attend MNCH day only.

Table E-25 Community awareness of CMAM interventions

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Percentage of communities reporting that…					
They are aware of a community worker that identifies malnourished children using a MUAC	23.4	23.6	19.0	49.7	29.8
	(209)	(208)	(210)	(209)	(836)
There is a health facility nearby where severely malnourished children can receive special treatment with RUTF	44.5	24.3	9.9	48.1	32.2
	(209)	(208)	(210)	(209)	(836)

Table E-26 CMAM					
	Estimate				
Indicator	Jigawa	Katsina	Kebbi	Zamfara	Total
Percentage of households aware of a community health worker / volunteer that uses MUAC to identify malnourished children	5.3	4.2	2.8	8.7	5.5
	(839)	(835)	(840)	(838)	(3,352)
Percentage of children whose mother/carer is aware of a community health worker/ volunteer that uses MUAC to identify malnourished children	3.1	2.9	1.6	7.0	3.9
	(1,618)	(1,571)	(1,834)	(1,668)	(6,691)
Percentage of children who have ever been examined for malnutrition by community health worker at home‡	48.6	32.6	18.0	31.7	34.0
	(69)	(46)	(23)	(112)	(250)
Percentage of children who have had MUAC measured in the last 30 days+	57.9	47.3	54.9	63.5	58.7
	(32)	(17)	(7)	(31)	(87)
Percentage of children who have had MUAC measured twice or more in the last 30 days++	54.3	47.7	71.1	42.2	47.5
	(16)	(8)	(4)	(18)	(46)
Percentage of children where carer took any action as a result of MUAC measurement++	26.2	27.4	100.0	38.0	35.8
	(16)	(8)	(4)	(18)	(46)
Percentage of mothers / carers that received information when MUAC was measured+	41.0	51.9	54.9	51.9	49.0
	(32)	(17)	(7)	(31)	(87)
Percentage of children ever taken to a health facility to receive RUTF	6.7	6.2	2.2	5.2	5.2
	(1,616)	(1,575)	(1,835)	(1,669)	(6,695)
Percentage of children that were required to stay overnight at a health facility when receiving RUTF+++	7.0	28.7	11.2	5.7	13.4
	(118)	(103)	(44)	(73)	(338)
Times child has been taken to health facility to be treated with RUTF+++					
1	13.1	12.3	14.8	21.3	15.2
2	10.0	13.5	5.1	15.0	12.0
3	11.0	11.6	25.0	4.3	10.6
4	13.7	11.2	12.5	4.2	10.3
5	10.1	9.3	6.3	7.3	8.8
6	4.0	7.7	4.9	6.2	5.8
7	7.9	8.3	4.1	7.0	7.5
8	13.5	11.2	4.1	9.4	10.8
9 or more	16.7	14.9	23.3	25.3	19.0
Total	100.0	100.0	100.0	100.0	100.0
	(115)	(102)	(40)	(68)	(325)
Time taken to walk to health facility where child received RUTF (two-way) +++					
0min – 59min	16.2	16.6	6.4	32.3	20.4
1h – >2h	29.6	22.6	15.9	12.6	21.2
2h – >4h	24.6	35.7	35.0	34.3	31.7
4h+	29.6	25.2	42.8	20.8	26.7
Total	100.0	100.0	100.0	100.0	100.0
	(117)	(103)	(38)	(73)	(331)

Table E-26 CMAM

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Proportion of carers that spent NGN 100 or more to travel to health facility where child received RUTF (two-way) +++	69.0	68.5	71.5	66.2	68.2
	(118)	(96)	(34)	(69)	(317)
Time taken at health facility to receive RUTF treatment +++					
0 hours – less than 1 hour	12.3	21.5	5.8	8.2	13.2
1 hour – less than 2 hours	19.3	22.6	19.8	9.3	17.3
2 hours – less than 3 hours	9.6	23.7	26.6	19.1	18.1
3 hours – less than 4 hours	21.9	15.5	15.5	15.1	17.4
4 hours – less than 5 hours	17.0	8.6	6.9	21.6	15.0
More than 6 hours	19.9	8.2	25.5	26.8	19.0
Total	100.0	100.0	100.0	100.0	100.0
	(118)	(103)	(42)	(73)	(336)
Percentage of mothers that responded correctly when asked…+++					
Does RUTF need preparation before it can be fed to child? (No)	73.6	64.5	71.4	61.8	67.2
	(117)	(102)	(41)	(73)	(333)
Is it OK to share RUTF with other children? (No)	91.3	65.2	92.1	82.2	80.9
	(118)	(103)	(40)	(73)	(334)

Notes:
‡ Indicator calculated for children whose carer is aware of community worker only.

+ Indicators calculated for children that were ever examined for malnutrition at home.

++ Indicators calculated for children that were examined in the last 30 days only.
+++ Indicators calculated for children that were ever taken to a health facility for treatment with RUTF only.

Table E-27 Opinions on CMAM treatment

	Estimate				
Indicator	**Jigawa**	**Katsina**	**Kebbi**	**Zamfara**	**Total**
Mothers / carers who think it is important to take their child to the health facility to receive treatment with RUTF+					
Not important	0.5	1.0	0.0	2.2	1.1
Important	98.0	99.1	100.0	97.5	98.3
No opinion	1.4	0.0	0.0	0.3	0.6
Total	100.0	100.0	100.0	100.0	100.0
Husband / household heads who think it is important to take their child to the health facility to receive treatment with RUTF+					
Important	95.9	94.5	100.0	96.7	96.1
Not important	2.7	0.7	0.0	3.3	2.1
He does not know about them	0.0	0.6	0.0	0.0	0.2
He does not have an opinion about them	1.4	4.2	0.0	0.0	1.7
Total	100.0	100.0	100.0	100.0	100.0
	(117)	(103)	(40)	(73)	(333)

Notes:
+ Indicator only calculated for children that were ever taken to health facility for RUTF treatment.

Annex F Cross-reference of key indicators

This Annex cross-references key indicators from the baseline study with other surveys in Nigeria. While comparisons are useful in triangulating findings and validating results, they must be interpreted carefully. There are four important considerations that must be taken into account when interpreting the cross-reference tables below. They are:

1. The population base for a particular indicator may be different across surveys.
    - For example, the DHS and SMART survey calculates child anthropometric indicators for all children 0-5 years old whereas the ORIE baseline report reports child anthropometric indicators for all children 0-2 years old.
2. The season in which cross-referenced surveys was conducted.
    - As a number of key indicators, such as household food security or even underweight and wasting vary by season so estimates from different sources may vary.
    - The ORIE baseline survey was conducted in June 2013, the SMART 2012 was conducted between August and October 2012, the NDHS 2013 was conducted between April and May 2013, the NDHS 2008 conducted between June to October 2008 and the MICS 2011 was conducted between February and March 2011.
3. The year in which the cross-reference survey was conducted.
    - Comparisons from the ORIE baseline to the DHS 2008 must be made carefully as the context must have certainly changed within this time gap.
4. The level of disaggregation
    - Some surveys are specifically designed to provide disaggregated results for particular levels. For example, the GHS was designed only to provide estimates for North West Nigeria whereas the NDHS 2008 disaggregates results by state.

Overall, the results presented in the ORIE baseline report are designed to provide a baseline description across the evaluation areas only. This includes 12 treatment LGAs and 12 control LGAs that span throughout the states of Jigawa, Katsina, Kebbi, and Zamfara. Hence, the present estimates are not designed to be separately representative of each of the four mentioned states. Any extrapolation of these results to each of these states, or indeed the rest of Northern Nigeria must be made with care.

With that said, the comparisons presented in this annex are to put the ORIE results into the wider context of evidence that already exists for the region.

F.1 Household demographics

Table F-1 presents comparisons of indicators on household demographics as measured by the present study and other reference surveys. In summary, we find:

- Female headship rates are generally low in Nigeria. However, the level measured by ORIE was distinctly lower than in rural Nigeria as a whole (NDHS 2008) and in North West Nigeria (GHS 2010/11).

- Similarly, educational attainment among household heads in the present study was found to be much lower than both for males in Nigeria as a whole (NDHS 2013) and in North West Nigeria (NDHS 2008).

- Finally, the demographic dependency ratio measured was similar to what the GHS 2010/11 found for North West Nigeria as a region.

Table F-1 Comparison of household demographics to other studies

Study	% of household heads that are female	% of households heads that have no formal education	Average household dependency ratio
ORIE	0.9	66.8	145.5
NDHS 2008	18.6	48.8	-
	Household headship rates for rural Nigeria	*Educational attainment for male respondents in North West Nigeria*	
NDHS 2013	-	37.8	-
		Male respondents in Nigeria	
GHS 2010/11	4.0	-	150.5
	North West Nigeria		*North West Nigeria*

F.2 Household characteristics

Overall, the results of the present survey were similar to the findings on housing characteristics of other studies in the region (Table F-2). In summary:

- *Electricity* access was identified to be similarly low both by the NDHS 2008 for the four relevant states in North West Nigeria and by the GHS 2010/11 for North West Nigeria as a whole.

- Households in the present survey were more likely to have earth as *flooring material* than in both of the earlier studies, but equally likely to use cement as found in the NDHS 2008 for rural Nigeria as a whole.

- However, households were less likely to *cook indoors* and were significantly more likely to use wood as *cooking fuel* than in the NDHS 2008.

- Surprisingly, households in the present survey were more likely to own any of the listed *assets* or *transport methods* than in both studies mentioned above. In particular, prevalence of mobile phone ownership (72%) was more than twice as high as was found by the NDHS 2008 for rural Nigeria as a whole (35%) and about 25 percentage points higher than the figure found by the GHS 2010/11 for North West Nigeria (46%). It is likely that this is due to an increase in utilisation of mobile phones in the region since the earlier surveys were conducted.

Table F-2 Comparison of housing characteristics to other studies

Study	Base population	Access to Electricity	Flooring material		Cooking indoors	Cooking fuel		Assets/transport			
			Earth	Cement		Kerosene	Wood	Radio	Mobile	Bike	Motorbike
ORIE		35.3	61.2	37.3	22.6	1.4	91.4	72.5	72.4	36.4	45.3
NDHS 2008	*(Rural Nigeria as a whole)*	-	45.5	38.5	37.7	11.3	82.5	69.4	35.1	29.3	24.9
Jigawa		18.6	-	-	-	-	-	-	-	-	-
Katsina		30.2	-	-	-	-	-	-	-	-	-
Kebbi		38.3	-	-	-	-	-	-	-	-	-
Yobe		24.5	-	-	-	-	-	-	-	-	-
Zamfara		18.8	-	-	-	-	-	-	-	-	-
GHS 2010/11	*(North West Nigeria)*	38.6	21.6	-	-	-	-	62.0 (Access: 84.6)	46.0	27.0	31.3

F.3 Water, sanitation and hygiene

Table F-3 shows that the present survey found similarly low levels of safe drinking water availability and sanitation infrastructure as comparative studies. In summary:

- The NDHS 2008 found that on average 50% of all households used *improved drinking water* sources in North West Nigeria, with significant variance across states (ranging from 28% in Zamfara to 80% in Jigawa). For North West Nigeria, the GHS 2010/11 found levels that lay within this range (61%). However, these estimates are much higher than what was found in the present survey.

- Similarly, the NDHS 2008 found that, on average, only 12% of households in North West Nigeria were using *appropriate treatment techniques* for drinking water. Again, this varied considerably across states, from 3% in Jigawa to 23% in Katsina. The ORIE estimates were close to the average found here.

- The NDHS 2008 did not disaggregate *sanitation facilities* used in households by the exact type, making comparisons to ORIE estimates impossible. However, the GHS 2010/11 found that, on average, 86% of all households used some type of pit latrine (including covered, uncovered, and ventilated improved pit latrine in North West Nigeria, while 7% did not use any sanitation facilities at all.

Table F-3 Comparison of water and sanitation infrastructure to other studies					
Study	**Base population**	**Drinking Water**		**Sanitation**	
		Improved Source	Appropriate Treatment	Pit latrine	No facilities
ORIE		40.2	10.8	78.2	17.7
NDHS 2008	*(North West Nigeria)*	49.5	11.9	-	-
Jigawa		79.4	3.1	-	-
Katsina		38.0	22.7	-	-
Kebbi		72.4	5.7	-	-
Yobe		50.3	3.8	-	-
Zamfara		27.6	3.3	-	-
MICS 2011					
Jigawa		64.9	1.6	-	48.1
Katsina		43.2	10.4	-	11.5
Kebbi		43.8	2.2	-	37.6
Yobe		62.1	4.4	-	39.5
Zamfara		44.2	6.6	-	9.8
GHS 2010/11	*(North West Nigeria)*	60.9	-	86.0	7.1

F.4 Maternal characteristics and decision making

Comparisons with the NDHS 2008 report indicate that the results presented are representative of the general situation in the region (Table F-4). In summary:

- For North West Nigeria, the *median age at first marriage* for women was found to be 15 years, which is very close to the estimate of the present survey.
- The *median age at first birth* was 18 years in North West Nigeria and lay between 18 years in Katsina and 19 years in Zamfara, hence being slightly but consistently higher than in the ORIE survey.
- The level of *educational attainment* in the relevant states of North West Nigeria was found to be similar: between 85% (Jigawa) and 91% (Katsina) of women were identified as not having any formal education. The ORIE estimates lie within this range.
- *Economic activity* was found to be slightly lower, as 47% of women in North West Nigeria were identified as not being employed in the 12 months preceding the survey compared to 31% of non-active women in the present survey. This difference could, however, perhaps be ascribed to definitional differences.
- *Decision making* and *attitudes towards wife beating* were also found to be very similar. For instance, 66% of married women in North West Nigeria were found to decide alone on their cash earnings. Similarly, 32% of women accepted wife beating if the wife neglected the

children. Looking at the same indicators at state level shows that the ORIE estimates lie within the ranges found here.

Table F-4 Comparison of maternal characteristics and decision making with other studies

Study	Base population	General characteristics				Decision making and women's attitudes towards wife beating (proportions)		
		Median age at first marriage	Median age at first birth	Proportion not having any formal education	Proportion not economically active (NDHS 2008: not employed in 12 months preceding survey)	Women deciding mainly alone on cash earnings	Wife beating accepted if woman went out alone	Wife beating accepted if children are neglected
ORIE	*(Mothers 15–49 years who had given birth within 35 months prior to survey)*	15	17	86.6	30.6	60.5	45.1	39.1
NDHS 2008	*(Women 20–49 in North West Nigeria for ages, 15–49 years for other indicators, married women for decision making only)*	15.3	18.3	74.2	46.6	66.4	40.5	32.4
Jigawa		-	18.4	84.6	49.9	55.0	50.3	46.2
Katsina		-	17.6	91.1	45.9	94.1	44.0	36.0
Kebbi		-	18.4	85.9	40.9	82.2	51.1	42.7
Yobe		-	17.7	80.8	50.2	80.1	21.1	18.3
Zamfara		-	18.5	87.9	55.6	82.3	32.4	24.0

F.5 Knowledge and utilisation of family planning

The results presented above are representative of the general situation in North West Nigeria, as can be seen in Table F-5. In summary:

- The NDHS 2008 report indicated that only 45% of all women aged 15–49 years in the region had *heard of any method of contraception*, and these values varied significantly between 18% (Kebbi) and 48% (Zamfara) in the relevant states. The ORIE results are close to the regional average and lie within the range found in these states.

- Preliminary results from the NDHS 2013 report indicate that utilisation of contraceptive methods in North West Nigeria is uncommon: only 4% of married women aged 15–49 reported using any method of contraception. In Jigawa, Katsina, Kebbi, and Zamfara, this value was found to be between 1% (Jigawa) and 3% (Zamfara).

Table F-5 Comparison of results on knowledge and utilisation of family planning methods			
Study	**Base population**	**Knowledge**	**Use**
		Proportion ever heard of any method of family planning	Proportion using any method of family planning
ORIE	*(Mothers aged 15–49 years who had given birth within 35 months prior to survey)*	42.2	-
NDHS 2008	*(North West Nigeria, currently married women aged 15–49 years)*	45.1	-
Jigawa		43.1	-
Katsina		25.7	-
Kebbi		18.0	-
Yobe		31.2	-
Zamfara		47.5	-
NDHS 2013	*(North West Nigeria, currently married women aged 15–49 years)*	-	4.3
Jigawa		-	0.9
Katsina		-	1.3
Kebbi		-	1.3
Yobe			1.1
Zamfara		-	3.0
MICS 2011	*(North West Nigeria, currently married women aged 15–49 years)*	-	3.7

F.6 ANC, place of delivery and PNC

The low utilisation of health services before, during and after pregnancy seems to be representative for the region in which the survey was carried out (Table F-6). In summary:

- According to the NDHS 2008 report, the proportion of women in the relevant states in North West Nigeria that did not receive *ANC* varied between 79% in Jigawa and 86% in Zamfara, which is consistently higher than what was found in the present survey. Yet the NDHS 2013 report indicated a slightly lower figure of 59%, a figure closer to the ORIE estimate.

- The NDHS 2008 also reported that 90% of live births *were delivered at home* in North West Nigeria, and only 8% at a health facility, which is very close to the estimate presented in Table 5-9.

- Finally, the utilisation of PNC in North West Nigeria was similarly reported as being very low: 80% of women were identified as not receiving any post-natal check-up according to the NDHS 2008 report.

Table F-6 Comparison of ANC, place of delivery, and PNC across studies					
Study	**Base population**	**ANC**	**Place of delivery**		**PNC**
		Proportion of mothers not receiving any ANC	Home	Health Facility	Proportion of mothers not receiving post-natal check-ups
ORIE	*(Mothers aged 15–49 years to children aged 0–35 months)*	57.5	90.7	9.0	85.7
NDHS 2008	*(North West Nigeria, women aged 15–49 years who have given birth in the five years prior to the survey)*	67.1	90.1	8.4	80.1
Jigawa		78.7	95.5	4.5	69.5
Katsina		82.8	93.1	4.2	91.4
Kebbi		84.7	92.3	4.8	83.5
Yobe		62.5	92.9	5.1	42.7
Zamfara		85.5	92.3	6.5	84.0
NDHS 2013	*(North West Nigeria, women aged 15–49 years who have given birth in the five years prior to the survey)*	59.0		11.5 (at last birth)	-
MICS 2011	*(Women aged 15–49 years who have given birth in the two years prior to the survey)*				
Jigawa		56.6	89.5	10.1	-
Katsina		82.5	53.3 (37.6% of missing values)	8.8	-
Kebbi		65.0	94.4	4.6	-
Yobe		52.3	79.0	18.6	-
Zamfara		80.3	84.6	7.7	-

F.7 Maternal anthropometrics

The NDHS 2008 reported a very similar distribution of BMI among women aged 15–49 in North West Nigeria (Table F-7). In summary:

- 21.5 was the mean BMI, 67% of women were reported as having a normal BMI, 19% as being underweight, and 14% as overweight, a slightly higher percentage than in the present survey.

Table F-7 Maternal anthropometrics compared					
Study	**Base population**	**Mean BMI**	**Proportion of**		
			Underweight	Normal	Overweight
ORIE		21.1	18.1	71.7	10.1
NDHS 2008	*(Women aged 15–49 years in North West Nigeria)*	21.5	18.6	66.6	14.2
Jigawa		21.1	21.4	67.0	11.5
Katsina		21.1	18.4	71.5	10.1
Kebbi		22.6	16.6	59.6	23.8
Yobe		20.7	26.2	64.7	9.1
Zamfara		21.6	25.1	59.9	14.9

F.8 IYCF practices

Other sources report similar breastfeeding practices in Northern Nigeria (Table F-8). In summary:

- The NDHS 2008 indicated that breastfeeding was nearly universal (98%) and that almost 60% of all children under the age of five in North West Nigeria were put to the breast within one day of their birth. Similar results were found for the four relevant states of Jigawa, Katsina, Kebbi, and Zamfara.

- Exclusive breastfeeding among Nigerian children (country-wide) aged 0–5 months was generally rare (13%).

Yet the NDHS 2008 also reported diverging results on complementary foods for infants and young children:

- An estimated 47% of all children aged 6–23 months in North West Nigeria received food the minimum times or more, which is 23.8 percentage points higher than the ORIE estimate. The estimates in the four relevant states for the NDHS 2008 were similarly high.

- In addition, 34% of children aged 6–35 months in North West Nigeria were estimated to have consumed iron-rich foods within the 24 hours preceding the survey. Again, this is significantly higher than the estimate for the consumption of iron-rich food in the present survey. However, this difference might partly be explained by a diverging definition of this indicator.

Table F-8 Comparison of breastfeeding and complementary feeding with other studies						
Study	**Base population**	**Breastfeeding**			**Complementary feeding**	
		Proportion of children ever breastfed	Proportion put to breast within one day	Exclusive breastfeeding of children aged *0–5 months*	Minimum meal frequency (6–23 months)	Consumption of iron-rich or iron-fortified foods (Note: NDHS 2008 includes eggs as food here, while ORIE does not)
ORIE		99.7	62.2	7.2	23.3	13.6
NDHS 2008	*(North West Nigeria, children under the age of five for breastfeeding, 6–35 months and living with mother for iron foods; Nigeria in total for exclusive breastfeeding)*	98.1	56.1	13.1	46.8	33.6
Jigawa		98.7	51.1	-	45.9	31.0
Katsina		98.2	54.2	-	49.9	25.3
Kebbi		97.4	59.1	-	60.2	29.4
Yobe		98.9	45.1	-	88.8	29.3
Zamfara		98.7	39.9	-	42.7	40.3
MICS 2011	*(North West Nigeria)*	-	-	6.2		
Jigawa	*(Last-born children in the two years preceding the survey for breastfeeding indicators)*	96.6	50.9	6.4	21.3	-
Katsina		61.8	33.6	6.3	19.8	-
Kebbi		95.7	55.7	6.6	22.3	-
Yobe		96.4	52.3	11.3	22.3	-
Zamfara		89.2	46.0	4.5	24.9	-

F.9 Child vaccination status

Vaccination status is commonly measured in a number of population-based surveys in Nigeria. The findings from the baseline survey are compared to the findings of other surveys in Table F-9. In summary:

- Vaccination status across all of the surveys cross-referenced varies widely by state.
- While full vaccination status can vary as much as between 2% in Zamfara and 9% Katsina according to the NDHS 2013, the estimate from the ORIE baseline certainly lies on the lower end of the scale at 3%.

- Across all studies reporting on vaccination status Katsina is far in the lead in regard to having a higher proportion of children fully vaccinated among the four states, with Zamfara having the lowest estimates.

Table F-9 Comparison of vaccination status of children to other studies

Study	Base population	Vaccination	
		Proportion of children not having any vaccination	Proportion of children aged 12–23 months having all basic vaccinations
ORIE	*(Children aged 12–35 months for no vaccinations)*	41.0	2.7
NDHS 2008	*(North West Nigeria, 12–23 months for no vaccinations)*	48.5	6.0
NDHS 2013	*(North West Nigeria, 12–23 months for no vaccinations)*		9.6
Jigawa		29.9	3.6
Katsina		4.9	8.7
Kebbi		5.8	2.8
Yobe		65.2	6.9
Zamfara		28.6	2.1
MICS 2011	*(Children aged 12–23 months, North West Nigeria)*	36.0	7.5
Jigawa		51.2	4.6
Katsina		30.1	9.2
Kebbi		27.6	4.3
Yobe		31.6	10.1
Zamfara		38.1	1.8

F.10 Child anthropometric analysis

Table F-10 shows that recent studies on nutrition in Nigeria gave similar but somewhat diverging and varying measures of malnutrition among children in Northern Nigeria. In summary:

- ORIE estimates lie within the ranges found in other surveys, but the prevalence levels of all indicators are higher than SMART 2012 and closer to those found in the NDHS 2013.
- The finding of boys being consistently more malnourished than girls is a trend that has also been documented in the NDHS 2008 report.

Table F-10 Comparison of anthropometric estimates with other studies

		Mean z-score			Prevalence			
Study	Base population	LAZ/HAZ	WAZ	WHZ/LHZ	Stunting	Underweight	Wasting	Severe Wasting
ORIE	*(Children aged 0–35 months)*							
Jigawa		-2.4	-1.9	-0.7	64.4	46.0	14.4	4.9
Katsina		-2.5	-1.9	-0.6	63.8	47.5	15.3	5.8
Kebbi		-2.0	-1.5	-0.7	51.0	38.2	18.8	6.4
Zamfara		-2.0	-1.5	-0.6	51.0	34.3	16.7	6.1
Total		-2.2	-1.7	-0.6	57.5	41.2	16.2	5.8
Total (6–35 Months)							*16.2*	
SMART 2012	*(Children aged 0–59 months, across four relevant states)* [+]	-1.8	-1.5	-0.7	43.2	31.0	12.0	2.8
	(Children aged 0–35 months, across four relevant states)[+]	-1.7	-1.6	-0.9	41.4	35.3	17.0	4.0
NDHS 2008	*(Children aged 0–59 months, North West Nigeria)*	-	-	-	52.6	35.1	19.9	10.6
NDHS 2013	*(Children aged 0–59 months)*							
Jigawa		-2.2	-1.7	-0.6	59.0	44.1	17.0	7.8
Katsina		-2.2	-1.9	-0.8	58.5	46.0	24.3	12.0
Kebbi		-2.5	-1.6	-0.3	60.6	39.0	18.1	9.4
Yobe		-1.8	-1.4	-0.5	49.3	36.6	23.6	13.3
Zamfara		-2.2	-1.6	-0.5	55.9	37.0	16.2	6.1
MICS 2011	*(Children aged 0–59 months)*							
Jigawa		-2.4	-1.8	-0.5	58.8	43.8	14.3	6.6
Katsina		-2.5	-1.8	-0.5	61.9	44.8	14.7	5.1
Kebbi		-2.0	-1.7	-0.8	53.9	43.4	18.2	5.7
Yobe		-2.5	-2.0	-0.7	64.8	48.0	14.9	4.9
Zamfara		-2.4	-1.9	-0.7	61.7	47.5	17.5	6.7

Notes:
[+] Results for this indicator were derived from the authors' calculations using the SMART 2012 data to match the base population of children.

Annex G Estimating impact

The quasi-experimental design will estimate the 'collective' impact of the WINNN Programme. This means the impact of the CMAM and IYCF interventions that are being implemented across all four states will be pooled in order to arrive at an overall estimate of the impact of the programme.

Despite using matching techniques to select control LGAs, the study groups may still be intrinsically unbalanced as this is something that can only be avoided when there is random assignment of the treatment. Furthermore, selection into the 'treatment' may be based on un-observable time-invariant characteristics. Therefore, difference-in-difference methods will be used on a panel of households to effectively remove this influence.

To further refine the impact estimate, the study will focus on children within the age range of 0–3 years old, as the CMAM and IYCF interventions are likely to have the greatest impact on key nutrition indicators within this age window. The final difference-in-difference impact model will rely on matching (via age) children interviewed at baseline with their siblings measured at follow-up who will have been exposed to the WINNN intervention since birth.

We intend to use the ITT estimate as this will tell us the impact of the programme on our target population regardless of whether or not they actually received treatment. It averages the effect of those who accepted the offer of treatment with those who did not receive the offer of treatment. This is an important impact estimator when trying to determine the impact of the programme in a 'real world' scenario. Please refer to Annex G for impact estimation model.

Formally, the identification strategy for this ITT could be summarised as follows:

$$y_{lit} = \alpha + \theta T_l + \emptyset Z_{it} + \omega T_l Z_{it} + \boldsymbol{\beta X}_{lit} + v_{lit};$$

where y_{lit} is outcome y for child i in LGA l at time t. T is the treatment dummy that will be equal to one if the child lives in a treatment LGA, irrespective of whether it actually was treated. Z is a time dummy that is equal to one if the observation is from follow-up. Finally, α is a constant, $\boldsymbol{X}$ is a vector of control variables, and v_{lit} is an error term. The coefficient on the interaction of treatment with time (ω) can then be interpreted as difference-in-difference estimator of the treatment effect.