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BASELINE SURVEY (2019): ZAMBIA SCALING UP NUTRITION (SUN) 2.0 / FIRST 1000 MOST CRITICAL DAYS PROGRAMME (MCDP II)

Final Report: 10 March 2020

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BASELINE SURVEY REPORT (2019)

Zambia Scaling Up Nutrition 2.0 / First 1000 Most Critical Days Programme (MCDP) II

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Prepared under:
Scaling Up Nutrition Learning and Evaluation (SUN LE) project
USAID Contract Number 72061119C00003

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Recommended Citation: USAID Scaling Up Nutrition Learning and Evaluation (SUN LE), National Food and Nutrition Commission (NFNC). 2019 Baseline Survey of the First 1000 Most Critical Days Programme (MCDP) II. 2020. Lusaka, Zambia

Cover Photo: SUN LE data collector and respondent. Courtesy of SUN LE staff.

Acknowledgements

This 2019 Baseline Survey of Zambia's Scaling Up Nutrition 2.0 / First 1000 Most Critical Days Programme (MCDP) II was made possible with the generous support of the American people through the United States Agency for International Development (USAID).

We also acknowledge the Government of the Republic of Zambia for infrastructural support that facilitated survey implementation. We are grateful to the National Food and Nutrition Commission (NFNC) for their leadership during the planning and execution of the survey. Technical and logistical support from the Zambia Statistics Agency, formerly known as the Central Statistics Office, and the Ministry of Health, is greatly appreciated. We further acknowledge the Monitoring, Evaluation, and Research (ME&R) Technical Working Group (TWG) for its technical review of, and input into, the baseline survey report.

We are grateful to the field workers who worked tirelessly during the data collection period as well as the households that provided the information. We are grateful to the communities without whose cooperation this survey would not have been possible.

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Annexes

NB: Submitted as separate documents, in two volumes

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Acronyms

BMI	Body Mass Index
CLTS	Community-Led Total Sanitation
EA	Enumeration Area
GRZ	Government of the Republic of Zambia
HH	Household
IAPRI	Indaba Agricultural Policy and Research Institute
IFA	Iron and Folic Acid
IYCF	Infant and Young Child Feeding
KII	Key Informant Interview
MCDP	Most Critical Days Programme
ME&R	Monitoring, Evaluation & Research
NFNC	National Food and Nutrition Commission
NGO	Non-Governmental Organisation
OR	Odds Ratio
ORS	Oral Rehydration Solution
QC	Quality Controller
SD	Standard Deviation
SUN	Scaling Up Nutrition
SUN LE	Scaling Up Nutrition Learning and Evaluation
SUN TA	Scaling Up Nutrition Technical Assistance
UNC	University of North Carolina at Chapel Hill
USAID	United States Agency for International Development
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization

EXECUTIVE SUMMARY

BACKGROUND: The Government of the Republic of Zambia (GRZ) is part of Scaling Up Nutrition (SUN) – a global movement uniting governments, civil society, businesses, and citizens in a worldwide effort to end undernutrition. The first phase of the Zambia SUN programme – or the First 1000 Most Critical Days Programme (MCDP I) – was initiated in 2013 to reduce stunting among children less than 2 years.

Currently in its second phase (2018–2022), MCDP II is implemented by 7-line ministries, coordinated by the National Food and Nutrition Commission of Zambia (NFNC), and implemented in 30 districts, having been scaled up from 15 districts in Phase 1.

MCDP II is financed and technically supported by various partners supporting the nutrition sector in Zambia. USAID/Zambia supports the SUN programme through a technical assistance project, SUN Technical Assistance (SUN TA), and the SUN Learning and Evaluation (SUN LE) project. Other donors also support MCDP II implementation, with the German development agency, GIZ, supporting two additional districts in Luapula Province, while others are set to support other districts.

BASELINE PURPOSE AND OBJECTIVES: The SUN 2.0 / MCDP II baseline survey was undertaken by the USAID SUN LE Project. The survey collected representative data in 30 districts, across all 10 provinces, where MCDP II is being rolled out. The survey assessed 26 out of 33 indicators aligned to the MCDP II framework for reducing stunting among children less than 2 years.

METHODOLOGY: This baseline survey was a cross-sectional survey comprised of two parts: (1) a household survey, and (2) Key Informant Interviews (KIIs) with key SUN stakeholders (i.e., SUN key personnel, focal-point persons at provincial and district levels from relevant government ministries, and selected NGOs implementing nutrition activities).

The household survey targeted 7,500 households (250 per district) with children less than 2 years. The household sample was drawn using stratified four-stage sampling:

1) Purposive selection of the 30 SUN districts;
2) Random selection of 10 enumeration areas (EAs) in each of the 30 districts. The EAs were selected based on Probability Proportional to Size (PPS) sampling, therefore more EAs were selected in larger districts than in smaller

districts;

3) Selection of 25 listed households in each selected EA that had children less than 24 months; and

4) In each selected household, the biological mother or primary caregiver of the child was interviewed, and anthropometric measurements (height/length and weight) of the randomly selected child and its biological mother were taken.

In total, 7,486 eligible households with children less than 2 years were reached (7,177 biological mother-child pairs and 309 other primary caregiver-child pairs).

The KIIs sought to obtain SUN stakeholders' perspectives on the current status of SUN 2.0 programme implementation in the sampled six districts. The KIIs targeted 66 key informants (24 provincial-level respondents and 42 district-level respondents) of which 51 were interviewed.

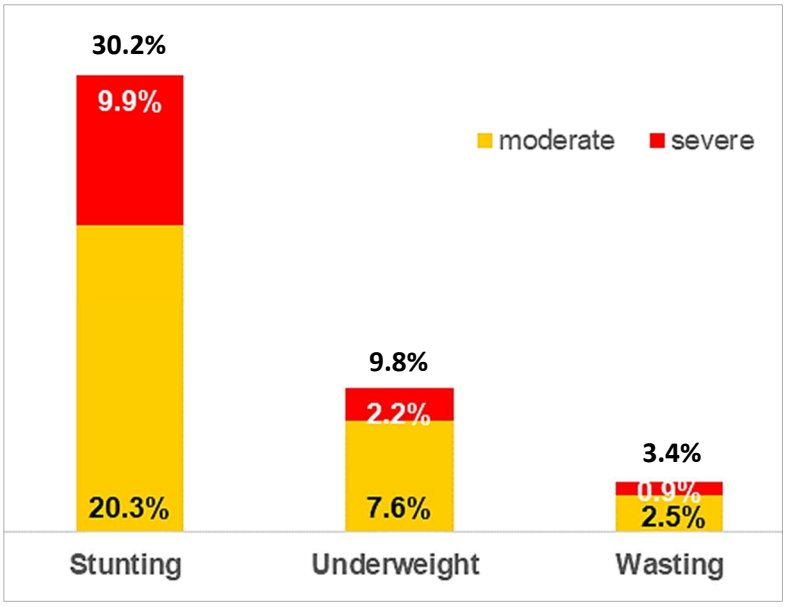
Data for both the household survey and KIIs were collected using Survey Solutions and JotForm applications, respectively. Household data were analysed using Stata v15, and Microsoft Excel and Tableau v2019.3 were used to generate descriptive statistics and, to a limited extent, inferential statistics. KIIs were analysed using non-parametric techniques, and open-ended questions were manually analysed based on principles of the constant comparative method.

RESULTS:

Child stunting: Across the 30 districts, 30.2% of children less than 2 years of age were stunted (<-2 standard deviations [SD]), of which 9.9% were severely stunted (<-3 SD) (Figure 1). Significantly higher stunting was observed in children in rural[1] areas (32.7%) compared to children in urban areas (24.8%). Significant variations were observed across the 30 districts, with the highest stunting prevalence observed in Nchelenge (43.1%) and Samfya (43.0%), and the lowest in Ndola (15%), Mongu (17.8%), and Zambezi (19.2%) (P<0.001).

[1] **Urban**: is a place-based characteristic that incorporates elements of population density, social and economic organization, and the transformation of the natural environment into a built environment. **Rural**: An area that lacks most if not all the facilities/amenities found in the urban areas. The population tends to be scattered – Compendium of Statistical Concepts and Definitions – Central Statistics Office (2018), Zambia

Figure 1. Child Stunting, Underweight, and Wasting in children less than 2 years



Adjusting for background factors, children aged 18-24 months were 2.9 times more likely to be stunted than those aged 0-5 months (OR= 2.92, p<0.001). Boys were nearly twice as likely to be stunted as girls (OR= 1.93, p<0.001). Children born to adolescent mothers (15-19 years old) were 1.2 times more likely to be stunted than those born to women 25 to 29 years old (OR= 1.25; p=0.026). The odds of stunting increased with the households' hunger experience – children in households that reported severe hunger (OR=1.25, P=0.014) and moderate hunger (OR=1.28, P=0.006) were significantly more likely to be stunted. Moreover, significantly fewer children were stunted in households that reported stronger resilience (28.7%) compared to households that did not (34.2%) (P<0.001).

On the other hand, children born to mothers who had attained secondary school education were 0.44 times less likely to be stunted compared to those whose mothers had no formal education. Children from households where the head of the household was in formal employment were 0.74 less likely to be stunted than those in households where the head was unemployed (p<0.001).

Child underweight and wasting: Overall, 9.8% of children were underweight (<-2 SD), of which 23% were severely underweight (<-3 SD) (Figure 1). Underweight was at a peak (17%) in children 16 months of age. A little over three percent (3.4%) of children were wasted (Figure 1).

Mother's body mass index (BMI): Overall, 7.2% of women were underweight, with women in rural areas more likely to be underweight (8.0%) than those in urban areas (5.5%). Younger women (15-19 years of age) were more likely to be

underweight (9.5%) than older women (35-39 years of age) (8.1%). Kalabo district reported the highest proportion of underweight women (20.8%), while Solwezi District had the lowest (3.1%). A unit increase in women's dietary diversity was associated with a 0.25-point increase in mother's BMI (P<0.001), and an increase in one scale of household hunger was associated with a 0.61 unit decrease in mother's BMI (P<0.001).

Exclusive breastfeeding: Based on the 24-hour recall, 68.2% of children less than 6 months of age were reportedly exclusively breastfed, with more girls (70.4%) than boys (65.8%) exclusively breastfed (P=0.019). However, breastfeeding reduced with the increase in the age of the children. Children in rural areas (69.4%) were significantly more likely to be exclusively breastfed than those in urban areas (65.6%). Shangombo (81%) and Kalabo (79.0%) districts had the highest proportion of exclusively breastfed children, while Mpika (39.7%) and Nchelenge (45.2%) had the lowest (P<0.001).

Children meeting Infant and Young Child Feeding (IYCF) standards:

Only 28.6% of children less than 2 years of age met IYCF standards. No significant differences were observed between girls (29.3%) and boys (27.7%) (P=0.15). The highest proportions of children fed according to minimum IYCF standards were in Kabwe (44%) and Mumbwa (41.6%) districts, while the lowest were in Kaputa (15.7%), Mpika (16.5%), and Shangombo (18.4%).

The table below summarises the key baseline results for 26 indicators; 22 derived from SUN 2.0 indicators and 4 new indicators proposed by the Monitoring, Evaluation, and Research (ME&R) Technical Working Group (TWG) in January 2019.

Indicator and Results	Overall %	Rural %	Urban %
GOAL: Reduced stunting among children under 2 years of age			
Percent of children under age 2 who are stunted	30.2	32.7	24.8*
Percent of women with low BMI (by age)	7.2	8.0	5.5*
Percent of children under age 2 who are underweight	9.9	10.9	7.6*
Number of children under age 2 reached with community-level nutrition-specific interventions	19.8	18.7	22.0
Objective 1: Adequate quantity and quality of dietary intake among target groups			
Percent of HH with moderate or severe hunger	75.6	81.0	64.1*
Intermediate Result 1: Increased reliable access to safe, nutritious foods			
Prevalence of HHs practicing safe food processing/preparation /improved storage practice	7.5	6.6	9.4*

Indicator and Results	Overall %	Rural %	Urban %
Prevalence of women of reproductive age who consume targeted nutrient-rich value chain commodities	34.4	31.6	40.5*
Women's dietary diversity: Mean number of food groups consumed by women of reproductive age	4.6	4.3	5.4*
Percent of HHs selling or bartering nutritious crops that they grew	62.9	67.8	44.8*
^^ Percent of HHs producing safe and nutritious foods (crops and livestock) for consumption	58.2	63.2	39.8*
^^Percent of HHs with a recommended diet diversity	19.4	15.8	28.8*
Percent of HHs reporting stronger resilience to lean season and environmental shocks	39.3	32.1	58.9*
Intermediate Result 2: Adoption of better child feeding and household hygiene practices			
Percent of HHs practicing essential hygiene actions	5.6	0.9	18.8*
Percent of HHs practicing essential nutrition actions	18.4	18.1	19.0
Percent of children exclusively breastfed to 6 months	68.2	69.4	65.6*
Percent of children less than age 2 meeting minimal standards for IYCF	28.5	26.3	33.3*
Objective 2: Adequate health conditions for biological utilisation of nutrients			
Percent of children less than age 2 who had diarrhoea in the preceding 2 weeks.	34.5	36.0	31.4*
Intermediate Result 3: Improved delivery of effective, sustainable health and nutrition services			
Number of new family planning users	50.8	49.5	53.7*
Percent of children with diarrhoea in the preceding 2 weeks who received treatment from a health facility or provider	64.9	68.2	56.5*
Intermediate Result 4: Healthier cleaner environment			
Number of people with access to basic drinking water (% of households))	37.5	27.2	60.1*
Percent of HHs in target areas practicing correct use of recommended household water treatment technologies	9.5	8.4	18.5*
^^Percent of HHs practicing correct water storage of the treated water	96.9	96.5	98.7
^^Percent of children exposed to environmental animal waste in play areas	48.8	63.8	17.0*
Percent of HHs with soap and water at a handwashing station commonly used by family members	14.6	7.9	29.0*
Percent of HHs water with access to basic sanitation services	20.4	11.4	40.3*

Indicator and Results	Overall %	Rural %	Urban %
Number of HHs with clean latrines, including covers	13.7	14.0	13.0

* = Significant P value (P<0.001)
^^ = New indicator proposed by the TWG

In summary, the baseline survey results show that child stunting is significantly associated with maternal and household factors. Therefore, child stunting interventions should take a holistic approach and address household conditions that affect both the mother's and child's nutritional status. Meeting IYCF recommendations for age-appropriate feeding, improving household food security, and improving access to basic water and sanitation, play a critical role in reducing stunting and child undernutrition.

The results also show differences between rural and urban areas, with children in rural areas at a disadvantage regarding stunting and a host of other indicators. Further, there are significant differences in stunting levels among districts. Therefore, it will be necessary to develop contextualised district-specific plans which consider district-specific risk factors.

1 INTRODUCTION

1.1 Background

Malnutrition among women of childbearing age and children under five years of age is a significant public health problem worldwide. According to global estimates, in 2012, 165 million children under five years of age (26%) were stunted; 101 million children less than five years of age (16%) were underweight, and 52 million children under five years of age (8%), were wasted. Though these figures are a significant improvement from 1990 estimates, the numbers are still too high. More than 90% of the world's stunted children live in Africa and Asia. The high prevalence of stunting among children under five years of age in Africa (36% in 2011) and Asia (27% in 2011) remains a public health problem, one which often goes unrecognized[2]. In Africa, the highest stunting rates are in southern Africa.

Box 1. GRZ line Ministries involved in the SUN MCDP Programme

1. Ministry of Health
2. Ministry of Agriculture
3. Ministry of Fisheries and Livestock
4. Ministry of General Education
5. Ministry of Local Government
6. Ministry of Community Development and Social Services
7. Ministry of Water Development, Sanitation, and Environmental Protection

Zambia has a persistently high proportion of undernourished children despite improvements over the last five years[3] in key nutrition indices (stunting, wasting, and underweight). In children under 5 years of age, stunting decreased from 40% to 35%, wasting from 6% to 4%, and underweight from 15% to 12%, from 2013 to 2018.

Evidence shows that stunting has serious negative consequences on both the individual and the broader population. Early childhood stunting is associated with an increased risk of short-term morbidity and mortality, non-communicable

[2] United Nations Children's Fund, World Health Organization, and the World Bank. UNICEF-WHO-World Bank Joint Child Malnutrition Estimates. (UNICEF, New York; WHO, Geneva; the World Bank, Washington, DC; 2012).

[3] Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia], and ICF International. 2018. Zambia Demographic and Health Survey. Rockville, Maryland, USA: Central Statistical Office, Ministry of Health, and ICF International

diseases later in life, and reduced learning capacity and productivity[4]. Stunting can begin in utero and continue through the first two years of life, with rates peaking between 18-24 months of age.

Recognizing the importance of better nutrition in human and national development, the GRZ SUN 2.0 programme, through seven different ministries (Box 1), has implemented the First 1000 Most critical Days programme (MCDP) since 2013[5] with the goal of reducing undernutrition among children less than two years old. MCDP focuses on delivering a range of nutrition interventions (Box 2) through the various line ministries.

The first phase of the MCDP, implemented in 15 districts¸ came to an end in 2017. The second phase, MCDP II (SUN 2.0), started in 2018 and targeted an additional 15 districts for implementation, for a total of 30 districts (Figure 2). MCDP II (SUN 2.0) seeks to reduce stunting by 14 percentage points over 7 years (2% reduction a year).

Box 2. GRZ Nutrition-Specific Interventions

Interventions to the Mother

- Iron supplementation for pregnant women
- Folic acid supplementation for pregnant women
- Social behavioural change communication (SBCC):
  - exclusive breastfeeding,
  - diet during pregnancy,
  - diet during breastfeeding,,
  - complementary feeding,
  - feeding the sick child

Interventions to the Child (6-23 months)

- Child deworming every 6 months
- Vitamin A every 6 months
- Growth monitoring every 4 weeks

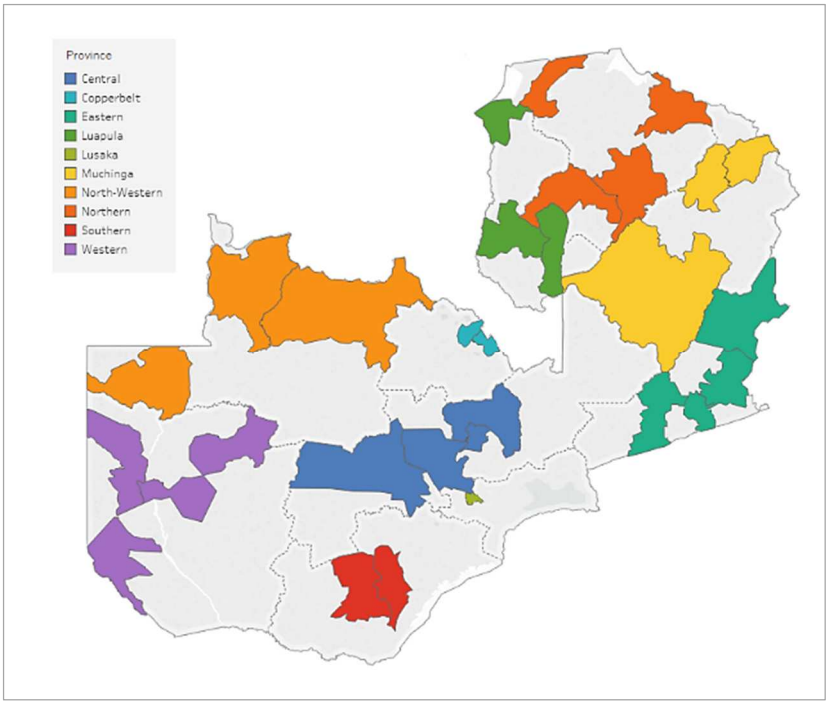
Nutrition-sensitive interventions to promote

- Water and sanitation hygiene
- Food production, processing storage and utilization of diverse diets among women and children
- Women empowerment

[4] Black, R.E. et al. 2013. Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries. The Lancet. Vol. 382, pp. 427-451.

[5] The First 1000 Most Critical Days Programme (MCDP) II. "Zambia's Five Year Flagship Stunting Reduction Programme". 2018-2022. DRAFT. http://www.nfnc.org.zm/download/file/fid/536

Figure 2. 30 districts for MCDP II (SUN 2.0)



1.2 Baseline Survey Objectives

In order to assess impact at different implementation levels, the USAID-funded SUN LE project is mandated to provide a situation analysis of the current context in SUN's 30 targeted districts. Therefore, the project conducted a baseline survey between June and July 2019 to assess the current state of 26 of the 33 key SUN indicators[6] on which the SUN 2.0 programme will focus in the 30 districts. Other indicators will require special studies as they could not be collected using the baseline survey design.

Specifically, the baseline survey aimed to:

- Set benchmarks for 26 of 33 SUN 2.0 indicators, to monitor programme implementation, the achievement of programme outputs and outcomes, and decision making.
- Identify factors associated with stunting in children less than 2 years of age.
- Establish the current status of SUN 2.0 programme implementation, especially around stunting among children less than 2 years of age and underlying factors.

[6] Annex 1 presents the indicators targeted by the baseline survey. Annex 5 presents the analytical approach used to calculate the indicators, including indicator definitions.

2 METHODS

The baseline survey design comprised of two parts: a household survey to establish baseline values for the 25 indicators and Key Informant Interviews (KIIs) with SUN managers and partners at provincial and district levels to obtain their perspectives around SUN 2.0 programme implementation.

2.1 Sampling

2.1.1 Cross-sectional Household Survey

A sample of 7,500 households (250 households in each of the 30 districts) with children less than 2 years was determined to have sufficient power to detect a 14% reduction in stunting from baseline to end line, over 7 years (or 2% per year), which is the goal of the SUN programme in Zambia.

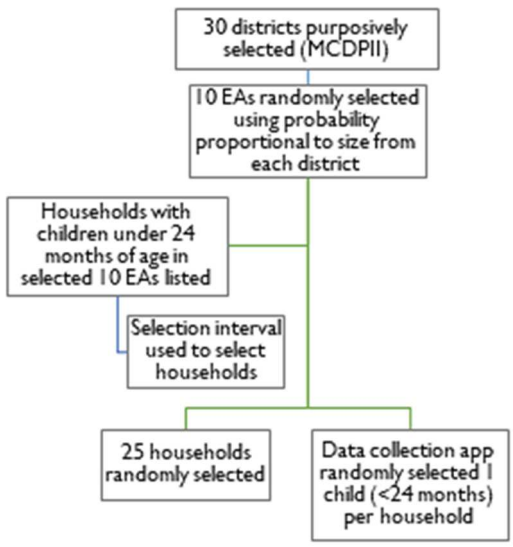
The household survey followed a two-stage sampling design (Figure 3):

First, the 30 SUN 2.0 districts were purposively selected as defined in the First 1000 MCDP document programme[5] (see map in Figure 2). In each of the 30 districts, 10 enumeration areas (EAs) were randomly selected using probability proportional to size sampling from a list of EAs obtained from the 2010 Census of Population and Housing Sampling Frame (Annex 2).

Second, a list was made of all households with children less than 2 years for each EA. From this listing, a random sample of 25 households was drawn. Five (5) additional households were also randomly selected, per EA, as potential replacements for instances of non-response. In cases in which a selected EA had fewer than 25 eligible households, or when the sample could not be met due to non-availability of residents, an adjacent EA was randomly selected, and all households in that EA were listed. Household lists from both EAs were combined, and a sample of 25 households was randomly selected from the new list.

In each sampled household, the biological mother or primary caregiver of the child was interviewed, and anthropometric measurements (height/length and weight) of the child and biological mother were

Figure 3. Household Sampling Procedure



taken. If a household had more than one eligible child, the data collection system randomly selected one child.

2.1.2 Key Informant Interviews (KIIs)

2.1.2.1 *Selection of Provincial KII Respondents*

To select provincial-level key informants, the 10 provinces were grouped into 2 categories:

Category 1 provinces were not involved in SUN 1.0 but would be part of SUN 2.0 (i.e., three provinces: Lusaka, Copperbelt, and Southern). One province was selected from this category.

Category 2 provinces were involved in SUN 1.0 and would also be part of SUN 2.0 (i.e., seven provinces: Northern, North-Western, Eastern, Central, Muchinga, Luapula, and Western). Two provinces were randomly selected from this category.

In each sampled province, one representative was selected from each relevant SUN 2.0 line ministry (Box 1). The exception was the Ministry of Health, from which two officers – the Provincial Nutrition Officer and the Maternal and Child Health Officer – were selected. One representative from a nongovernmental organisation (NGO) with the lengthiest involvement in the province's SUN programme, or the highest coverage, was also selected.

2.1.2.2 *Selection of District KII Respondents*

For district-level key informants, the 30 SUN 2.0 target districts were grouped into two categories:

Category A districts included all districts that would be involved in SUN 2.0 but had not been part of SUN 1.0 (n=15).

Category B districts included all districts that would be involved in SUN 2.0 and were also part of SUN 1.0 (n=15).

Three districts were randomly selected from each category for a total of six districts (Category A: Choma, Chibombo, and Kitwe; Category B: Lundazi, Kaputa, and Kasama). In each sampled district, the SUN focal point officers from the seven-line ministries were selected, as well as one NGO official from among those involved in the district's SUN programme. Due to competing tasks and the non-availability of the targeted officers, only 51 of the targeted 66 key informants were interviewed.

2.2 Ethical Approval

The baseline survey protocol was submitted to the University of Zambia Biomedical

Research Ethics Committee for ethical approval, which was granted on 2 April 2019.

2.3 Field Work

2.3.1 Recruiting and Training the Survey Team

Interviewers and supervisors were recruited in four stages: (1) soliciting, reviewing, and shortlisting applications; (2) administering an aptitude test to shortlisted candidates; (3) selecting candidates to participate in the training, and (4) selecting interviewers and supervisors based on performance during training and field practice. A total of 90 individuals were selected to participate in data collection, and 20 were assigned as reserves.

Furthermore, 15 quality controllers (QCs), with prior experience as a survey supervisor or QC, were recruited from the Ministries of Health, Agriculture, and Fisheries and Livestock, as well as from the National Food and Nutrition Commission of Zambia (NFNC), Zambia Statistics Agency (ZAMSTAT), and IAPRI. The QCs were trained for five days (29 April–4 May 2019) in Lusaka.

Interviewers and supervisors were trained simultaneously in two locations: in Kasama for participants from the northern group, and in Kabwe for participants from the southern group. SUN LE staff led the training with the assistance of QCs. Two field practice runs in local languages were conducted in each region to familiarise data collectors and supervisors with the data collection tools, identify potential challenges, and inform further improvements in the survey instruments.

2.3.2 Data Collection and Capturing

Household survey data were electronically collected using a structured questionnaire (Annex 6) programmed in Survey Solutions software in English and seven local language translations (Lunda, Luvale, Bemba, Chinyanja, Chitonga, Silozi, and Kaonde).

As described earlier, in preparation for data collection in a selected EA, all households with children less than 2 years old were listed. Thirty (30) households (25 per EA as well as 5 replacement households) were then selected using a determined sampling interval (derived by dividing the 30 into the EA's total number of listed households). Interviewers were then assigned households to interview for each day.

KII data were collected using a semi-structured questionnaire and electronically captured using JotForm (Annex 7).

Fieldwork took place from 22 May to 14 July 2019. Fifteen (15) data collection teams were deployed, with each team comprising one supervisor, one quality controller, and five interviewers. The 15 teams were divided into 2 groups: the northern group (7 teams), covering 14 districts, and the southern group (8 teams), covering 16 districts.

2.3.3 Oversight and Data Quality Control

During fieldwork, the SUN LE team and the QCs were responsible for data quality checks. The SUN LE Survey Manager supervised the seven teams in the northern group, and the Senior Researcher oversaw the eight teams in the southern group. Two QCs were assigned to provide data quality checks to two data collection teams. The data collection system was programed with data validation checks that flagged potential data issues, including missing or inconsistent data.

Measuring a mother's height during data collection

A three-tier quality control process was applied to ensure quality data collection. At the first stage, the supervisor checked the data collectors' questionnaires and flagged any suspected errors in the data. These were sent back to interviewers for correction, including callbacks if necessary. In the next stage, the QCs checked the data and sent questionnaires with issues back to the supervisors, who then sought further clarification from the data collectors. In

the last stage, the Survey Manager and Senior Researcher conducted final data quality checks before uploading the data to the server.

2.3.4 Data Cleaning

Data were cleaned in SPSS using frequencies and scatter plots to identify extreme or unexpected values. These were verified by calling interviewers and QCs and, where necessary, households. World Health Organization (WHO) anthropometric standards were used to further flag anthropometric data. Variables such as weight, height, and age of the child were checked against standard ranges, and flagged cases were checked, verified, and, where possible, corrected.

2.4 Data Analysis

A data analysis plan was developed, which included, wherever available, standard definitions of indicators. The plan was further reviewed and validated by a small team of the M&ER TWG members.

Household data were analysed using Stata v15, Microsoft Excel, and Tableau v2019.3. The analysis mainly involved establishing descriptive values (percentages, mean, median, and standard deviations [SD]) for the indicators, disaggregated by district, region, and sex, where applicable. Z-scores for anthropometric data were generated using WHO anthropometric standards and merged with household data in Stata. Regression models were used to explore the relationship between stunting and selected demographic and socioeconomic variables.

KIIs produced quantitative and qualitative data. Descriptive statistics were performed in SAS 9.4. Categorical data were summarized as frequencies and percentages. Ordinal response data, analysed using the Wilcoxon-Mann Whitney test, measured the degree to which respondents agreed or disagreed with certain statements and relationships with the SUN programme phase. Open-ended questions were manually analysed as qualitative "text" using qualitative analysis procedures based on the constant comparative method principles[7]. Initially, the response text was reviewed and coded independently by four analysts. The codes were then compared to ensure coding consistency and validity of coding decisions. Once the agreement level was deemed satisfactory, the remaining questions were coded by one analyst and discussed by the team during regular peer debriefings. For each question, responses were analysed by SUN phase, district, sector, province, and gender.

[7] Strauss AL, Corbin JM. Basics of qualitative research. Thousand Oaks, CA: Sage; 1990

2.5 Survey Limitations and Challenges

As with all cross-sectional surveys, where outcome and exposure are measured concurrently, it is not possible to confidently infer whether the outcome or the exposure came first. Therefore, assumed causation should always be confirmed by more rigorous studies. Cross-sectional surveys are also susceptible to respondent recall and interviewer/social acceptability biases. Risk mitigation measures included in-depth training of the fieldwork team and implementation of various layers of quality controls as described above.

This survey also faced a few challenges that could have impacted the results. First, because the maps used were old (2010 census), the profiles of some EAs had changed in the intervening years. For instance, some EAs had changed from residential areas to commercial ones, making it difficult to obtain the required sample of 25 households with children less than 2 years old per EA. Second, some households, especially in urban areas, could not be accessed due to refusal by household owners or adult household members' absence during the survey. In cases where the selected EA had few eligible households (<25), the fieldwork teams were assigned a randomly selected EA from the surrounding EAs to complete the required sample size, as described in Section 2.1.1.

3 MAIN FINDINGS

The following discussion presents the main findings for both the household survey and the KIIs. Detailed data for the 26 household survey indicators listed in the Executive Summary are presented in Annex 3.

3.1 Sample Description

3.1.1 HOUSEHOLD

In total, 11,498 eligible households were listed across the 30 districts, from which 7,500 were randomly selected and interviewed. Seventy-six (76) households were replaced to counteract 28 refusals and 48 non-contacts and maintain the original target of 7500 interviewed households. However, in one district, an additional interview was inadvertently carried out, resulting in 7501 households interviewed.

During analysis, 15 household interviews were excluded from the dataset because the children were older than 2 years. Thus, the baseline report reflects 7,486 household interviews.

Of these 7,486 households:

- 31.6% (2,373) were in urban areas while 68.4% (5,113) were in rural areas
- 81.5% were male-headed while 18.5% were female-headed
- 7,177 were biological mother-child pairs, and 309 were other primary caregiver-child pairs.
- The mean age of the household head was 38.9 years, with the youngest being 15 and the oldest 101 years old
- The average household size was 6.1, with 23.1% of the total household population being children under five years old.
- The household heads' main economic activity was farming (49.9%), but 4.4% of all household heads were not involved in any economic activity – more commonly seen among female-headed (11%) compared to male-headed households (2.9%).

Annex 3, Tables 1-3 provide details of the household sample by district.

3.1.2 Key Informant Interviews

Of the targeted 66 key informants, a total of 51 were interviewed. Thirty-one (31) respondents were from the district level, while 20 were from the provincial level. There were nearly equal numbers of male (26) and female (25) respondents interviewed. Annex 4, Tables 42 and 43 provide a breakdown of KII respondents' location and sector.

3.2 Maternal and Child Nutrition Status

3.2.1 Nutritional Status of Children less than two years

Anthropometric measurements (height/ length and weight) for children were taken to determine the nutrition status of children. The analysis was based on the 2006 WHO Multicentre Growth Reference Study, which compares measurements of children in the survey to the reference population of well-nourished children. In line with these standards, three nutritional status indices were calculated based on the standard deviations from the median: stunting, wasting, and underweight.

- ***Stunting (Height/Length for age)***: Stunting, measured as height/length-for-age, is an important indicator that shows the failure to receive adequate nutrition over a long period and frequent and chronic illness. It also indicates the long-term effects of undernutrition in a population.
- ***Wasting (Height/ length for weight)***: Wasting, measured as weight-for-height/length, characterises the failure to receive adequate nourishment

during a short period before the survey. Wasting may also indicate inadequate food intake or a recent episode of illness, such as diarrhoea, that causes weight loss and the onset of malnutrition.

- *Underweight (Weight for age)*: Underweight measured as weight-for-age, is a composite of both stunting and wasting, and is a measure of chronic and acute malnutrition.

Figure 5. Percentage of children less than 2 years of age stunted, underweight, or wasted (<2 SD) by age in months

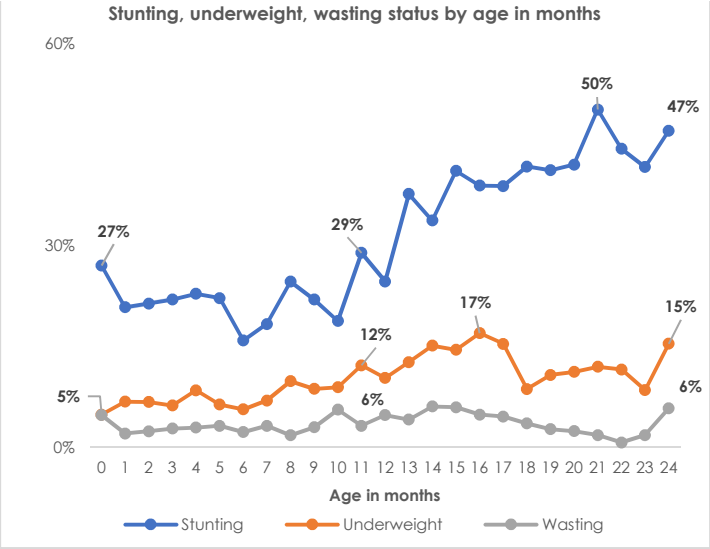
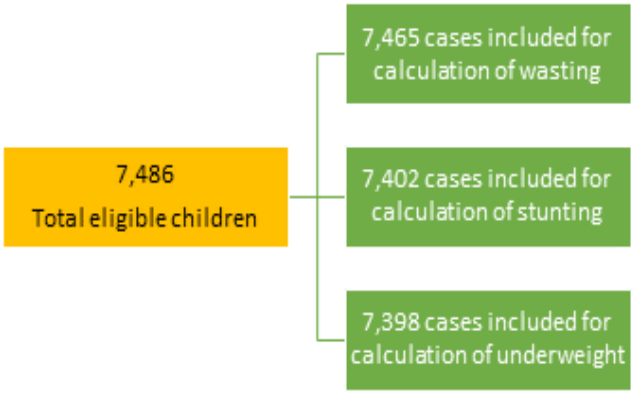


Figure 4 summarises the sample for calculating stunting, underweight, and wasting. Some cases were excluded from the calculations due to missing values in the anthropometric data.



For each of the three nutritional status indices, children were classified as normal, undernourished (<-2 SD), or severely undernourished (<-3 SD) based on the WHO growth standard classifications. Figure 5 presents the prevalence of stunting, underweight, and wasting by a child's age in months.

Stunting: Overall, 30.2% of children less than 2 years of age were stunted (<-2 SD), of which 9.9% were severely stunted (<-3SD). The observed stunting trends mirror the 2018 Zambia Demographic and Health Survey (ZDHS) that confirmed that about 32% of children less than 2 years of age were stunted[8].

Prevalence of stunting was highest among children 21 months of age (50%) and

[8] Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia], and ICF International. 2018. Zambia Demographic and Health Survey. Rockville, Maryland, USA: Central Statistical Office, Ministry of Health, and ICF International

lowest among children 6 months of age (16%) (Figure 5). High levels of stunting (27%) were observed in children less than one month of age, suggesting that stunting can begin in utero due to possible effects of poor maternal nutrition in the early life of the child[9] [10] [11] [12]. There was no difference between the mean birth weight for stunted children (2.7 kg) and non-stunted children (2.8 kg).

Underweight: Overall, 9.8% of children less than 2 years of age were underweight (<-2 SD), of which 23% were severely underweight (<-3 SD). Underweight increases with age (Figure 5) – from approximately 5% in children less than 1 month of age to 12% in children 11 months of age, peaking at 17% in children 16 months of age.

Wasting: Overall, 3.4% of children were wasted. Wasting was highest among children, 14-15, and 24 months of age (6% in both groups) (Figure 5). Approximately 0.1% of the children had oedema.

Gender Differences: Significant variations in child undernutrition were observed between boys and girls and among districts. More boys than girls were stunted (34.5% and 25.7%, respectively) and underweight (11.1% and 8.5%, respectively) (P<0.001).

Geographic Location Differences: Significantly higher stunting rates were observed among children in rural areas (32.7%) compared to children in urban areas (24.8%) (P<0.001) (Figure 6). However, high levels of stunting were also observed even in highly urbanized districts such as Kabwe (34.3%) and Kitwe (28.9%), and low rates were observed in some rural districts, such as Mongu (17.8%) and Zambezi (19.2%). The highest stunting rates were in Nchelenge (43.1%) and Samfya (43%), and the lowest in Ndola (15%), Mongu (17.8%), and Zambezi (19.2%).

Underweight was highest in districts in Northern Province, particularly Kaputa (17.2%). The lowest prevalence of underweight was observed in Ndola (5.2%), Chipata (6.1%), and Zambezi (6.9%). Wasting in highly urbanized Lusaka (4.8%) was comparable with rates in Shangombo (4.9%).

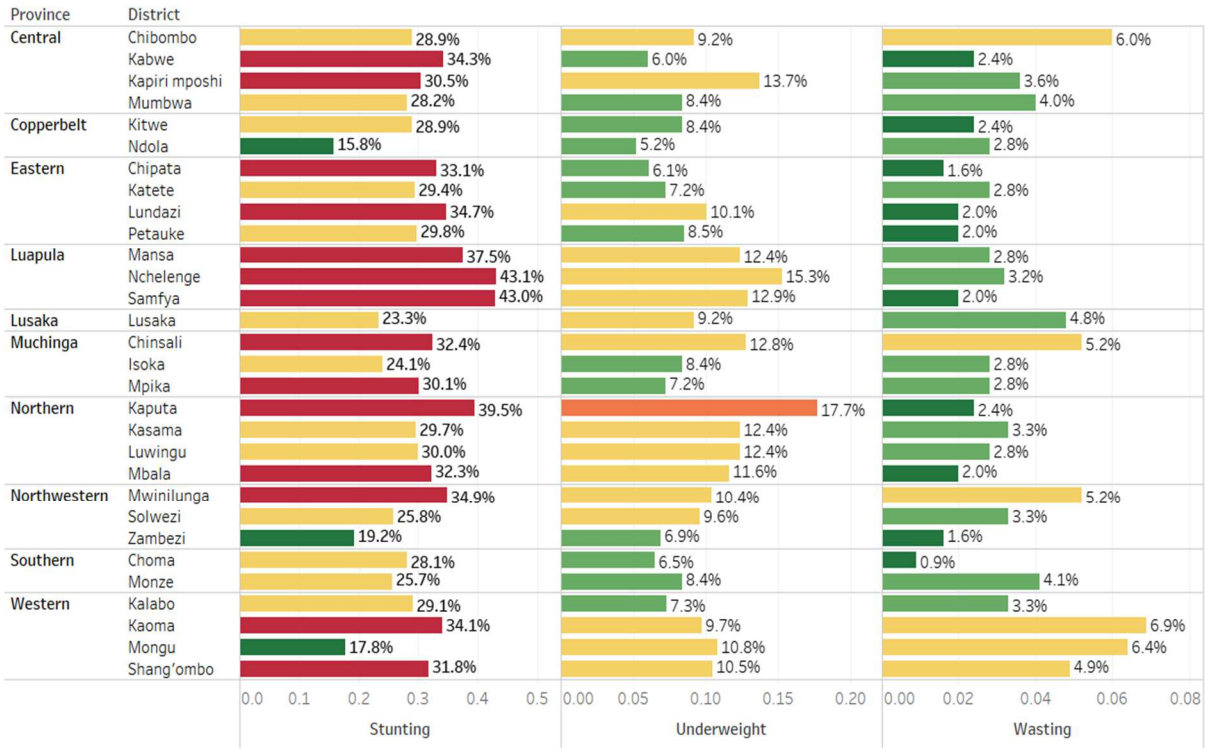
[9] Venkatachalam PS. Maternal nutritional status and its effect on the newborn. Bull World Health Organ. 1962;26(2):193-201.

[10] Dewey K.G. & Huffman S.L. (2009). Maternal, infant, and young child nutrition: combining efforts to maximize impacts on child growth and micronutrient status. Food and Nutrition Bulletin 30, S187-S189.

[11] Prendergast, A. J., & J H Humphrey. (2014). The stunting syndrome in developing countries. Paediatrics and international child health, 34(4), 250-265.

[12] De Onis, M., & Branca, F. (2016). Childhood stunting: a global perspective. Maternal & child nutrition, 12 (Suppl 1), 12-26. doi:10.1111/mcn.12231.

Figure 6. Percent of children stunted, underweight and wasted by district



Generally, Ndola and Zambezi districts had comparatively lower child undernutrition.

3.2.2 Factors Associated with Child Stunting

The survey results were further analysed to determine the association between stunting and the following factors:

- child-related factors – sex, age, exclusive breastfeeding status, infant and young child feeding (IYCF) status, diarrhoea
- maternal factors – age, body mass index [BMI], education level, marital status, dietary diversity, access to community nutrition interventions (Box 2); and
- household economic factors – household hunger, household size

After adjusting for background characteristics, the data showed statistically significant associations between stunting and child's age, child's sex, child's birth weight, mother's age, mother's education level, mother's BMI, mother's dietary diversity, and household hunger.

3.2.2.1 *Child-Related Factors*

Child's age: The risk of stunting increases with the child's age. With every one month increase in age, the odds of stunting increases by 0.013 ($P<0.001$). Children

18-24 months of age were nearly three times as likely to be stunted as children 0-5 months of age (OR =2.92, P<0.001).

Child's sex: Boys were nearly twice as likely to be stunted as girls (OR = 1.93 P<0.001). This observation could be a result of multiple factors. For example, baseline findings showed that more girls (70.4%) are exclusively breastfed than boys (65.8%), an indication that boys may be sub-optimally fed from birth, putting them at higher risk of undernutrition.

The baseline findings point to additional factors that may explain the increased risk of stunting by age. A low percentage of children 6-23 months of age (19.5%) received a minimally acceptable diet, defined as having achieved minimum dietary diversity and minimum meal frequency in the day preceding the survey (see section 3.4.1.5 for further discussion). Only 33.8% met the recommended dietary diversity, and 44.5% met the minimum meal frequency. Stunting risk may also be due to higher incidences of diarrhoea in these age groups as 31.2% of children 12-17 months of age had diarrhoea in the previous 2 weeks, compared to only 12.3% of children 0-5 months of age.

3.2.2.2 *Maternal Factors*

Mother's age: Children of younger mothers (15-19 years of age) were 1.3 times more likely to be stunted than children of older mothers 35-39 years of age (OR = 1.25, P=0.026). Compared to older mothers, adolescents may not have adequate experience in childcare.

Mother's education level: Children of mothers with secondary or tertiary education were significantly less likely to be stunted (OR=0.7, P<0.001) compared to children whose mothers have no formal education (OR=0.4, P<0.001). Educated mothers were more likely to understand and apply Infant and young child feeding recommendations than mothers with no formal education. The data also show that educated mothers were more likely to be in salaried employment that may allow them to access adequate foods for their children. The evidence indicates that illiterate mothers are less likely to practice recommended feeding practices[13].

Mother's BMI: children of mothers with a higher BMI (≥18.5) were significantly less likely to be stunted, compared to those whose mothers had a low BMI (<18.5) (OR =0.97, P=0.001)). This could be because mothers with higher BMI are likely to be

[13] Ickes, S. B., Hurst, T. E., & Flax, V. L. (2015). Maternal literacy, facility birth, and education are positively associated with better infant and young child feeding practices and nutritional status among Ugandan children. The Journal of nutrition, 145(11), 2578-2586.

better off economically since the economic empowerment of women is positively associated with an increased child diet diversity[14] [15] [16].

Mother's dietary diversity: Children whose mothers did not meet the minimum dietary diversity (i.e., consumed fewer than five food groups) in the 24 hours preceding the survey were more likely to be stunted than those whose mothers ate food from five or more food groups (OR= 1.04, P=0.042). Because data in this study show that 90% of children were being fed by their mothers, it can be assumed that mothers feed the same foods they eat to their child, thereby increasing or decreasing the food diversity of the child accordingly.

3.2.2.3 *Household Characteristics*

Economic status of the household head: Children from households where the household head was in formal employment were less likely to be stunted, compared to children from households where the household head was unemployed (OR= 0.74, P=0.014). Households with employed household heads are likely to have more income to support child feeding, among other household needs.

Household hunger: Children from households that reported experiencing hunger in the month preceding the survey[17] were more likely to be stunted compared to households that did not report hunger. Children in households that reported severe hunger (OR=1.25, P=0.014) and moderate hunger (OR=1.28, P=0.006) were significantly more likely to be stunted.

Moreover, significantly fewer children were stunted in households that reported stronger resilience[18] (28.7%) compared to households that did not (34.2%) (P<0.001). This means that stunting was more prominent in households that reported hunger and less so in households that coped better with hunger during lean seasons.

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[14] Komakech, J., Walters, C., Rakotomanana, H., Hildebrand, D., & Stoecker, B. (2019). Women's Empowerment Measures and Their Association with Child Dietary Diversity and Child Nutritional Status: Findings from DHS Form Eight East African Countries (P10-007-19). Current Developments in Nutrition, 3(Suppl 1), nzz034.P10-007-19. doi:10.1093/cdn/nzz034.P10-007-19

[15] Sakala P & Curry P, 2017. Associations between women empowerment dimensions and child diet diversity among children less than 24 months old in Zambia, Lusaka, NFNC, Zambia.

[16] Yimer, Feiruz & Tadesse, Fanaye, 2016. "Synopsis: Women's empowerment in agriculture and dietary diversity in Ethiopia," ESSP research notes 55, International Food Policy Research Institute (IFPRI).

[17] See section 3.4.3.3 for further discussion on the calculation of household hunger

[18] Refer to section 3.4.3.4 for a definition of resilience.

3.3 Nutritional Status of Mothers

3.3.1 Low BMI

Mother's Body Mass Index (BMI) was assessed using height and weight measurements to classify them as underweight, normal, overweight, and obese. Women with a BMI of less than 18.5 were classified as underweight or low BMI.

Overall, 7.2% of all women were underweight, with women in rural areas more likely to be underweight (8.0%) than those in urban areas (5.5%), and younger women (15-19 years of age) more likely to be underweight (9.5%) than older women (35-39 years of age) (8.1%).

The highest proportions of underweight women were found in Kalabo (20.5%) and Kaoma (15.0%) districts, and the lowest in Solwezi and Kitwe (both 3.0%) (Figure 7).

3.3.2 Factors Associated with Low BMI

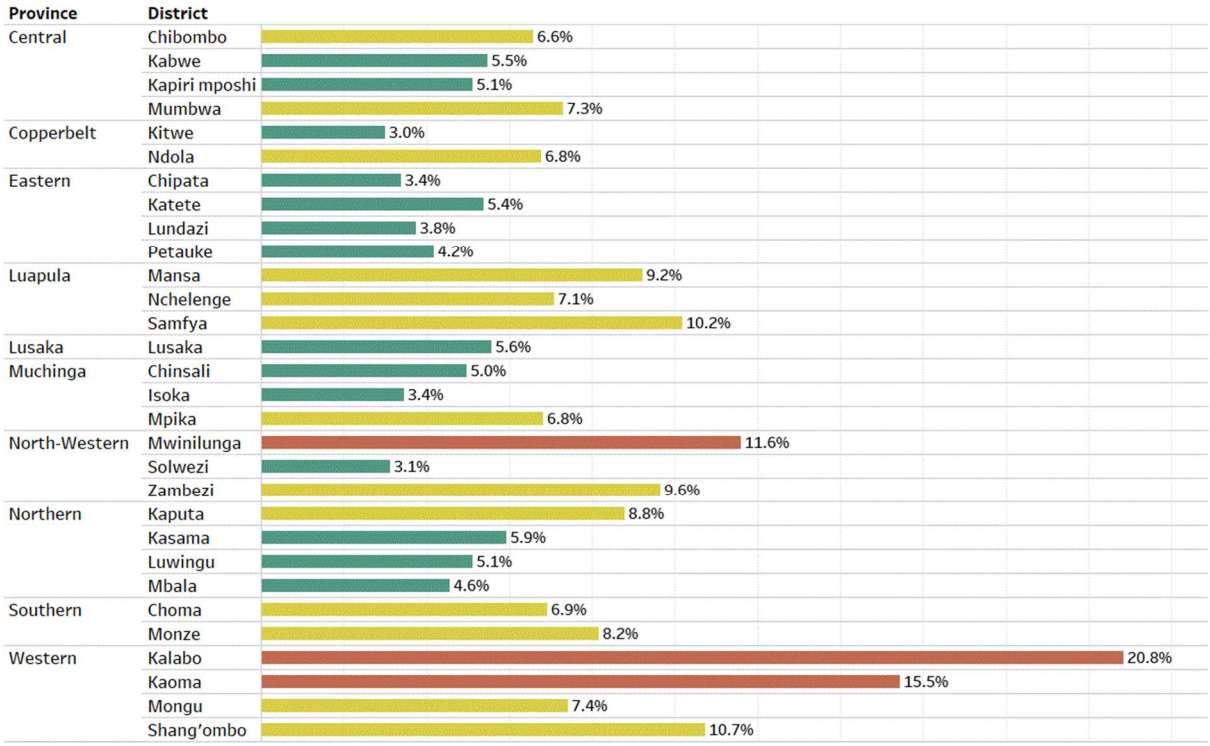
3.3.2.1 *Mother's Education Level*

Findings show a positive association between BMI and level of education. Significantly more mothers who never went to school were underweight (9.4%) than women who attained a higher education (2.9%) ($P<0.001$).

3.3.2.2 *Mother's Marital Status*

The marital status of the mother is associated with her BMI. There were more underweight women among those who were cohabiting (living together, but unmarried) (28.6%), compared to those who were in monogamous marriages (6.0%) ($P<0.001$).

Figure 7. Percent of mothers with Low BMI



3.3.2.3 *Mother's Economic Status*

Low BMI was significantly more prevalent among women who had no employment (7.7%), compared to those in formal employment (4.3%) (P=0.003). This means that unemployment is a risk factor for underweight among women.

3.3.2.4 *Women's Dietary Diversity*

Women's dietary diversity was significantly associated with BMI. More women who ate fewer than five food groups were underweight (59.3%), compared to women who ate the recommended five and above food groups (40.7%) (P<0.001). This means that underweight mothers with low dietary diversity obtained fewer nutrients from their diets.

3.3.2.5 *Sex of the Household Head*

A difference was observed between BMI and sex of the household head. Significantly more underweight women (10%) were found in female-headed households compared to male-headed households (6.6%), suggesting that women in male-headed households are less likely to be underweight, probably because there is more economic contribution in the male-headed household.

3.3.2.6 *Household Hunger and Resilience*

There was a strong relationship between a mother's BMI and household hunger. Significantly more underweight women (10.9%) lived in households that reported hunger, compared to households that did not (6.0%) (P<0.001).

Furthermore, households with low resilience during lean seasons had higher proportions of underweight women (8.6%), compared to households that had higher resilience scores (6.5%) (P<0.001). This implies that a woman's diet is negatively affected by household hunger but protected by stronger household resilience.

3.3.2.7 *Summary of Risk Factors for Low BMI in Women*

Predictors of a mother's BMI include dietary diversity, sex of the household head, and reported household hunger. Each unit increase in women's dietary diversity was associated with a 0.25 unit increase in BMI. An increase in mother's age was associated with a 0.09 unit increase in BMI, and everyone unit increase in reported household hunger resulted in a 0.61 unit decrease in mother's BMI.

3.4 Dietary Intake and Access to Safe Food

3.4.1 Children

Infant and young child feeding practices directly affect the nutritional status, development, and health of children less than 2 years of age and, ultimately, impact their survival. WHO recommends that children receive optimal nutrition from birth to at least 24 months of age and has developed a set of 8 core population-level recommendations for appropriate feeding practices in children aged 0-23. These are generally called Infant and Young Child Feeding practices (IYCF) and include:

1. Early initiation of breastfeeding;
2. Exclusive breastfeeding until 6 months;
3. Continued breastfeeding until 1 year;
4. Introduction of solid, semi-solid, or soft foods at 6 months;
5. Minimum dietary diversity;
6. Minimum meal frequency;
7. Minimum acceptable diet, and
8. Consumption of iron-rich or iron-fortified foods.

Children are expected to obtain optimal nutrition if they are fed age-appropriate recommendations. The survey assessed the status of each of these practices and the following presents the findings.

3.4.1.1 *Initiation of breastfeeding at birth*

Early initiation of breastfeeding is vital to the health of both the mother and the child. Early initiation of breastfeeding stimulates breast milk production. It also provides the new-born with colostrum (the first yellowish milk produced after the mother gives birth), known for its high nutrient and antibody content, and essential to protecting the baby. The new-born needs to be breastfed within the first hour of life to receive this protection.

Overall, 73.6% of children were initiated on breast milk within one hour of birth, with no significant differences between girls (74.0%) and boys (73.2%) (P=0.422). Significantly more children in rural areas (75.3%) were likely to be put to the breast within one hour of birth than children in urban areas (69.9%) (P<0.001). Data also show that most non-breastfed children (in rural and urban areas) were given infant formula (e.g., Lactogen).

3.4.1.2 *Exclusive Breastfeeding for Children less than 6 Months of Age*

Exclusive breastfeeding for the first 6 months of a child's life is one of the most effective measures for ensuring a child's health and survival[19]. As per WHO indicator definition, children were classified as exclusively breastfed if they were fed only breast milk, with no other solids or liquids in the 24 hours preceding the survey.

Overall, 68.2% of all children less than 6 months of age were exclusively breastfed in the previous 24 hours of the survey, with more girls exclusively breastfed (70.4%) than boys (65.8%). Breastfeeding decreased with increasing age: 89.4% of children less than one month were exclusively breastfed compared to 24.4% among children five months of age (Figure 8). Children in rural areas (69.4.4%) were significantly more likely to be exclusively breastfed than children in urban areas (65.6%) (P<0.001).

District disaggregation showed that the highest proportion of children exclusively breastfed was in Shangombo (60.3%) and Kalabo (53.8%), and the lowest in Mpika (40.3%), Nchelenge (45.2%), and Kaputa (50.0%) districts (Annex 3: Table 21).

Differences observed between boys and girls on the initiation of breastfeeding and exclusive breastfeeding suggest that boys miss out on optimal nutrition at an early age, and this may be contributing to higher stunting rates among boys.

[19] World Health Organization. (2005). Guiding principles for feeding non-breastfed children 6-24 months of age.

3.4.1.3 *Introduction of Complementary Feeding*

WHO recommends the introduction of solid and semi-solid foods to exclusively breastfed children at 6 months of age. This is important in promoting optimal nutrition because a lack of complementary foods after 6 months leads to undernutrition. The survey results indicate that 90% of exclusively breastfed children were introduced to complementary foods at the right age. Boys were significantly more likely to be fed complementary foods (92.1%) at the right age than girls (87.9%) (P=0.022). Significantly more children in urban areas (95.2%) were introduced to complementary foods at 6 months of age than children in rural areas (88.0%) (P<0.001).

3.4.1.4 *Continued Breastfeeding up to 1 and 2 Years of Age*

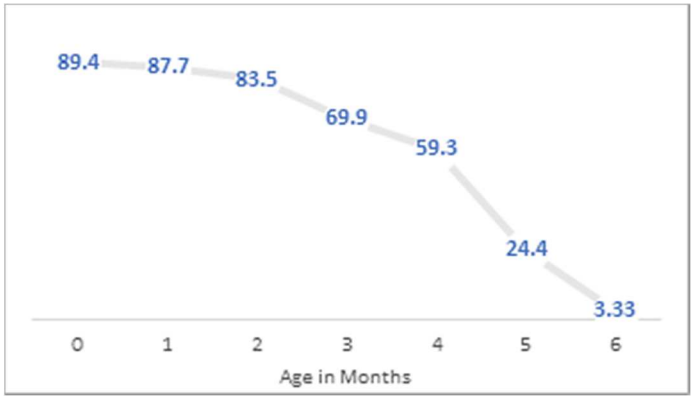
A high proportion of children were still being breastfed at 1 year (89.6%), but only 28.2% continued breastfeeding to 2 years. There was no significant difference in continued breastfeeding to 1 year between boys (90.1%) and girls (88.9%) (P=0.52). A similar observation was made for continued breastfeeding to 2 years (P=0.38). This suggests that continued breastfeeding up to 1 or 2 years is similar between boys and girls and indicates that most children were breastfed longer. Further, at the time of the survey, 80.6% of all children in the survey were being breastfed.

However, there are significant differences in continued breastfeeding between urban and rural areas. More children in rural areas were breastfed up to 1 year (93.6%) than in urban areas (80.5%) (P<0.001). Furthermore, significantly more children in rural areas (36.5%) were breastfed to 2 years, compared to children in urban areas (11.1%) (P<0.001). Data also indicate that continued breastfeeding was higher in districts where most households reported hunger, suggesting that breastfeeding was the only food for children in households experiencing hunger.

3.4.1.5 *Minimum Acceptable Diet for children 6-23 months of age*

Three indicators are used to determine whether children are fed the minimum acceptable diet: (i) dietary diversity (number of food groups consumed), (ii) feeding frequency (number of times the child is fed), and (iii) consumption of breast milk or other types of milk or milk products. Breastfed children over 6 months of age meet minimum

Figure 8. Percent of Exclusively breastfed children by age in months



standards if they consume food from at least 4 food groups at least twice a day (in the case of infants 6-8 months of age) and at least three times a day (in the case of children 9-23 months of age).

In line with this definition, only 33.8% of children met the minimum dietary diversity, although 44.5% of children met the minimum meal frequency for their age. The combined proportion of children who both received foods from four or more food groups and were given the minimum number of feeds for their age per day was only 19.1%, with no significant differences observed between boys (19.5%) and girls (18.7%) (P=0.42).

3.4.1.6 *Consumption of Iron-rich Foods*

Iron is essential for cognitive development among children 6-23 months of age. WHO recommends that children are fed iron-rich foods (e.g., organ meat, dark green leafy vegetables) after 6 months of age.

Overall, 68.2% of children received iron-rich foods in the 24 hours preceding the survey, with no significant differences between boys (67.5%) and girls (68.8%) (P=0.29). However, feeding of iron-rich foods differs significantly by region, with more children in rural areas (64.8%) fed iron-rich foods 24 hours prior to the survey, compared to children in urban areas (35.1%) (P<0.001). It is important to note that the baseline survey only inquired about whether or not the children consumed these foods and did not enquire about the quality or quantity of the iron-rich food consumed.

3.4.1.7 *Children Meeting Minimum IYCF standards*

According to WHO, a child meets the minimum IYCF standards if the child

- 0-6 months of age is exclusively breastfed;
- 6-8 months of age was breastfed and had at least two meals per day; or
- 9-23 months of age was breastfed and had at least three meals per day; or
- 6-23 months of age was not breastfeeding and had at least four meals per day; and
- 6-23 months of age consumed at least four or more foods from different groups.

Overall, only 28.5% of children less than 2 years of age met the minimum IYCF standards. No significant differences were observed between girls (29.3%) and boys (27.7%) (P=0.15).

No district reached 50% of children fed according to minimum IYCF standards, although more children in Kabwe (44%) and Mumbwa (41.6%) met minimum IYCF

standards compared to Kaputa (15.7%), Mpika (16.5%), and Shangombo (18.4%) (Annex 3: Table 22).

Closer examination shows that districts with lower exclusive breastfeeding rates, and a lower proportion of children fed according to the minimum IYCF standards, reported higher stunting rates.

3.4.2 MOTHERS

3.4.2.1 *Women's Consumption of Targeted Nutrient-rich Value Chain Commodities*

Targeted nutrient-rich value chain commodities include the following: bio-fortified foods; legumes; nuts; some seeds (such as sesame, sunflower, and pumpkin seeds), wheat germ, or sprouted legume seeds; an animal-source food, including dairy products (milk, yogurt, cheese); fish; eggs; organ meats, flesh foods, and other miscellaneous small animal protein (e.g., insects); dark yellow or orange-fleshed roots or tubers; and a fruit or vegetable that meets the threshold for being a "high source" of one or more micronutrients[20]

Overall, 34.5% of women consumed nutrient-rich value chain commodities (Annex 3: Table 12), but these rates are higher for women in urban areas (40.5%) than rural areas (31.6%) ($P<0.001$). The highest proportion of women's consumption of nutrient-rich value chain commodities was highest in Mbala district (53.6%), followed by Petauke (45.8%) and Lundazi (45%), while the lowest proportion was in Shangombo (4.8%).

Women from larger households (more than 10 members) were more likely to consume nutrient-rich value chain foods (40.7%) than those in smaller households (fewer than 10 members) (34.1%) ($P=0.035$).

Consumption of nutrient-rich value chain commodities did not vary by age group: 33.5% of women aged 15-19 years consumed nutrient-rich value chain commodities, compared to 33.5% of women aged 40-44 years ($P=0.342$).

3.4.2.2 *Factors Associated with Consumption of Nutrient-rich Value Chain Commodities among Women*

Consumption of nutrient-rich value chain foods among women is significantly associated with household production and consumption of nutritious crops and livestock. About 40% of women from households that produced nutritious crops also consumed nutrient-rich value chain commodities compared to women from

[20] https://www.usaid.gov/sites/default/files/documents/1864/nutrition-sensitive-agriculture-508.pdf

households that did not produce (P<0.001), suggesting that they were able to eat the nutritious foods produced. Likewise, more women in households that produced and sold nutritious crops (40.0%) consumed nutrient-rich value chain commodities than women in households that did not (24.5%) (P<0.001). This suggests that women in households that sell nutritious crops and livestock might have either been able to consume what was produced or have been able to purchase other nutrient-rich value chain commodities for consumption.

Significant associations were also found between women's consumption of nutrient-rich value chain commodities and the households' practice of essential nutrition actions (see section 3.3.2). More women who consumed nutrient-rich value chain commodities (21.0%) lived in households that practiced essential nutrition actions than households that did not (17.0%) (P<0.001). This suggests that household nutrition practices might have a positive influence on women's consumption of nutrient-rich value chains commodities.

There is also a significant relationship between women who consumed nutrient-rich value chain commodities and their nutritional status. Few underweight women consumed nutrient-rich value chain commodities (28.5%), compared to women with normal or higher BMI (71.5%) (P=0.004).

There is also a significant relationship between the consumption of nutrient-rich value chain commodities and household hunger. Very few women (18.2%) in households that reported hunger ate nutrient-rich value chain commodities, compared to those in households that did not report hunger (40.0%) (P<0.001). This implies that factors leading to household hunger also affect the availability of nutrient-rich value chain commodities in households, thereby the diet quality.

Finally, women who ate nutrient-rich value chain commodities had higher dietary diversity than those who did not. Ninety-four percent (94.8%) of women who ate foods from eight food groups consumed nutrient-rich value chain commodities, compared to 20.4% of women who ate foods from four food groups (P<0.001).

3.4.2.3 *Minimum Dietary Diversity for Women*

Minimum dietary diversity (consumption of 5 or more food groups in the preceding 24 hours) for women is a proxy for micronutrient adequacy among women of reproductive age. FAO notes that women of reproductive age who consume 5 or more food groups are more likely to eat at least one animal-source food and two or more fruit and vegetable food groups[21].

[21] FAO and FHI 360. 2016. Minimum Dietary Diversity for Women: A Guide for Measurement. Rome.

Overall, women in the sample reported consuming a mean of 4.6 food groups (urban 5.4, rural 4.3). Fifty-four percent (54.0%) of women consumed five or more food groups.

More women in urban (74.1%) than rural areas (44.6%) met minimum dietary diversity (P<0.001), implying that women in rural areas are at risk of micronutrient deficiencies because they eat less diversified diets.

Lusaka and Kitwe districts have the highest proportion of women meeting the minimum dietary diversity (both with 81.6%); with the lowest proportions found in Shangombo (5.2%), Kalabo (9.2%), and Kaoma (19.6%) districts – all in Western Province (Annex 3: Table 13).

3.4.2.4 *Factors Associated with Minimum Dietary Diversity for Women*

Women in households that reported hunger were less likely to meet minimum dietary diversity (47.8%) than women in households that did not report hunger (73.3%). The opposite is also true – in households that did not report hunger, fewer women (26.8%) ate less than five food groups, compared to women in households that reported hunger (52.3%) (P<0.001). This confirms that in households experiencing hunger, women consume a less-varied diet and are at greater risk of inadequate micronutrient intake.

Women in households with stronger resilience during lean periods and environmental shocks[18] were more likely to achieve minimum dietary diversity (consumed five or more food groups) (65.2%) than those living in households with lower resilience (39.8%). Similarly, in households with lower resilience, more women (60.2%) ate fewer than five food groups compared to women in households with stronger hunger resilience (34.8%) (P<0.001). This suggests that stronger resilience during lean periods is associated with a more diversified diet for women.

Household production of nutritious food (see discussion in section 3.4.3.1) is positively associated with women's dietary diversity. Among households that produced nutritious foods for consumption, 56.5% of women met their minimum dietary diversity, compared to 45.5% of women in households that did not produce food for consumption.

The above holds true even when households sell or barter the nutritious foods they produce – more women (54.8%) met minimum dietary diversity requirements than those living in households that did not sell or barter their nutritious foods (47.0%) (P<0.001).

This is in line with other findings in this study which found that 74.3% of the

households that produced nutritious crops sold less than 50% of their produce, meaning that most of the crops were retained or the produced nutritious foods were too low to allow for any selling or bartering.

Further analysis of women's dietary diversity with food processing/cooking (including preparation) showed that in households that practiced better food processing, more women (61.5%) met minimum dietary diversity (five or more food groups), compared to 34.8% of women in households that did not (P=0.04). The reverse is also true. In households that did not meet recommended food preparation, processing, and storage practices, more women (46.2%) ate fewer than five food groups, compared to women in households that followed the recommended procedures (38.5%).

These data suggest that household production of nutritious foods (whether for consumption only or also for sale/barter), as well as practicing good food processing enables women to eat a more varied diet.

3.4.3 HOUSEHOLDS

3.4.3.1 *Household Production of Safe/Nutritious Foods (Crops and Livestock) for Consumption*

Production of safe and nutritious crops was assessed in households, which were asked about their production and consumption of crops (such as dark green leafy vegetables, pumpkins, groundnuts, orange-fleshed sweet potatoes, squash, iron-rich beans, fruits, peas, lentils orange maize, and carrots) and livestock (chickens, rabbits, ducks' goats, pigs, cattle, and guinea fowls).

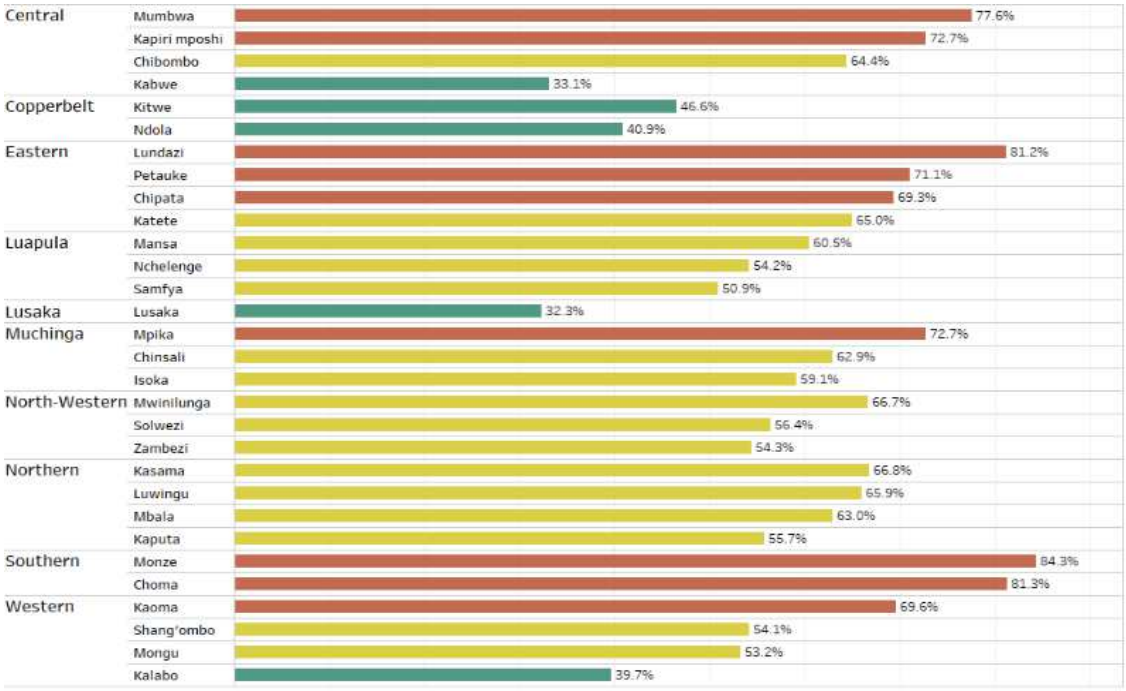
More than half (58.2%) of households produced safe and nutritious crops and livestock for consumption. A higher proportion of rural households (63.2%) produced and consumed nutritious foods, compared to urban households (39.8%). This is not surprising given that agricultural production is the main source of livelihood among rural households.

Eastern Province had the highest proportion of households (more than three-quarters) producing nutritious crops and livestock for consumption. Lundazi District had the highest proportion of households producing and consuming nutritious foods (89.3%). In contrast, Western Province had the least (less than 40%), aside from Kaoma District with 60.8%. This is consistent with climate variability and change in that part of the country, which has had an adverse effect on agricultural production. As expected, given its urban environment and access to markets for nutritious foods, making production less likely, Lusaka District had the lowest proportion of households producing food for consumption at 6.5%.

3.4.3.2 *Household Sale/Barter of Nutritious Crops that They Grew*

Of households that produced nutritious crops and livestock, 62.9% also sold or bartered these foods, and this was more prevalent in rural (67.8%) than urban (44.8%) households. The highest rates of selling/bartering were in districts of Southern Province (more than 80% of households) and Eastern Province (71.7% of households) (Figure 9). The results are not surprising as these two provinces are agricultural and have large markets. As expected, urban provinces (i.e., Copperbelt and Lusaka) had the lowest proportion (less than 50%) of households engaged in bartering/selling of nutritious crops or livestock. Among rural districts, Kalabo District had the lowest proportion of selling/bartering reported by households, with only 39.7% of households so engaged.

Figure 9. Percent of HHs that sold/bartered safe and nutritious crops/livestock they grew/kept



3.4.3.3 *Households with moderate or severe hunger*

Household hunger was measured according to the Household Food Insecurity Access Scale[22] that asks if households experienced any of 9 specific hunger

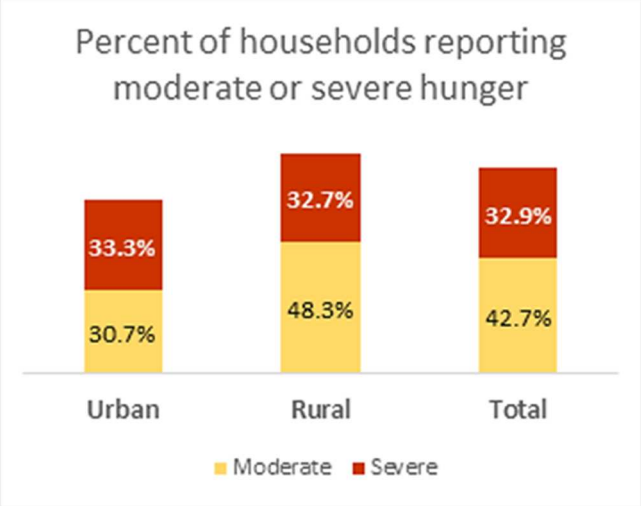
[22] Coates, J., Swindale, A. & Bilinsky, P. 2007. Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide (v.3), Food and Nutrition Technical Assistance Project, Academy for Educational Development. Washington, D.C
http://www.fao.org/fileadmin/user_upload/eufao-fsi4dm/doc-training/hfias.pdf

situations in the 4 weeks preceding the survey. If the respondent answered "yes" to any of the situations, they were then asked how often they had experienced the situation, with responses ranging from 1-2 times ("rarely"), to 3-10 times ("sometimes"), to more than 10 times ("often"). The prevalence of household food insecurity (access) was then calculated as per the HFIAS guidelines[23].

Overall, 75.6% of households reported moderate or severe hunger. This can be explained by the prolonged dry spells and inadequate rainfall in the 2018/19 agricultural season, particularly in the western and southern parts of the country, which led to a drastic reduction in national cereal production and worsened food insecurity nationwide[24].

Eighty-one percent (81%) of rural households reported experiencing either moderate or severe hunger compared to 64.1% of urban households (Figure 10), and more rural households reported severe hunger (42.7%) compared to urban households (30.7%).

Figure 10. Percent of households experiencing hunger by region



Western Province had the highest percentage of households reporting moderate to severe hunger (more than 80%), with the highest proportion of households in Shangombo District (97.6%). Similar findings were found in Northern Province, where half of the four districts surveyed had more than 80% of households reporting moderate to severe hunger, with nearly all households in Kaputa District (95.6%) reporting moderate to severe hunger.

In contrast, Eastern Province had much lower reports of household hunger, with all districts having less than three-quarters of the households experiencing moderate or severe hunger. Lusaka District had the lowest proportion among all the surveyed districts, with slightly more than half (54%) of its households reporting moderate to severe hunger (Annex 3: Table 10).

[23] https://www.fantaproject.org/monitoring-and-evaluation/household-food-insecurity-access-scale-hfias

[24] FAO (2019) GIEWS Country Brief – Zambia, Global Information and Early Warning System on Food and Agriculture, Food and Agriculture Organization of the United Nations

We also observed differences in household hunger experienced by the sex of the household head. More female-headed households reported severe hunger (51.8%) compared to male-headed households (41%). This is in line with other evidence that suggests that women typically do not have access to productive assets that would allow them to secure their livelihoods and are more likely to bear the brunt of poverty and experience hunger. In contrast, a higher proportion of male-headed households reported being food secure compared to female-headed households.

3.4.3.4 *Household Resilience to Lean Seasons and Environmental Shocks*

Households were considered to have stronger resilience to lean seasons and environmental shocks if they did not need to undertake certain coping strategies to hunger experienced in the 12 months preceding the survey. Resilience was measured using FAO's HH Coping Strategy Index (CSI) referencing the previous 12 months[25]. Responses to questions were weighted based on the severity of the coping strategies, and a total score was calculated for the household. Households were categorized as Low, Medium, or Stronger Resilience based on their total score.

By definition, only 39.3% of households that experienced hunger reported strong resilience to the lean season of food availability (October to January) and environmental shocks. Most of these were male-headed households (40.7%), and fewer were female-headed households (33.5%). This speaks to documented evidence of female-headed households typically not having capital essential for building resilience for their livelihoods[26] [27].

More urban households (58.9%) reported strong resilience to lean seasons, compared to rural households (42.1%). On average, more than 60% of households in Lusaka and Copperbelt provinces reported strong resilience than the national average. Western Province had the lowest percentage of households reporting strong resilience, with Shangombo District being the lowest at 9.6%.

The three most commonly reported household coping strategies were: relying on less preferred and less expensive foods (76.4%), reducing the number of meals eaten in a day (62.4%), and limiting portion size at mealtimes (61.1%) (Annex 3: Table 18).

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[25] FAO, The Coping Strategies Index. http://www.fao.org/3/a-ae513e.pdf

[26] Meinzen-Dick, R., Quisumbing, A., Behrman, J., Biermayr-Jenzano, P., Wilde, V., Noordeloos, M., & Beintema, N. (2010). Engendering agricultural research (No. 973). International Food Policy Research Institute (IFPRI).

[27] Mukuka, R. M., Sambo, J., & Kuhlgatz, C. H. (2017). Exploring Linkages between Farm Productive Assets and Household Food Security in Zambia

3.4.3.5 *Household Dietary Diversity*

In each household, we conducted 24-hour dietary recalls for one child less than 2 years of age and one woman of childbearing age in the household. We decided to calculate household dietary diversity using a proxy measure that combined both the woman's and child's minimum dietary diversity. Only households that met the minimum recommended threshold for both indicators were considered to have met recommended dietary diversity for the household overall.

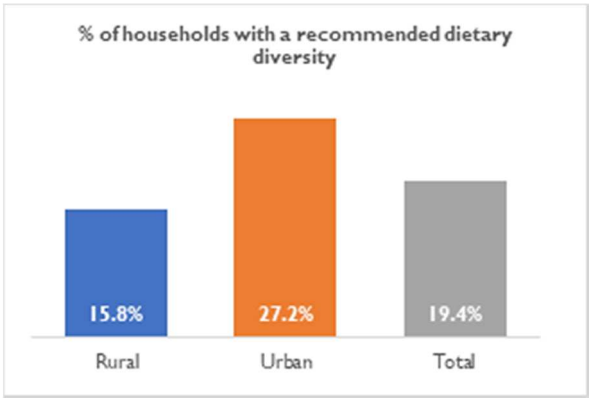
Less than a quarter (19.4%) of households met the minimum recommended dietary diversity. Although more urban households (27.2%) compared to rural (15.8%) met the recommended dietary diversity, the values were still very low overall (Figure 11).

Kabwe, Ndola, and Mumbwa districts had the highest proportions of households meeting recommended dietary diversity at slightly more than 30% of all households interviewed. The lowest of all surveyed districts was Shangombo, where only 1.6% of the households reported meeting the minimum dietary diversity targets (Annex 3: Table 16). In Western Province, less than 10% of the households in all 4 districts met the dietary diversity targets. These findings are consistent with data showing that Western Province has the least diversified food production and high food insecurity[28] [29], mainly due to the variability in climate and weather, which make rain-fed production difficult.

3.5 Household Food and Nutrition Practices

3.5.1 Safe Food Preparation, Processing, and Storage Practices

Figure 11. Households with recommended dietary diversity



Safe food handling, cooking, and storage are associated with reduced foodborne diseases. A household was counted to have practiced safe food processing, preparation, and storage if it practiced all nine recommended actions for safe food practices (Box 3)

Overall, less than 10% of households reported practicing all three food safety

[28] CSO/MAL/IAPRI. 2015. 2015 Rural Agricultural Livelihoods Survey. Indaba Agricultural Policy Research Institute. Lusaka

[29] Longley, K. and S. H. Thilsted. 2015. Food Nutrition Security in the Barotse Floodplain System, Draft Report, Penang, Malaysia: CGIAR Research Programme on Aquatic Agricultural Systems

actions. Significantly more urban households (9.4%) reported safe practices, compared to rural households (6.6%) (P<0.001). Only two of the 30 districts had more than 15% of households practicing safe food preparation, processing, and storage practices. The lowest prevalence was in Mongu District (0.4%), and the highest was in Monze (37.3%), followed by Choma (20.6%), both located in Southern Province (Annex 3: Table 11).

Box 3. Safe food practices

Food handling/preparation

1. Washing hands when handling food
2. Keeping food vessels clean
3. Separating and sorting food to avoid contamination
4. Handling of leftover foods (did the household reheat stored food before eating)

Processing

5. Duration of cooking (until tender)
6. Extent of cooking (for meat products)

Storage

7. Time food is kept before preservation (i.e. refrigeration)

Higher education levels of the mother were associated with the practice of safe food handling practices; only 2.8% of mothers with no education practiced safe food handling actions, compared to 19.8% of mothers with higher education (P<0.001). However, safe food practices were not significantly different across the different ages of mothers (P=0.053).

Food processing was identified as the most problematic area in safe food actions – only 3.5% of households reported practicing recommended food processing actions. The practice of safe food preparation was also relatively low (14%). Safe storage of food was reported to be very high (99.6%).

3.5.2 Household Essential Nutrition Action Practices

WHO has identified a set of 9 essential nutrition actions that, if adhered to, are likely to reduce malnutrition (Box 4). A household was counted as implementing essential nutrition actions if it reported practicing all the actions in relation to the mother and the child.

Box 4. Essential nutrition actions

Mother

1. Adequate diet during and lactation
2. Iron supplementation during pregnancy
3. Vitamin A supplementation during pregnancy

Child

4. Early initiation of breastfeeding
5. Exclusive breastfeeding for 6 months
6. Continued breastfeeding from 1 year
7. Adequate complementary foods through diversified diet for children 6–23 months of age
8. Correct feeding of the sick child during and after sickness (i.e., feeding through fluids and foods)
9. Vitamin A supplementation in children above 6 months of age

Overall, only 18.4% of households reported having practiced essential

nutrition actions during the relevant reference periods. Slightly more households in urban areas (19.0%) practiced all essential nutrition actions, compared to rural households (18.1%) (P=0.353).

There were significant differences across the districts, with only 6 of 30 districts having a prevalence of more than 30 percent of households practicing essential nutrition actions. Mongu district had the lowest proportion of households practicing essential nutrition actions (9.2%), and Chipata District had the highest (29.6%) (Annex 3: Table 20).

Minimum acceptable diet in children 6-23 months of age was the least reported (19.1%) of all essential nutrition actions targeting the child. As expected, the introduction of complementary feeding was very high (98.9%).

Regarding maternal-related actions, diet during pregnancy appears to be the most problematic – only 39% of pregnant women reported increased intake of foods during pregnancy. Diet during breastfeeding was slightly better (73.8%) but still requires improvement.

Further, there were significant differences by mothers' age group in the practice of essential nutrition actions; more younger mothers (20-24 years old) (20.2%) reported practicing all essential nutrition actions compared to older mothers (45-49 years old) (14.7%) (P<0.003).

Moreover, significantly more women in households that reported practicing essential nutrition actions also consumed nutrient-rich foods (21%), compared to women in households that did not practice essential nutrition actions (17%) (P<0.001).

3.6 Child Diarrhoea

3.6.1 Diarrhoea Episodes in the Preceding 2 Weeks

Diarrhoea among children was assessed by asking the mother or caregiver if the child had passed at least three loose stools in the two weeks preceding the survey. Overall, more than one-third of children less than 2 years of age (34.7%) had diarrhoea in the 2 weeks preceding data collection – more than double the national average reported in the 2018 DHS (15%)[30].

Diarrhoeal incidence was highest among children 9-11 months of age (45.8%) and

[30] Because there are seasonal variations in the prevalence of diarrhoea (i.e., diarrhoea prevalence is higher during the hot, rainy season), the different data collection timing for the 2018 DHS (July 2018-January 2019) and this baseline survey (May 2019-July 2019) may partially explain the variance.

12-17 months of age (45.1%), and lowest among children less than 6 months of age (16.3%). Incidence was also slightly higher among rural children (36.0%), compared to urban children (31.4%), and boys (36%) compared to girls (33.1%).

Examining diarrhoea incidence by child stunting status shows that more severely-stunted children (<-3SD) had diarrhoea (39.0%) than those who were not stunted (>-2SD) (33.2%).

At the district level, Kaputa District in Northern Province had the highest percentage of children with diarrhoea (57.4%), followed by Nchelenge District in Luapula Province (46.6%) and Shangombo District in Western Province (45.6%). Chinsali District in Muchinga Province and Mbala District in Northern Province had the lowest percentages (both 26.8%), followed by Ndola in Copperbelt Province (28%) (Figure 12 and Annex 3: Table 23).

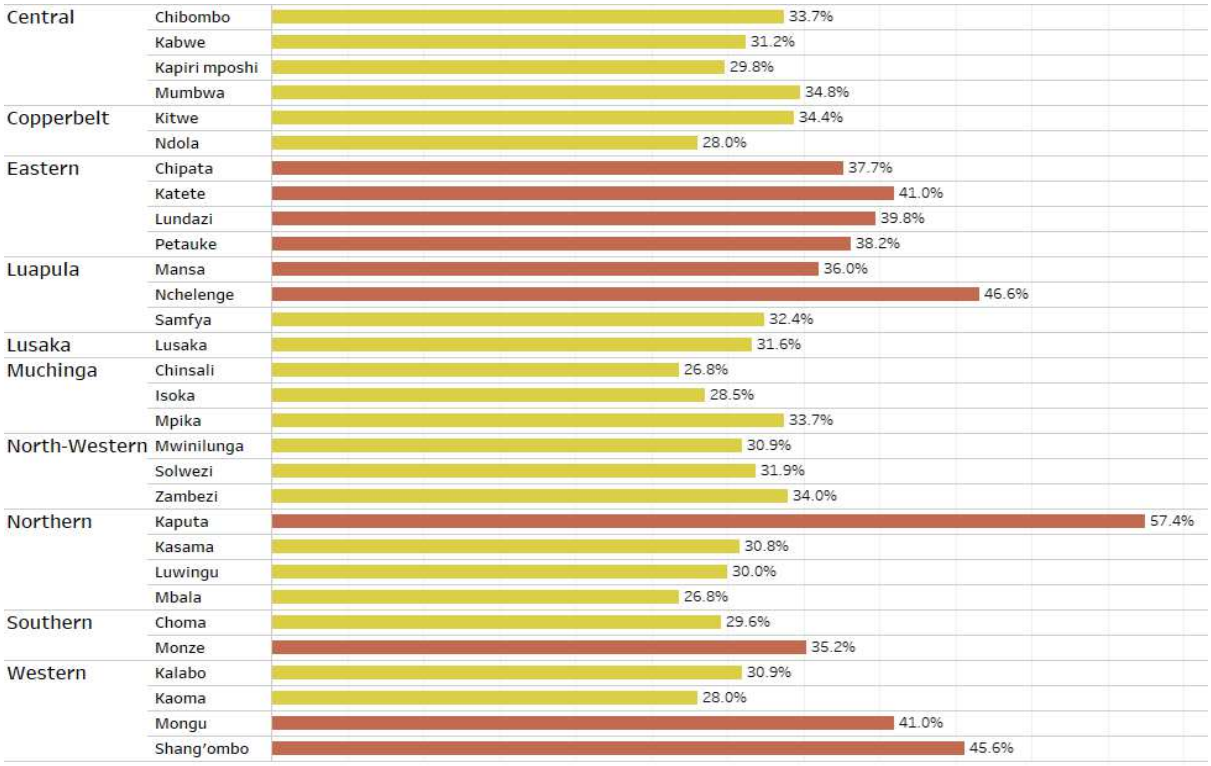
3.6.2 Diarrhoea Treatment

Caregivers of children who had diarrhoea were asked what was done to treat diarrhoea. Based on caregivers' reports,

- 65% of children with diarrhoea were taken to a health facility,
- 23.3% of children received zinc from a health facility,
- 13.8% received pre-packaged ORS, and
- 3.9% received homemade ORS.

The highest percentage of children who received zinc from a health facility as reported by their caregivers was in Mongu District, Western Province (38.2%), and the lowest was in Mbala District, Northern Province (7.5%) (Annex 3: Table 26).

Figure 12. Percent of children experiencing diarrhoea in the preceding two weeks by district

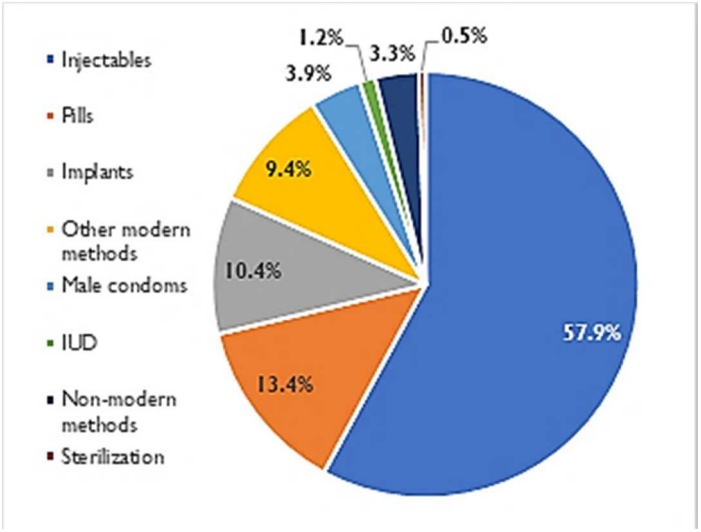


3.7 Family Planning Use

Fifty-three percent (53.1%) of women of reproductive age reported using a modern family planning method, with a higher percentage of users in urban areas (57.6%) compared to rural areas (51%). The use of family planning was higher among married women (61.0%) compared to single (29.0%), divorced/separated (33.5%), or widowed (23.5%) women.

Among family planning users, injectable contraceptives were the most widely used modern method (57.9%), followed by the pill (13.4%), implants (10.4%), and the male condom (3.9%) (Figure 13).

Figure 13. Percent of modern family planning users by methods



Family planning use was highest among women in their 20s and 30s, 25-29 years (57.5%) and 30-34 years (57.4%), and lowest among women 40-44 years of age (37.6%). Use of modern

family planning methods varied by province. It was highest in Eastern (68.1%) and Southern (67.10%) provinces and lowest in North-western (36.8%) and Western (36.2%) provinces. At district-level, modern family planning use was highest in Chipata (74.2%) and lowest in Kalabo (29.5%) (Annex 3: Table 24).

3.8 Household Water, Sanitation, and Hygiene (WASH)

Inadequate household water, sanitation, and hygiene (WASH) practices are linked to the transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid, and polio[31]. WASH improvements, including safe drinking water, water resource management, sanitation, and hygiene practices, can reduce nearly 10% of the total burden of disease worldwide. This disease burden is also linked to undernutrition, and undernutrition is linked to poor wash hygiene practice[32]. Access to clean drinking water is essential to the overall health and well-being of households. Improved access to basic drinking water is associated with reduced disease burden and reduced likelihood of waterborne disease transmission[33].

The survey assessed household WASH practices regarding drinking water sources, treatment and storage, sanitation, handwashing, other hygienic practices, and children's exposure to animal waste.

3.8.1 Drinking Water Sources and Treatment

Access to Drinking Water: A household was counted as having access to basic drinking water if it accessed water from a safe[34] water source, if the water was usually accessible, and if they could get to the water source in 30 minutes or less. By this definition, only 38% of households had access to basic drinking water, with the highest percentage in Chinsali District (80%) and the lowest percentage in Kalabo (8%). Urban households had much better access to basic drinking water (60.3%) than rural households (27.2%).

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[31] Word Health Organization. Drinking-water. (2019). https://www.who.int/news-room/fact-sheets/detail/drinking-water

[32] Mshida, H. A., Kassim, N., Mpolya, E., & Kimanya, M. (2018). Water, sanitation, and hygiene practices associated with nutritional status of under-five children in semi-pastoral communities Tanzania. The American Journal of Tropical Medicine and Hygiene, 98(5), 1242-1249

[33] Guo, A., Bowling, JM., Bartram, J., & Kayser, G. (2017). Water, sanitation, and hygiene in rural health-care facilities: a cross-sectional study in Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia. The American Journal of Tropical Medicine and Hygiene, 97(4), 1033-1042. http://www.ajtmh.org/docserver/fulltext/14761645/97/4/tpmd170208.pdf?expires=1570052018&id=id&accname=guest&checksum=24001D12A0D9CD37CC282142D48E47C9

[34] Safe water was recorded if the household's primary source of water and secondary source of water was from a tube well, borehole, protected shallow well, harvested rainwater piped water/ public tap, protected spring

Water Treatment: A household was regarded as practicing correct treatment and storage of treated water if it reported an unsafe water source as the primary or alternative source of drinking water and reported treating it, including demonstrating the treatment materials, their correct usage, and the proper storage of treated water.

Correct forms of water treatment include:

- boiling, using ceramics/sand/other water filter,
- adding bleach/chlorine,
- using disinfectant powder, and
- using solar disinfection.

Correct water storage of treated water includes:

- a specific place for storing treated water,
- clean water containers, and
- water containers with narrow necks/protective cover and a tap or narrow mouth for drawing the water.

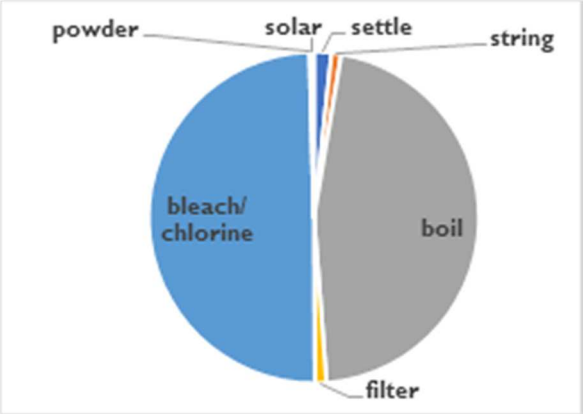
Across most districts, the use of recommended water treatment technologies was very low (10%). Ndola had the highest percentage of households using recommended water treatment technologies (56%). Urban households (19%) were more likely to use recommended water treatment technologies than rural households (8%). The most common methods of treatment reported were boiling (56%) and adding bleach/chlorine (52%); few households reported using any of the alternative forms of water treatment technologies (Figure 14 and Annex 3: Table 30 and 31).

Of the 10% of households that reported storing treated water, nearly all stored it correctly (97%). When households can treat water correctly, by using recommended methods, they are more likely to store the water correctly.

3.8.2 Household Sanitation

Handwashing: A household was considered as having access to soap and water at a handwashing station if the household showed a place where household members usually wash their hands, and there were soap and water within 1 minute of reach. Although most households (71%) had water available for handwashing, few households had soap

Figure 14. Types of water treatment technologies



(41%), and even fewer had a designated handwashing facility (38%).

Based on the indicator definition, only 14.6% of households had access to both soap and water at a handwashing station commonly used by family members. Urban households (29.1%) were more likely to have access to soap and water at handwashing stations than rural households (8%). Districts in Western Province had the lowest percentage (21% or less) (Annex 3: Table 38 and 39) of households with water, soap, and handwashing facility.

Household sanitation facilities: A household was considered to have basic sanitation if it used ventilated improved pit latrine, used flush or pour toilet connected to a sewer system or septic tank, used composting toilet, and the latrine was shown and had visible signs of the facility being used.

About 20.4% of households had access to a basic sanitation facility; this percentage was higher in urban households (40.5%) than in rural households (11.4%). Shangombo District had the lowest percentage of households with clean latrines, including covers (3.7%), while Kitwe District had the highest percentage (66.8%) (Annex 3: Table 35 and 36).

Among households that used latrines, 13.7% of households had clean latrines with covers. There was no difference between rural (14%) and urban (13%) households on the use of clean latrines (Annex 3: Table 40).

3.8.3 Household Essential Hygiene Practices

A household was considered as practicing essential hygiene actions if it had access to clean drinking water, a handwashing facility with soap and water, and had access to clean latrines and environment. Implementing all the essential hygiene practices within a household can reduce the likelihood of disease transmission and reduce rates of diarrhoea.

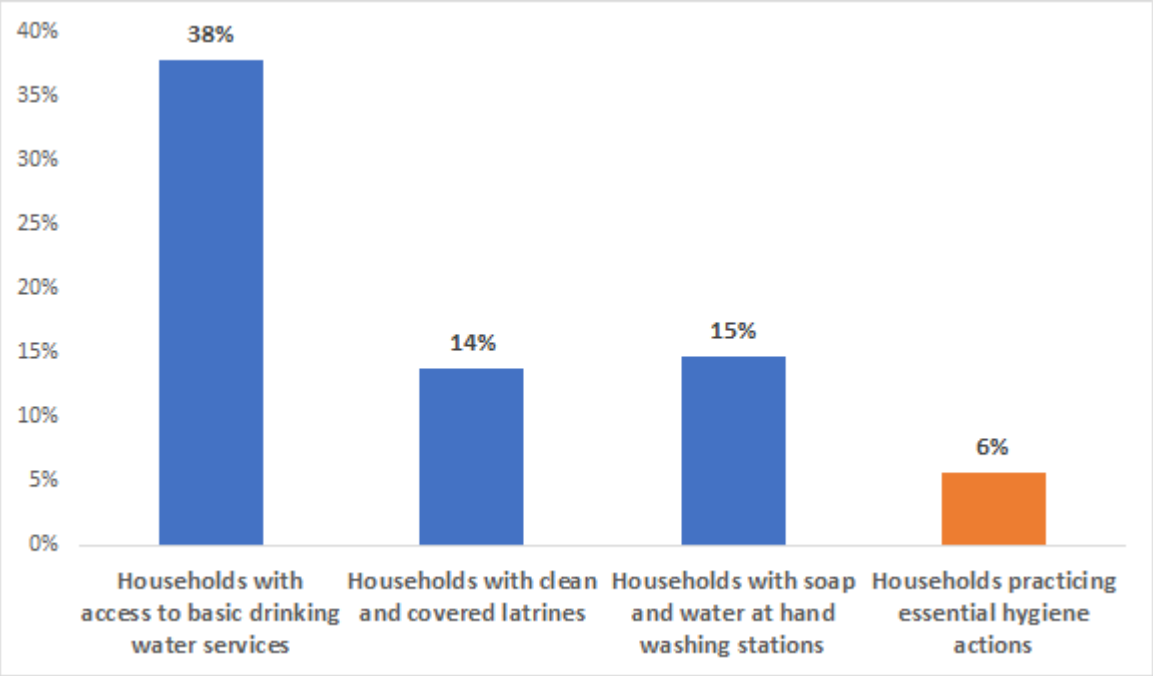
Overall, the practice of essential hygiene actions was low (6%), with urban households (16%) more likely to practice essential hygiene actions than rural households (1%) (**Error! Reference source not found.**).

The literature suggests that the practice of essential hygiene reduces rates of diarrhoea within the household[35]. Indeed, in this survey, there is an association ($P<0.01$) between households that practice essential hygiene and the percentage of children less than 2 years of age who had diarrhoea in the 2 weeks preceding the

[35] World Health Organization. (2011). Water, sanitation and hygiene interventions and the prevention of diarrhoea. Biological, behavioural and contextual rationale (http://www.who.int/elena/titles/bbc/wsh_diarrhoea/en/ accessed 9 Dec 2017).

survey. Of the children who had diarrhoea, 97% were from households that were not implementing essential hygiene practices.

Figure 15. Percentage of households practicing essential hygiene practices



A child was considered as being exposed to environmental animal waste if a specific place where the child plays was shown, and there was evidence of animal presence such as feathers, faeces, etc., or the respondent indicates that animals play there at least once a week.

Exposure to environmental animal waste can contribute to human diarrhoea incidence, particularly in children. Some research suggests that exposure to animal waste in young children, coupled with poor sanitation and hygiene, can cause increased diarrhoea incidence and environmental enteric disorders, and lead to childhood stunting and wasting[36].

Nearly half (48.8%) of children were exposed to environmental animal waste in their play areas, with children in rural areas having higher exposure (63.8%) than children in urban areas (17.2%). The highest exposure of children to animal waste occurred in the following districts: Monze (84.7%), Shangombo (76.5%), Mumbwa (76%), Kalabo (73.4%), Kaoma (71.9%), and Katete (68%) (Annex 3: Table 37).

In line with the body of literature that states that environmental exposure to animal waste contributes to human diarrhoea incidence, there is an association ($P<0.05$) between the percentage of children exposed to environmental animal waste in their

[36] Vilcins, D., Sly, P. D., & Jagals, P. (2018). Environmental Risk Factors Associated with Child Stunting: A Systematic Review of the Literature. *Annals of global health*, *84*(4), 551–562. doi:10.9204/aogh.2361

play areas and the percentage of children less than 2 years of age who had diarrhoea in the two weeks preceding the survey.

3.9 Reach of Community-level Nutrition-specific Interventions

Worldwide, there is a growing strategic focus on implementing multi-sectoral interventions[37] (both nutrition-specific[38] and nutrition-sensitive[39]) to address the multiple determinants of malnutrition, so as to attain rapid reductions in malnutrition prevalence. The GRZ implements 10 nutrition-specific and 7 nutrition-sensitive interventions (Figure 16) to the household, the pregnant mother, and/or to the child under 2 years of age:

- pregnant and post-partum women are targeted with 9 interventions
- children 0-23 months are directly targeted with 1-3 interventions (depending on their age), and
- households are targeted with 5 interventions.

Figure 16. GRZ interventions to reduce stunting

Nutrition-Specific Interventions		
To the Mother during Pregnancy	Micronutrient Supplementation	Combined IFA supplement: 1. Iron supplementation and 2. Folic acid supplementation
	Social behavioural change communication	3. SBCC: exclusive breast feeding
		4. SBCC: diet during pregnancy
		5. SBCC: diet during breastfeeding
		6. SBCC: complementary feeding
		7. SBCC: feeding the sick child
To the Child	0-23 months	8. Growth monitoring every 6 months
	6-23 months	9. Vitamin A every 6 months
	12-23 months	10. Deworming every 6 months
Nutrition-Sensitive Interventions		
To the household	Access to water, sanitation, and hygiene	11. Access to safe water
		12. Access to latrines/toilets
		13. Access to a handwashing station
		14. Social Cash Transfer ***
		15. Agricultural support ***

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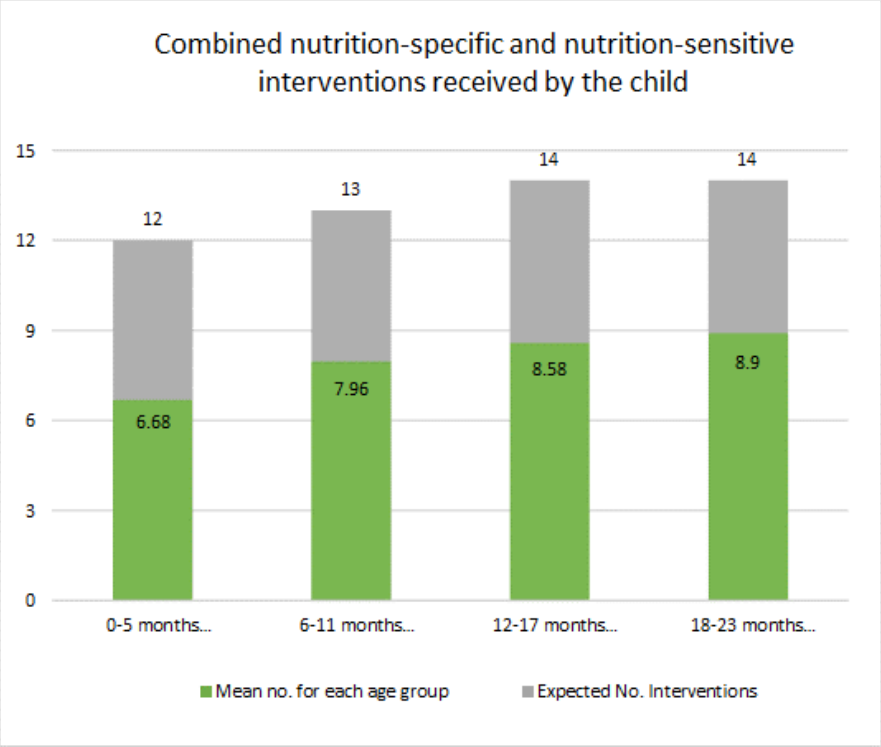
To the Mother	16. Family Planning
	17. Women's Empowerment ***

*** These interventions were not measured during the 2019 MCDP II Baseline Survey

The baseline survey assessed all 10 nutrition-specific interventions, but only 4 of the 7 nutrition-sensitive interventions. Therefore, in this analysis, convergence is achieved when a child receives 12-14 interventions (depending on their age) – either directly or indirectly through the mother or household.

Overall, children under 2 years of age receive only 60% of intended interventions (Figure 17). The shortfall can be largely explained by low coverage of SBCC and family planning to the mother, poor coverage of WASH interventions to the household, and inadequate Vitamin A supplementation and deworming to the child as further discussed below.

Figure 17. No. nutrition-specific and -sensitive interventions (combined) received by the child



3.9.1 Nutrition-Specific Interventions (Reach and Convergence)

A child under 2 years of age should receive between 8 and 10 nutrition-specific interventions either directly or through the mother. But convergence is low – only 9.9% of children received all the nutrition-specific interventions intended for them. Most children received 70% of the intended interventions, depending on their age group. The shortfall in convergence can be largely explained by poor coverage of

SBCC to mothers, insufficient coverage of vitamin A supplementation to children over 6 months and insufficient coverage of deworming to children over 12 months.

Children who are exposed to the full range of nutrition-specific interventions intended for them are less likely to be stunted (26.0%) (p=.009); conversely, children who did not receive all interventions intended are more likely to be stunted (30.7%). More detail on the coverage of nutrition-specific interventions to the mother and child is presented below.

Interventions Targeting the Mother

During their pregnancies, most women (more than 90%) received micronutrient supplementation (in a combined iron and folic acid (IFA) supplement) and SBCC messages on diet during pregnancy. However, the coverage of SBCC messages around infant and young child feeding (IYCF) – particularly exclusive breastfeeding and feeding of the sick child – was extremely low (42 and 41% respectively). These findings are concerning and suggest that suboptimal infant and young child feeding practices identified in Section 3.4.1 are not being adequately addressed. There was little difference between rural and urban women in terms of the coverage of these nutrition-specific interventions. And there was no difference between stunted and normal growth children in services delivered to their mothers, except for SBCC on 'exclusive breastfeeding' where more mothers of normal growth children (44%) reported receiving information on exclusive breastfeeding compared to mothers of stunted children (39%) ($p<0.001$).

Convergence of nutrition-specific interventions to the mother was low, with only 13% of women receiving all 7 interventions. On average, a mother received 4.9 interventions during pregnancy (or 70% of the intended 7 nutrition-specific interventions). There was no difference between women living in rural and urban areas in terms of overall convergence.

Interventions Targeting the Child (6-23 months)

Three nutrition-specific interventions are directly targeted at children under 2 years of age:

- growth monitoring (all ages),
- vitamin A supplementation (starting at 6 months), and
- deworming (starting at 12 months).

Most children (88%) had their growth monitored in the preceding 6 months, as evidenced by weights plotted on health cards (seen in two-thirds of cases) or by mother's memory. Fewer children received Vitamin A supplementation (67% of those age 6-23 months) and deworming services (55% of children 12-23 months).

Overall, convergence of these interventions to the child was moderate, with only 59% of children receiving all the relevant services for their age group.

3.9.2 Nutrition-sensitive Interventions (reach and convergence)

Overall, coverage of nutrition-sensitive interventions is low, with only half of mothers (53%) reporting use of modern family planning methods, and most children under two years of age living in environments with limited access to WASH amenities – only 6% of all children had access to all three WASH interventions. This low coverage of WASH interventions is concerning because it means that a large proportion of young children are exposed to disease-causing pathogens and will be more susceptible to illness due to an unsanitary community environment and poor household hygiene practices.

In terms of convergence, overall, only 2.8% of all children benefited from all four nutrition-sensitive interventions. On average, a child under 2 years of age is reached with only 1.2 out of the four interventions.

Moreover children who benefit from two or more nutrition-sensitive interventions are significantly less likely to be stunted (22.4%) than children who do not benefit from these interventions (31.9%) ($p<.001$).

3.10 Stakeholder Perceptions on SUN Implementation

KIIs were conducted to explore participants' perspectives on the implementation of nutrition activities in their geographic area. SUN 1.0 and 2.0 districts were included to provide a comparison, and even though SUN 2.0 activities targeted support from SUN TA and UNICEF had not started in those districts, 15 of the 20 participants in the new SUN districts and 18 of the 31 in the SUN 1.0 districts said that their districts had nutrition coordinating committees and all were able to speak to the current nutrition-specific and nutrition-sensitive interventions being implemented in their geographic area.

KIIs were conducted with 51 provincial and district-level government officials and NGO staff who represented multiple sectors and both SUN 1.0 and 2.0 phases. Interviews included closed-and open-ended questions about the types of nutrition interventions being implemented in the respondents' geographic areas; their perceptions of the implementation of nutrition interventions; their impressions of the partnerships and coordination related to nutrition (and the coordinating committees, in particular); and successes, lessons learned, and areas for improvement from SUN 1.0 experience. Detailed summaries of responses are presented in data tables in Annex 4.

Though most respondents reported that a nutrition coordinating committee had been established in their geographic area (as indicated above), less than half of respondents from both phases reported that the committee met regularly or had a shared work plan.

As expected, more respondents from SUN Phase 1.0 districts consistently agreed with statements about the successful functioning of the coordinating committees than respondents from Phase 2.0. Most respondents in both phases rated the coordinating committee in their geographic area as 'average or above' for their effect on maternal and child nutrition interventions.

Although respondents in both phases thought that the nutrition programme receives at least some political support, 10 of the 20 participants in the SUN 2.0 districts and 22 of the 31 participants in the SUN 1.0 districts did not think there were adequate policies to address stunting. Respondent impressions of nutrition policies were more favourable among Phase 1.0 respondents than Phase 2.0 respondents (Annex 4: Table 45).

Respondents were asked to rate the implementation of various nutrition-specific and nutrition-sensitive interventions in their geographic area (Annex 4: Table 46). Most respondents in both SUN phases rated the implementation of IFA supplementation, vitamin A supplementation, growth monitoring and promotion, exclusive breastfeeding, and complementary feeding as 'good' or 'excellent'.

"The Ministry of Health has serious campaign on breastfeeding, especially with the coming of SUN project."
— District Local Government Official

The implementation of activities to promote dietary diversity, including animal-source foods, consumption of nutrient-dense crops, and WASH activities, were rated as 'neutral' or 'poor' by many respondents in both phases.

"The water supply is very bad, and access to clean water is still a big challenge in most parts of the district. Standards are also not being followed when installing water points in communities."
— District Education Official

Several cross-cutting themes related to the implementation of nutrition interventions emerged, both positive and negative. For example, respondents from both phases frequently mentioned community sensitisation and engaging community leaders as facilitators to implementation.

"The training of community-based volunteers who facilitate door-to-door campaigns helps (IFA supplementation) a lot."
—Provincial NGO staff

"Engage traditional leaders (so) that they can become champions of promoting breastfeeding. The community will act more when guided by their traditional leader."
—Provincial Clinical Decision Support Systems Official

Traditional beliefs were frequently cited as barriers to implementing breastfeeding and IFA interventions.

"Traditions and beliefs that when a child is born they are not supposed to be given first breast milk for whatever reasons. Children are also given traditional herbs."
—District Health Official

Lack of supplies and equipment were also listed as barriers to IFA and growth monitoring and promotion.

"Only 40% of the facilities measure heights and there are a few SECA scales."
—Provincial Health Official

The most commonly cited barriers to complementary feeding included families' lack of resources and knowledge, which both Phase 1.0 and Phase 2.0 respondents listed. Furthermore, several respondents identified challenges with the delivery of complementary feeding activities, including competing priorities.

"High levels of poverty. Most households do not have stable income to buy food and inputs that can be used to produce locally rich foods. High levels of ignorance among the rural populace, and high dependency on a single crop (maize)."
—District Education Official

"Lack of adequate resources to comprehensively conduct complementary feeding promotion. Some of the officers trained in complementary feeding promotion are biased to other activities and not the complementary feeding promotion."
—Provincial Agriculture Official

Respondent views around interventions to increase consumption of nutrient-dense crops were quite mixed; some were positive, others negative.

"Not much promotion done on nutrition-dense crops; it is just on paper."
—District Community Development Official (1)

"Ministry of Agriculture is sensitising households (regarding) the production of these crops, and farmers are adopting."
—District Community Development Official (2)

When asked how MCDP I (SUN 1.0) could have been better implemented, 16 of the 20 Phase 1.0 respondents mentioned improved funding flows (Annex 4: Table 49).

"Funding was released towards the end of a quarter, about 1month, and instruction was given to exhaust the funding. This affected the time frame to properly implement the activities. In some cases, monies ended up being returned because of little time to exhaust the funds."
—Provincial Community Development Official

A few respondents (4 out of 20) mentioned the need for bottom-up, rather than top-down, approaches.

"Encourage group formation at community-level to develop ideas around SUN as opposed to a top-down approach where most activities are imposed."
—District Local Government Official

4 CONCLUSIONS

The 2019 MCDP II Baseline Survey was conducted to provide information on the current nutrition situation of women and children in the 30 SUN 2.0 districts prior to the implementation of the programme. The survey aimed to provide benchmarks to be used in monitoring the implementation of the programme when it commences.

This survey found that among children 0-24 months of age in the 30 SUN target districts, one-third are stunted, 10% are underweight, and 3.4% are wasted. However, there is a wide geographical variation in these measures. Districts in Luapula Province face a significantly higher risk of stunting and underweight, and children in Western Province face a comparatively higher risk of wasting and stunting. Children in rural areas are more at risk of stunting than children in urban areas.

The risk of child stunting also increases with the child's age, suboptimal breastfeeding of children less than 6 months of age, and failure to meet minimum IYCF standards. Likewise, maternal factors play an important role in child stunting, with children of younger mothers, older mothers, and mothers with lower education levels having a higher risk of stunting. The data also show that more stunted children were found in households with underweight mothers.

Household factors, such as the sex of the household head and family size, were not associated with stunting ($P>0.05$); however, the level of education of the household head was inversely associated with stunting. Children in households with a household head who had attained a higher level of education were less likely to be stunted than those from households with a less-educated household head ($P<0.001$).

WASH practices are strongly associated with child nutrition status. Inadequate WASH practices are linked to the transmission of diseases that affect nutrient absorption, such as cholera, diarrhoea, and dysentery. This survey found that less than half of households (41%) have access to basic drinking water services. In addition, most districts have low use of recommended water treatment technologies (10%). This situation will continue to put children at risk of stunting and a host of other nutrition and health problems.

Hand washing is key to promoting hygiene and reducing disease transmission. But only 38% of households had a handwashing facility, and although three-quarters of these had available water at the hand washing facility, less than half had soap at the handwashing facility. These data mean that overall, only 15% of households who

had access to both soap and water at a nearby handwashing station could implement the recommended handwashing practices. Moreover, only 14% of households had access to basic sanitation (clean latrines with covers). Lastly, children's exposure to environmental animal waste was significantly associated with diarrhoea incidence ($P<0.05$), which can adversely hamper absorption and use of nutrients.

Stakeholder involvement in all aspects of the programme is key to the success of any programme. The survey collected stakeholder opinions on SUN implementation to inform MCDP II. As expected, respondents indicated that "new" SUN districts had limited structures to implement the MCDP II programme. Respondents also reported that there was limited involvement of stakeholders in MCDP 1 planning activities as these had primarily been top-down.

Most respondents perceive IFA supplementation, vitamin A supplementation, growth monitoring and promotion, exclusive breastfeeding, and complementary feeding to have been implemented well. But the implementation of activities to promote dietary diversity, including animal-source foods, consumption of nutrient-dense crops, and WASH activities, were reportedly sub-optimal. Respondents also stated that interventions to increase the consumption of nutrient-dense crops had not been implemented or adopted well.

Respondents identified the most common barriers to complementary feeding to be families' lack of resources and knowledge. Traditional beliefs were also frequently cited as barriers to the implementation of breastfeeding and IFA interventions by many respondents. Further, respondents in the MCDP 1 districts reported that poor funding flows affected the smooth implementation of the programme.

5 RECOMMENDATIONS

While most of the following recommendations are already part of the SUN 2.0 programme, the baseline survey highlights areas that need special focus. Recommendations in **red bold** below are considered priority actions.

NUTRITION-SENSITIVE AND NUTRITION-SPECIFIC INTERVENTIONS

Infant and Young Child Feeding

1 **Promote optimal IYCF practices for all children, but particularly for children of young mothers. Nutrition-specific interventions, such as exclusive breastfeeding, dietary diversity, and meal frequency among children less than 2 years, should be strongly promoted in the SUN**

programme.

2 Support vulnerable children with micronutrient powders and strong support to the households, particularly those in Luapula and Western provinces.

3 Strengthen legal frameworks to support exclusive breastfeeding among working mothers, especially in urban areas.

4 Strengthen collaboration between the SUN programme and the MOH's reproductive health department in order to reach pregnant women (especially adolescents) with SBCC about optimal IYCF.

Agriculture and Food Access

5 Promote broad-based household food security (food production, preservation, processing, and storage) among vulnerable populations.

6 Promote production of nutrient-dense locally accepted foods.

7 **Promote the consumption of a diverse diet among pregnant and lactating women and children 6-23 months of age.**

Water, Sanitation, and Hygiene

8 **Promote and emphasise the importance of all essential hygiene practices, including access to clean drinking water, availability of soap and water at handwashing facilities, and access to clean latrines and environment, among all households.**

9 Promote access to safe drinking water through the provision of safe and clean water points in communities.

10 Promote recommended CLTs among communities in close collaboration with traditional leaders.

11 Support safe environments for children through the establishment of safe play areas, penning animals and poultry, and maintaining clean homesteads – especially in districts reporting high levels of animal waste around homesteads.

Social Protection

12 In areas of severe hunger and low resilience, coupled with high wasting among children, respond with emergency interventions including general household food distribution and distribution of nutritious complementary foods for children less than two years.

13 Promote tailored strategies to strengthen household resilience to hunger in food-insecure areas (e.g., drought-resistant crops/ livestock, early maturing crops for areas with less rainfall, etc.).

Cross-Cutting

14 **Support women's empowerment programmes to enhance income availability for women to support child feeding among the vulnerable and less-educated women in the districts**.

15 **Promote nutrition-sensitive SBCC on maternal and child feeding and hygiene using various channels across all government sectors e.g., via health, education, and gender ministries.**

16 **Coverage of both nutrition-specific and nutrition-sensitive interventions need to reach 90% (per the Lancet) to achieve the GRZ's desired impact of reducing stunting by 2% per year. Much more emphasis in the SUN programme should be placed on increasing coverage of all interventions, but particularly WASH, SBCC around child feeding, and micronutrient supplementation to children.**

SUN 2.0/MCDP II MANAGEMENT

17 Adopt a bottom-up and participatory approach to programme design and implementation to foster ownership and sustainability of the programme.

18 **Strengthen or establish multi-sectoral structures (e.g., nutrition** coordinating **committees) for effectively coordinating implementation to enhance convergence of SUN interventions. This should include the creation of shared integrated workplans.**

19 Ensure adequate supplies (e.g., anthropometry equipment, micronutrient supplements) at service delivery points to promote nutrition-specific interventions.

FURTHER ANALYSIS/RESEARCH

The baseline results reveal additional SUN learning questions to guide programme design and implementation. The following questions will need to be added to the National Nutrition Learning Agenda and prioritised accordingly.

- What are the barriers and enablers of good sanitation and hygiene practices? How can these be incorporated into programme guidelines?
- What can provinces with high stunting rates (e.g., Luapula) learn from

others with similar profiles but lower stunting rates (e.g., North-western)? What accounts for North-western Province's positive deviance?