SIERRA LEONE

NATIONAL NUTRITION SURVEY 2014

June 30 – August 12, 2014

unicef

The implementation of the Sierra Leone National Nutrition Survey (SLNNS) 2014 was led by the technical oversight and management of the Consultant (Asfaw Addisu) from Planning, through Field Implementation to Analysis and Reporting. Coordination and Management of the daily data quality as the SLNNS 2014 data collection progressed, Management of Data Entry, Data processing, Data Analysis and Reporting of the SLNNS 2014 was done by the consultant.

This report summarises the findings of the SLNNS 2014, carried out by the Directorate of Food and Nutrition Security within the Ministry of Health and Sanitation of Sierra Leone and UNICEF Sierra Leone Country office. The field work took place between June 30th and August 12th, 2014. The SLNNS 2014 was fully funded by Irish Aid.

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Suggested citation:
Ministry of Health and Sanitation Sierra Leone and UNICEF Sierra Leone. 2014. Sierra Leone National Nutrition Survey 2014. Freetown, Sierra Leone.

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ACKNOWLEDGEMENTS

The success of the 2014 Sierra Leone National Nutrition Survey (SLNNS) using the SMART (Standardize, Methodology, Assessment, Relief and Transition) Methodology results from the support of many institutions instrumental in its overall implementation.

Firstly, on behalf of the Ministry of Health and Sanitation, I wish to thank Irish Aid for providing funding for the survey.

Secondly, to the United Nations Children's Fund (UNICEF) for taking the lead in technical, planning, logistics, monitoring and supervision support without which, the survey would not have been possible.

I would like to recognize the support provided by our nutrition implementing partners Statistics Sierra Leone, the World Health Organization (WHO), Action Contre la Faim (ACF), SILPA, Helen Keller International and other nutrition partners in the field implementation process nationwide. Similar sentiments are extended to the nutrition technical committee comprised of members whose technical guidance made possible the successful implementation of the survey.

All field staff engaged in data collection, field coordinators and supervisors, enumerators and data processing staff, worked assiduously and their effort is hereby acknowledged.

My appreciation also goes to all chiefs, household heads—men, women and their children who were selected and responded to all the interviews. Without their participation and support, this survey would have been futile.

Finally to the Directorate of Food and Nutrition, for their leadership and dedication in working efficaciously for the women and children of Sierra Leone towards the attainment of a malnutrition free Country, I say thank you and keep up the good work.

Dr. Brima Kargbo (GOOR)
Chief Medical Officer
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LIST OF ACRONYMS

ACF-F	Action Contre La Faim France
BMI	Body Mass Index
CDC	Center for Disease Control
CI	Confidence Interval
CSD	Child Survival Division
DFNS	Directorate of Food and Nutrition Security
DHS	Demographic Health Survey
ENA	Emergency Nutrition Assessment
EPI	Expanded Program on Immunization
FCS	Food Consumption Score
FS	Food Security
GAM	Global Acute Malnutrition
GDP	Gross Domestic Product
HDDS	Household Dietary Diversity Score
HAZ	Height-for-Age Z score
HH	Household
HMIS	Health Management Information System
IMAM	Integrated Management of Acute Malnutrition
NGO	Non-Governmental Organization
INGO	International Non-Governmental Organization Mosquito Nets
IYCF	Infant and Young Child Feeding
LBW	Low Birth Weight
MAM	Moderate Acute Malnutrition
MICS	Multiple Indicator Cluster Survey
WHZ	Weight-for-Height Z score
MOHS	Ministry of Health and Sanitation
MUAC	Mid Upper Arm Circumference
NCA	Nutrition Causal Analysis
NFNSP-IP	National Food and Nutrition Security Policy Implementation Plan
NFNSP	National Food and Nutrition Security Policy
NNIS	National Nutrition Information System
NTC-NS	National Technical Committee for Nutrition Surveys
PPS	Probability Proportional Size
PRSP	Poverty Reduction Strategy Papers
PW	Pregnant Woman
SAM	Severe Acute Malnutrition
SCUK	Save the Children UK
SD	Standard Deviation
SE	Standard Error
SFP	Supplementary Feeding Program
SLNNS	Sierra Leone National Nutrition Survey
SMART	Standardized Monitoring and Assessment in Relief and Transition
SSL	Statistics Sierra Leone
U5MR	Under-Five Mortality Rate
UNHCR	United Nation Higher Commission for Refugees
VAD	Vitamin A Deficiency
WaSH	Water and Sanitation, Health
WAZ	Weight-for-Age Z Score
WFP	World Food Program
WHO	World Health Organization

GLOSSARY

Body mass index (BMI): An index of fatness. It is calculated by dividing weight in kilograms by height in meters squared. Both high and low indexes are associated with poor health. The normal range for a healthy adult is 18.5 to 24.9. A BMI below 18.5 is considered too lean, while one above 25 is considered overweight. A BMI greater than 30 is considered obese, and one greater than 40 is considered morbidly obese.

Exclusive breast-feeding: When an infant is fed only breast milk and is not fed water, tea, gruel, or other animal milk. Exclusive breast-feeding is recommended for the first six months of life.

Food security: Availability, access, and utilization of sufficient food by all people at all times for an active, healthy life.

Food Consumption Score (FCS): Food consumption pattern is computed based on Food Consumption Score (FCS), which is a weighted score of frequency of consumption of food groups and the nutritional value of the food. Based on the FCS, households are classified into food consumption groups as poor, borderline, acceptable.

Household Dietary Diversity Score (HDDS): Households Dietary Diversity relates to nutrient adequacy (coverage of basic needs in terms of macro and micro nutrients) and to diet variety/balance, which are two of the main components of diet quality. This indictor is used to calculate total number of food groups consumed by members of the household over a reference time period (24 hours recall).

Low Birth Weight (LBW): An infant born weighing less than 2,500 grams (5.5 pounds). In rural areas, this is estimated by the infant's "relative size" to other babies, as assessed by the birth attendant or mother.

Malnutrition: An imbalance between the body's needs and its use and intake of nutrients. The imbalance can be caused by poor or lacking diet, poor hygiene, disease states, lack of knowledge, and cultural practices, among others. Underweight, stunting, wasting, obesity, and vitamin and mineral deficiencies are all forms of malnutrition.

Mid-upper arm circumference (MUAC): One of the anthropometric measures used in assessing nutritional status. It is always measured on the left arm. Measuring MUAC is easier and faster to use and train for than measuring weight and height.

Moderate acute malnutrition: A common benchmark used in health and nutrition studies that can be defined in more than one way. In this book, unless stated otherwise, "moderate malnutrition" refers to a child with a MUAC between 11.5 and 12.5 centimeters.

Severe acute malnutrition: A common benchmark used in health and nutrition studies. It refers to a child who has visible severe wasting or nutritional edema. In Sierra Leone, children with a MUAC less than 11.5 centimeters are considered to have severe acute malnutrition.

Severe stunting, wasting, or underweight rate: A common benchmark used in health and nutrition studies. It is technically defined as the percentage of children under five years of age who suffer from severe stunting, wasting, or underweight, defined, respectively, as having a height-for-age, weight-for-height, or weight-for-age value that is equal to or smaller than the value corresponding to three standard deviations below the median of the global reference population—that is, the value corresponding to –3 Z-scores with respect to the global reference population (see also the definitions of stunting, wasting, and underweight).

Stunting: When a child has low stature compared to other children his or her age because of inadequate nutrition, care, and environment. It is a proxy measure for long-term malnutrition. Stunting is defined as height-for-age that is equal to the value corresponding to or smaller than two standard deviations below the median of the global reference population— that is, the value corresponding to –2 Z-scores with respect to the global reference population (a population with a distribution of height-for-age values that is considered normal by international standards).

Undernutrition: Failure to get enough nutrients for a healthy body. Undernutrition can result from low intake, malabsorption during disease, or extreme losses, such as during bouts of diarrhea.

Underweight: When a child has low weight compared to other children his or her age. “Underweight” is one way to measure malnutrition. It is defined as weight-for-age that is equal to or smaller than the value corresponding to two standard deviations below the median of the global reference population—that is, the value corresponding to –2 Z-scores with respect to the global reference population (a population with a distribution of weight-for-age values that is considered normal by international standards).

Vitamin A deficiency: A form of malnutrition resulting from inadequate intake or high loss of vitamin A. Symptoms include growth retardation, night blindness in mild deficiency, and xerophthalmia (drying of the cornea), which leads to complete blindness.

Wasting: When a child has a low weight for his or her current height. Wasting is used as a proxy measure of acute malnutrition. It is defined as weight-for-height, which is equal to/ or less than the value corresponding to two standard deviations below the median of the global reference population— that is, the value corresponding to –2 Z-scores with respect to the global reference population (a population with a distribution of weight-for-height values that is considered normal by international standards).

Z-score: A unit of measure often used in the nutrition and health field. It is the deviation of an individual’s value from the median value of the global reference population, divided by the standard deviation of the global reference population. The Z-score indicates where one observation lies in reference to the

global population. A Z-score of –2 or less (that is, equal to or smaller than two standard deviations below the median of the global reference population) is considered low. (The global reference population is a population with a distribution of heights, weights, ages, or related measures that is considered normal by international standards.) The Z-score criteria always yield a greater prevalence of malnutrition than the percent-of-median criteria because the former takes into account variations in the standard deviation of weight at different heights, thereby making it more statistically valid. The World Health Organization recommends the use of Z-scores, because they are the most age-independent method of presenting indexes. In addition, individuals with indexes below the extreme percentiles can be classified more accurately.

EXECUTIVE SUMMARY

The Sierra Leone National Nutrition Survey (SLNNS) 2014 was conducted by the Directorate of Food and Nutrition Security in the Ministry of Health and Sanitation (MoHS) and UNICEF Sierra Leone from June 30th – August 12th, 2014. The major objective of the SLNNS 2014 was to determine and evaluate the current nutrition status of the population (especially children 6-59 months old and women of reproductive age (15-49 years of age)) and the retrospective mortality rate in the population at district level. The SLNNS 2014 also further assessed the major contextual factors contributing to malnutrition such as IYCF, Food Security, Water and Sanitation, Hygiene (WaSH) and Health situation in Sierra Leone in order to define program planning priorities for direct and indirect nutrition interventions.

The SLNNS 2014 presents the current nutrition situation, analysis of the trends in key nutrition indicators and gauges progress towards the targets set for the Millennium Development Goals (MDGs) and beyond. The NNS also assesses the severity and geographical scope of nutrition related issues. Furthermore, it sets the platform for policy and strategy development to prioritize the programs for short, medium and long term direct and indirect nutrition interventions at the national and district level. The SLNNS 2014 implementation was closely monitored by MoHS and UNICEF Sierra Leone, and members of the National Technical Committee for Nutrition Surveys (NTCNS). Support was provided from Statistics Sierra Leone in providing the sampling frame with EA maps, nutrition implementing partner international NGOs in Sierra Leone, such as ACF-France and HKI and UN agencies - WFP and WHO provided training, supervision and monitoring support, while Save the Children and other national NGOs provided community mobilization and logistics support. A total of eighteen (18) survey teams conducted the survey supervised by a total of eighteen to twenty (18-20) national supervisors (one supervisor for each team) and coordinated by 3-6 district coordinators at any one time. The technical lead and oversight, management and coordination of the overall implementation from the planning through training, daily data quality management during the implementation to analysis and reporting of the SLNNS 2014 was the responsibility of the consultant with logistics and operational coordination provided by the Directorate of Food and Nutrition Security at Ministry of Health and Sanitation and UNICEF Sierra Leone.

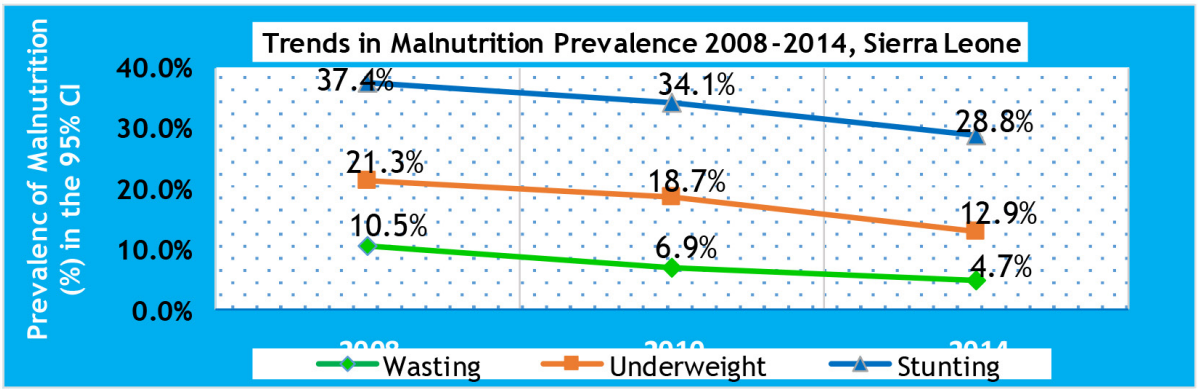
The findings of the SLNNS 2014 provide evidence base on key nutrition and public health indicators at population level for informed planning, advocacy for policy reviews and adaptation, decision making on relevant and appropriate direct and indirect nutrition related interventions for optimal child survival outcomes. It further provides timely and pertinent data that complements the national nutrition information system (NNIS) for strengthened surveillance of the nutrition situation in the country. The population groups surveyed include: children 0-59 months of age (0-23.9 months old for IYCF and 6-59.9 months of age for anthropometry, women of reproductive age (15-49 years of age) for assessing the nutrition status of the population in Sierra Leone. Household heads and primary care takers of children in each household were targeted for household interviews to obtain information on contextual factors that contribute to malnutrition at household level.

The methodology for the SLNNS 2014 followed a cross-sectional study design with a two-stage cluster sampling method using SMART (Standardized Monitoring and Assessment of Relief and Transitions) methodology that was applied to the clusters based on Probability Proportional to Population Size (PPS). At the planning stage the SLNNS 2014 targeted all the districts in Sierra Leone with 15 statistical domains. However at the implementation stage two of the 14 districts were excluded from data collection (Kailahun and Bonthe) due to and national public health emergency as a result of an Ebola outbreak, resulting in data collection in 13 statistical domains with around 90% population and geographic coverage. However the results were representative both at the district level and national level. Accordingly

Anthropometric data was collected in 10,989 children 6-59 months of age and 11,257 women of reproductive age; IYCF data was collected on 5,173 children 0-5 months of age, while non-anthropometric (FS, WaSH and Health) data was collected in 9,658 households surveyed. Updated household listing was conducted in each of the 551 Enumeration Areas (EAs) or clusters.

Key findings of the SLNNS 2014

Child Nutrition Status: The results of the SLNNS 2014 show a significant improvement in nutrition status of the population where Sierra Leone has made a significant progress towards meeting some of the MDGs related with child survival, especially MDGs 1and 4. In relation with the indicator set for MDG1 (Eradication of extreme poverty and hunger) Sierra Leone has recorded an underweight prevalence of 12.9% in children 6-59 months of age, which is more than close to achieving the target of 12% set as called for in the Global Strategy to monitor the progress of individual countries towards this indicator. This is further supplemented by the significant improvements in early initiation of breastfeeding and exclusive breastfeeding as reported by the IYCF assessment integrated with this same survey. Subsequently the prevalence of wasting was has also shown a significant improvement at 4.7% (4.3 – 5.2 95% CI), deemed as "acceptable" based on international benchmarks for this indicator. Stunting, which based on the results of the current SLNNS stands at 28.8% (27.5 – 30.2 95% CI) having made a reduction of 15.5% to the level it was in 2010, has also shown a significant reduction from where it was in 2010. This significant gain in reduction of the level of stunting has joined Sierra Leone to the group of developing countries in sub-Saharan Africa with moderate level of stunting and currently showing positive progress. The analysis of trends in prevalence of malnutrition have thus shown a steady decrease (in wasting, underweight and stunting prevalence) between 2008 and 2014 as portrayed in the figure below.



Maternal Nutrition Status: The prevalence of underweight in non-pregnant women of reproductive age was recorded at 5.9% (5.4-6.4 95% CI), while severe stunting stands at 0.3% (0.2-0.4 95% CI) showing a low level of underweight and stunting prevalence in non-pregnant women. The current findings show that improvement in the level of undernutrition in general in women were made with a jump from 9.9% in 2010 to 6.2% in 2014. These results indicate that significant progress is also being made towards meeting the universal target set for the MDG5 (improving maternal health), which also are complemented by improvements in breastfeeding practices by lactating women as breast feeding has significant contribution for improving maternal health and reduction of maternal mortality. However a trend of a subsequent increase in the level of overnutrition (overweight and obesity) prevalence from 17.9% in 2010 to 22.3% in 2014 was seen, showing an emerging risk of the problem of overweight and obesity in women of reproductive age in the country as is the case in most developing countries.

Mortality and Child Morbidity: The results of the retrospective mortality combined survey conducted in integration with SLNNS 2014 show that under-five mortality rate(U5MR) was at 0.83 deaths/10,000 persons/per day, while crude mortality rate (CMR) was found at 0.36 deaths/10,000 persons/per day with some level of differences observed among the districts, especially on the U5MR. Based on the as-

sessment of the two weeks retrospective morbidity situation in the target children, the disease burden in children under-five was found to be 37% which relates to poor child caring practices. The presence of a relatively high U5MR as compared to the sub-Saharan average is attributed to an increasing disease burden in children under-five years of age. Assessment of treatment seeking behaviour of primary care takers/mothers of sick under-five children in Sierra Leone along with the prevalence of childhood illnesses indicated that 71.4% of the primary care takers sought treatment for the sick child in the nearest health service provider facility available.

Vitamin-A Supplementation, Measles Immunization and ITN usage: based on the findings of the current NNS the national coverage of Vitamin A Supplementation was estimated at 96.1% (95.2-97.0 95% CI) while measles immunization coverage was at 90.4%(89.2-91.5). Similarly the coverage of ITN usage was high at 89.6% (88.1-91.1). These coverages were boosted as a result of a national EPI campaign a few weeks to one month preceding the commencement of the field implementation of the NNS (May-June 2014).

Infant and Young Child Feeding status: The results from the current NNS combined IYCF assessment show that exclusive breast feeding is good at 58.8% (exceeding the global proposed target of 50% for 2022), colostrum feeding is high at 80.9%, Timely initiation of breastfeeding (within the first hour after birth) is at 54.9% while Continued breast feeding at 1 year is also very good at 86.0%. The minimum dietary diversity was at 36.4% while the minimum meal frequency based on four or more food groups' consumption was found low at 14.4%. The average (mean) age the child started taking anything other than breast milk was found to be around 6 months of age. The significant improvements in timely initiation of exclusive breastfeeding (a 22% increase to the level it was in 2010) as well as exclusive breast feeding with a staggering 84% increase from the level it was in 2010 are encouraging progresses while the results also highlight need for further improvements in child dietary diversity and the daily meal frequency of the child.

Food Security Situation: The food security situation at household level was assessed using data collected on key proxy indicators of household food security situation in the country. Accordingly analysis of proportion of households allocating income for food purchase based on households income expenditure threshold shows that around 26% of the households were allocating >65% of their monthly income for food purchase, while 41% were allocating 50-65% of their monthly income for food purchase and the remaining 32% were allocating 1-50% of their monthly income for food purchase. The mean Household Dietary Diversity Score (HDDS) was found to be 4.6 at national level, showing that households in Sierra Leone on average consumed 4 or more food groups the previous day of interview during the time of the NNS. According to results of the Food Consumption Score (FCS) analysis the overwhelming majority (96.2%) of the surveyed households were found to be in the "acceptable" food consumption category. The results of the household interviews during the NNS data collection indicated that high food price was the main shock faced by over 78% of the respondent households which is attributed to the presence of a recent surge in food prices resulting in high food price inflation, followed by human sickness for 58.8% of the households while it was reported as insecurity by 29.3% of the households.

Water and Sanitation, Hygiene situation: Access to safe drinking water, hygiene and sanitation practices and availability of sanitation facilities were assessed at household level. Accordingly over two-third (65.5%) of the households surveyed have access to improved water, while the remaining 34.5% have access to unprotected water sources. The main sources of drinking water was protected shallow well for 19.8% of households, HH connection/Stand pipe/Tanker for 21.7% of households and Tube well for 21.1% of the households interviewed. The utmost majority (93%) of the households spend less than one (1) hour collecting water including travel time (on foot) to and from water source and queuing time, while out of this 71.3% spend less than 30 minutes. The mean amount of water used per person per day was 13.6litres. Around 79% of the households do not use any water treatment means to ensure the microbiological water quality before drinking, while only the remaining 21% of households use differ-

ent household level water treatment options. Hand washing practices in the surveyed communities was good in general as over three quarters of the households interviewed wash hands after defecating and before eating. However 30% of the primary care takers interviewed responded that they wash hands after cleaning child faeces, while only 3.5% before breast feeding showing the need to integrate hygiene education in health education and IYCF counselling sessions. A considerable proportion of the households (86%) use improved sanitary facilities.

The findings of the SLNNS 2014 show that over the past five years Sierra Leone has made significant gains in nutrition outcomes thus making impressive progress towards meeting some of the MDG targets associated with child survival outcomes. An absolute reduction in levels of wasting, stunting and underweight in the country are results of improved services in maternal and child health and nutrition showing the combined effective contributions of existing and ongoing health, nutrition, food security and WaSH programs in the country. Further efforts however are mandatory to scale up IYCF practices, and micronutrient supplementation through food fortification of staple foods and promoting locally available and affordable energy dense and micronutrient rich food groups that can easily be accessed by the poorest households in the country.

2. INTRODUCTION

2.1 Geography, Climate and Economy

Sierra Leone is located on the west coast of Africa and covers an area of about 72,000 square kilometers (28,000 square miles). It extends from latitude 7 degrees north to 10 degrees north, and from longitude 10 degrees west to 14 degrees west. The country is bordered by the Republic of Guinea on the north and northeast, and the Republic of Liberia on the east and southeast; while the Atlantic Ocean extends approximately 340 kilometers (211 miles) on the west and southwest.

Administratively, Sierra Leone is divided into four regions. Each region is subdivided into districts, and each district is divided into chiefdoms. Overall, there are 14 districts and 149 chiefdoms. Among the 14 districts, there are five city councils and 14 district councils, including Freetown, the capital, for a total of 19 local councils (SSL, 2006). Sierra Leone has four main physical regions: the Freetown Peninsula's raised beaches and hills, the Coastal Plains, the Interior Lowlands, and the Interior Plateau. The Freetown Peninsula consists of three roughly parallel ranges of highlands that are narrow but extend about 30 kilometers south of Freetown.

The country experiences two main seasons: the dry season, between November and May, and the wet/rainy season, from April/May to November.

The economy of Sierra Leone is predominantly agricultural, which has accounted for about half of the real gross domestic product (GDP). However, the share of the GDP attributed to agriculture has been declining, from about 54 percent in 2009 to less than 53 percent in 2010 and 2011, and with a sharper decline from 47 percent in 2012 to 41 percent in 2013, mainly due to the mining activities in the country during this period. Services are next to agriculture as a major contributor of the GDP, at about 34 percent. The manufacturing sector, consisting mainly of import–substituting industries, accounts for only 2 percent of GDP. The mining sector accounted for less than 6 percent of GDP between 2001 and 2011 but increased to 12 percent of GDP in 2012 (SSL, 2012), due mainly to the discovery and mining of iron ore in 2011 in the Northern region. Coffee, cocoa, and fish are the major agricultural exports of the country.[1]

The performance of the country's economy has been declining since the post-independence era, with its greatest decline during the 10-year civil conflict. Since the end of the conflict in 2002, several measures have been put in place to improve the economy and the quality of life of the people. These include

[1] *Sierra Leone Demographic and Health Survey (DHS) 2013, MOHS Sierra Leone, Statistics Sierra Leone.*

the introduction of five-year development frameworks such as the Poverty Reduction Strategy Papers (PRSP), the Agenda for Change, and the Agenda for Prosperity.

2.2 Context of the Implementation

The Nutrition Situation in Sierra Leone

Malnutrition in Sierra Leone is an important contributor to child mortality and morbidity. While there has been some reduction in malnutrition rates since 2005, data collected on stunting using different types of national surveys between 2010 and 2013 indicated that about 300,000 or one third of all children under five years are stunted and may never achieve their full potential in life. The causes of malnutrition are complex; encompassing dietary quality, caring practices, hygiene and access to effective health care.

Nutritional status is influenced by three broad factors: food, health and care. Optimal nutritional status results when children have access to affordable, diverse, nutrient-rich food; appro¬priate maternal and child-care practices; adequate health services; and a healthy environment including safe water, sanitation and good hygiene practices. These factors directly influence nutrient intake and the presence of disease. The interaction between under-nutrition and infection creates a potentially lethal cycle of worsening illness and deteriorating nutritional status.[2]

Despite all efforts undertaken both nationally and internationally, poor nutritional status is still a fundamental cause of disease and shortened life-span. Most people are aware that many factors are either directly or indirectly responsible for undernutrition, including insecure food supply, lack of basic education, inadequate health services, deteriorated environment, low income, and inadequate empowerment. The factors contributing to malnutrition vary from community to community. Stunted, underweight, and wasted children have an increased risk of death from diarrhea, pneumonia, measles, and other infectious diseases. However, poverty is nearly always an underlying factor.[3]

Low and middle income countries will not be able to break out of poverty or sustain economic advances when so much of their population is unable to achieve the nutritional security that is needed for a healthy and productive life. Undernutrition is estimated to reduce a nation's economic advancement by at least 8% (direct productivity losses, losses via poorer cognition, and losses via reduced schooling). [4]

Comparison of data between the last two rounds of DHS (2008 and 2013) in Sierra Leone shows that there has been significant improvement in many outcome level indicators for health including antenatal care, skilled assistance during delivery, immunization, treatment of childhood diseases etc. However, all this have so far failed to have any impact on the child mortality rate. The only set of indicators constant during the implementation period are related to nutrition.

2.3 Background and Justification

In order to assess the impact of the various interventions designed in addressing the high prevalence of malnutrition in Sierra Leone and to monitor the nutritional status of specific population groups nutrition assessments have been conducted by various stakeholders. In 2010 the first National Nutrition Survey

[2] *Improving Child Nutrition: The Achievable Imperative for Global Progress; New York, USA, UNICEF 2013*

[3] *Black RE, Victora CG, Walker SP et al, Maternal and child nutrition: Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet 2013: 382: 427–51*

[4] *Horton S, Steckel RH. Global economic losses attributable to malnutrition 1990–2000 and projections to 2050. Cambridge: Cambridge University Press, 2013*

using SMART methodology was conducted followed by MICS 2010 and DHS 2013. While conducting these nutrition and health assessments, different approaches, methodologies and tools have been used. Many variations in study design, timing of nutrition surveys, variables assessed and data analysis have been used, making comparison and trend analysis difficult.

Therefore, the MoHS and partners agreed to conduct the second national nutrition survey (NNS) using the internationally recognised methodology, Standardized Monitoring and Assessment of Relief and Transitions (SMART) Methodology for the purpose of standardization of tools used and to enable comparability of methodology and trends in the evolution of nutrition situation in Sierra Leone.

The implementation of national nutrition survey using SMART methodology protocol is believed to enhance the quality, validity and reliability of survey data generated and ultimately enable for comparison and efficient prioritization and targeting of interventions and resources. The Directorate of Food and Nutrition Security at MoHS proposes to conduct SMART surveys at regular times at the same period every two years to obtain data across timelines and therefore enable trend analysis.

The Sierra Leone National Nutrition Survey (SLNNS) 2014 presents the current nutrition situation, analysis of the trends in key nutrition indicators and gauges progress towards the targets set for the Millennium Development Goals (MDGs) and beyond. The NNS also assesses the severity and geographical scope of nutrition related issues. Furthermore, it sets the platform for policy and strategy development to prioritize the programs for short, medium and long term direct and indirect interventions at the national and district level.

Results from this national nutritional survey (NNS) using SMART methodology will further contribute to the National Nutrition Information System (NNIS). As malnutrition is a significant contributor to child mortality, it is critical to have quality information to monitor the evolution of the context and program implementation. The NNIS also uses Integrated Management of Acute Malnutrition (IMAM) program data, community level screening data and other sources of quantitative and qualitative data from government and partners to provide up-to-date information on the nutrition situation in the country. This allows for improved program planning and monitoring for better child survival outcomes.

3. OBJECTIVES OF THE NATIONAL NUTRITION SURVEY

Overall Objective

The Overall objective of the NNS using SMART methodology was to determine and evaluate the current nutrition status of children 6-59 months and Women of reproductive age (15-49 years of age) and the retrospective mortality rate in the population at district level. The SLNNS 2014 further assessed the major contextual factors contributing to malnutrition such as IYCF, Food Security, Water and Sanitation, Hygiene (WaSH) and Health situation in Sierra Leone in order to define program planning priorities for direct and indirect nutrition interventions. This NNS was conducted during the peak of the hunger gap period/lean season, June 30-August 12, 2014.

Specific objectives of the survey are:

1. To generate District level estimates on Acute and Chronic Malnutrition and Under-nutrition in children 6-59 months of age (children 65-110cm Height/Length as proxy for age if age was not known) in Sierra Leone.

2. To assess the District level Maternal Nutrition status in Women of Reproductive age (15-49 years of age).

3. To assess the district level coverage of access to key primary health care services for child survival outcomes: Measles vaccination (in children 9-59 months of age) and Vitamin-A supplementation in children under five years of age in Sierra Leone.

4. To assess the district level two-week retrospective morbidity rate among children under five years of age in Sierra Leone.

5. To assess the district level retrospective mortality (CMR & U5MR) rates (over a 3 months recall period) among the population in Sierra Leone.

6. To assess the district level Infant and Young Child Feeding (IYCF) practices among the mothers/primary Care takers of 0-23.9 months old children in Sierra Leone.

7. To assess the major contextual factors contributing the malnutrition situation such as Food Security, WaSH and Health situation in Sierra Leone.

8. To establish recommendations on actions to be taken to address the situation for planning, advocacy, decision making and monitoring the evolution of the nutrition situation in Sierra Leone.

It was thus believed that the results of this NNS will further serve in monitoring the evolution of the nutrition and health situation in the country. It also provides evidence base on key public health indicators related to malnutrition and the scope of the problem of malnutrition in Sierra Leone for advocacy purposes within the wider international humanitarian and development community in-country and key government stakeholder institutions for sound policy analysis that targets on measurable nutrition outcomes and informed planning on direct and indirect nutrition interventions to this end.

4. METHODOLOGY

4.1 Geographic Target Area and Population

The SLNNS originally targeted all the 14 districts in Sierra Leone. However at the implementation stage two districts, namely Kailahun and Bonthe were excluded due to a national public health emergency because of an Ebola outbreak. Kailahun district was excluded as it was the first affected district and the district was already under blockade by the time the survey field implementation was starting. However Bonthe district was excluded at a later stage mid-way the survey implementation as the survey team was forced to pull out from the district due to a strong resistance by the district community added with a national state of emergency declaration by the president that constrained the teams' movement.

The study population for the NNS were children from the age of 6-59 months old (children 65-110 cm height/length as proxy for age) and Women of reproductive age (15-49 years old) for the anthropometric survey, whereas for the IYCF part of the NNS mothers or care takers of children 0-23.9 months old were targeted. Also Vitamin A supplementation and Measles vaccination were assessed in all households visited. Household interviews were undertaken in every other households to collect contextual information on food security, Water and Sanitation, Hygiene (WaSH) and other primary health care service issues.

4.2 Type of Survey and Survey Design

This NNS based on the SMART methodology followed a cross-sectional study design with a two-stage cluster sampling method using SMART (Standardized Monitoring and Assessment of Relief and Transitions) methodology that was applied to the clusters based on Probability Proportional to Population Size (PPS) at first stage sampling. At the second stage sampling selection of basic sampling units (BSUs) or households in the case of this NNS followed using simple random sampling for rural domains and systematic random sampling for urban domains as appropriate. This was following the fact that the survey was targeted at district level based on the need to have a district level estimate by the MoHS.

Statistics Sierra Leone provided the sampling frame with a list of enumeration areas (EA) along with population information and maps. The master sample that included the list of enumeration areas and population was developed from the 2004 Sierra Leone Population and Housing Census and was updated during the 2013 Demographic and Health Survey. Hence the sampling of the EAs from each statistical domain was drawn from the master sample frame provided by Statistics Sierra Leone.

Apart from Anthropometric measurements key IYCF practices indicators based on WHO standards[5] were used including indicators of key primary health care services (including two weeks retrospective morbidity, Measles immunization coverage, Vitamin-A supplementation access, and treatment seeking behaviour of carers). Additional indicators on contextual factors such as Food Security and WaSH were also used to determine the nutrition situation at district level in Sierra Leone. The sampling procedures, techniques and tools to be applied are described as follows.

[5] *Indicators for assessing infant and young child feeding practices part 2: measurement, WHO 2010*

4.3 Sampling Procedures

4.3.1 First stage sampling

The sample frame data with number and the population of Enumeration Areas (EAs) in an excel spreadsheet was divided into separate spreadsheets detailed by district and region with their respective EA identification number and population size. This was copy-pasted into the planning screen of the ENA Delta software once the data was arranged in the format of the ENA for SMART cluster sampling table. Once the number of clusters was entered and the sampling design box checked on the software to "cluster sampling" the clusters were selected randomly by the application using the population proportionate to size method independently for each domain by using the "assign clusters" function of the software. The selected clusters included 'reserve' clusters selected randomly together with the main clusters by the software based on the % of non-response households anticipated and entered into the planning screen of the ENA for SMART software. The same clusters selected for the anthropometric surveys were used for the assessment of the selected IYCF indicators at district level.

4.3.2 Second stage sampling

Second stage sampling (household selection) utilized a similarly randomized approach referred to as *population listing method*. In the randomly selected clusters part of the survey team in collaboration with the village leaders listed all the households within the village/selected cluster. Simple or Systematic Random Sampling (SRS) method was then applied to select households based on the protocol which was validated by the National Technical Committee for Nutrition Surveys (NTCNS) at the planning stage. Most suitably simple random sampling of households per cluster was used for rural districts/domains and systematic random sampling (following the procedures for selection of households using systematic random sampling method)[6] for urban districts/domains. The interval used for systematic random sampling of households differed based on the number/size of households in each village or selected cluster.

A household was defined as as *'a person or a group of persons, related or unrelated, who live together and share a common source of food and livelihood, and recognize one person as a head'* [7]. Definition of 'Household' was adapted from Sierra Leone DHS surveys for purposes of standardization and consistency with other similar surveys in the country. Uninhabited houses were not counted as households. Inhabited households with no persons presented were counted as a household and if the household members were not nearby nor can be interviewed then "no interview" was recorded on the 'cluster control' form and the questionnaire was retained with the completed questionnaires of the cluster.

In all selected households, all children 6 - 59 months of age were included in the anthropometric survey as agreed by the NTCNS during the validation process of the protocol. In the final household, all children regardless of the required number of children needed per cluster were included. If there were no children in the household, the household remained as part of the sample that contributed zero children to the anthropometric survey. Other data was collected whenever applied as per the agreement during the training session for the survey team. For the IYCF component primary care takers or mothers of all children 0 – 23.9 months were interviewed. The ages of the children were determined using official birth records, such as immunization cards for 98% of all children surveyed while a local calendar of events was used whenever birth records were unavailable.

4.4 Sample Size Determination

The sample size for anthropometric surveys at district level was determined using ENA for SMART software version, November 16th, 2013 by entering all the required data into the planning screen. The data entered in the ENA software included estimated prevalence of malnutrition, desired precision, design

[6] *Measuring Mortality, Nutrition Status, and Food Security in Crisis Situations: SMART Methodology; Version 1, 2006; PP50-53*

[7] *Sierra Leone Demographic and Health Survey, MoHS/SSL; Freetown, Sierra Leone, 2008*

effect, average household size, percentage of under five children and expected proportion (%) of non-response households. The prevalence of malnutrition was estimated using the NNS 2010 survey results conducted in the Country (MoHS 2010)[8] . The sample sizes calculation was based on international guidelines[4,9], for emergency nutrition surveys using SMART methodology using the ENA for SMART November 16th, 2013 version software.

4.4.1 Sample Size for Anthropometric Survey

The sample size for the anthropometric survey of the NNS is calculated based on ENA for SMART Software, November 16th, 2013 Version. Accordingly, the following parameters were considered to estimate the sample size:

a) Under 5 populations: The total under-five population per survey district which was estimated from the total population of each district with projected data based on the intercensal rate of change between that of 1985 and 2004 Censuses, which stands at a rate of 1.8, which was also updated during the 2013 national DHS (obtained from statistics Sierra Leone) was used.
b) Estimated prevalence of malnutrition: This was determined from results of 2010 SMART national nutrition survey.
c) Desired Precision: Based on the estimation of expected prevalence of malnutrition for each district a corresponding precision of 3% was set according to the expected prevalence to enable the survey detect/capture any significant changes since the 2010 NNS.
d) Design effect: This was determined based on information from previous nutrition surveys such as SMART NNS 2010, and other District level SMART Nutrition surveys. A design effect of 1.5 was used for the SMART NNS 2014.
e) Contingency: After the sample has been calculated, the sample size was increased by 5% to account for non-response based on information on access to primary sampling units in order to account for factors such as absence of children, being unable to measure all the children, in cases where children are not present in the house, or disabled, etc) in selected households or having to exclude data from analysis during the cleaning process (Table 4.1).

4.4.2 Sample Size for Mortality Survey

The sample size for the mortality component was calculated using ENA for SMART Software, November 16th, 2013 Version. Accordingly the following parameters were considered:

a) Estimated Crude Mortality Rate (CMR): This was determined from the triangulation of information on reported disease outbreak incidences in the past three months in the district levels (as sampling is done at district level for all indicators used in the survey), however given the lack of most recent information an estimated prevalence of 0.44deaths/10000persons/day was used.[10]
b) Desired Precision: Based on estimation of anticipated crude mortality rate, the desired precision was set to be 0.3 accordingly for all district level combined retrospective mortality surveys in accordance with the estimated prevalence.
c) Design effect: A design effect of 1.5 was set to account for the variation between clusters in rate of mortality.
d) A recall period of 90 days was used to determine the recent mortality estimate in the population of interest (population of the intervention district). Information on average household size (5.9) was used for the respective district based on existing official data.
e) Contingency: a 5% contingency for non-response households was considered to account for missing population for any reasons.

[8] *Sierra Leone National Nutrition Survey, MoHS/UNICEF Sierra Leone; Freetown, Sierra Leone, 2010*
[9] *Emergency Nutrition Assessment: Guidelines for Field Workers, Save the Children, U.K., 2004*
[10] *The Sphere Project: Humanitarian Charter and Minimum Standards in Humanitarian Response; U.K., 2011*

As per the above parameters based on the calculated sample size as the sample sizes for nutrition and mortality components are different, the larger sample size of the two (anthropometry) was used as both components were to be conducted concomitantly by the same team (Table4.1 below).

4.4.3 Sample size for Assessment of IYCF practices

To determine sample size for IYCF indicators in the assessment of IYCF practices among mothers or primary caretakers multiple outcome indicator sampling approach was used. However for the purpose of convenience the sampling of the indicators was done within the already sampled households for anthropometric surveys ("piggybacking") as the procedure was to integrate the IYCF assessment with the anthropometric surveys in the same households and children sampled for anthropometry.[11] Where it was difficult to find prevalence estimates for the selected IYCF indicators at district level maximum prevalence point estimate of 50% was used, which resulted in the maximum sample size for the indicator of interest.

Accordingly IYCF interviews were undertaken in all households anthropometric surveys were conducted. In which case mothers or primary care takers of all eligible children for IYCF assessment (children 0-23.9 months old) per surveyed household for anthropometry were subjected for IYCF practices Interviews. Sample size calculated for IYCF practices is included in the sample size calculation for anthropometric survey sample (***Table 4.1***).

4.4.4 Sample Size for Household Interviews (FS, WaSH, and Health)

As a standard practice in combined nutrition surveys using the SMART Methodology household interviews were conducted in 50% of the households selected for Anthropometry. Accordingly households were sampled for Food Security and WaSH interviews using systematic sampling method of households (every other household sampled for anthropometry was included for household interviews). Data collected during household interviews included Water, Sanitation and Hygiene practices (WaSH), Food security and general health and socio economic contexts in the survey community.

Table 4.1: Sample size calculation for Anthropometric and IYCF survey per district, NNS Sierra Leone, 2014

Province	District/ Domain	Estimated prevalence of GAM (%)	Desired Precision	Design effect	Children to be included by district		Average Household size	% children under-five (2013-DPI)	% non-response HHs	Households to be included by district
					Children 6-59 months (Anthropometry)	Children 0-23.9 months old (IYCF)				
Western Area	Urban Freetown	12.1	3%	1.5	741	329	5.9	16.5	5	891
	Slums Freetown	12.2	3%	1.5	747	332	5.9	16.5	5	897
	W/A Rural	9.9	3%	1.5	622	276	5.9	16.5	5	747
East province	Kenema	12.3	3%	1.5	752	334	5.9	16.5	5	903
	Kailahun*	7.2	3%	1.5	501	223	5.9	16.5	5	602
	Kono	7.7	3%	1.5	501	223	5.9	16.5	5	602
South province	Pujehun	9.9	3%	1.5	622	276	5.9	16.5	5	747
	Bo	11.0	3%	1.5	682	303	5.9	16.5	5	820
	Moyamba	10.3	3%	1.5	644	286	5.9	16.5	5	774

[11] *Infant and Young Child Feeding Practices, Collecting and Using Data: A Step-by-Step guide, Care 2010*

	Bonthe*	9.8	3%	1.5	616	274	5.9	16.5	5	740
North province	Kambia	9.8	3%	1.5	616	274	5.9	16.5	5	740
	Port Loko	10.2	3%	1.5	638	284	5.9	16.5	5	767
	Koina-dugu	8.0	3%	1.5	513	228	5.9	16.5	5	616
	Tonkolili	7.8	3%	1.5	501	223	5.9	16.5	5	602
	Bombali	10.0	3%	1.5	627	279	5.9	16.5	5	754
TOTAL					**9,323**	**4,144**				**11,202**

*The SLNNS was not carried out in these districts (Kailahun and Bonthe) due to a national public health emergency (an Ebola outbreak) which posed a major health risks to the SLNNS team with added movement restriction due to a declaration of national state of emergency by the President of the country.

Table 4.2: Sample size calculation for Retrospective Mortality survey by district, SLNNS 2014

Province	District/ Domain	Estimated CMR /10000/day	Desired Precision	Designed effect	Popula-tion to be included by district	Average House-hold size	% non-response HHs	House-holds to be included by district	House-holds to be included by Province
Western Area	Urban Freetown	0.44	0.3	1.5	3408	5.9	5	608	**1,824**
	Slums Freetown	0.44	0.3	1.5	3408	5.9	5	608	
	W/A Rural	0.44	0.3	1.5	3408	5.9	5	608	
East prov-ince	Kenema	0.44	0.3	1.5	3408	5.9	5	608	**1,824**
	Kailahun*	0.44	0.3	1.5	3408	5.9	5	608	
	Kono	0.44	0.3	1.5	3408	5.9	5	608	
South province	Pujehun	0.44	0.3	1.5	3408	5.9	5	608	**2,432**
	Bo	0.44	0.3	1.5	3408	5.9	5	608	
	Moyamba	0.44	0.3	1.5	3408	5.9	5	608	
	Bonthe*	0.44	0.3	1.5	3408	5.9	5	608	
North province	Kambia	0.44	0.3	1.5	3408	5.9	5	608	
	Port Loko	0.44	0.3	1.5	3408	5.9	5	608	
	Koina-dugu	0.44	0.3	1.5	3408	5.9	5	608	**3,040**
	Tonkolili	0.44	0.3	1.5	3408	5.9	5	608	
	Bombali	0.44	0.3	1.5	3408	5.9	5	608	
					51,120			**9,120**	

Total number of Population and Households to be Included by the Retrospective Mortality Survey

*The SLNNS was not carried out in these districts (Kailahun and Bonthe) due to a national public health emergency (an Ebola outbreak) which posed a major health risks to the SLNNS team with added movement restriction due to a declaration of national state of emergency by the President of the country.

5. TRAINING AND ORGANIZATION

5.1 Training of National Supervisors and Survey Teams

The training for the SLNNS using the SMART methodology was organized in two stages. The first round of training (high profile SMART methodology training) for the national supervisors was undertaken from the 30th of May to the 5th of June 2014 while the second round of training for the Survey teams (Team leaders and Enumerators) was undertaken from June 12th - 17th 2014. The trainings were organized by the MoHS Sierra Leone and UNICEF Sierra Leone country office.

5.1.1 SMART Methodology Training for National Supervisors

A standardized training package (STP) for SMART methodology was used to deliver a high profile training for the national supervisors of SLNNS 2014 which focused on a full package SMART methodology training that involved 9 modules with practical sessions including exercises on data entry, cleaning and quality assurance, analysis and reporting of child anthropometric data using the ENA for SMART software version November 16th, 2013. The training modules were delivered to the participants without any alteration in the contents of the presentation as provided by the Global SMART Initiative and the CDC, supported by practical field experiences by the training facilitator (the consultant). Various training strategies and topical methodologies were employed in the facilitation of the high profile national SMART methodology training.

Pre & post training evaluation tests were administered to assess the scope of knowledge of participants before and after the training. The training assessment also involved a continuous assessment of the participants of the training. This continuous assessment involved tests and recaps every morning on the previous day's sessions (modules), as well as group work practical exercises and case studies to assess the level of knowledge of the participants.

5.1.2 Training of the National Nutrition Survey Team (Enumerators Training)

The contents of the training of the enumerators (NNS survey teams) were focused on the aspects of the survey field implementation; survey field procedures including selection of households and children for anthropometry and IYCF), anthropometric measurement skills, identification of oedema, age determination (using Immunization Cards/and or birth certificates, and using Events Calendar), data collection questionnaires, interview skills and overview of malnutrition and conceptual frameworks of malnutrition. It was aimed at imparting the required knowledge and skills upon the participants for the delivery of high quality data during the implementation process of the NNS. The same materials and tools were used for all the three groups of enumerators to standardize the sessions. Furthermore prior discussions were held between the consultant and the master trainers regarding the each session to ensure the same with one material prepared and provided for the master trainers by the consultant.

Roles play Exercises and discussions on Survey Questionnaires and tools: included Interpretation of questions from each questionnaire into local dialects; Role play exercise on interview skills; what kind of information needs to be collected by each questionnaire, How the sequence and approach of questionnaires should be, and ways to ensure consistency of information between the different questionnaires.

Practical exercise: Standardization Test

This exercise was undertaken during the last two days of the training. The standardization exercise was well organized as there were supervisors assigned to each post and the teams were divided to smaller groups that contained only five posts per room in a well-ventilated room (training hall). The exercise included Anthropometric measurement of children's MUAC, Weight and Height wherein each enumerator took a child's measurement twice for all the three anthropometric body measurements (MUAC, Weight and Height) in the presence of a designated supervisor. Five to Six mothers were assigned at their respective posts with their eligible child (6-59 months old child) and were given child numbers indicating the age and sex of the child. For each post the child's number with respective age and sex and mother's name was posted written in a conspicuous Marker pen.

The supervisors in each child post recorded the readings of each of the enumerator as one enumerator assisted the other and took turns wherein for each post two enumerators were assigned. The enumerators took rounds with anthropometric measurements of all the ten children assigned for the group. Once the supervisor has taken two supervisor's measurements for each of the children for all MUAC, Weight and Height anthropometric measurements each enumerator assigned within the group proceeded with his own measurements.

During the two days standardization exercise four different groups of 10 children 6-59 months old have participated in the standardization exercise as the participants were divided into four smaller groups to ensure proper supervision of the exercise as well as manageability of the exercise. All anthropometric equipments were checked for calibration before the start of the exercise each day.

Each participant entered data into ENA software to run Analysis of the Precision and Accuracy of measurements. The supervisor's measurement was used as reference measurement for the most part while the **observed mean** of the enumerators' measurement was used in cases where children being measured could not complete the supervisor's measurement due to refusals.

Based on the analysis result participants with better measurement precision and accuracy were selected as anthropometrists for the survey. Those with poor measurement precision and accuracy were coupled with stronger anthropometrists as assistant anthropometrists to ensure practical learning to improve their anthropometric measurement skills.

Pilot Survey in Non-selected villages

A pilot field pre-test survey was undertaken in villages that were not included in the actual survey clusters, with similar socio-economic and population demographic profiles. This practical field exercise was carried out after the standardization test and selection of the survey team members based on the pre and post training evaluation test results and the standardization test.

This pilot survey was aimed at pre-testing the survey tools and questionnaires so as to make any necessary adjustments to fit into the context of implementation of the survey as well as subjecting the survey teams to a practical field exercise in the communities to materialize their class room training in terms of field procedures, team management, community rapport and hands-on community level exercise of anthropometric measurement and household interviews. The subsequent adjustments were made based on the feed backs from the survey teams and their respective supervisors assigned to the different communities in the non-selected villages for the actual survey with similar socio demographic and economic profile.

For the purpose of this exercise he teams were divided into 14 teams of 6 and were sent to Six (6) different villages in Western Area using 3 busses on the 20th of June 2014. During this one day exercise each team was assigned a supervisor to supervise the team's activities and provided the necessary guidance in field methodological implementation of the survey.

Based on the results of the pilot survey and subsequent feedbacks from the supervisors and teams from the meetings held with supervisors and team leaders after the pilot exercise, necessary adjustments were made to the questionnaires to fit into the context of implementation. The validated and final versions of the questionnaires were thus used for the actual field implementation of the survey.

6. MANAGEMENT AND COORDINATION OF THE IMPLEMENTATION

6.1 Management Process and Coordination Structure

The survey team consisted of 72 team members and 3 groups (6 teams per district with each team composed of 4 people; 1 team leader, 1 IYCF Interviewer and 2 enumerators). 18 National supervisors wherein each team was assigned 1 supervisor supervised the survey. The supervisors were swapped between rounds of districts to ensure objective supervision and adequate support was provided for each team. The district coordinators assisted by the consultant in technical and management issues coordinated each district survey implementation. The MoHS and UNICEF provided overall coordination support in Logistics provision, community Mobilization and sensitization about the survey.

6.2 Implementation Process and Strategy

The national nutrition survey using the SMART methodology was implemented in 5 rounds of surveys with each round constituting a simultaneous implementation of 3 districts per round of implementation. The survey was managed by the lead technical support of the consultant in planning, coordination and management of the day-to-day data quality and implementation of the NNS. District coordinators from MoHS, UNICEF and WFP (1 District coordinator for each district), with back-stopping support by 1 district coordinator from WHO, were responsible for the management of the field implementation of their respective districts surveys. The NNS was implemented using a simultaneous implementation approach in 3 districts at a time in order to be able to map the nutrition status of the population in a shorter period of time (1 month and half).

6.3 Ethical Considerations

Household heads and primary care takers of children 0-59 months of age as well as Women of reproductive age were given consent forms and verbal consent was sought before either interviews or taking anthropometric measurements.

6.4 Limitations

Community Rejections: Community rejection was a major problem during the implementation of the survey due to an Ebola outbreak in Kailahun district at the early stage of the outbreak which was the period of the field implementation of the NNS. The practical example for this was Bonthe district, the community of which showed massive rejection districtwide and threatened the lives of the survey teams as a result of which the survey in the district was cancelled at an early stage. Such cases were complemented by late community mobilization activities in the respective survey districts at the early stages of the survey.

Bad roads and Terrains: Some of the districts had very bad terrains and roads that resulted in breaking down of survey vehicles thereby constraining movements and posing communication challenges with the survey teams in the field.

Rainy season: The NNS was conducted at a time the country had started experiencing heavy rains, which made some parts of the country inaccessible. Most of the household respondents were also busy with cultivation, as they could not leave their farms to attend to survey teams. Hence the survey teams had to wait for them to return home and stay over in the villages.

Age determination: Although 98% of the children had birth dates recorded from immunization cards and other official records some of these records were faulty and later resulted in some level of errors with age related data, which were as a result excluded from further analysis.

7. DATA COLLECTION, MANAGEMENT AND ANALYSIS

7.1 Data Quality Assurance Process

In order to ensure accurate and reliable anthropometric measurements were taken, survey team leaders and enumerators were subjected to Standardization test after the third day of the training. Based on the results of the test those who had good precision and accuracy in Height, Weight and MUAC measurements from the team were selected as anthropometrists coupled with the ones who had poor results from the exercise.

The next step of the data quality assurance process was the pilot survey (field pre-testing of the survey instruments and survey teams) in a non-selected cluster/village in a nearby district after the training sessions. The precision and the accuracy of the data collected as part of the pre-test was evaluated and feedbacks were provided to the teams. To improve the accuracy in determining dates of child birth, a local events calendar was developed in consultation with the team leaders, enumerators and local authorities) and used for age assessment whenever the mothers or primary caretakers were unable to provide a child card or recall the exact date of birth during the actual survey.

At the end of each day during the data collection all the anthropometric data was entered into the computer using ENA-SMART software by each team leader before leaving the specific cluster whenever possible. Plausibility check was performed on daily basis and feedbacks were provided to each team by the consultant before commencement of the subsequent day's data collection. Accordingly on-spot improvements were made to ensure the quality of the data collection process. Prior to departure to the field all anthropometric data collection equipment's were calibrated each day to ensure high quality data collection and standardization of the data collection process in minimizing systematic and random errors in measurement.

Hard copies of all questionnaires (anthropometric and non-anthropometric) were checked by the national supervisors for completeness and consistency of information between the different sections and sets of questionnaires, both on spot before leaving the surveyed cluster and after returning back to base. The district coordinators made further checks of all questionnaires for each day by the end of data collection for the day's work whenever possible to ensure the quality and completeness of data.

7.2 Type of Data collected, Data Collection Methods and Instruments

7.2.1 Types of Data Collected

Anthropometric data: Anthropometric data was collected from all children within the eligible age range (6-59 months) and Women of reproductive age group (15-49 years of age) using anthropometric questionnaires prepared for each separate. The data that was collected included:

Age: Recorded with birth record and the help of local calendar of events whenever birth records were not available.

Sex: Male or female

Weight: Targeted children were weighed using Seca 881 digital scale with a precision of 100 grams. All children were measured naked following the recommended anthropometric methods.

Women were also weighed after removing shoes, headdresses and any heavy clothing using the same scale. Small children who were not able to stand on the scale were measured in their caregiver's arms using the mother-to-baby function to measure the weight of the child.

Height: children were measured on a measuring board (with a precision of 0.1cm). Children less than 87 cm were measured lying down, while those greater than or equal to 87 cm were measured standing up. A small towel was placed under the child on the board for recumbent length measurements, as on hot days sweat can make children stick to the board causing pinching and complicating the measurement. This allowed the child to slide easily into position for correct measurement. The WHO light weight Microtoise was used to measure women's height.

Mid-upper arm circumference (MUAC): MUAC was measured to the nearest 1mm on the left arm, at the middle point between the elbow and the shoulder (between the olecranon and the tip of the acromium part of the scapula), while the arm was relaxed and hanging by the body's side by using adult MUAC tapes. In the event of a disability the right arm was used. For those who are left-handed MUAC was taken on the right arm. Adult MUAC tapes were used for taking Women's MUAC.

Bilateral oedema: This was assessed by the application of moderate thumb pressure for at least 3 seconds to both feet. Only children with bilateral oedema were recorded as having nutritional oedema.

Measles Vaccination: Measles vaccination status of children 9-59 months was confirmed from their vaccination cards. Care takers were asked to show the vaccination cards of the child and then cards were observed and checked whether or not the child has had measles vaccination. If a child does not have a card, mothers were probed whether they can recall child being vaccinated or not.

Mortality Data: Household level Mortality data was collected using 90 days recall period. The number of deaths during the three months prior to the survey date was recorded retrospectively for all households selected for mortality using the household census method of mortality assessment following international guidelines for combined Nutrition Surveys. Apart from considering the number of people currently in the households, those who were present at the beginning of recall period, births, and deaths, including the number of people who joined or left the households during the recall period was recorded. The information was collected in each households visited for mortality regardless of the presence of children aged 6 to 59 months.

Infant and Young Child Feeding (IYCF) Practices Data: IYCF practices' data was collected on selected key IYCF practices indicators using standardized semi-structured IYCF questionnaires in all households selected for anthropometry. Mothers or primary care takers were interviewed separately for each child in the household eligible for IYCF (Children 0-23.9 months old).

Morbidity Data: Two-weeks retrospective morbidity data was collected from mothers or primary care takers regarding all children included in the anthropometric measurement. The mother/ primary care taker was asked whether or not the child had diarrhea, fever, malaria and/or cough in the two weeks preceding the survey (definition of the above indicators was included in data collection forms). All morbidity data collection were based on mother's or primary care taker's confirmation.

Vitamin-A supplementations: Vitamin-A Supplementation coverage was assessed using a vitamin-A capsule to demonstrate, and a recall period of the last six months before the survey date was used following Sierra Leone MoHS EPI protocols. Mothers were asked whether or not their children had received Vitamin-A in the last 6 months.

Data on Contextual factors: Data was collected on proxy indicators of Food security, water, sanitation and hygiene situation in the survey population to complement the nutrition data, alongside anthropometric and mortality data to triangulate the findings using semi-structured questionnaires.

7.2.2 Data Collection Methods and Instruments

Structured questionnaires were used for anthropometric and mortality surveys. Semi-structured questionnaires and key informant interviews were used to collect quantitative and semi-qualitative data on Infant and Young Child Feeding (IYCF), food security, WaSH and access to primary health care services. For anthropometric surveys the indicators used include: MUAC, Age, Weight, Height, and Bilateral Oedema; and Measles vaccinations to assess immunization coverage.

7.3 Data Management and Analysis

7.3.1 Data Double Entry and Cleaning

After the completion of the fieldwork, all questionnaires were brought to UNICEF country office in Freetown and two pass verification or double data entry was carried out for each questionnaire set to minimize keypunch errors, cleaning and validation of data was finalized for all anthropometric data using ENA for SMART November 6th, 2013 version, while cleaning and validation of Women's anthropometric and all non-anthropometric data was done using MS-Excel, and EPI Data version 3.1 Statistical Software packages. All keying errors were removed from the data by verifying the correct recorded answer from the questionnaires and entering those responses in the third final database.

7.3.2 Data Processing and Analysis

ENA for SMART software November 16th, 2013 version was used to enter and analyse child anthropometric and mortality data. Data with extreme values flagged by the software were excluded from analysis using SMART flags. Data processing and analysis of all non-anthropometric and Women's anthropometric data was done using EPI-Info version 5.3.4 and SPSS version 18 statistical packages.

7.4 Indicators, Case Definitions and Inclusion Criteria

Table7.1: Cut-offs for definition of Wasting, Stunting and underweight

Classification	Acute Malnutrition (Weight for Height)	Chronic Malnutrition (Height for Age)	Underweight (Weight for Age)
Global	<-2 SD and/or bilateral edema	< -2 SD	< -2 SD
Moderate	<-2 SD and ≥ 3 SD	< -2 SD and ≥ -3 SD	< -2 SD and ≥ -3 SD
Severe	<-3 SD and/or bilateral edema	< -3 SD	< -3 SD

For the measures of middle upper arm circumference (MUAC), the standards/cut-offs in the table below are taken from the WHO child growth standards in the identification of severe acute malnutrition in infants and children, 2009.

Table7.2 Cut-offs for definition of acute malnutrition defined by MUAC

Classification	*Cut-offs*	*Interpretation*
Severe Acute Malnutrition (MUAC)	< 11.5 cm and /or bilateral pitting oedema	SAM Children with high risk of mortality
Moderate Acute Malnutrition (MUAC)	11.5 cm ≤ MUAC < 12.5 cm	MAM children with high risk of further severe malnutrition
Not acutely malnourished (MUAC)	MUAC>=125mm and < 135 mm	Children with high risk of malnutrition
Healthy Child (MUAC)	MUAC >= 135 mm	Children with adequate nutritional status

International Classification of adult underweight, overweight and obesity according to the best available measure of adult weight, Body Mass Index (BMI, a measure of body fat based on weight and height) was used to determine nutrition status of Women. The WHO 2004 standard were used for calculation of BMI.

Table 7.3: Cut-offs for definition of adult underweight, overweight and obesity by BMI

Classification	BMI (kg/m2) Cut-offs
Severe thinness	<16.0
Underweight	<18.5
Normal range	18.5 - 24.9
Overweight	≥25.0
Obese	≥30.0

Body Mass Index (BMI) is used to classify underweight, overweight and obesity in adult. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m2). BMI are not age dependent and same cut-offs are used for both sex.

The cut-off points for adult MUAC indicated below in Table 7.4 are based on UNHCR/WFP March 2009 supplementary feeding program guideline for non-pregnant women.

Table7.4: Cut-offs for definition of acute malnutrition defined by MUAC, adult (non-pregnant women)

Classification	*Cut-offs*
Severe Acute Malnutrition (MUAC)	MUAC < 214 mm
Moderate Acute Malnutrition (MUAC)	MUAC >= 214 mm and < 221 mm
Not acutely malnourished (MUAC)	≥ 221 mm

To estimate the vitamin A supplementation access, Measles immunization coverage, and IYCF practices status the following definitions presented below were used.

Table7.4: Definitions of indicators for Vitamin-A Supplementation, Measles immunization, and IYCF

Indicator	*Numerator*	*Denominator*
Vitamin A supplementation	Number of children age 6-59 months who received at least one high-dose vitamin A supplement in the six months preceding the interview	Total number of children age 6-59 months old
Measles immunization	Number of children 9-59 months who received measles vaccine	Total number of children age 9 -59 months old
IYCF Indicators	*Numerator*	*Denominator*
Timely Initiation of breast feeding	Number of children 0-23.9 months who were put to the breast within one hour of birth	*Total number of children 0-23.9 months old*
Exclusive breast feeding under 6 months (24 hour recall)	Number of infants 0-5.9 months who received only breast milk the previous day of interview	*Total number of infants 0-5.9 months*

Timely introduction of complementary feeding ***(24-hour dietary recall)***	Number of infants 6-9 months who received breast milk and a solid or semi-solid food the previous day	*Total number of infants 6-9 months old*
Continued breast feeding at 1 year	Number of children 12-15 months old who received breast milk the previous day	*Total number of children 12-15 months old*
Minimum Meal Frequency (24 dietary recall)	Number of breastfed and non-breastfed children 6-23 months who receive solid, semi-solid or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more	*Total number of breastfed and non-breastfed children 6-23.9 months old*
Minimum Dietary Diversity (24 dietary recall)	Number of children 0-23.9 months who received food from 4 or more food groups	*Total number of children 0-23.9 months old*

Mortality

A 90 days recall period was used to collect mortality data. ENA-smart software was used in data entry and calculations of crude and under five mortality rates. The results are expressed per 10,000 persons per day. It was calculated using the following formula.

Crude mortality Rate (CMR) = 10,000/a*f/ (b+f/2-e/2+d/2-c/2), where:

a= Number of recall days (90)

b= Number of current households resident

c = Number of people who household

d= Number of people who left household joined

e= Number of births during recall

f= Number of deaths during recall period

Thresholds for mortality were defined as follows based on the SPHERE standards.

Level (Classification)	Crude Mortality Rate (CMR)	Under-Five Mortality Rate (UMR)
Alert Level	1/10,000 persons/day	2/10,000 persons/day
Emergency level	2/10,000 persons/day	4/10,000 persons/day

Food Security

a) Food consumption score: Food consumption pattern is computed based on Food Consumption Score (FCS), which is a weighted score of frequency of consumption of food groups and the nutritional value of the food. Based on the FCS, households are classified into food consumption groups as poor, borderline, acceptable.[12]

Food items are grouped into 8 standard food groups with a maximum value of 7 days/week. The consumption frequency of each food group is multiplied by an assigned weight that is based on its nutrient content. Those values are then summed obtaining the Food Consumption Score (FCS). Below is the formula:

FCS = **a** staple **x** staple + **a** pulses **x** pulses + **a** vegetable **x** vegetable + **a** fruit **x** fruit + **a** animal **x** animal + **a** sugar **x** sugar + **a** dairy **x** dairy+ **a** oil **x** oil

Where: FCS = Food consumption score

ai = Frequencies of food consumption = number of days for which each food group was consumed dur-

[12] *Interagency Workshop Report WFP – FAO; Measures of Food Consumption - Harmonizing Methodologies Rome, 9 - 10 April 2008*

ing the past 7 days (7 days was designated as the maximum value of the sum of the frequencies of the different food items belonging to the same food group)
X i = Weight of each food group

b) Household Dietary Diversity Score: Households Dietary Diversity (HDDS) relates to nutrient adequacy (coverage of basic needs in terms of macro and micro nutrients) and to diet variety/balance, which are two of the main components of diet quality. This indictor is used to calculate total number of food groups consumed by members of the household over a reference time period (24 hours recall). For the purpose of this survey 10 food groups for assessment of the HDDS were considered.

8. RESULTS AND DISCUSSION

8.1 Demographic Profile of the Survey Population

8.1.1 Demographic Distribution by Age and Sex

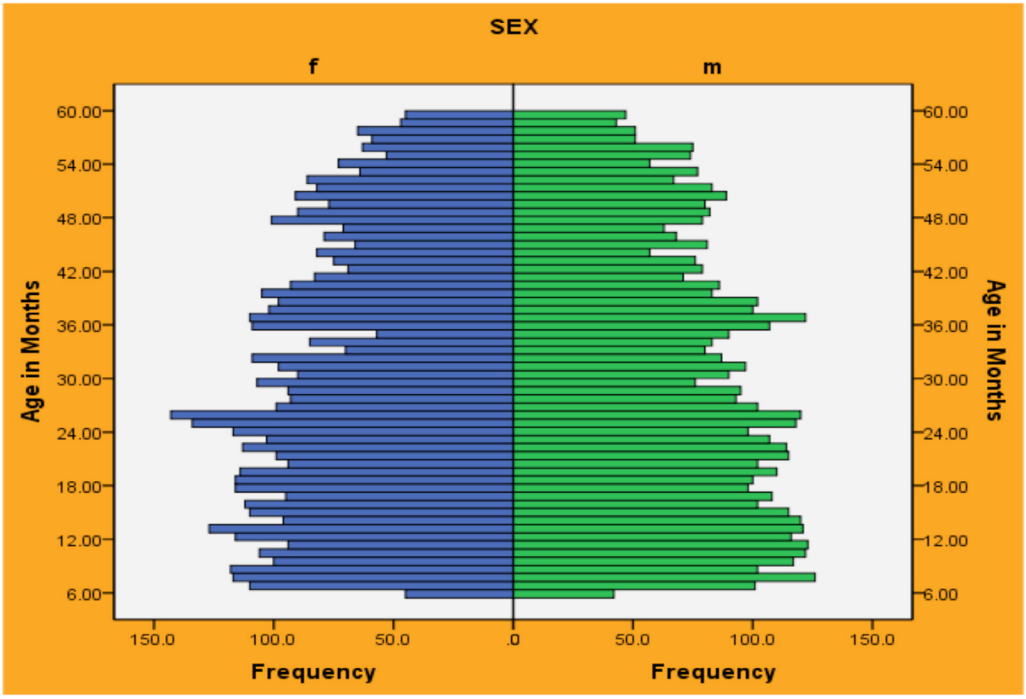
The overall distribution of the sample by age and sex showed that the overall sex ratio was 1.0, (p=0.364), showing that boys and girls were equally represented in the survey (Table 8.1). The NNS follows a statistically valid trend for a normally distributed population, especially children < 5 years. From the 10,975 children 6-59 months old assessed, 49.6% were boys and 50.4% were girls, which is the same with that of the WHO standards for Developing countries (WHO 2004). The overall sex ratio of boys to girls falls within the acceptable range (0.8-1.2) and is equal to 1.0 following the normal demographic distribution.

The proportion of young children (6-29 months) as compared to that of 30-59 months old children was found at 1.10 (expected to be around 0.85), showing the presence of more number of younger children than older ones. A systematic exclusion of older children during the selection of eligible children for anthropometry might as well have contributed to some extent to this effect. This is especially true in case of rural statistical domains where older children spend in the farms with either of thier parents as it was a farming season in the suryed areas. The general demographic trend however shows that this was mainly as a result of increase in birth rate in the most recent years. Below is the population distribution pyramid for children 6-59 months of age from the NNS.

Table 8.1: Distribution of Age and Sex of Children 6-59 months old, SLNNS 2014

AGE (months)	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boys:Girls
6-17	1486	50.8	1441	49.2	2927	26.7	1.0
30-41	1216	49.9	1219	50.1	2435	22.2	1.0
42-53	979	48.2	1051	51.8	2030	18.5	0.9
54-59	382	50.3	377	49.7	759	6.9	1.0
Total	5440	49.6	5535	50.4	10975	100.0	1.0

Figure 8.1: Population age and sex pyramid for Children 6-59 months old, (N=10,975), SLNNS 2014



8.1.2 Response Rate and Geographic Coverage of SLNNS 2014

The current NNS covered 13 statistical domains out of the 15 statistical domains originally planned for accounting for 87% geographic coverage and 90% population coverage in Sierra Leone. Kailahun and Bonthe districts were excluded from the survey at the beginning (Kailahun) stage and mid-way (Bonthe) the NNS implementation as Kailahun district was affected by the Ebola outbreak epidemic and a massive rejection by communities of Bonthe districts. In terms of the selected clusters for the NNS clusters which were not accessible were replaced by reserve clusters resulting in around 90% coverage of clusters/PSUs surveyed per statistical domain.

The proportion of under-five children was found at 1.2 children under-five per household at national level, while the regional averages were found at 1.4 for Southern, 1.3 for WA, 1.2 for Northern and 1 for Eastern provinces/regions. The proportion of children 6-59 months old was at 92% of the total under-five population which also follows international standards for population distribution in developing countries.

The proportion of under-five years old children was found at 19.1% at national level, 20.8% for Western Area, 20.6% for Southern, 15.9% for Eastern, and 17.9% for Northern provinces/regions on average.

The percentage of households with completed Interview was found at 98% (a total of 9,658 households were visited out of the 9,860 households planned in the 13 statistical domains surveyed). The total of 9,860 households does not include Kailahun and Bonthe district as they were excluded from the NNS at different stages of the NNS implementation.

Province	District	No. of HHs Planned*	No. of HHs Surveyed	Total Number of People	No. of Children 6-59 months Sampled	No. of Children 6-59 months Surveyed	Total No. of Children <5 Surveyed	Average No. of Children <5 per HH	Response rate of HHs	Response Rate of Children 6-59 months	% of <5 Children	Average no. of People per HH
	Koinadugu	616	583	3369	513	463	499	0.9	95%	90%	14.8%	5.8
	Bombali	754	660	4516	627	743	823	1.2	88%	119%	18.2%	6.8
Northern	Tonkolili	602	601	3946	501	732	779	1.3	100%	146%	19.7%	6.6
	Kambia	740	728	5109	616	883	900	1.2	98%	143%	17.6%	7.0
	Port-Loko	767	921	6278	638	1038	1191	1.3	120%	163%	19.0%	6.8
Eastern	Kono	602	571	3527	501	493	557	1.0	95%	98%	15.8%	6.2
	Kenema	747	843	5109	752	733	820	1.0	113%	97%	16.1%	6.1
Southern	Moyamba	774	861	5719	644	1020	1186	1.4	111%	158%	20.7%	6.6
	Bo	820	750	4742	682	919	1046	1.4	91%	135%	22.1%	6.3
	Pujehun	747	693	4653	622	793	890	1.3	93%	127%	19.1%	6.7
Western	WA Rural	747	707	4206	622	979	824	1.2	95%	157%	19.6%	5.9
	WA Urban	891	858	5071	741	877	931	1.1	96%	118%	18.4%	5.9
	WA Slum	829	882	6010	747	1318	1465	1.7	106%	176%	24.4%	6.8
National Average**		9636	9658	62255	8206	10975	11911	1.2	98%	134%	19.1%	6.4

*Excluding Kailahun and Bonthe districts
**The national averages are excluding Kailahun and Bonthe districts

8.2 Child Nutrition Status

Anthropometry Results (WHO 2006 Growth References)

The results presented in the body of the report used the WHO 2006 growth reference standards. The estimates of malnutrition are presented for children from 6-59 months of age. The national level estimates presented for all indicators are based on data of all the districts surveyed excluding Kailahun and Bonthe Districts. SMART flags were applied in the analysis of wasting based on MUAC, and Stunting to exclude extreme values that likely resulted from incorrect MUAC measurements or age assessments respectively.

8.2.1 Child Anthropometric Data Quality Evaluation

The evaluation of the quality of child anthropometric data using the ENA for SMART plausibility check analysis shows that the overall score of the data quality for all districts was either "good" or "excellent" except for Kenema which was "acceptable" too (See Table 8.2 below). The criteria included in the quality evaluation analysis were: percentage of missing/flagged data, overall sex ratio, and overall age distribution, digit preference scores for weight, height and MUAC anthropometric measurements, standard deviation for anthropometric indexes, Skewness, Kurtosis and Poisson distribution statistical analysis.

Accordingly moments of Skewness and Kurtosis of the survey data were within acceptable range of +2 and -2 for Skewness showing a symmetrical distribution; and less than the absolute value of 0.2 for kurtosis showing a normal distribution. The standard deviation (SD) of 1.10 for wasting and underweight with no exclusion while it is 1.02 for WHZ and 1.03 for WAZ with SMART flags (using exclusion from observed mean). The SD for stunting was 1.17 (with SMART flags applied). This is within the acceptable range of 0.8 and 1.2 and close to 1, showing the good to excellent quality of the data and subsequently normal distribution of this NNS's data.

Further Statistical evaluation of the Index of Dispersion (ID) and comparison with the Poisson distribution of the data shows that there were pocket cases (aggregation of cases into certain clusters) of underweight and stunting showing that the prevalence of underweight and stunting was not uniformly distributed among the clusters of some of the statistical domains.

A detailed report on the summary of the overall data quality evaluation of the child anthropometric data from the plausibility check analysis of ENA for SMART software version November 16th, 2013 is presented in Annex 3.

District	Overall Quality Score	Quality Level
Bo	3	Excellent
Bombali	13	Good
Kambia	10	Good
Kenema	15	Acceptable
Koinadugu	13	Good
Kono	13	Good
Moyamba	10	Good
Port Loko	10	Good
Pujehun	5	Excellent

8.2.2 Prevalence of Acute Malnutrition (Wasting)

Wasting represents the failure to receive adequate nutrition in the period immediately before the measurements and may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition. In the assessment of acute malnutrition at population level with large scale surveys Weight for Height Z (WHZ) score index is a good indicator of the most recent and current nutrition status, which is complemented by assessment of pitting bilateral edema in children under five years of age.

Assessment of MUAC also provides a good estimate of the level of wasting in a specific population. MUAC is not affected by various body sizes such as Height (thinness). Population groups with longer lower limbs resulting in higher standing to sitting ratio (SSR) tend to be very thin and with very higher proportion of height which affect WHZ based estimates of malnutrition (Mark Myatt, 2008). Thus MUAC is a better predictor of mortality that results from recent illness related with malnutrition and infection as compared to other anthropometric indices. The results of wasting estimates from the NNS are presented in both WHZ scores and MUAC based estimates in the WHO 2006 reference child growth standards.

8.2.2.1 Wasting Prevalence based on WHZ score

The national estimate of wasting was found at a GAM of 4.7% (4.3 – 5.2 95% CI) with severe wasting at 1% (0.9 – 1.2 95% CI) using WHZ Indices in the WHO 2006 Reference standards, while using MUAC cutoffs the level of global wasting prevalence was found at 3.8% (3.4 – 4.4 95% CI). The prevalence of severe wasting was found at 1.1% (0.9 – 1.3 95% CI) in the WHO 2006 Reference Standards, (N=10973).

Table 8.4: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex, SLNNS 2014

Acute malnutrition Categories	All n = 10973	Boys n = 5441	Girls n = 5532
Prevalence of global malnutrition (GAM) (<-2 z-score and/or oedema)	(516) 4.7 % (4.3 - 5.2 95% C.I.)	(308) 5.7 %* (5.0 - 6.4 95% C.I.)	(208) 3.8 %* (3.3 - 4.3 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(403) 3.7 % (3.3 - 4.1 95% C.I.)	(245) 4.5 % (3.9 - 5.1 95% C.I.)	(158) 2.9 % (2.4 - 3.4 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(113) 1.0 % (0.9 - 1.2 95% C.I.)	(63) 1.2 % (0.9 - 1.5 95% C.I.)	(50) 0.9 % (0.7 - 1.2 95% C.I.)

The prevalence of oedema is 0.1 % *P=0.000

Comparison between the nutrition status of boys and girls in terms of wasting (Table 8.4 above) shows a statistically significant difference (p=0.000) between boys and girls in the level of global wasting (GAM) where boys were found to be more acutely malnourished than girls. Global wasting in boys was found at 5.7% (5.0- 6.4 95% CI), while it was found at a GAM of 3.8% (3.3- 4.3 95% CI) in girls. Further comparison of severe wasting between boys and girls kshowed that there is no significant difference (p=0.132) in severe wasting was observed between boys and girls. The level of severe wasting in boys was found at 1.2% (0.9- 1.5 95% CI), while it was at 0.9% (0.7- 1.2 95% CI) in girls.

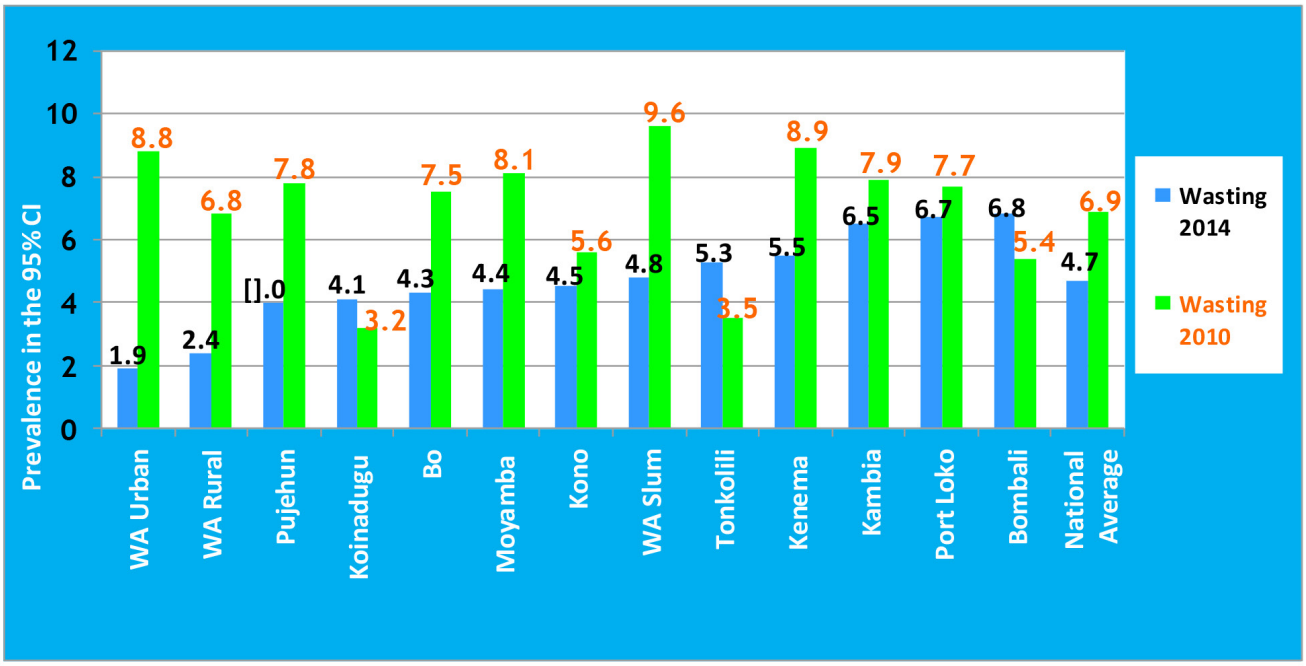
There were 6 oedema cases identified during the data collection of the NNS. The Mean ± SD of WHZ was found to be -0.14±1.10 which is within the acceptable range of 0.8-1.2 SD, and close to 1 SD, which follows that of a good quality survey as the SD is close to 1SD.

Table 8.4: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex, SLNNS 2014

Province	District	N	Global Acute Malnutrition (WHZ <-2, and/or edema)	Moderate Acute Malnutrition (WHZ <-2 & >=-3, no edema)	Severe Acute Malnutrition (WHZ <-3, and/or edema)
Western	Urban	877	1.9% (1.2 - 3.1)	1.8% (1.1 - 3.0)	0.1% (0.0 - 0.9)
	Slums	1317	4.8% (3.8 - 6.0)	3.9% (3.0 - 5.1)	0.8% (0.4 - 1.6)
	Rural	979	2.3% (1.6 - 3.5)	1.6% (1.0 - 2.7)	0.7% (0.3 - 1.8)
Eastern	Kono	490	4.5% (2.7 - 7.4)	4.1% (2.4 - 6.9)	0.4% (0.1 - 1.7)
	Kenema	729	5.5% (3.6 - 8.4)	3.8% (2.4 - 6.0)	1.6% (0.9 - 3.0)
	Pujehun	791	4.0% (3.0 - 5.4)	3.8% (2.8 - 5.1)	0.3% (0.1 - 1.0)
Southern	Bo	918	4.3% (2.9 - 6.2)	3.7% (2.4 - 5.6)	0.5% (0.2 - 1.3)
	Moyamba	1015	4.4% (3.3 - 5.9)	3.0% (2.1 - 4.1)	1.5% (0.8 - 2.7)
	Kambia	883	6.5% (4.6 - 8.9)	5.0% (3.5 - 7.0)	1.5% (0.8 - 2.7)
	Port Loko	1038	6.7% (5.2 - 8.7)	5.7% (4.4 - 7.4)	1.1% (0.6 - 1.8)
Northern	Koinadugu	461	4.1% (2.5 - 6.8)	2.6% (1.4 - 4.7)	1.5% (0.6 - 3.5)
	Tonkolili	732	5.3% (3.9 - 7.3)	3.7% (2.6 - 5.3)	1.6% (0.9 - 2.9)
	Bombali	739	6.8% (5.1 - 9.0)	4.7% (3.5 - 6.4)	2% (1.1 - 3.7)
National Average*		10973	4.7% (4,3 – 5,2)	3.7% (3.3 - 4.1)	1.0% (0.9 - 1.2

*The National Averages are excluding Kailahun and Bonthe districts.
The numbers in bracket are 95% Confidence Intervals (CI)

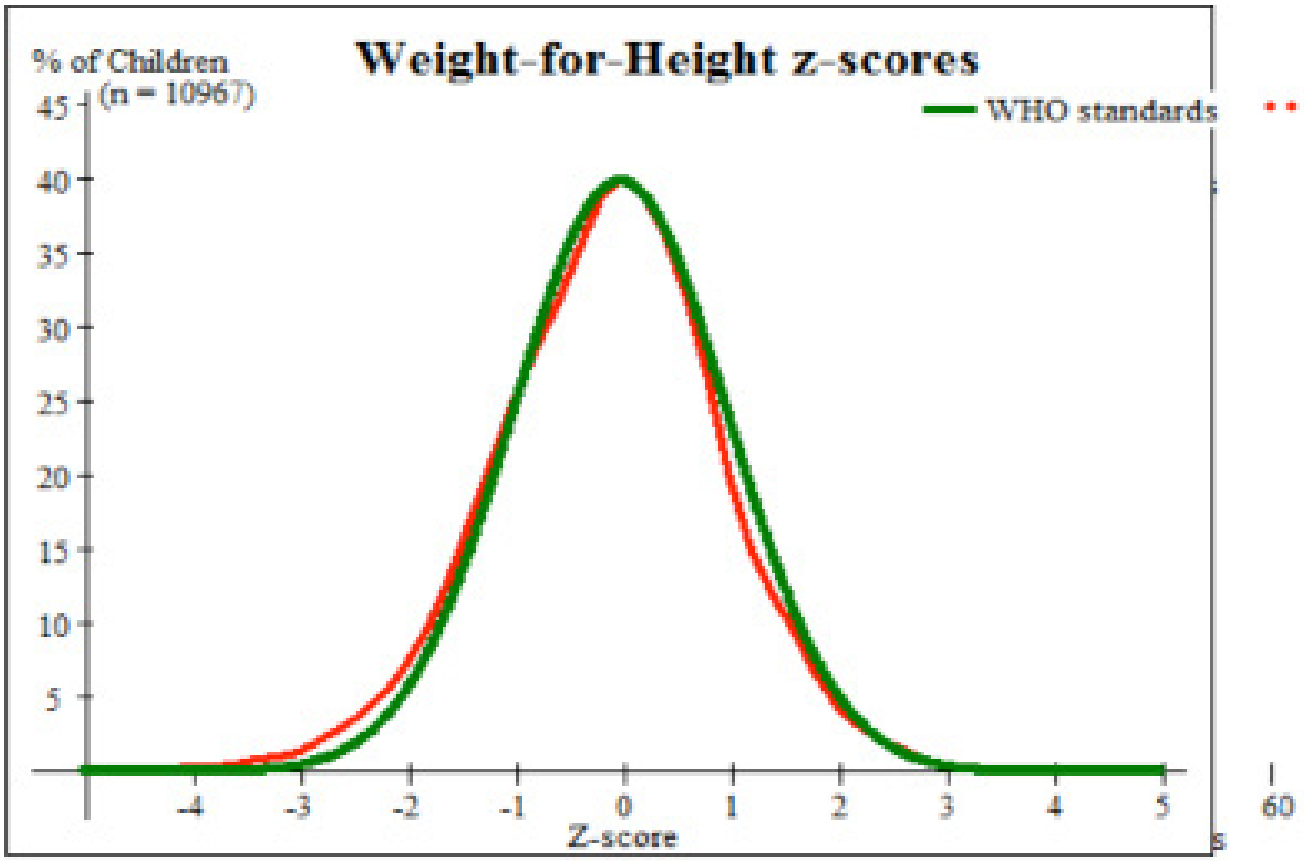
Figure 8.2: Comparison of wasting estimates between 2010 and 2014 by District, Sierra Leone, WHO 2006



Comparison in the prevalence of wasting between the 2010 National Nutrition Survey implemented using the SMART methodology with the current NNS shows that there were significant improvements made in each district in the level of wasting (See Figure 8.2 above). Thus a statistically significant difference (p=0.000) was observed between the nutrition status of children 6-59 months of age in terms Wasting between 2010 and 2014.

Portrayed in the Gaussian curve graph below ***(Figure 8.3)*** is the distribution of wasting in children 6-59 months old from the current national nutrition survey.

Figure 8.3: Gaussian Curve distribution of wasting in children 6-59 months, SLNNS 2014



The above Frequency Distribution Curve of WHZ Scores of the surveyed children 6-59 months shows that the distribution of Weight-for-Height follows that of the WHO 2006 reference population and a natural Gaussian distribution.

8.2.2.2 Wasting Prevalence based on MUAC cutoffs

The national prevalence of wasting based on MUAC cutoffs was estimated at 3.8% (3.4- 4.4. 95% CI), (N=10,973). No statistically significant difference (p=0.076) in global wasting was observed between boys and girls in the level of wasting using MUAC indicators. Wasting in boys was found at 3.4% (2.9- 4.1 95% CI) while it was found at 4.2% (3.6- 4.9 95% CI) in girls.

The national prevalence of severe wasting using MUAC cutoffs was estimated at 1.1% (0.9- 1.3 95% CI). No significant difference (p=0.132) in severe wasting was observed between Boys and girls (see the cummulative distribution curve in Figure 8.4 below). The level of severe wasting was estimated at 0.9% (0.7- 1.2 95% CI) in boys while it was estimated at 1.2% (1.0- 1.6 95% CI) in girls.

Figure8.4: Cumulative distribution of MUAC between Boys and Girls, (WHO 2006), SLNNS 2014

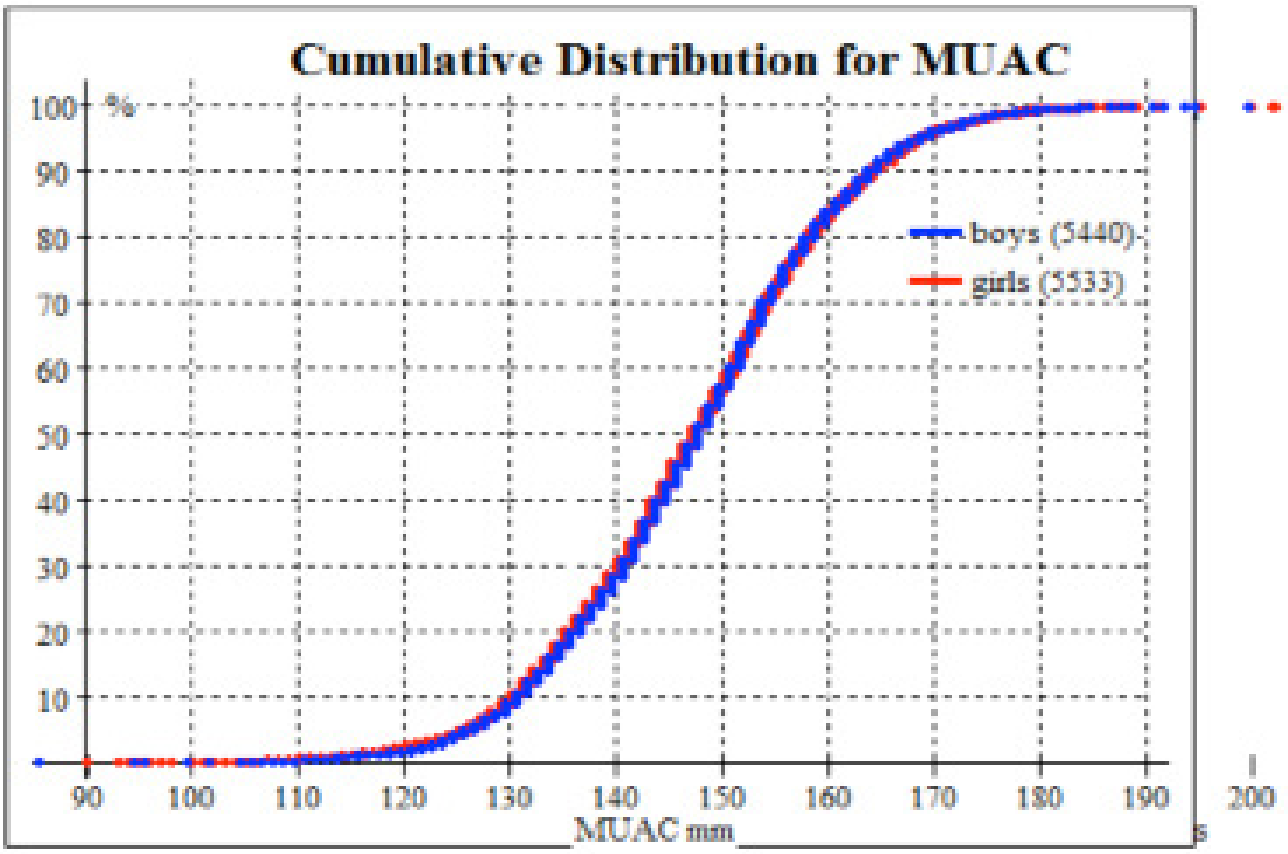


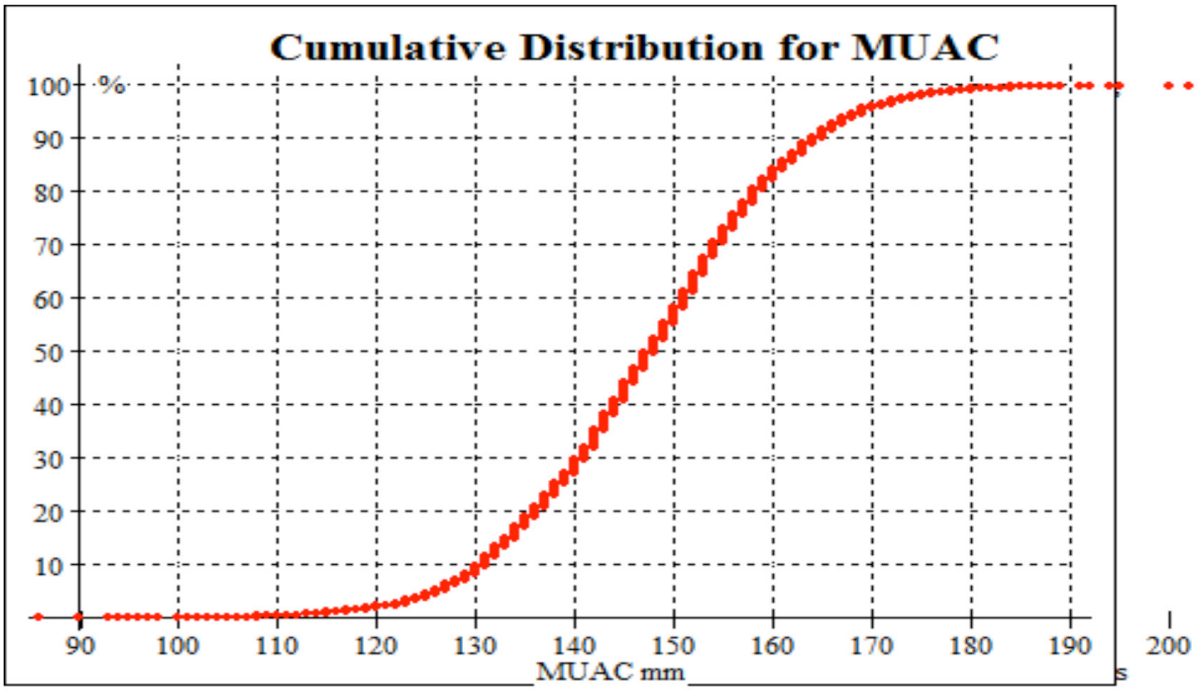
Table 8.6: Prevalence of acute malnutrition based on MUAC cutoffs in children 6 to 59 months of age by district (WHO 2006), SLNNS 2014

Province	District	N	Global Acute Malnutrition	Moderate Acute Malnutrition (WHZ <-2 & >=-3, no edema)	Severe Acute Malnutrition (WHZ <-3, and/or edema)
Western	Urban	877	1.3% (0.6- 2.6)	1.0% (0.4- 2.3)	0.2% (0.0- 1.7)
	Slums	1318	2.4% (1.6- 3.7)	1.9% (1.2- 2.9)	0.5% (0.2- 1.2)
	Rural	979	2.3% (1.4- 3.9)	1.6% (1.0- 2.7)	0.7% (0.3- 1.6)
Eastern	Kono	493	3.0% (1.8- 5.1)	2.4% (1.4- 4.3)	0.6% (0.2- 1.9)
	Kenema	733	5.5% (3.4- 8.7)	3.5% (2.1- 5.9)	1.9% (1.0- 3.5)
Southern	Pujehun	793	5.0% (3.3- 7.5)	4.2% (2.6- 6.6)	0.9% (0.4- 2.2)
	Bo	919	3.3% (2.0- 5.4)	2.2% (1.3- 3.8)	1.1% (0.5- 2.4)
Northern	Moyamba	1020	5.0% (3.2- 7.8)	3.1% (2.0- 4.9)	1.9% (1.0- 3.4)
	Kambia	882	4.6% (2.9- 7.3)	3.5% (2.2- 5.5)	1.1% (0.5- 2.4)
	Port Loko	1038	5.5% (4.0- 7.5)	4.1% (2.9- 5.8)	1.3% (0.8- 2.2)
	Koinadugu	462	2.8% (1.4- 5.7)	1.7% (0.8- 3.7)	1.1% (0.4- 3.1)
	Tonkolili	732	6.6% (4.4- 9.6)	4.8% (3.1- 7.2)	1.8% (1.0- 3.3)
National Average*		10989	3.8% (3.4- 4.4)	2.8% (2.4- 3.2)	1.1% (0.9- 1.3)

The numbers in bracket are 95% Confidence Intervals (CIs)

* The national averages are excluding Kailahun and Bonthe Districts

Figure 8.5. Cumulative distribution of Wasting based on MUAC, SLNNS 2014



Age Disaggregated Prevalence of Wasting in Children 6-59 months old

The age disaggregated prevalence of wasting portrayed in Table 8.7 below shows that the prevalence of wasting is high in young children at early stage in life. This shows inadequate level of predominant breast feeding and optimal complementary feeding practices in the survey population.

Table 8.7: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema, SLNNS 2014

Age (months)	Total no.	Global Wasting (<-2 z-score)		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No	%	No.	%	No.	%	No.	%	No.	%
6-17	2924	248	8.5	55	1.9	193	6.6	2674	91.5		0.1
18-29	2822	140	5.0	28	1.0	112	4.0	2680	95.0	2	0.1
30-41	2428	66	2.7	14	0.6	52	2.1	2360	97.2	2	0.1
42-53	2029	42	2.1	6	0.3	36	1.8	1987	97.9	0	0.0
54-59	759	14	1.8	4	0.5	10	1.3	745	98.2	0	0.0
Total	**10962**	**510**	**4.7**	**107**	**1.0**	**403**	**3.7**	**10446**	**95.3**	**6**	**0.1**

A) Prevalence of Wasting in Children 6-24 months of Age

The prevalence of wasting in children 6-24 months old was found at GAM of 7.8% (7.0- 8.7 95% CI) with severe wasting at 1.8% (1.5- 2.2 95% CI) based on WHZ scores in the WHO 2006 reference standards, (N=4,323). The Mean ± SD of WHZ was found to be -0.35±1.19 which is within the acceptable range of 0.8-1.2 SD, and close to 1 SD.

Global wasting in boys 6-24 months old was found at 9.0% (7.8-10.4 95% CI), while it was 6.6% (5.7- 7.7 95% CI) in girls of the same age group, based on WHO 2006 reference standards. A statistically significant difference (p=0.004) was observed between boys and girls 6-24 months of age in the level of global wasting (GAM) where boys were found to be more acutely malnourished than girls of the same age group. Severe wasting in boys 6-24 months old was found at 2.1% (1.6- 2.6 95% CI) while it was 1.5% (1.0- 2.1 95% CI) in girls of the same age group. No significant difference (p=0.113) in Severe Wasting was observed between Boys and Girls.

Based on MUAC cut-offs the level of global wasting in children 6-24 months old was found at 8.2% (7.1-9.4 95% CI), while the prevalence of severe wasting was found at 2.3% (1.9- 2.8 95% CI) in the WHO 2006 reference standards.

B) Prevalence of Wasting in Children 24-59 months of Age

The prevalence of wasting in children 24-59 months old children was found at GAM of 2.7% (2.3- 3.1 95% CI) with severe wasting at 0.5% (0.4- 0.7 95% CI) based on WHZ scores in the WHO 2006 Reference standards, (N=6,639). The Mean ± SD of WHZ was found to be -0.01±1.01 which is within the acceptable range of 0.8-1.2 SD, and close to 1 SD.

Global wasting in boys 24-59 months old was found at 3.4% (2.7- 4.2 95% CI), while it was found at 2.0% (1.5- 2.6 95% CI) in girls of the same age group. A statistically significant difference (p=0.003) was observed between boys and girls in the level of global wasting (GAM) where boys were found to be more acutely malnourished than girls. Severe wasting in boys 24-59 months old was found at 0.6% (0.3- 1.0 95% CI) while it was found at 0.5% (0.3- 0.8 95% CI) in girls of the same age group. No statistically significant difference (p=0.648) in Severe Wasting was observed between boys and girls in this age group.

Based on MUAC cut-offs the level of global wasting prevalence was found at 1.0% (0.8- 1.4 95% CI), (N=6,647), while the prevalence of severe wasting was found at 0.3% (0.2- 0.5 95% CI) in the WHO 2006 reference standards.

8.2.3 Prevalence of Chronic Malnutrition (Stunting)

Stunting reduces a child's chance of survival, while also hindering optimal health and growth. It is associated with sub-optimal brain development, which is likely to have long-lasting harmful consequences for cognitive ability, school performance and future earnings. A stunted child enters adulthood with a greater propensity for developing obesity and chronic diseases. This in turn affects the development potential of a nation.

Stunting or height-for-age is an indicator of linear growth retardation and cumulative growth deficits. Stunting reflects the failure to receive adequate nutrition over a long period of time and is also affected by recurrent and chronic illness. Height-for-age represents the long-term effects of malnutrition in a population and is not sensitive to recent, short-term changes in dietary intake.

Accordingly the results of the current NNS the national prevalence of Stunting in Sierra Leone was found at 28.8% (27.5 – 30.2 95% CI) using HAZ scores in the WHO 2006 reference standards. Comparison of the prevalence of stunting between boys and girls showed a statistically significant difference (p=0.000) in the level of global stunting where boys were found to be more chronically malnourished than girls (Table 8.8 below). The prevalence of stunting in boys was found at 32.4% (30.9-34.0 95%, while it was at 25.3% (23.8-26.9 95% CI) in girls.

Table 8.8: Sex disaggregated prevalence of stunting based on height-for-age z-scores, SLNNS 2014

Stunting Categories	All (n = 10630)	Boys (n = 5267)	Girls (n = 5363
Prevalence of stunting (<-2 z-score)	(3062) 28.8 % (27.5 - 30.2 95% C.I.)	(1705) 32.4 %* (30.9 - 33.9 95% C.I.)	(1357) 25.3 %* (23.8 - 26.9 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(2231) 21.0 % (19.9 - 22.1 95% C.I.)	(1233) 23.4 % (22.0 - 24.9 95% C.I.)	(998) 18.6 % (17.4 - 19.8 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(831) 7.8 % (7.2 - 8.5 95% C.I.)	(472) 9.0 %** (8.1 - 10.0 95% C.I.)	(359) 6.7 %** (5.9 - 7.6 95% C.I.)

*p=0.000 **p=0.000

The national prevalence of severe stunting was found at 7.8% (7.2 – 8.5 95% CI) using HAZ scores in the WHO 2006 reference standards. Comparison of the level of severe stunting between boys and girls shows the presence of a statistically significant difference (p=0.000), meaning boys were more severely stunted than girls (Table 8.8 above). The level of severe stunting in boys at national level was at 9.0% (8.1-10.0 95% CI), while it was at 6.7% (5.9- 7.6 95% CI) in girls using HAZ scores in the WHO 2006 reference standards.

Table 8.9: Prevalence of overall, moderate and severe Stunting (Height-for-Age) in children 6 to 59 months of age by District (WHO 2006)

Province	District	N	Prevalence of Stunting	Moderate Acute Malnutrition (WHZ <-2 & >=-3, no edema)	Severe Acute Malnutrition (WHZ <-3, and/or edema)
Western	Urban	872	17.4% (12.8-23.2)	13.3% (9.7-17.9)	4.1% (2.7- 6.2)
	Slums	1292	17.0% (13.6-21.0)	13.5% (10.6-17.1)	3.4% (2.5- 4.7)
	Rural	936	22.3% (19.2-25.8)	18.4% (15.6-21.5)	4.0% (2.7- 5.7)
Eastern	Kono	469	30.1% (23.8-37.2)	19.8% (15.7-24.7)	10.2% (6.5 -15.7)
	Kenema	695	39.6% (34.4-45.0)	26.5% (23.0-30.3)	13.1% (10.3-16.5)
Southern	Pujehun	783	41.0% (35.3-46.9)	30.7% (26.3-35.4)	10.3% (7.7-13.8)
	Bo	896	22.7% (17.0-29.5)	17.6% (13.0-23.4)	5.0% (3.3- 7.6)
	Moyamba	984	34.5% (31.1-38.0)	24.1% (21.8-26.5)	10.4% (8.0-13.3)
	Kambia	832	28.2% (22.7-34.5)	20.7% (16.5-25.6)	7.6% (5.6-10.2)
Northern	Port Loko	1032	32.2% (27.6-37.1)	23.2% (19.9-26.8)	9.0% (6.8-11.8)
	Koinadugu	442	27.4% (22.0-33.4)	19.5% (15.5-24.1)	7.9% (5.1-12.0)
	Tonkolili	712	41.2% (35.9-46.6)	26.0% (22.1-30.3)	15.2% (12.3-18.6)
	Bombali	703	33.3%(28.3-38.7)	24.8% (20.6-29.5)	8.5%(6.4 - 11.3)
National Average		10,630	28.8% (27.5-30.2)	21.0% (19.9-22.1)	7.8% (7.2- 8.5)

The numbers in bracket are 95% CI

The Mean ± SD of HAZ was found to be -1.31 ± 1.17 (with SMART flags applied) which is within the acceptable range of 0.8-1.2 SD, and close to 1 SD.

The highest stunting prevalence was found in Pujehun and Tonkolili districts with a Stunting Prevalence of 41% and 41.2% respectively based on HAZ WHO 2006 Reference standards. The Lowest Stunting Prevalence was found in WA Slum and WA Urban in the order of 17% and 17.4% based on HAZ WHO 2006 Reference Standards. The Highest Severe Stunting was found in Tonkolili at 15.2% while the Lowest was found in WA Slum at 3.4% based on HAZ WHO 2006 reference standards.

Age Disaggregated Prevalence of Stunting in Children 6-59 months of age

The age disaggregated prevalence of stunting (Table 8.10 below) shows that the level of stunting peaks in children between 18-41 months of age, which is a composite effect of lack of optimal IYCF practices complemented by poor dietary intake later as the child gets older.

Table 8.10: Age disaggregated prevalence of stunting based on height-for-age z-scores, SLNNS 2014

Age (months)	Total no.	Stunting (<-2 z-score)		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
		No	%	No.	%	No.	%	No.	%
6-17	2797	692	24.7	188	6.7	504	18.0	2105	75.3
18-29	2727	902	33.1	251	9.2	651	23.9	1825	66.9
30-41	2364	778	32.9	218	9.2	560	23.7	1586	67.1
42-53	1984	532	26.8	139	7.0	393	19.8	1452	73.2
54-59	745	156	21.0	34	4.6	122	16.4	589	79.1
Total	**10617**	**3060**	**28.8**	**830**	**7.8**	**2230**	**21.0**	**7557**	**71.2**

A) Stunting prevalence in Children 6-24 months of age

Under-nutrition's most damaging effect occurs during pregnancy and in the first two years of life, and the effects of this early damage on health, brain development, intelligence, educability, and productivity are largely irreversible.[13] Thus stunting introduced at this point in the life of an individual is both irreversible and results in massive economic loss as a result of reduced productivity.[14]

From the current NNS, the prevalence of stunting in children 6-24 months of age was found to be at 26.7% (25.2-28.2 95% CI) with Severe Stunting at 6.8% (6.1- 7.6 95% CI) based on HAZ Indices in the WHO 2006 Reference standards, (N=4,140). The level of stunting in boys 6-24 months was found at 30.6% (28.7-32.5 95% CI), while it was 22.7% (20.5-24.9 95% CI) girls of the same age group. A statistically significant difference (p=0.000) was observed between boys and girls in the level of stunting where boys were found to be more stunted than girls. Further in-depth qualitative study could better explain the disparity between boys and girls in stunting in particular and undernutrition in general.

Severe stunting in boys 6-24 months of age was found at 8.2% (7.2- 9.3 95% CI), while it was found at 5.4% (4.4- 6.6 95% CI) in girls of the same age group. A statistically significant difference (p=0.000) was observed between Boys and Girls in the level of Severe stunting in children 6-24 months of age, where Boys were found to be more Severely Stunted than girls.

B) Stunting prevalence in Children 24-59 months of age

The prevalence of stunting in children 24-59 months old was estimated at 30.3% (28.5-32.2 95% CI) with Severe Stunting at 8.6% (7.7- 9.5 95% CI) based on HAZ scores in the WHO 2006 reference standards, (N=6,484). The Mean ± SD of HAZ was found to be -1.38±1.15 (with SMART flags applied) which is within

[13] *Repositioning Nutrition as Central to Development: A Strategy for Large scale action; World Bank 2006*

[14] *The Cost of Hunger in Africa: Social and Economic impact of Child Under-nutrition; AUC, UNECA, WFP 2013*

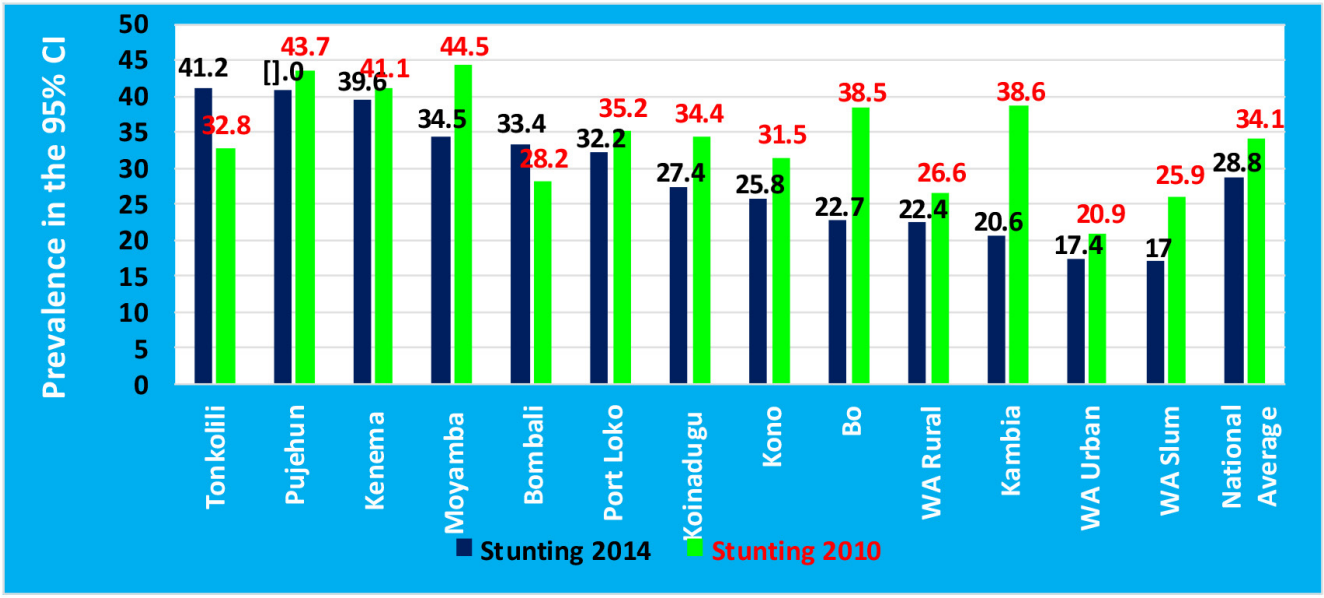
the acceptable range of 0.8-1.2 SD, and close to 1 SD.

A statistically significant difference (p=0.000) was observed between boys and girls in the level of stunting where boys were found to be more stunted than girls. The prevalence of stunting in boys 24-59 months old was 33.7% (31.4-36.0 95% CI) while it was found to be 27.1% (25.1-29.1 95% CI) in girls of the same age group. Similarly a statistically significant difference (p=0.031) was observed between Boys and Girls 24-59 months old in the level of severe stunting where boys were found to be more severely stunted than girls. Severe stunting in boys 24-59 months old was at 9.6% (8.2-11.1 95% CI) while it was 7.6% (6.6- 8.8 95% CI) in girls 24-59 months of age.

Comparison of Prevalence of Stunting between 2010 and 2014 in Sierra Leone

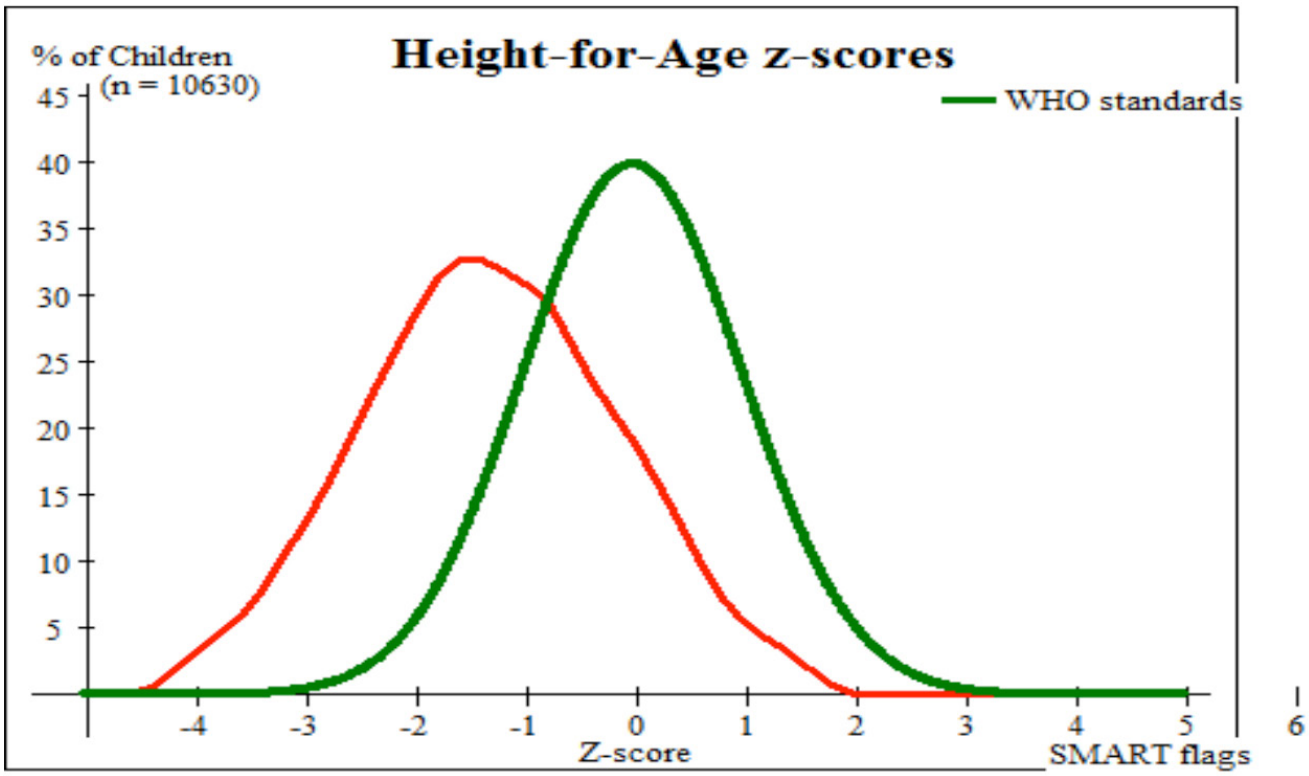
The comparison of the prevalence of stunting between 2010 and 2014 by district as portrayed in the figure below shows that there were impressive improvements in some of the districts such as Kambia, Bo and Western Area Slum parts, and Moyamba while an increase in the level of stunting was observed in districts such as Bombali and Tonkolili.

Figure 8.6: Stunting in Children 6-59 months old between 2010 and 2014, Sierra Leone



Further test of significance between the national averages of 2010 and 2014 NNSs also showed a statistically significant difference (p=0.000) in stunting prevalence in Sierra Leone. This huge improvement in reducing stunting over the past four years is contributed by the positive development endeavors in the country complemented by the corresponding nutrition and health programs.

Figure 8.7: Gaussian curve distribution of stunting in children 6-59 months old, Sierra Leone, N=10630, WHO 2006 standards



The above Frequency Distribution Curve based on WHO 2006 reference standards is skewed to the left to that of the Reference population showing that the survey population was relatively more stunted than the reference population.

Even though 98% of all the children had exact birth dates from official records aberrant data as a result of wrong recording of the birth dates on official birth certificates and immunization cards by health facility workers, which resulted in some erroneous age assessments, were excluded from analysis applying the SMART Flags.

8.2.4 Prevalence of Under-weight

Weight-for-age is a composite index of height-for-age and weight-for-height. It takes into account both acute and chronic malnutrition. While underweight or weight-for-age is used for monitoring the Millennium Development Goals (MDGs), it is no longer in use for monitoring individual children as it cannot detect children who are stunted but of normal weight and does not detect acute malnutrition that threatens children's lives.

The national prevalence of underweight among children 6-59 months of age was found at 12.9% (11.9 - 14.0 95% C.I.), which is pretty much close to the MDG1target of 12%, with severe underweight prevalence at 3.2% (2.7 - 3.7 95% C.I.) based on WAZ-scores in the WHO 2006 reference standards, (N=10,983). The Mean ± SD of WAZ was found to be -0.82±1.10 which is within the acceptable range of 0.8 - 1.2 SD, and close to 1 SD, indicating that the NNS for Weight-for-Age indices data was normally distributed.

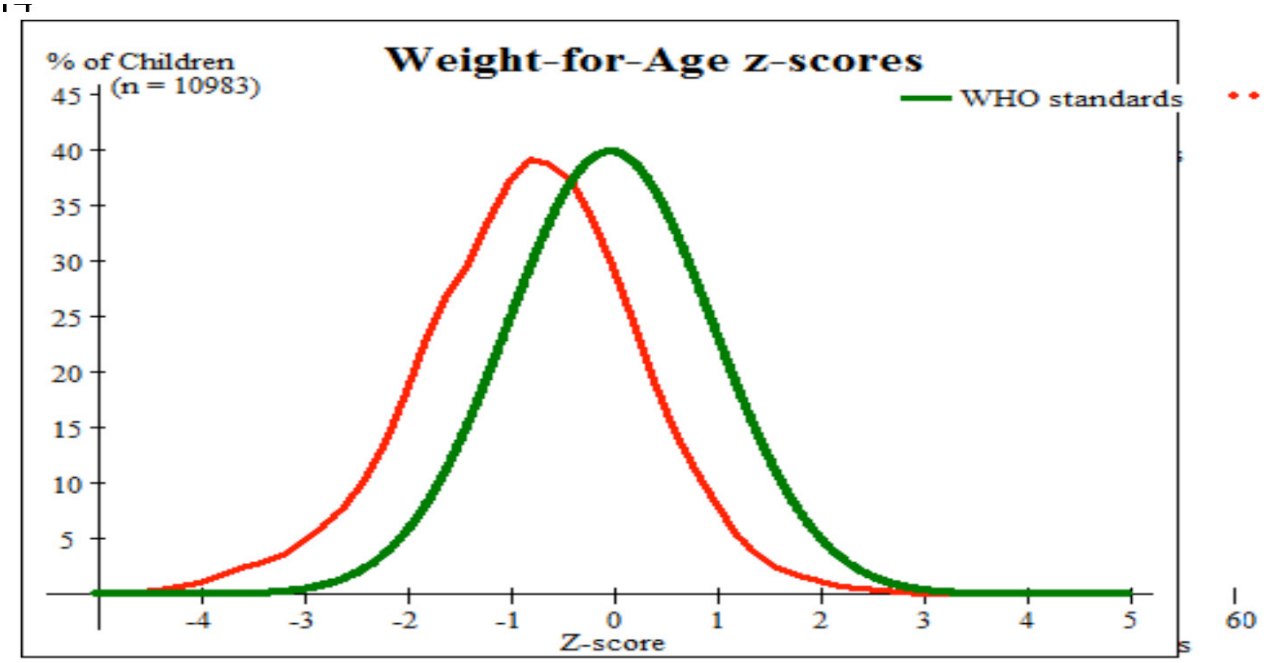
Table 8.11: Prevalence of underweight based on weight-for-age z-scores by sex, SLNNS 2014

Underweight Categories	All (n = 10,983)	Boys (n = 5,444)	Girls (n = 5,539)
Prevalence of underweight (<-2 z-score)	(3062) 28.8 % (27.5 - 30.2 95% C.I.)	(1705) 32.4 %* (30.9 - 33.9 95% C.I.)	(1357) 25.3 %* (23.8 - 26.9 95% C.I.)
Prevalence of moderate under-weight (<-2 z-score and >=-3 z-score)	(1073) 9.8 % (9.0 - 10.6 95% C.I.)	(598) 11.0 % (10.0 - 12.1 95% C.I.)	(475) 8.6 % (7.7 - 9.5 95% C.I.)
Prevalence of severe under-weight (<-3 z-score)	(346) 3.2 % (2.7 - 3.7 95% C.I.)	(195) 3.6 %** (3.0 - 4.2 95% C.I.)	(151) 2.7 %** (2.2 - 3.3 95% C.I.)

*p=0.000 **p=0.030

As observed in ***Table 8.11*** above a statistically significant difference was observed between boys and girls in the level of underweight (p=0.000), where boys were found to be more underweight than girls. Similarly a statistically significant difference (p=0.030) was observed between Boys and Girls in Severe underweight Prevalence where Boys were more severely Underweight as compared to girls.

Figure 8.8: Gaussian curve distribution of Underweight in children 6-59 months of age, Sierra Leone, SLNNS 2014



The above Frequency distribution Curve in ***Figure 8.8*** based on WHO 2006 reference standards is Skewed to the left to that of the reference population, showing that the survey population is relatively more underweight (malnourished) than the reference population. The fact that the underweight prevalence curve follows the natural Gaussian Curve distribution shows that the survey data is of good quality as the SD is close to 1 SD.

Table 8.12: Prevalence of overall, moderate and severe Stunting (HAZ-Score) in children 6 to 59 months of age by District

and National Average (WHO 2006), SLNNS 2014

Province	District	N	Prevalence of Underweight	Moderate Acute Malnutrition (WHZ <-2 & >=-3, no edema)	Severe Acute Malnutrition (WHZ <-3, and/or edema)
Western	Urban	877	5.0% (3.3- 7.7)	4.6% (3.0- 6.9)	0.5% (0.1- 1.5)
	Slums	1316	8.0% (6.0-10.6)	6.8% (5.0- 9.2)	1.1% (0.6- 2.0)
	Rural	979	6.3% (4.6- 8.7)	4.9% (3.3- 7.3)	1.4% (0.7- 2.8)
Eastern	Kono	492	14.2% (10.6-18.9)	11.0% (8.3-14.4)	3.3% (1.8- 5.8)
	Kenema	732	16.5% (12.9-21.0)	11.6% (9.0-14.8)	4.9% (3.2- 7.5)
Southern	Pujehun	793	17.2% (13.2-22.0)	14.6% (11.2-18.8)	2.5% (1.6- 3.8)
	Bo	919	10.1% (6.6-15.3)	6.3% (4.2- 9.4)	3.8% (2.2- 6.6)
	Moyamba	1018	15.6% (12.7-19.1)	11.4% (9.3-14.0)	4.2% (2.8- 6.3)
	Kambia	883	12.7% (9.7-16.4)	8.9% (6.8-11.6)	3.7% (2.5- 5.5)
Northern	Port Loko	1037	16.4% (13.3-20.0)	12.6% (10.1-15.7)	3.8% (2.5- 5.6)
	Koinadugu	463	12.5% (8.8-17.6)	9.3% (6.7-12.7)	3.2% (1.6- 6.5)
	Tonkolili	731	19.8% (16.0-24.3)	14.9% (11.9-18.5)	4.9% (3.2- 7.4)
	Bombali	743	19.4% (16.4-22.8)	14.0% (11.2-17.4)	5.4% (4.0- 7.3)
National Average*		10,983	12.9% (11.9-14.0)	9.8% (9.0-10.6)	3.2% (2.7- 3.7)

** National Average estimates do not include Kailahun and Bonthe districts*
*Numbers in **bracket are 95% Confidence Intervals***

Age Disaggregated Prevalence of Underweight in Children 6-59 months of age

As portrayed in ***Table 8.13*** below the prevalence of underweight peaks in younger children (6-29 months old), which is mostly contributed by the prevailing high prevalence of stunting in this age group.

Table 8.13: Prevalence of underweight by age, based on weight-for-age z-scores, SLNNS 2014

Age (months)	Total no.	Underweight (<-2 z score)		Severe under-weight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No	%	No.	%	No.	%	No.	%	No.	%
6-17	2925	498	17.1	151	5.2	347	11.9	2427	83.0	2	0.1
18-29	2821	397	14.1	93	3.3	304	10.8	2424	85.9	2	0.1
30-41	2433	249	10.6	54	2.2	205	8.4	2174	89.4	2	0.1
42-53	2030	201	9.9	39	1.9	162	8.0	1829	90.1	0	0.0
54-59	758	63	8.3	9	1.2	54	7.1	695	91.7	0	0.0
Total	**10967**	**1418**	**12.9**	**346**	**3.1**	**1072**	**9.8**	**9549**	**87.1**	**6**	**0.1**

A) Underweight Prevalence in Children 6-24 months of age

The prevalence of underweight in children 6-24 months of age was estimated at 15.6% (14.3-17.0 95% CI) with severe underweight at 3.7% (3.1- 4.5 95% CI) based on WAZ Indices in the WHO 2006 reference standards, (N=4,245). The Mean ± SD of WAZ was found to be -0.84±1.14 which is within the acceptable range of 0.8-1.2 SD, and close to 1 SD.

The prevalence of underweight in boys 6-24 months was found at 17.9% (16.2-19.8 95% CI), while it was 13.2% (11.6-14.9 95% CI) in girls of the same age group. A statistically significant difference (p=0.000) was observed between boys and girls in the prevalence of underweight where boys were found to be more underweight than girls.

The prevalence of severe underweight in boys 6-24 months of age was found at 4.3% (3.5- 5.3 95% CI), while it was found at 3.1% (2.4- 4.0 95% CI) in girls of the same age group. A statistically significant difference (p=0.048) was observed between boys and girls in the prevalence of severe underweight in children 6-24 months of age, where boys were found to be more severely underweight than girls.

B) Underweight Prevalence in Children 24-59 months of age

The Prevalence of underweight in children 24-59 months was estimated at 10.7% (9.6-11.8 95% CI) with severe underweight at 2.1% (1.7- 2.6 95% CI) based on WAZ Indices in the WHO 2006 reference standards, (N=6,644). The Mean ± SD of WAZ was found to be -0.80±1.00, which is within the acceptable range of 0.8-1.2 SD, and equal to 1 SD.

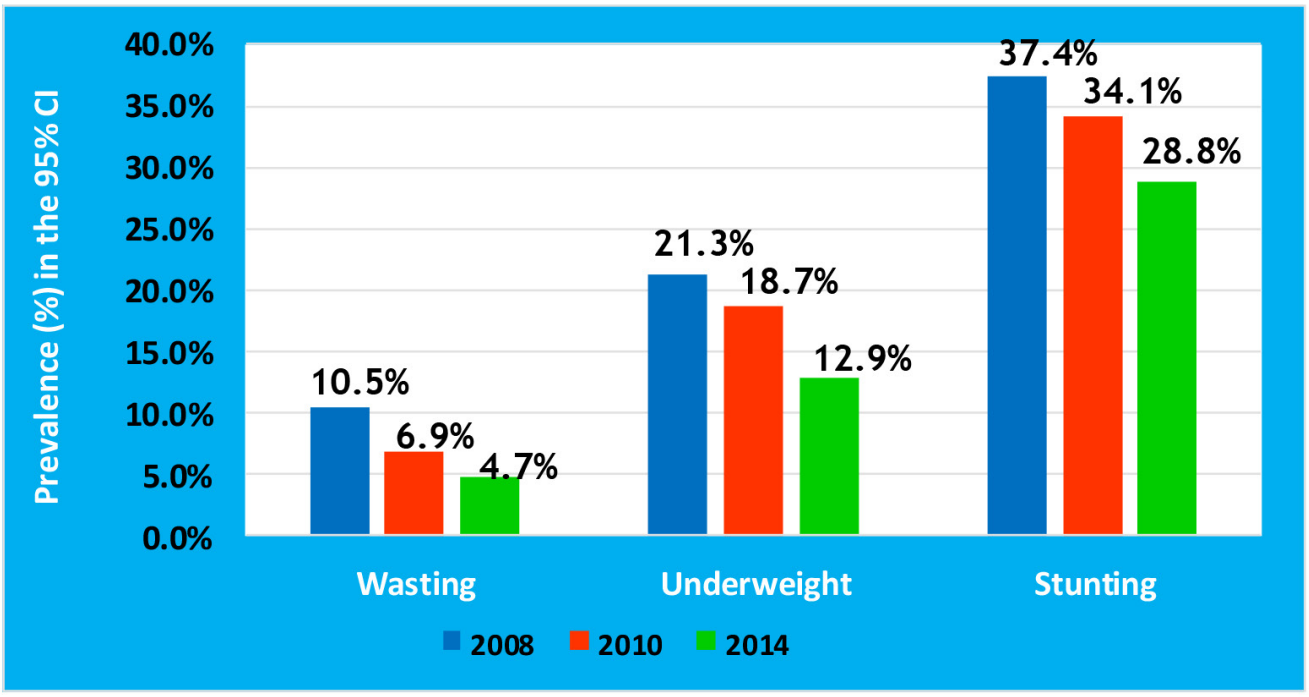
The prevalence of underweight in boys 24-59 months was found at 11.8% (10.5-13.3 95% CI), while it

was 9.6% (8.3-11.0 95% CI) in girls of the same age group. A statistically significant difference (p=0.025) was observed between boys and girls in the level of stunting where boys were found to be more stunted than girls.

The prevalence of severe underweight in boys 24-59 months of age was found at 2.4% (1.9- 3.0 95% CI), while it was found at 1.9% (1.4- 2.5 95% CI) in girls of the same age group. No statistically significant difference (p=0.207) in the prevalence of severe underweight was observed between boys and girls.

The nutrition status in children 6-59 months of age in Sierra Leone has shown a significant improvement (Figure 8.9) indicating the effective contributions of various direct and indirect interventions targeting better Child and maternal nutrition and child survival outcomes in the past five years. It also highlights the success in part of national development programs that targeted on achieving the Millennium Development Goals (MDGs), especially those related to child survival, i.e., eradication of extreme poverty and hunger (MDGs 1) and child survival (MDG 4).

Figure 8.9: Comparison of Nutrition Status in children 6-59 months between 2008, 2010 and 2014, Sierra Leone



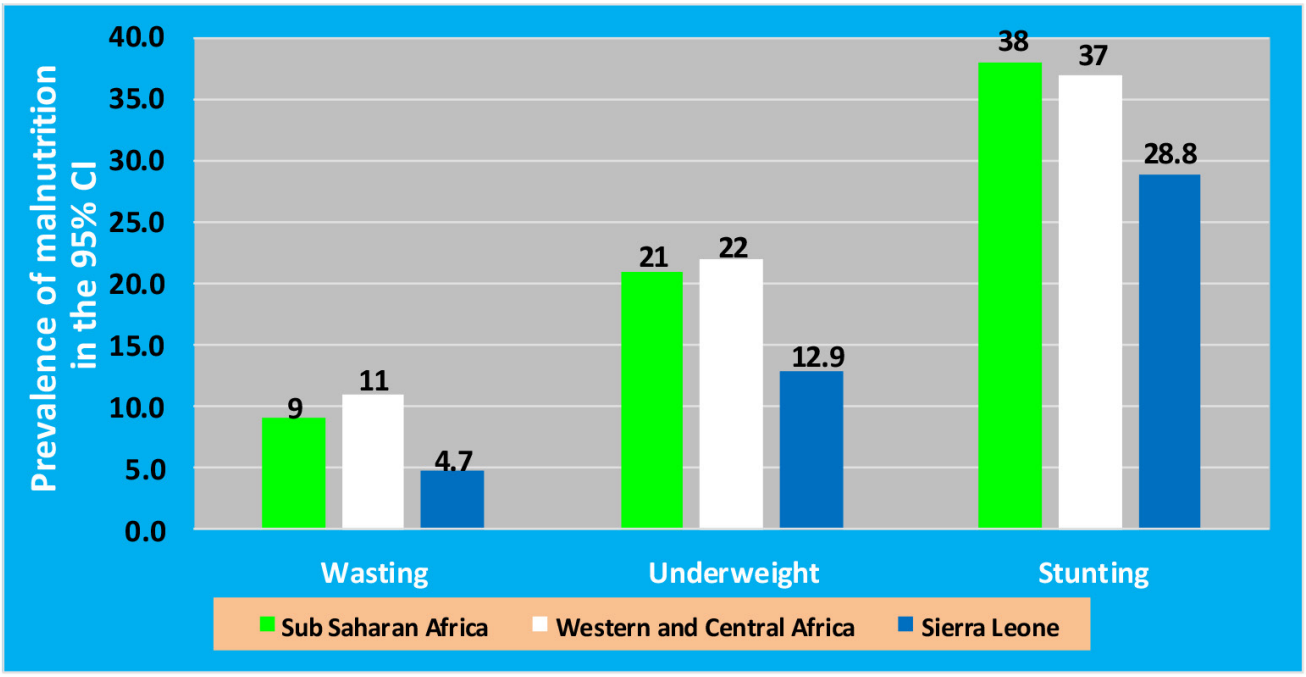
Comparisons of the current malnutrition prevalence with regional averages ***(Figure8.10)***, estimates of the prevalence of stunting, underweight, and wasting Worldwide and for UN sub-regions based on analysis of 639 national surveys from 142 countries in the WHO database, jointly done by UNICEF, WHO, and the World Bank using standard methods[15], shows that currently Sierra Leone has the lower malnutrition prevalence as compared to the regional averages.

These findings confirm that Sierra Leone is one of the countries showing positive improvements in the sub-Saharan Africa region with some of the child survival outcomes in meeting the millennium development goals. However these positive gains in population nutrition status can continue only if protected putting in place proper mitigation measures to ensure continued progress is maintained and efforts put in place so far are sustained.[16]

[15] *UNICEF, WHO, World Bank. Levels and trends in child malnutrition. Joint child malnutrition estimates. New York, NY: UNICEF; Geneva: WHO; Washington, DC: World Bank, 2012*

[16] *Black RE, et al, Maternal and child nutrition: building momentum for impact (Comment). Lancet, June 2013*

Figure 8.10: Comparison of Prevalence of malnutrition in Sierra Leone, with regional averages in Africa



8.2.5 Prevalence of Overweight

Childhood overweight, which is an emerging health risk in developing countries in recent years, results in both immediate and longer-term risks to health. Among the immediate risks are metabolic abnormalities including raised cholesterol, triglycerides, and glucose, type 2 diabetes, and high blood pressure. Childhood overweight is also a strong risk factor for adult obesity and its consequences.[17]

From the results of the current NNS the prevalence of overweight in children 6-59 months of age in Sierra Leone was found low at 2.2% (1.8 - 2.6 95% C.I.) while sever overweight was found at 0.3% (0.2 - 0.4 95% C.I.), indicating the presence of lower prevalence of overweight among children under-five in the country.

Table 8.13: Prevalence of underweight by age, based on weight-for-age z-scores, SLNNS 2014

Overweight (Based on WHZ)	All n = 10973	Boys n = 5441	Girls n = 5532
Prevalence of overweight (WHZ > 2)	(237) 2.2 % (1.8 - 2.6 95% C.I.)	(110) 2.0 % (1.6 - 2.5 95% C.I.)	(127) 2.3 % (1.8 - 2.9 95% C.I.)
Prevalence of severe overweight (WHZ > 3)	(30) 0.3 % (0.2 - 0.4 95% C.I.)	(17) 0.3 % (0.2 - 0.5 95% C.I.)	(13) 0.2 % (0.1 - 0.4 95% C.I.)

Child overweight is also related to growing up in an obesogenic environment, in which population changes in physical activity and diet are the main drivers.[18] Modifiable risk factors for childhood obesity are maternal gestational diabetes; low levels of physical activity; parents' inactivity; and high consumption of dietary fat, carbohydrate, and sweetened drinks.

A critical window of opportunity to ensure optimal child growth and development covers the period of pregnancy up to the second year of life. Thus growth failure during intrauterine life and poor nutrition in the first two years of life has critical consequences throughout the life-course. Hence optimum growth in the first 1000 days of life is also essential for prevention of overweight.[19]

[17] *Victora CG, Adair L, Fall C, et al, for the Maternal and Child Undernutrition Group. Maternal and child undernutrition: consequences for adult health and human capital. Lancet 2008; 371: 340–57.*

[18] *Han JC, Lawlor DA, Kimm SY. Childhood obesity. Lancet 2010; 375: 1737–48.*

[19] *K ipping RR, Jago R, Lawlor DA. Obesity in children. Part 1: Epidemiology, measurement, risk factors, and screening. BMJ 2008*

Table 8.15: Prevalence of overweight by age, based on weight for height (no oedema), SLNNS 2014

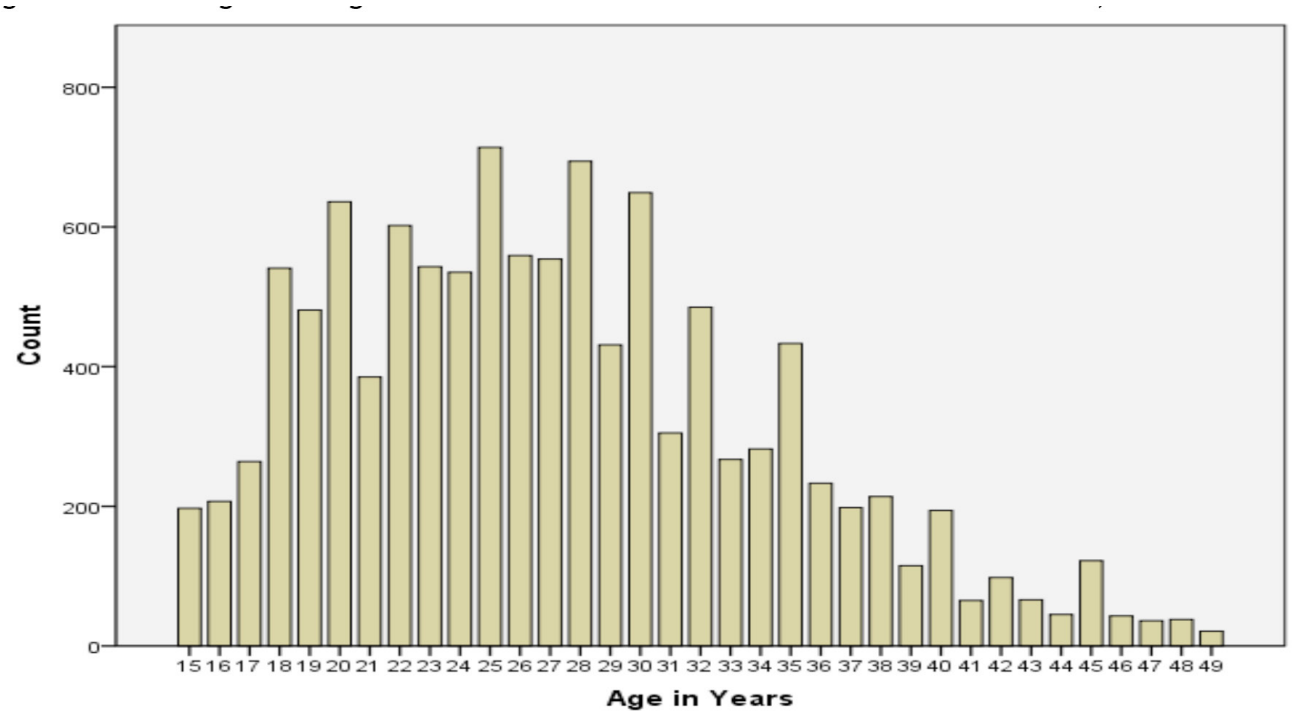
Age Distribution		Overweight (WHZ > 2)		Severe Overweight (WHZ > 3)	
Age (months)	Total no.	No.	%	No.	%
6-17	2924	52	1.8	9	0.3
18-29	2822	71	2.5	5	0.2
30-41	2428	64	2.6	8	0.3
42-53	2029	41	2.0	5	0.2
54-59	759	9	1.2	3	0.4
Total	10962	237	2.2	30	0.3

8.3 Women Nutrition Status

8.3.1 Demographic Distribution of Women 15-49 Years

Anthropometric data on Weight, Height and MUAC was collected in women of reproductive age (15-49 years old) in 13 domains excluding Kailahun and Bonthe districts to determine the nutrition status of Women in Sierra Leone. Accordingly data was collected in 11, 257 Women, pregnant and lactating as well as non-pregnant and non-lactating. Below is the distribution of proportion of Women data was collected on in the 9,658 surveyed households.

Figure 8.11: Histogram of age distribution of Women 15-49 months in Sierra Leone, SLNNS 2014



8.3.2 Women Nutrition Status

Maternal nutrition status, which is assessed using body anthropometric measurement, is an important determinant of maternal and child health. As women are the primary care takers of children and perinatal out comes and low birth weight contribute to the vicious cycle of malnutrition, an undernourished mother is more likely to give birth to a stunted child, perpetuating a vicious cycle of undernutrition and poverty. In addition to the quality and frequency of infant and young child feeding and the incidence of infectious diseases, the mother's nutrition and health status are important determinants of stunting.

Based on the findings of the current NNS, 5.9% (5.4-6.4 95% CI) of non-pregnant women in the country were found underweight, while severe stunting stands at 0.3% (0.2-0.4 95% CI) showing a low level of underweight and stunting prevalence in non-pregnant women. However the prevalence of overweight in non-pregnant women was identified at 16.7% (15.7-17.9 95% CI) based on BMI. This shows that the problem of overweight is more predominant in Sierra Leone in Women of reproductive age than the problem of underweight or stunting.

Table 8.16: Percentage distribution of Non-pregnant Women Nutrition Status by BMI category, District and National Averages (95% CI), SLNNS 2014

Province	District	BMI Category					
		N	Severely Stunted(<16	Underweight (16-18.4)	Normal (18.5-24.9)	Overweight (25.0-29.9)	Obese (30.0+)
	Koinadugu	393	(1)0.3% (0.0-0.8)	(27)6.9% (4.2-9.5)	(318)80.9% (76.2-85.6)	(35)8.9% (6.4-11.4)	(12)3.1% (0.0-6.1)
	Bombali	712	(2)0.3% (0.0-0.7)	(49)6.9% (5.2-8.6)	(524)73.6% (69.2-78.0)	(106)14.9% (10.8-19.0)	(31)4.4% (2.6-6.1)
Northern	Tonkolili	681	(2)0.3% (0.0-0.7)	(46)6.8% (4.5-9.0)	(529)77.7% (74.5-80.9)	(90)13.2% (10.5-15.9)	(14)2.1% (0.6-3.5)
	Kambia	839	(5)0.6% (0.1-1.0)	(41)4.9% (3.2-6.5)	(650)77.5% (73.4-81.5)	(107)12.8% (9.9-15.6)	(36)4.3% (2.8-5.8)
	PortLoko	979	(2)0.2% (0.0-0.5)	(71)7.3% (5.5-9.0)	(720)73.5% (70.9-76.2)	(154)15.7% (13.1-18.3)	(32)3.3% (2.1-4.4)
	Kono	570	0.0% (0.0-0.0)	(36)6.3% (4.2-8.5)	(418)73.3% (68.6-78.1)	(99)17.4% (14.1-20.6)	(17)3.0% (0.9-5.1)
Eastern	Kenema	821	(5)0.6% (0.0-1.2)	(67)8.2% (6.4-9.9)	(537)65.4% (61.4-69.5)	(161)19.6% (16.0-23.2)	(51)6.2% (4.7-7.7)
	Moyamba	851	(3)0.4% (0.0-0.9)	(57)6.7% (5.1-8.3)	(616)72.4% (68.3-76.5)	(133)15.6% (12.7-18.6)	(42)4.9% (3.3-6.6)
Southern	Bo	846	(1)0.1% (0.0-0.4)	(49)5.8% (4.0-7.6)	(620)73.3% (69.0-77.5)	(138)16.3% (13.4-19.2)	(38)4.5% (2.8-6.2)
	Pujehun	645	0.0% (0.0-0.0)	(36)5.6% (3.8-7.3)	(485)75.2% (70.5-79.9)	(92)14.3% (11.3-17.2)	(32)5.0% (2.9-7.0)

	WA Rural	882	(3)0.3% (0.0-0.7)	(48)5.4% (3.8-7.1)	(609)69.1% (64.8-73.3)	(144)16.3% (13.0-19.6)	(78)8.8% (6.7-11.0)
Western	WA Urban	906	(2)0.2% (0.0-0.5)	(38)4.2% (2.7-5.7)	(548)60.5% (55.7-65.3)	(208)23.0% (19.4-26.5)	(110)12.1% (9.3-14.9)
	WA Slum	1093	(2)0.2% (0.0-0.4)	(39)3.6% (1.8-5.3)	(732)67.0% (62.5-71.4)	(241)22.1% (18.5-25.7)	(79)7.2% (5.2-9.3)
National Average		**10,218**	**(28)0.3% (0.2-0.4)**	**(604)5.9% (5.4-6.4)**	**(7306)71.5% (70.2-72.8)**	**1708)16.7% (15.7-17.9)**	**572)5.6% (5.0-6.2)**

Maternal undernutrition is one of the main contributing factors for low birth weight (LBW) babies. Low maternal BMI is associated with intrauterine growth restriction. Low birth weight is caused by intrauterine growth restriction and pre-term birth. The Sierra Leone DHS 2013 reported that 7.0% of all children were born with a reported low birth weight (<2.5 kg), showing a 5% reduction in the prevalence of low birth weight from that of 2008. This is attributed to improved maternal nutrition status during this period. Babies who are undernourished in the womb face risk of dying during their early months and years. Those who survive are likely to remain undernourished throughout their lives, thus contributing to the inter-generational cycle of malnutrition.

Table 8.17: Percentage distribution of Pregnant Women by Nutrition Status Based on BMI by District and National Averages, SLNNS 2014 (Nutrition during Pregnancy, IOM 2009)

Province	District		BMI Category			
			Underweight	Normal Weight	Overweight	Obese
		N	<18.5	18.5-24.9	25.0-29.9	>=30.0
	Koinadugu	50	0% (0.0-0.0)	(44)88% (80.2-95.8)	(5)10% (2.3-17.7)	(1)2% (0.0-5.7)
	Bombali	44	0% (0.0-0.0)	(30)65.2% (49.5-86.9)	(12)27.3% (10.5-44.0)	(2)4.6% (0.0-10.5)
Northern	Tonkolili	54	(1)1.9% (0.0-5.4)	(37)68.5% (52.8-84.3)	(13)24.1% (10.9-37.2)	(3)5.5% (0.0-11.6)
	Kambia	75	0% (0.0-0.0)	(48)64% (53.0-75.0)	(22)29.3% (19.1-39.6)	(5)6.7% (1.3-12.1)
	PortLoko	70	(2)2.9% (0.0-6.1)	(46)65.7% (56.4-75.0)	(20)28.6% (18.9-38.3)	(2)2.9% (0.0-6.7)
Eastern	Kono	58	(3)5.2% (0.0-11.4)	(32)55.2% (41.9-68.4)	(18)31.0% (19.9-42.1)	(5)8.6% (0.0-19.2)
	Kenema	61	(4)6.5% (0.9-12.3)	(38)62.3% (50.7-73.9)	(12)19.7% (10.3-29.0)	(7)11.5% (2.6-20.4)
	Moyamba	73	(1)1.4% (0.0-4.1)	(55)75.3% (66.4-84.3)	(12)16.4% (8.0-24.9)	(5)6.8% (1.4-12.3)
Southern	Bo	66	(0)0% (0.0-0.0)	(51)77.3% (68.8-85.8)	(13)19.7% (12.2-27.2)	(2)3.0% (0.0-7.1)
	Pujehun	61	(1)1.6% (0.0-4.7)	(41)67.2% (56.1-78.4)	(15)24.6% (14.7-34.5)	(4)6.5% (0.8-12.3)

	WA Rural	68	0% (0.0-0.0)	(34)50% (37.9-62.1)	(23)38.8% (23.0-44.6)	(11)16.2 (8.0-24.3)
Western	WA Urban	87	(1)1.2% (0.0-3.4)	(47)54.1% (43.1-64.9)	(30)34.5% (25.0-44.0)	(9)10.4% (5.0-15.7)
	WA Slum	100	(2)2% (0.0-4.7)	(55)55% (41.7-68.3)	(35)35% (23.6-46.4)	(8)8% (2.9-13.1)
National Average		**867**	**(15)1.7% (0.8-2.6)**	**(558)64.4% (60.8-67.9)**	**(230)26.5% (23.5-29.6)**	**(64)7.4% (5.6-9.2)**

In a recently published large meta-analysis it was found that Pregnant Women (PW) with a BMI ranging from ≤18.3 to ≤23 kg/m2 (but <20 kg/m2 in most studies) increased the risk of having a LBW infant (RR 1.52, 95%CI: 1.25–1.85) in developing countries.[20] BMI can vary substantially during pregnancy, but it is a good indicator of risk for LBW.

Currently there is neither consensus on which anthropometric measurement should be used to identify acute malnutrition during pregnancy nor which cut-off value should be used. Existing recommendation to measure the nutritional status of pregnant women recommend the use of pre-pregnancy BMI category to classify them as underweight, normal weight, overweight, and obese with recommended weight gain ranges for the respective categories.[21] A large systematic review of outcomes of maternal weight gain found strong evidence to support the association between low gestational weight gain and LBW.[22]

Portrayed in ***Table 8.17*** above are the results of the nutrition status of pregnant women based on current anthropometric measurements in BMI categories, assuming international standards of BMI cut-offs for adult women are applicable for pregnant women as is the practice by national programs in some countries.[23] These results however do not provide the true picture of nutritional status of pregnant women, as they are not pre-pregnancy measures and BMI is very sensitive to changes with the different gestational periods during pregnancy. However they are indicative of their respective current nutrition status.

The MUAC based results in ***Table 8.18*** are presented for programmatic purposes, as well as they provide a better picture of the nutrition status of PW as MUAC is insensitive to changes over the total period of pregnancy for adult women. MUAC is a good indicator of the protein reserves of a body, and a thinner arm reflects wasted lean mass, i.e. malnutrition. The WHO Collaborative Study 1995 showed MUAC cut-off values of <21 to 23 cm as having significant risk for LBW (OR 1.9, 95%CI: 95% 1.7-2.1) when highest and lowest quartiles of the maternal height distribution were compared.[24] The United Nations High Commissioner for Refugees (UNHCR) also recommends <23 cm but states also to use <21 cm for program admission into supplementary feeding programs, depending on the proportions of women falling under each category of MUAC and available resources.[25]

Most studies indicate a MUAC ranging from <22.0 cm to <27.6 cm with statistical significance for LBW. According to a study conducted by MSF cut-off values of <22 and <23 cm were found strongly indicative

[20] *Han Z MS, Beyene J, Liao G, McDonald SD. Maternal underweight and the risk of preterm birth and low birth weight: a systematic review and meta-analyses. International Journal of Epidemiology. 2011a; February; 40(1): 65-101.*

[21] *Nutrition during pregnancy, Institute of Medicine (IOM) of the National Academies, 2009*

[22] *Siega-Riz AM, Viswanathan M, Moos MK, et al. A systematic review of outcomes of maternal weight gain according to the Institute of Medicine recommendations: birth weight, fetal growth, and postpartum weight retention. Am J Obstet Gynecol 2009; 201(4):339 e1-14.*

[23] *Nahar S, Mascie-Taylor CG, Begum HA. Impact of targeted food supplementation on pregnancy weight gain and birth weight in rural Bangladesh: an assessment of the Bangladesh Integrated Nutrition Program (BINP). Public Health Nutrition 2009; 12(8):1205-12.*

[24] *WHO. Maternal anthropometry and pregnancy outcomes. A WHO Collaborative Study. Bull World Health Organ 1995b; 73 Suppl:1-98. [PMCID: PMC2486648]*

[25] *UNHCR. Guidelines for selective feeding: The management of malnutrition in emergencies. United Nations High Commissioner for Refugees. http://www.unhcr.org/4b7421fd20.html. 2011*

for identifying a PW as high risk for LBW.[26] One study, a large prospective study in Nepal amongst almost 26,000 pregnancies, demonstrated that a MUAC of approximately 21-22 cm increased risk of maternal mortality.[27]

According to the results of the current NNS as portrayed in Table8.18 below the prevalence of wasting among pregnant women based on MUAC cut-offs was low at 2.6% (2.3-3.0 95% CI) indicting that PW had good nutrition status at the time of the survey. The proportion of PW at national level was found at 7.9% with Koinadugu district having the highest proportion of pregnant women (11.1%) and Bombali district the lowest at 5.8%. There was not much difference between districts in the proportion of PW (Table8.19).

Table 8.18: Percentage distribution of Pregnant Women by Nutrition Status Based on MUAC cut-offs by District and National Averages, SLNNS 2014

Province	District	N	Prevalence of Acute Malnutrition (MUAC<221mm)	Prevalence of Severe Acute Malnutrition MUAC <214mm)	Prevalence of Moderate Acute Malnutrition (MUAC<221mm and MUAC>=214mm)	Percentage of PW Not Acutely Malnourished (MUAC >=221mm)
	Urban	1003	1.4% (0.6-2.2)	0.5% (0.1- 0.9)	0.9% (0.4- 1.4)	98.6% (97.9- 99.4)
Western	Slums	1213	1.7% (0.8-2.7)	0.9% (0.2-1.6)	0.8% (0.3- 1.4)	98.3% (97.3- 99.2)
	Rural	959	2.6% (1.6-3.6)	1.2% (0.6- 1.7)	1.5% (0.7- 2.2)	97.4% (96.4- 98.4)
	Kono	485	1.9% (0.7-3.0)	1.0 % (0.0-2.1)	0.8% (0.1-1.6)	98.1% (97.0- 99.3)
Eastern	Kenema	891	4.5% (2.7-6.3)	2.6% (1.3-3.8)	1.9% (0.9-2.9)	95.5% (93.7- 97.3)
	Pujehun	723	3.5% (2.1-4.8)	1.8% (0.9-2.7)	1.7% (0.7-2.7)	96.5% (95.2- 97.9)
Southern	Bo	928	2.2% (1.1-3.2)	1.0% (0.4-1.6)	1.2% (0.5- 1.9)	97.9% (96.8- 98.9)
	Moyamba	940	2.1% (1.3-2.9)	1.1% (0.4-1.7)	1.1% (0.4-1.7)	97.9% (97.1- 98.7)
	Kambia	931	2.9% (1.8-4.0)	1.6% (0.8-2.4)	1.3% (0.5-2.1)	97.1% (96.0- 98.2)
	Port Loko	1062	3.1% (2.0-4.3)	1.5% (0.6-2.4)	1.6% (0.9-2.3)	96.9% (95.7- 98.1)
Northern	Koinadugu	448	2.0% (0.7-3.4)	0.9% (0.1-1.7)	1.1% (0.0-2.3)	98.0% (96.7- 99.3)
	Tonkolili	748	3.7% (2.3-5.2)	1.9% (0.7-3.1)	1.9% (0.9-2.8)	96.3% (94.8- 97.7)
	Bombali	764	2.2% (1.2-3.3)	1.1% (0.3-1.8)	1.2% (0.4-1.9)	97.8% (96.8- 98.8)
National Average*		**11,095**	**2.6% (2.3-3.0)**	**1.3% (1.1-1.5)**	**1.3% (1.1-1.5)**	**97.4% (97.1- 97.7)**

* Interpretation of the results based on MUAC presented above should be taken with caution as this survey was conducted during an

[26] *Mija-tesse Ververs et al, 'Which Anthropometric Indicators Identify a Pregnant Woman as Acutely Malnourished and Predict Adverse Birth Outcomes in the Humanitarian Context?', Geneva, Switzerland; MSF 2013*

[27] *Christian P, Katz J, Wu L, et al. Risk factors for pregnancy-related mortality: a prospective study in rural Nepal. Public Health 2008; 122(2):161-72. [PMCID: PMC2367232]*

early stage of an Ebola outbreak in the country, where some level of systematic measurement errors in MUAC are likely to be introduced by the survey team due to biases.

In a study involving 109 Demographic and Health Surveys, analysis adjusted for wealth, education, and urban or rural residence showed that the absolute risk of dying among children younger than 5 years born to shortest mothers (<145cm) was almost twice as high compared to those born to tallest mother (≥160cm). According to this study the corresponding absolute risk for a child being stunted was more than three (3) times higher in children born to shortest mothers as compared to those born to tallest mothers.[28]

A further comparison of the nutrition status of non-pregnant women between the 2010 NNS and the current NNS shows that there has been a significant improvement in the prevalence of undernutrition with a near 4% reduction seen over the past four years. A closer look at the distribution of pregnant women by age groups shows that around 15% of the pregnant women were teenagers. As early pregnancy is correlated with adverse birth outcomes such as LBW, intra-uterine growth retardation (IUGR) and pre-term birth (PTB), which also are strongly related with infant survival as well as a risk factor for maternal mortality, it is advised to avoid cultural practices that encourage the same.

Table 8.19: Percentage distribution of women by pregnancy status by district and national, SLNNS 2014

Province	District	Pregnant (%)	Not pregnant (%)	Total percent	Total N
Western	Urban	8.9	91.1	100.0	1003
	Slums	8.5	91.5	100.0	1213
	Rural	7.1	92.9	100.0	959
Eastern	Kono	7.3	92.7	100.0	894
	Kenema	9.3	90.7	100.0	637
	Pujehun	8.6	91.4	100.0	723
Southern	Bo	7.7	92.3	100.0	928
	Moyamba	8.0	92.0	100.0	940
	Kambia	8.3	91.7	100.0	933
	Port Loko	6.6	93.4	100.0	1065
Northern	Koinadugu	11.1	88.9	100.0	449
	Tonkolili	7.2	92.8	100.0	749
	Bombali	5.8	94.2	100.0	764
National Average*		**7.9**	**92.1**	**100.0**	**11257**

[28] *Ö zaltin E, Hill K. Subramanian S. V. Association of maternal stature with off spring mortality, underweight, and stunting in low- to middle-income countries. JAMA 2010; 303: 1507–16*

8.4 Mortality Results

A 90 days recall retrospective Mortality survey was undertaken as a combined survey with the nutrition survey in all the households sampled irrespective of the presence of eligible child for anthropometric or IYCF surveys in the surveyed household.

The results of the retrospective mortality survey show that under-five mortality rate(U5MR) was found at 0.83 deaths/10,000 persons/per day, while crude mortality rate (CMR) was found at 0.36 deaths/10,000 persons/per day as displayed in the table below aggregated by district (Table 8.20). Kailahun and Bonthe districts are not included as the survey was not conducted in the two districts even though they were included in the planning stage. The national average is a weighted average adjusted to the sampling design.

Table 8.20: Crude mortality rate and under-five mortality rate (deaths/10,000 persons/per day) by district and National Average (90 days recall period)

Province	District	Crude mortality rate (deaths/10,000/day)			Under-five death rate (deaths/10,000/day)		
		CMR	95% CI	DEFF	U5MR	95% CI	DEFF
Northern	Bombali	0.46	(0.26 - 0.79)	1.4	1.35	(0.65 - 2.77)	1.28
	Kambia	0.63	(0.40 - 1.01)	1.55	2.29	(1.25 - 4.18)	1.63
	Koinadugu	0.70	(0.30 - 1.61)	3.59	1.88	(0.71 - 4.87)	1.82
	Port Loko	0.41	(0.27 - 0.62)	1	0.67	(0.27 - 1.67)	1.47
	Tonkolili	0.14	(0.05 - 0.40)	1.28	0	(0.00 - 0.00)	1
Eastern	Kenema	0.35	(0.18 - 0.68)	1.74	0.14	(0.02 - 1.02)	1
	Kono	0.85	(0.44 - 1.64)	2.86	2.63	(1.58 - 4.35)	1
Southern	Bo	0.23	((0.08 - 0.64)	2.61	0.64	(0.15 - 2.65)	3.02
	Moyamba	0.29	(0.16 - 0.55)	1.42	0.76	(0.34 - 1.70)	1.27
	Pujehun	0.29	(0.13 - 0.64)	1.87	0.52	(0.10 - 2.51)	2.46
Western	WA Rural	0.43	(0.22 - 0.81)	1.58	0.97	(0.44 - 2.12)	1.06
	WA Slum	0.32	(0.16 - 0.61)	1.86	1.08	(0.50 - 2.34)	2.08
	WA Urban	0.18	(0.08 - 0.32)	1.11	0	(0.00 - 0.00)	1
National Average		**0.36 deaths/10,000 persons/per day**			**0.83 deaths/10,000 persons/per day**		

Table 8.20: Crude mortality rate and under-five mortality rate (deaths/10,000 persons/per day) by district and National Average (90 days recall period)

Demographic data	Number
Current resident at household	62,255
Current resident under five in household	11,911
People who joined the household	2,469
People who left the household during recall period	2,195
Under five children who joined the household during recall period	323
Under five children who left the household during recall period	256
Birth	620
Death	218
Under five death	96
Recall period in days	90
CMR(Death/10,000 people/day)-(weighted)	0.36
U5MR(death in under five children/10,000/day)- (weighted)	0.83

8.5 Child Morbidity and Treatment Seeking Behaviour of Primary Care takers

8.5.1 Child Morbidity

Malnutrition and infection are highly correlated in children under-five years of age as infection leads to malnutrition by suppressing appetite and absorption of key nutrients vital for the metabolic activities the body undergoes. The most important mechanisms that bring about increased infection among the severely malnourished are decreased resistance as a result of selective immunologic changes, and changes to intestinal function. Severe malnutrition is associated with a high prevalence of measles and diarrheal illnesses as a result of severely decreased resistance. Repeated attacks of diarrhoea are associated with poor nutrient absorption and considerable nutrient losses in the faeces.[29] Both lead to reduced weight gain or even weight loss, which in some children may cause malnutrition. After diarrhoea most children quickly regain weight and 'catch-up' their previous losses; while Fever increases energy expenditure by ten to fifteen per cent for each one degree Celsius rise in body temperature.

The two weeks retrospective morbidity situation in children 6-59 months old was assessed to get information on the disease burden of the target survey population. The disease burden in children under-five was found to be 37% which relates to poor child caring practices. The main symptoms observed were fever, cough, skin infection and diarrhoea from the most prevalent to the least. Despite the fact that the current level of malnutrition in the country is low the high disease burden poses a significant risk of malnutrition in children.

A closer look at the district level disease burden in under-five children shows that the disease burden is much higher than the national average in the northern and eastern districts, ranging between 40% and 56% in most of these districts.

Table8.22: Two weeks Retrospective Morbidity rate in Children 6-59 months old by type of illness, by District and National average, SLNNS 2014

Province	District	N	Prevalence of Reported Illnesses in Children 6-59.9 months Old (95% CI) Type of Reported Illness symptoms					
			Prevalence of Illness	Fever	Diarrhea	Cough/ARI	Skin Infection	Eye Infection
Northern	Koinadugu	448	(179)40% (31.4-48.5)	(122)68.1% (59.8-76.5)	(18)10.1% (4.8-15.3)	(46)25.7% (18.1-33.3)	(18)10.1% (4.5-15.6)	(1)0.6% (0.0-1.6)
	Bombali	704	(360)51.1% (43.8-58.5)	(263)73.1% (65.0-81.1)	(27)7.5% (3.4-11.6)	(92)25.6% (16.1-35.0)	(20)5.6% (3.0-8.1)	(5)1.4% (0.0-3.2)
	Tonkolili	715	(306)42.8% (34.7-50.9)	(262)85.6% (79.6-91.6)	(1)0.3% (0.0-1.0)	(7)2.3% (0.4-4.2)	(24)7.8% (3.0-12.7)	(5)1.6% (0.0-3.9)
	Kambia	629	(253)40.2% (31.9-48.5)	(175)69.2% (62.9-75.4)	(15)5.9% (1.6-10.3)	(51)20.2% (14.0-26.4)	(21)8.3% (4.8-11.8)	(7)2.8% (0.0-6.8)
	PortLoko	701	(346)49.4% (37.5-61.2)	(240)69.4% (56.4-82.3)	(25)7.2% (4.1-10.3)	(127)36.7% (29.1-44.3)	(46)13.3% (8.8-17.8)	(2)0.6% (0.0-1.4)
Eastern	Kono	350	(197)56.3% (45.1-67.5)	(151)76.7% (69.1-84.2)	(12)6.1% (2.8-9.4)	(40)20.3% (13.0-27.6)	(22)11.2% (4.8-17.5)	(2)1.0% (0-2.4)
	Kenema	704	(240)34.1% (27.5-40.7)	(159)66.3% (55.4-77.1)	(12)5% (2.6-7.4)	(53)22.1% (13.3-30.8)	(15)6.3% (3.7-8.8)	(1)0.4% (0.0-1.2)

[29] *Guidelines on Emergency Nutrition Assessment; Addis Ababa, Ethiopia, DPPC 2002*

	Moyamba	1030	(431)41.9% (36.4-47.3)	(301)69.8% (62.6-77.1)	(38)8.8% (5.1-12.5)	(143)33.2% (25.1-42.3)	(40)9.3% (5.6-13.0)	(1)0.2% (0.0-0.7)
Southern	Bo	842	(247)29.3% (23.7-35.0)	(185)74.9% (67.1-82.7)	(4)1.6% (0.1-3.1)	(48)19.4% (13.4-25.5)	(19)7.7% (3.7-11.7)	(1)0.4% (0.0-1.2)
	Pujehun	724	(243)33.6% (26.3-40.8)	(156)64.2% (54.7-73.7)	(12)4.9% (1.9-8.0)	(64)26.3% (15.3-37.3)	(7)3.1% (1.1-5.1)	(1)0.4% (0.0-1.3)
	WA Rural	932	(319)34.2% (29.7-38.7)	(220)69.0% (62.0-75.9)	(26)8.2% (3.9-12.5)	(105)32.9% (23.5-42.4)	(47)14.7% (9.2-20.3)	(8)2.5% (0.0-5.1)
Western	WA Urban	n=860	(200)23.2% (17.7-28.8)	(129)64.5% (53.2-75.8)	(15)7.5% (3.9-11.1)	(90)45% (32.2-57.9)	(22)11.6% (6.0-17.1)	(1)0.5% (0.0-1.6)
	WA Slum	n=1129	(318)28.2% (22.3-34.0)	(224)70.4% (61.0-79.9)	(16)5.0% (3.0-7.1)	(63)19.8% (13.7-25.9)	(30)9.4% (5.8-13.1)	(4)1.3% (0.1-2.5)
National Average		**N=9768**	**(3639)37.3% (35.1-39.4)**	**(2587)71.1% (68.5-73.7)**	**(221)6.1% (5.1-7.1)**	**929)25.5% (22.9-28.2)**	**(331)9.2% (7.9-10.4)**	**(39)1.1% (0.6-1.6)**

8.5.2 Treatment Seeking Behaviour of Primary Care Takers

Disease treatment is influenced by the provision of, and access to, local health services. Inadequate or late treatment places a child at increased nutritional risk by prolonging disease. This may occur if local health services are understaffed or have a limited supply of essential drugs. Alternatively, health care services may be well developed but too expensive for poorer groups in the community to access. Attitudes to health care (which may be affected by education and cultural beliefs) can influence a community's willingness to make use of available services.

Treatment seeking behaviour of primary care takers/mothers of sick under-five children in Sierra Leone was assessed in each household along with the prevalence of childhood illnesses. Accordingly the results show that the survey community in the country has a relatively good treatment seeking behaviour where 71.4% of the primary care takers responded they sought treatment for the sick child in the nearest health service provider facility available.

Table 8.23. Health Seeking Behaviour of Primary Care takers by District and National Average

		Treatment Sought for Sick Children 6-59 months old				
Province	**District**	**N**	**%Yes**	**95% CI**	**%No**	**95% CI**
	Koinadugu	172	71.5%	(62.4-80.6)	28.5%	(19.4-37.6)
	Bombali	347	71.2%	(63.0-79.3)	28.8%	(20.7-36.9)
Northern	Tonkolili	289	78.6%	(72.8-84.3)	21.5%	(15.7-27.2)
	Kambia	242	72.7%	(64.5-80.9)	27.3%	(19.1-35.5)
	PortLoko	334	79.6%	(72.8-86.5)	20.4%	(13.5-27.2)
	Kono	188	69.2%	(61.7-76.6)	30.9%	(23.4-38.3)
Eastern	Kenema	165	63.0%	(53.3-72.8)	37.0%	(27.3-46.3)
	Moyamba	421	76.0%	(69.0-83.0)	24.0%	(17.0-31.0)
Southern	Bo	244	70.9%	(65.0-76.5)	29.1%	(23.2-35.0)
	Pujehun	236	68.6%	(59.5-77.8)	31.4%	(22.2-40.5)
	WA Rural	306	62.4%	(56.3-68.5)	37.6%	(31.5-43.7)
Western	WA Urban	198	62.6%	(54.9-70.3)	37.4%	(29.7-45.1)
	WA Slum	313	71.6%	(63.5-79.6)	28.4%	(20.4-36.5)
National Average		**3,455**	**71.4%**	**(69.2-73.7)**	**28.6%**	**(26.3-30.9)**

8.6 Coverage of Measles Immunization, Vitamin A Supplementation and Insecticide Treated Mosquito Nets Usage

8.6.1 Measles Immunization Coverage

Measles is an infectious disease that has a direct relationship with the nutrition status of a child. Measles immunization and Vitamin A Supplementation are good proxy indictors of primary health care services access and coverage.

Based on the results of the NNS over 90% of the eligible children (9-59 months old) have received measles immunization which shows a high national coverage when compared to international benchmark of 90% coverage for measles immunization of eligible children (Table8.24 below). At district level the coverage ranged from 82% to 97%, also showing relatively high coverage across districts. From the overall sample 79.1% (77.0-81.2 95% CI) of the children had Immunization cards while the remaining 11.3% (9.7-13.0 95% CI) of children eligible it was confirmed using recall by mothers. This shows that there was a good retention of immunization cards by the survey population in the country. It is also a clear indication that the routine EPI program is performing well in the Sierra Leone.

8.6.2 Vitamin A Supplementation Coverage

Vitamin A is an essential micronutrient for the immune system and plays an important role in maintaining the epithelial tissue in the body. Severe Vitamin A Deficiency (VAD) can cause eye damage. Vitamin A deficiency is associated with increased mortality, especially when children have low WFH. Low WFH is usually associated with low vitamin A body stores and often with vitamin A deficiency.VAD can also increase severity of infections such as measles and diarrheal diseases in children and slows recovery from illness. Vitamin A supplementation delivered periodically to children aged 6 to 59 months has been shown to be highly effective in reducing mortality from all causes in countries where vitamin A deficiency is a public health problem.

From the results of the NNS, the national coverage of Vitamin A Supplementation was estimated at 96.1% (95.2-97.0 95% CI) showing a very high coverage of Vitamin A supplementation which is above the international benchmark of 90%. This is mainly attributed to a V-A supplementation done during a national EPI campaign only two weeks preceding the field data collection of the NNS. Improving the vitamin A status of deficient children through supplementation enhances their resistance to disease and can significantly reduce mortality, therefore it can be considered as a central element of the child survival program. A coverage threshold of 70 percent is the minimal coverage at which countries can expect to observe reductions in child mortality.

Table8.24: Measles Immunization and Vitamin A Supplementation Coverage by District and National Average

Province	District	Proportion of Children 9-59 months Immunized for Measles			Proportion of Children 6-59months Received Vitamin A Supplementation		
		N	(%)	95% CI	N	(%)	95% CI
	Koinadugu	427	82.0%	(73.9-90.0)	461	97.0%	(95.2-98.7)
	Bombali	658	88.9%	(86.3-91.5)	710	95.8%	(93.2-98.4)
Northern	Tonkolili	632	88.3%	(84.2-92.3)	719	94.4%	(90.9-98.0)
	Kambia	645	87.9%	(83.5-92.3)	713	94.0%	(89.1-98.9)
	PortLoko	847	83.0%	(76.8-89.2)	926	91.8%	(85.7-97.9)
	Kono	357	91.0%	(87.1-94.9)	425	89.4%	(83.4-95.4)
Eastern	Kenema	596	93.1%	(90.6-95.7)	760	97.8%	(96.3-99.1)
	Moyamba	993	87.1%	(83.5-90.7)	1075	97.3%	(95.2-99.4)
Southern	Bo	807	93.3%	(91.0-95.7)	882	98.1%	(97.1-99.0)
	Pujehun	692	96.4%	(94.3-98.5)	744	96.4%	(93.0-99.8)
	WA Rural	830	85.9%	(82.5-89.3)	952	97.4%	(95.7-99.0)
Western	WA Urban	832	97.4%	(95.9-98.8)	876	97.7%	(96.3-99.1)
	WA Slum	1033	96.5%	(94.8-98.3)	1129	98.2%	(97.2-99.2)
National Average		**9349**	**90.4%**	**(89.2-91.5)**	**10342**	**96.1%**	**(95.2-97.0)**

8.6.3 Coverage of Insecticide treated Mosquito net (ITN) Usage

Usage of Insecticide treated mosquito nets was assessed in each household asking whether the primary care takers as to whether the child has slept under mosquito net the previous night of the interview. Accordingly the results show that the coverage of Insecticide treated mosquito nets (ITN) is high at a national average of around 90% as portrayed in the table below (Table8.25). This high coverage was as a result of a national campaign that included ITN distribution in May 2014. There was also no significance difference observed between district coverages except in western area the coverage is lower than the national average.

Table 8.25: Usage of Insecticide Treated Mosquito Net the previous day of Interview by District and National Average

Province	District	Treatment Sought for Sick Children 6-59 months old		
		N	%	95% CI
Northern	Koinadugu	456	86.8%	(78.6-95.1)
	Bombali	699	94.4%	(91.4-97.5)
	Tonkolili	719	86.1%	(79.2-93.0)
	Kambia	757	92.9%	(88.8-96.9)
	PortLoko	951	89.5%	(85.2-93.7)
Eastern	Kono	420	82.1%	(73.4-90.9)
	Kenema	707	91.9%	(88.2-95.7)
Southern	Moyamba	1,058	97.2%	(96.2-98.1)
	Bo	872	96.7%	(94.8-98.6)
	Pujehun	729	95.3%	(93.0-97.7)
Western	WA Rural	924	87.2%	(81.2-93.2)
	WA Urban	859	81.0%	(76.4-85.6)
	WA Slum	1126	81.6%	(74.8-88.4)
National Average		**1,0277**	**89.6%**	**(88.1-91.1)**

8.7 Infant and Young Child Feeding (IYCF) Status

Infant and young child feeding practices directly affect the nutritional status of children under two years of age and, ultimately, impact child survival. Infants and young children who are not breastfed need early identification and appropriate support to minimize risks of malnutrition. Based on this need to monitor trends in IYCF practices in order to make appropriate decision in program implementation and policy analysis and development primary data was collected on key IYCF practices in a combined survey with anthropometric surveys. Even though caution should be taken in the interpretation of the results given the smaller sample size for some of the indicators with narrow age group due to the nature of the survey these results are indicative of the current status of IYCF practices in the survey population and enable to monitor trends across time.

Breastfeeding guarantees food and fluid security in infants for the first six months and provides active immune protection. Breast milk thus remains to be a vital source of nourishment for infants while timely initiation of breastfeeding (within the first hour of birth) coupled with exclusively breastfeeding during the first six months of child's life is critical for normal growth and development. In addition, breastfeeding is associated with decreased maternal postpartum blood loss, breast cancer, ovarian cancer, and endometrial cancer, as well as the probability of decreased bone loss post-menopause. Breastfeeding also contributes to the duration of birth intervals, reducing maternal risks of pregnancy too close together, including lessening risk of maternal nutritional depletion from repeated, closely-spaced pregnancies.

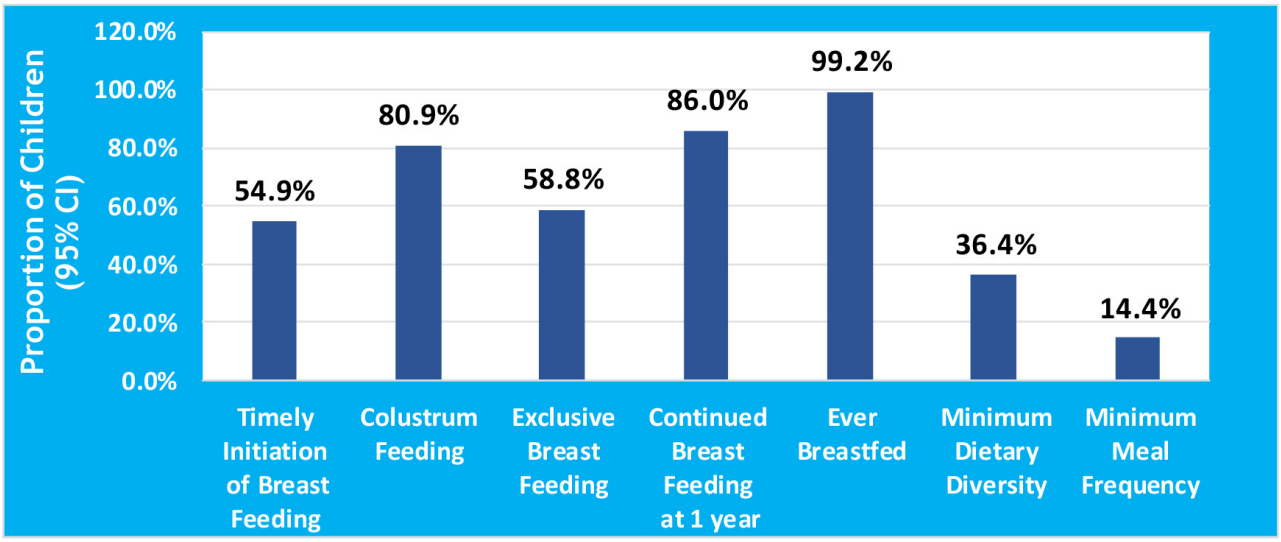
Several studies have demonstrated that early initiation of breastfeeding reduces the risk of neo¬natal mortality.[30] Colostrum, the rich milk produced by the mother during the first few days after delivery, provides essential nutrients as well as antibodies to boost the baby's immune system, thus reducing the likelihood of death in the neonatal period. Beyond saving lives, early initiation of breastfeeding pro¬motes stronger uterine contractions, reducing the likelihood of uterine bleeding. It also reduces the risk of hypothermia, improves bonding between mother and child and promotes early milk production.

The results from the current NNS combined IYCF assessment show that exclusive breast feeding is good at 58.8% (exceeding the global proposed target of 50% for 2022)[31], colostrum feeding is high at 80.9%, Timely initiation of breastfeeding (within the first hour after birth) is at 54.9% while Continued breast feeding at 1 year is also very good at 86.0% (***Figure8.12*** below.)

[30] *Zulfiqar et al, 'Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost?' The Lancet Series 2013.*

[31] *WHO, Proposed Global Targets for Maternal, Infant and Young Child Nutrition; WHO Discussion Paper: 2012*

Figure 8.12. Proportion of children with the respective IYCF indicator, SLNNS 2014



breastfed is more than 14 times more likely to die from all causes than an exclusively breastfed infant.[32] Infants who are exclusively breastfed are less likely to die from diarrhoea and pneumonia, the two leading killers of children under-five. Moreover, many other benefits are associated with exclusive breastfeeding for both mother and infant, including prevention of growth faltering. For the mother, exclusive breastfeeding can delay return of fertility.[33]

As increasing dietary diversity helps ensure adequate intake of essential nutrients, subsequent lack of acceptable level of dietary diversity leads to malnutrition in young children. The current NNS indicated that 36.4% of the children have the minimum dietary diversity, showing the presence of average child dietary diversity in the survey households visited. However the minimum meal frequency based on four or more food groups consumption was found low at 14.4%, showing the need to improve meal frequency for younger children in order to provide them with adequate number of meals per day that constitute energy dense and nutrient rich foods in order to lead a health life. As the results of food groups consumption by children 6-23.9 months old show (Figure8.13 below), the consumption pattern of different food groups by the majority (62%) of the children in the surveyed households fall on the Low dietary diversity (<= 3 food groups).

The more diverse the food utilized in a household the better composition and range nutritional values it consists.[34] WHO recommendations for child dietary intake suggest that breastfed children 6-23.9 months should receive animal-source foods and vitamin A rich fruits and vegetables daily, while breastfed infants age 6-8 months should be fed meals of complementary foods two or three times per day, with one or two snacks as desired; and breastfed children age 9-23 months should be fed meals three or four times per day, with one or two snacks.[35] The WHO guidelines further recommend that non-breastfed children age 6-23 months should receive milk products at least twice a day to ensure that their calcium needs are met. In addition, they need animal-source foods and Vitamin-A rich fruits and vegetables, as well should be fed meals four or five times per day, with one or two snacks as desired.[36]

[32] *Black et al, 'Maternal and Child Under-nutrition'. Lancet 2008; PP. 243-260*

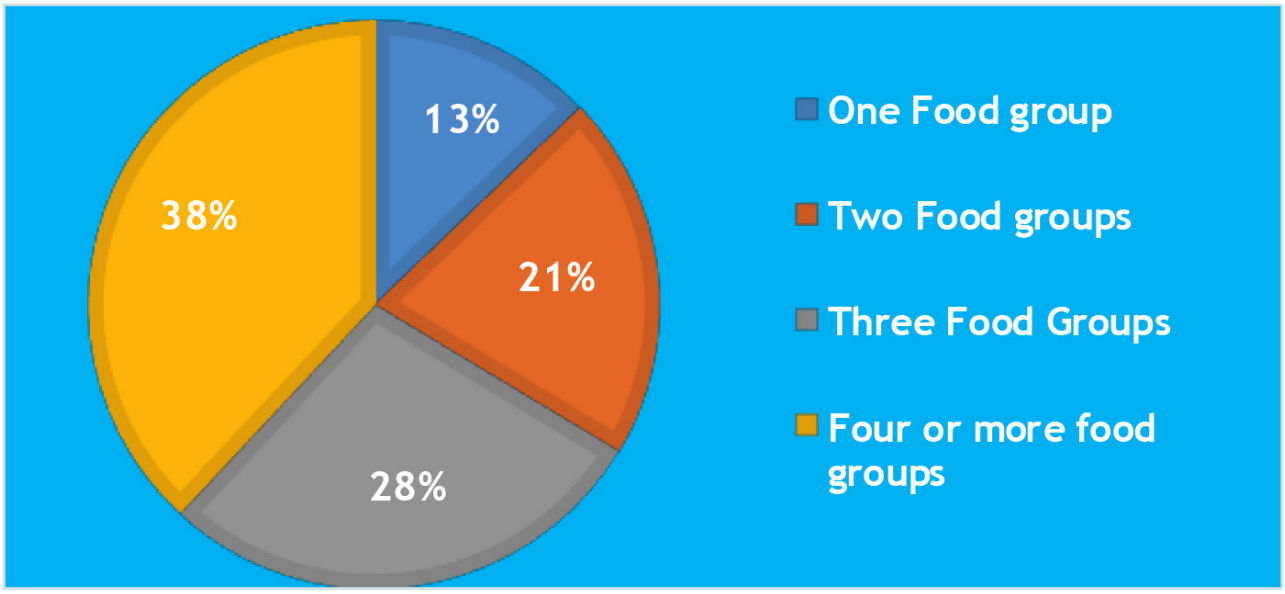
[33] *WHO et al. Indicators for assessing infant and young child feeding practices. Part 3: Country profiles. 2010. Geneva.*

[34] *Ruel M. T.: 'Is dietary diversity an indicator of poor food security or diversity quality? A review of measurement issues and research needs'. Food Consumption and Nutrition Division, International Food Policy Research Institute (IFPRI). FCND Discussion Paper NO. 140: 2002*

[35] *Pan-American Health Organization (PAHO) and World Health Organization (WHO): 'Guiding Principles for Complementary Feeding of the Breastfed Child'; Washington, DC/Geneva: PAHO and WHO 2003.*

[36] *World Health Organization (WHO); 'Guiding Principles for Feeding Non-breastfed Children 6 to 24 Months of Age'. Geneva, Switzerland: WHO 2005*

Figure 8.13: Child dietary diversity based on food groups' consumption pattern, SLNNS 2014



The average (mean) age the child started taking anything other than breast milk was found to be around 6 months of age (SE=0.056). A cross tabulation of the frequency of feeding with food groups consumed by children 6-23.9 months old shows that high number of children with a meal frequency of three(3) meals a day consume 4 or more food groups as compared to those children who received 4 or more meals the previous day.

Table 8.26: Cross tabulation of frequency of feeding (for Children 6-23.9 months) with food groups consumed, Sierra Leone, SLNNS 2014

Food groups consumed by Child 6-23 months, n=3,714	Frequency of feeding				Total
	Once/day	*twice/day*	*3 times/day*	*4 or >4 times/day*	
	%				
1 food group	88	163	165	60	476
2 food groups	145	257	271	100	773
3 food groups	189	329	428	103	1049
4 or more food groups	169	307	649	291	1416
Total	**591**	**1056**	**1513**	**554**	**3714**

Table 8.27. Infant and Young Child Feeding (IYCF) practice status indicators by district and national average, SLNNS 2014

Province	District	Ever Breastfed	Colostrum Feeding	Timely Initiation of Breast Feeding	Continued Breastfeeding at 1 year	Exclusive Breast Feeding (0-5months)	Minimum Meal Frequency
	Koinadugu	(223)99.6% (98.7-100)	(39)88.6% (80.5-96.8)	(144)64.9%) (52.5-77.2)	(44)100% (100.0-100.0)	(23)65.7% (49.2-75.2)	(22)11.8% (6.4-17.2)
	Bombali	(359)96.8% (98.7-100.0)	(84)92.3% (87.0-97.6)	(196)53.8% (41.1-66.6)	(60)89.6% (81.7-97.4)	(57)63.3% (53.0-72.6)	(15)5.4% (2.2-8.7)
Northern	Tonkolili	(233)99.6% (99.2-100.0)	(79)100.0% (100.0-100.0)	(204)58.8% (45.6-72.0)	(67)95.7% (911.3-100.0)	(49)61.3% (50.3-71.2)	(43)16.1% (4.5-27.7)
	Kambia	(489)100.0% (100.0-100.0)	(154)93.9% (90.5-97.3)	(324)66.3% (58.7-73.8)	(80)97.6% (94.3-100.0)	(92)64.8% (56.6-72.2)	(59)17.0% (11.6-22.5)
	PortLoko	(555)98.8% (97.6-100.0)	(132)63.8% (46.9-80.6)	(251)45.0% (34.1-55.8)	(88)93.6% (88.7-98.5)	(62)47.7% (39.3-56.2)	(61)14.4% (7.9-21.0)
	Kono	(248)98.8% (97.5-100.0)	(65)89.0% (81.2-96.9)	(134)54.3% (44.6-63.9)	(35)97.2% (94.4-100.0)	(38)56.7% (44.8-67.9)	(37)20.0% (13.3-26.7)
Eastern	Kenema	(516)98.9% (97.9-99.8)	(19)95.0% (84.9-100.0%)	(137)59.1% (47.7-70.4)	(40)88.9% (79.9-97.9)	(9)60.0% (35.8-80.2)	(54)24.9% (15.4-34.4)
	Moyamba	(516)98.9% (97.9-99.8)	(119)46.9% (33.6-60.1)	(278)53.9% (42.2-65.6)	(99)97.1% (93.8-100.0)	(82)68.3% (59.6-76.0)	(30)7.9% (4.3-11.5)
Southern	Bo	(434)99.3% (98.3-100.0)	(114)91.9% (85.8-85.1)	(283)65.8% (57.0-74.6)	(57)82.6% (74.0-91.2)	(87)68.5% (60.9-75.9)	(36)11.6% (5.0-18.2)
	Pujehun	(363)100.0% (100.0-100.0)	(93)92.1% (85.0-99.2)	(180)49.7% (34.9-64.6)	(68)97.1% (93.9-100.0)	(56)59.0% (48.9-68.3)	(22)9.2% (5.1-13.4)
	WA Rural	(379)98.4% (97.1-99.8)	(75)92.6% (86.8-98.4)	(179)46.7% (36.0-57.4)	(67)88.2% (80.8-95.6)	(34)43.0% (32.7-54.0)	(83)27.1% (17.2-37.1)
Western	WA Urban	(329)99.7% (99.1-100.0)	(43)91.5% (84.1-99.0)	(133)40.3% (29.7-51.0)	(39)59.1% (45.5-72.7)	(23)50.0% (36.1-63.9)	(46)16.8% (10.1-23.4)
	WA Slum	(656)99.9% (99.6-100.0)	(135)97.8% (95.5-100.0)	(379)57.7% (48.2-67.2)	(89)85.6% (77.7-93.4)	(73)52.5% (44.3-60.6)	(57)11.2% (5.3-17.1)
National Average		**(5131)99.2% (98.9-99.5)**	**(1151)80.9% (75.6-86.2)**	**(2822)54.9% (51.7-58.2)**	**(640)86.0% (83.3-88.3)**	**685)58.8% (56.0-61.6)**	**(566)14.4% (12.4-16.4)**

8.8 Food Security Situation

8.8.1 Crop Cultivation and Main Staple Foods

The combined survey to understand the current food security situation in Sierra Leone in targeted 50% of all the households visited for anthropometry and mortality. Accordingly the results of the survey show that around 54% (n=2,643) of all households surveyed cultivated in the recent past cropping season for their respective areas (districts). The main Staple food was Rice for well over 96% (n=4,774) of the households as per the results of the household interviews.

Table 8.28: Food Cultivation in recent last production season, Type and Source of Main Staple Foods by District, SLNNS 2014

Province	District	Type and Source of Main Staple Food at this time of the year and Next 3 months			
		Main Staple food At this time of the year*	Source of main Staple food at this time of the year	Source of main staple food in the next 3 months**	% of Households which Cultivated Food in recent last Season***
Northern	Koinadugu	Rice (95.2%)	Own Production (62.5%) Cereal Purchase (28.2%)	Own Production (47.4%) Cereal Purchase (42.3%)	82.1%(75.5-88.7)
	Bombali	Rice (96.9%)	Cereal Purchase (62.8%) Own production (35.9%)	Cereal Purchase (74.1%) Own production (23.4%)	62.3%(50.2-74.4)
	Tonkolili	Rice (93.5%)	Cereal Purchase (59.4%) Own production (39.6%)	Cereal Purchase (64.6%) Own production (33.8%)	84.7%(76.8-92.6)
	Kambia	Rice (98.8%)	Cereal Purchase (63.0%) Own Production (36.0%)	Cereal Purchase (54.1%) Own Production (23.6%)	82.6%(76.2-89.1)
	PortLoko	Rice (92.1%)	Cereal Purchase (72.4%) Own Production (25.1%)	Cereal Purchase (76.5%) Own Production (21.0%)	70.0%(60.8-79.1)
Eastern	Kono	Rice (97.6%)	Cereal Purchase (61.9%) Own Production (32.3%)	Cereal Purchase (63.6%) Own Production (29.6%)	61.0%(51.4-70.6)
	Kenema	Rice (96.8%)	Cereal Purchase (62.9%) Own Production (35.3%)	Cereal Purchase (62.2%) Own Production (27.0%)	60.8%(49.6-72.0)
Southern	Moyamba	Rice (90.7%)	Cereal Purchase (69.2%) Own Production (28.6%)	Cereal Purchase (72.8%) Own Production (24.5%)	70.8%(62.3-79.3)
	Bo	Rice (97.8%)	Cereal Purchase (75.9%) Cereal Purchase (76.1%)	Cereal Purchase (66.2%) Cereal Purchase (70.7%)	49.0%(36.7-61.4)
	Pujehun	Rice (96.2%)	Own Production (23.3%)	Own Production (29.3%)	74.5%(65.5-83.4)
Western	WA Rural	Rice (98.7%)	Cereal Purchase (94.1%)	Cereal Purchase (96.7%)	17.5%(10.7-24.3)
	WA Urban	Rice (99.3%)	Cereal Purchase (97.8%)	Cereal Purchase (96.4%)	4.4%(0.7-8.1)
	WA Slum	Rice (100.0%)	Cereal Purchase (99.3%)	Cereal Purchase (97.2%)	3.1%(0.3-5.8)

* The lean season (June-August) ** the next three months to the date of the NNS
*** The last season of food cultivation preceding the period of the NNS in the district
Numbers in bracket for proportion of households which cultivated food in recent last cultivation season are 95% Confidence Intervals (CIs)

Rice was the main staple food in all the districts, and for 96.4% of the surveyed households at national level during the time of the NNS (the lean season). Also Cereal purchase was reported as the main source of staple food by 72.8% of all households surveyed at national level. At national level 53.4% of the households responded they have cultivated in the recent last food cultivation season.

8.8.2 Source of Food and Income for Households

Households' most main source of food in the previous week of interview was assessed together with the main source of income the previous month to the date of interview. Accordingly it was reported that the main source of income was sell of crops for 34% (n=1664) of the surveyed population, while it was

salaried work for 14% of the population (which mainly reside in the urban areas), causal labour for 11.3% (n=552), sell of food aid for 10.1% (n=493) and sell of fish for 6.0% (n=292) of the surveyed population.

Table 8.29: Households' Main Source of Income (1month recall) and Main Source of Food (1week recall) by District, SLNNS 2014

Province	District	Households' Main Income activity in the previous months(June, July) (30 days recall)		Households' main Source of Food in the previous week (7 days recall)	
		Households' main Source of Income	Proportion of Households (%)	Households' Main Source of Food	Proportion of Households (%)
Northern	Koinadugu	Sell of Crops	62.9%	Market Purchase	48.8% (44.0%)*
	Bombali	Sell of Crops	50.0%	Market Purchase	80.7%
	Tonkolili	Sell of Crops	50.7%	Market Purchase	74.0%
	Kambia	Sell of Crops	64.9%	Market Purchase	46.4%
	PortLoko	Sell of Crops	30.5%	Market Purchase	84.7%
Eastern	Kono	Sell of Crops	39.6%	Market Purchase	56.6%
	Kenema	Sell of Crops	33.6%	Market Purchase	67.0%
Southern	Moyamba	Sell of Crops	41.2%	Market Purchase	68.4%
	Bo	Sell of Crops	26.2%	Market Purchase	74.8%
	Pujehun	Sell of Crops	53.8%	Market Purchase	79.8%
Western	WA Rural	Salaried Work	23.4%	Market Purchase	96.9%
	WA Urban	Salaried Work	50.3%	Market Purchase	98.6%
	WA Slum	Salaried Work	20.8%	Market Purchase	95.1%

* Own Production: In Koinadugu own production was reported as main source of food by close to half of the households (44%). However Market Purchase was reported as the main source of food by 75.8% households at national level and in all the districts surveyed.

8.8.3 Household Income Expenditure Pattern

Analysis of proportion of households allocating income for food purchase based on households income expenditure threshold shows that around 26% of the households were allocating >65% of their monthly income for food purchase, while 41% were allocating 50-65% of their monthly income for food purchase and the remaining 32% were allocating 1-50% of their monthly income for food purchase. Only a staggering 1.0% of the households were getting their food from own production or not allocating any amount of their income for food purchase (***Table 8.30*** below). This income expenditure pattern shows that the majority of the households purchase their food from the market, as also indicated by results of households' main source of food (***Table 8.29***). This also indicates that the majority of the households have not diversified enough their source of food at the time of this NNS, even though they have adequate food access.

Table 8.30: Households' monthly Income Expenditure pattern with respect to Food Purchase by District and National Average

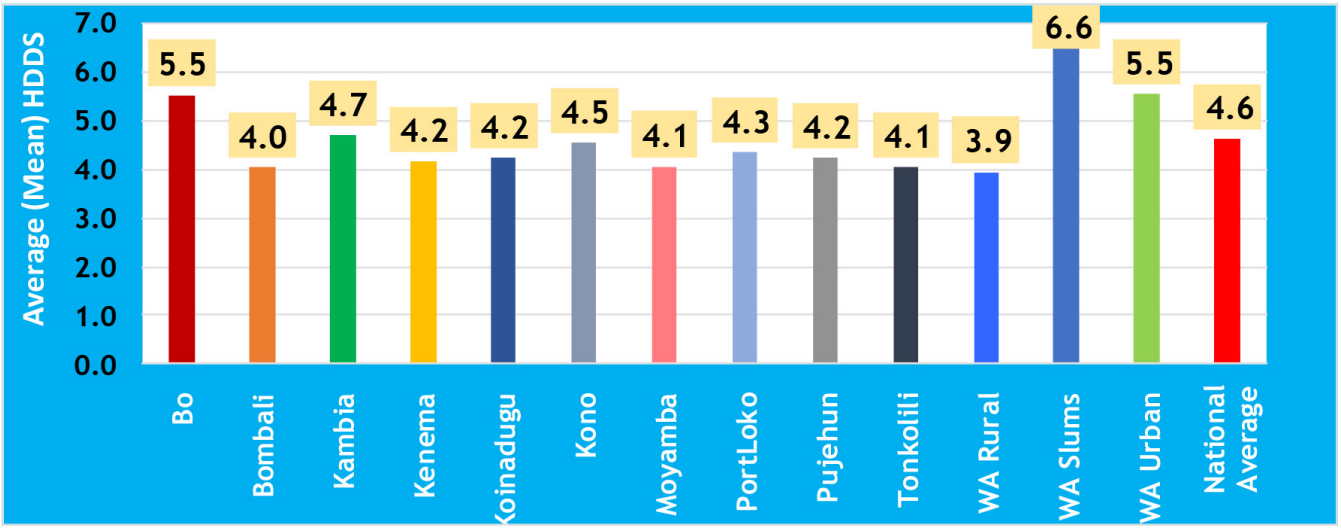
Province	District	Households' Income Expenditure Categories for Food Purchase							
		0% of Income		1-50% of Income		50-65% of Income		>65% of Income	
		No. of HHs	Proportion of HHs (%)	No. of HHs	Proportion of HHs (%)	No. of HHs	Proportion of HHs (%)	No. of HHs	Proportion of HHs (%)
Northern	Koinadugu	3	1.0%(0.0-2.2)	111	38.1%(25.7-50.6)	87	29.9%(19.4-40.4)	90	30.9%(20.3-41.6)
	Bombali	1	0.3%(0.0-0.9)	127	39.7%(28.6-50.8)	132	41.3%(31.8-50.7)	60	18.8%(9.6-27.9)
	Tonkolili	0	0.0%(0.0-0.0)	124	40.2%(27.9-52.7)	118	38.3%(28.0-48.7)	66	21.4%(10.7-32.2)
	Kambia	5	1.2%(0.0-2.4)	131	31.2%(20.5-41.8)	155	36.9%(27.1-46.7)	129	30.7%(19.7-41.7)
	PortLoko	5	1.1%(0.2-2.1)	176	40.2%(29.6-50.8)	171	39.0%(31.0-47.0)	86	19.6%(11.7-27.6)
Eastern	Kono	12	4.1%(0.0-9.3)	99	34.1%(21.3-47.0)	71	24.5%(15.7-33.3)	108	37.2%(25.9-48.6)
	Kenema	4	0.9%(0.0-2.0)	201	46.9%(36.1-57.7)	169	39.4%(31.3-47.5)	55	12.8%(7.3-18.4)
Southern	Moyamba	3	0.7%(0.0-1.6)	193	41.8%(32.6-51.0)	189	40.9%(32.8-49.0)	77	16.7%(9.4-23.9)
	Bo	1	0.3%(0.0-0.8)	59	16.0%(9.0-23.0)	182	49.3%(41.8-56.8)	127	34.4%(24.7-44.2)
	Pujehun	8	2.5%(0.6-4.5)	134	42.3%(30.1-54.4)	110	34.7%(25.4-44.0)	65	20.5%(11.8-29.2)
Western	WA Rural	0	0.0%(0.0-0.0)	76	16.9%(10.9-22.8)	226	50.1%(41.8-58.4)	149	33.0%(23.6-42.5)
	WA Urban	5	1.2%(0.0-2.4)	60	14.5%(8.1-21.0)	202	48.9%(41.1-56.6)	146	35.4%(26.7-44.0)
	WA Slum	1	0.2%(0.0-0.7)	94	22.0%(13.6-34.4)	211	49.4%(41.9-57.0)	121	28.3%(19.8-36.9)
National Average		**48**	**1.0% (0.6-1.4)**	**1585**	**32.1% (29.2-35.1)**	**2023**	**41.0% (38.5-43.5)**	**1279**	**25.9% (23.3-28.5)**

Numbers in bracket are 95% Confidence Intervals (CIs)

8.8.4 Household Dietary Diversity

Household Dietary Diversity Score (HDDS) relates to nutrient adequacy (coverage of basic needs in terms of macro and micro nutrients) and to diet variety/balance, which are two of the main components of diet quality. HDDS provides an indication of household economic access to food. Furthermore HDDS together with FCS is used to identify food access and consumption problems at the population level. Food quality which considers nutrient density, variety of foods and food safety to avoid infection, is a major determinant of nutritional status of under-five children. The mean HDDS was found to be 4.6 at national level, showing that households in Sierra Leone on average consumed 4 or more food groups the previous day of interview during the time of the NNS.

Figure 8.14: Average Household Dietary Diversity Score by District and National Average, SLNNS 2014



8.8.5 Household Food Consumption

The household Food Consumption Score (FCS) is a composite score based on dietary diversity, food frequency, and relative nutritional importance of different food groups. It is a proxy indicator reflecting quantity (kcal) & quality (nutrients) of people's diet. As a good indicator to show the "current" food security situation, it is used as a proxy indicator of household dietary adequacy principally on macronutrients and energy.

According to results of the FCS analysis the overwhelming majority (96.2%) of the surveyed households were found to be in the "acceptable" food consumption category, there by indicating that they were getting adequate diet. These results however should be taken with caution as although the FCS is a good proxy indicator of current and most recent households' food security situation, it has its own limitations. Some of these limitations include failure to capture seasonal changes and intra-household food consumption, inability to quantify food gaps as well as show how food consumption has changed as a result of crisis, unless previous FCSs for the same households are available.

Table 8.31: Households Dietary Diversity Score (HDDS) and Food Consumption Score Classification based on FCS thresholds by District, and National average, SLNNS 2014

Province	District	HDDS	HHs Food Consumption Categories based on FCS Classifications					
			0-21(Poor)		21.5-35 (Borderline)		>35(Acceptable)	
			No. of HHs	Proportion of HHs (%)	No. of HHs	Proportion of HHs (%)	No. of HHs	Proportion of HHs (%)
Northern	Koinadugu	4.2	6	2.1%	23	7.3%	262	90.0%
	Bombali	4	2	0.6%	8	2.5%	310	96.9%
	Tonkolili	4.1	1	0.3%	13	4.8%	294	95.5%
	Kambia	4.7	0	0.0%	2	0.5%	418	99.5%
	PortLoko	4.3	2	0.5%	18	4.1%	416	95.1%
Eastern	Kono	4.5	3	1.0%	14	4.8%	273	94.1%
	Kenema	4.2	9	2.3%	50	12.7%	334	85.0%
Southern	Moyamba	4.1	9	2.0%	16	3.5%	437	94.6%
	Bo	5.5	0	0.3%	1	0.3%	367	99.5%
	Pujehun	4.2	0	0.0%	7	2.2%	310	97.8%
Western	WA Rural	3.9	0	0.0%	1	0.2%	450	99.8%
	WA Urban	5.5	0	0.0%	0	0.0%	414	100.0%
	WA Slum	6.6	0	0.0%	0	0.0%	427	100.0%
National Average		**4.6**	**33**	**0.7%**	**153**	**3.1%**	**4,712**	**96.2%**

8.8.6 Household Coping Strategies

Household Coping strategies are related to a range of behaviours or coping mechanisms that the affected households employ to respond to food insecurity. The most common strategies are dietary change, increased short term household food availability, decrease in number of people, and rationing strategy. A range of these strategies specific to the context of Sierra Leone were used to assess how households responded to food insecurity as proxy indicators of recent food insecurity at household level.

Accordingly household heads in 4,788 households were interviewed as to whether or not there have been times when they did not have enough food or money to buy food during the past 30 days to the interview date. Subsequently 51.2% (48.3-54.1 95% CI) of the household heads responded "Yes". The main coping strategies used by these households were relying on less preferred foods (69.3%), Borrowing/kinship support (61.2%), limiting portion size at meals (43.3%), and reducing number of daily meals (39.8%). (***Figure 8.15*** below)

Figure 8.15: Coping strategies used by households to food shortages during the past 30 days to the interview, SLNNS 2014

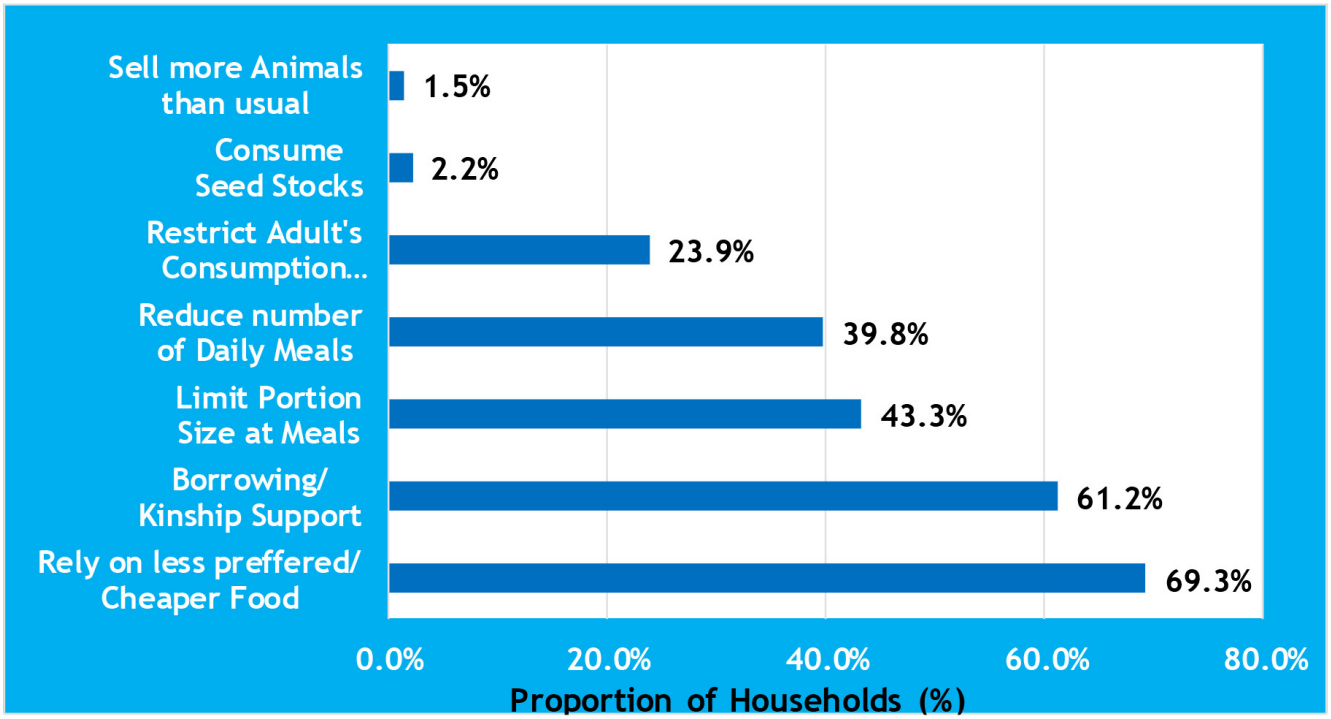


Table8.32: Proportion of households by Coping Strategies used during the previous 30 days of interview, district and national average, SLNNS 2014

Province	District	Coping Strategies used by Households						
		Rely on less pre-ferred/ Cheaper Food	Borrowing/ Kinship Support	Limit Portion Size at Meals	Restrict Adult's Consumption for Children	Reduce number of Daily Meals	Sell more Animals than usual	Consume Seed Stocks
Northern	Koinadugu	68.3%	42.9%	18.3%	13.5%	34.1%	25.6%	3.2%
	Bombali	76.7%	48.1%	41.9%	13.2%	42.6%	2.3%	0.0%
	Tonkolili	70.9%	56.7%	39.7%	12.8%	36.9%	0.7%	3.5%
	Kambia	57.6%	83.4%	36.4%	22.2%	35.1%	0.3%	1.7%
	PortLoko	70.9%	63.3%	38.8%	11.2%	29.1%	0.5%	1.0%
Eastern	Kono	60.4%	75.5%	31.6%	31.1%	35.8%	3.3%	4.7%
	Kenema	33.3%	55.8%	41.9%	20.9%	22.5%	0.8%	3.1%
Southern	Moyamba	74.1%	40.1%	30.7%	26.9%	28.8%	1.9%	7.1%
	Bo	76.2%	75.4%	50.0%	33.5%	56.0%	1.2%	1.6%
	Pujehun	73.4%	63.3%	50.8%	22.7%	39.1%	0.8%	0.0%
Western	WA Rural	69.2%	34.2%	36.3%	13.7%	18.5%	2.7%	0.7%
	WA Urban	85.1%	36.2%	51.1%	31.9%	59.6%	0.0%	1.1%
	WA Slum	82.2%	68.0%	74.8%	36.9%	62.5%	0.6%	0.3%
National Average*		**48**	**1.0% (0.6-1.4)**	**1585**	**32.1% (29.2-35.1)**	**2023**	**41.0% (38.5-43.5)**	**1279**

* National Average does not include Kailahun and Bonthe districts

8.8.7 Shocks

In conjunction with the assessment of the coping strategies use by households in response to food and income shortages, assessment of the broader context of shocks and the extent to which communities were challenged during the time of the survey were assessed. Shocks affect the food security situation of households thereby constraining livelihood base or options of the communities. To this account household heads were interviewed about whether or not they are facing any type of shocks. Accordingly 90.6% (89.1-92.1 95% CI) of the households interviewed responded that they are facing some type of shock while the remaining 9.4% (n=450) responded they were not facing any kind of shock at the time of the survey.

The results of the household survey during the NNS data collection indicated that high food price was the main shock faced by over 78% of the respondent households which is attributed to the presence of a recent surge in food prices resulting in high food price inflation. This is followed by Human sickness (58.8%) and Insecurity (29.3%). These shocks affect the livelihood base of the communities in constraining their economic access to food, access to healthy environment and health services, and access to clean and safe water which contribute to malnutrition as underlying causes.

Figure 8.16: Proportion of households by type of Shocks faced at the time of the survey, SLNNS 2014

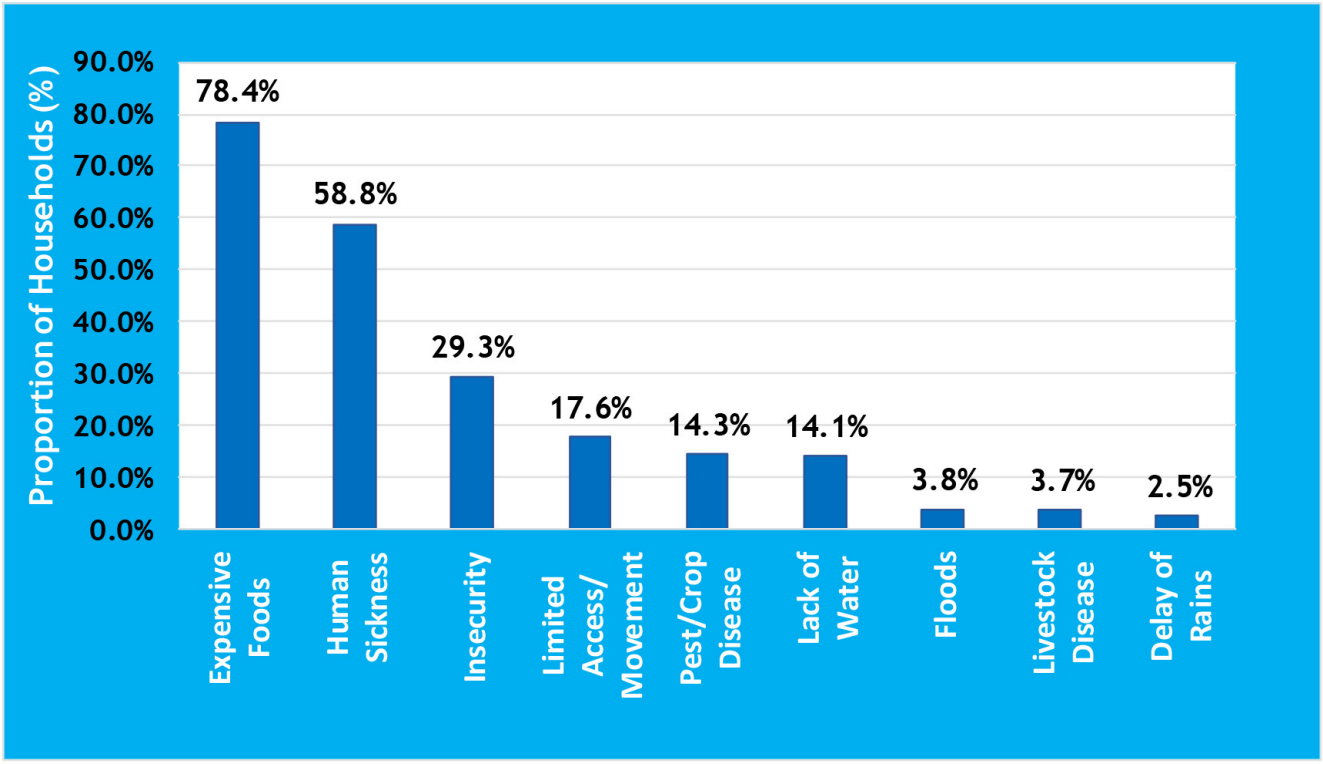


Table8.33: Proportion of Households by type of Shocks faced during the time of the survey, by district and National average, SLNNS 2014

Province	District	Shocks Faced by the Households during the time of the NNS								
		Insecurity	Expensive Foods	Floods	Human Sickness	Limited Access to Movement	Livestock Disease	Delay of Rains	Pest/ Crop Dis-ease	Lack of Water
Northern	Koinadugu	30.6%	53.0%	4.3%	35.8%	12.5%	10.3%	3.4%	15.9%	25.9%
	Bombali	29.2%	79.7%	1.7%	42.3%	20.3%	3.4%	1.0%	23.0%	10.0%
	Tonkolili	38.4%	86.5%	1.3%	71.7%	3.4%	12.2%	2.5%	23.2%	6.3%
	Kambia	28.0%	67.4%	5.7%	66.6%	21.9%	2.3%	2.6%	11.1%	29.8%
	PortLoko	29.7%	77.2%	2.1%	67.7%	5.3%	5.3%	1.8%	25.5%	9.8%
Eastern	Kono	33.2%	72.8%	2.3%	64.5%	24.2%	0.8%	5.3%	6.0%	14.7%
	Kenema	32.8%	79.7%	0.9%	60.9%	7.8%	3.5%	5.2%	22.6%	2.3%
Southern	Moyamba	25.1%	83.0%	3.1%	46.3%	20.4%	4.7%	2.9%	19.1%	12.0%
	Bo	30.0%	81.6%	3.4%	66.9%	23.8%	0.9%	3.8%	10.0%	17.5%
	Pujehun	12.3%	93.9%	2.5%	61.5%	16.4%	5.3%	0.0%	23.8%	2.5%
Western	WA Rural	16.4%	78.5%	2.8%	38.2%	35.4%	1.3%	1.5%	5.4%	16.9%
	WA Urban	37.9%	93.1%	4.8%	64.1%	13.1%	1.4%	0.0%	0.7%	26.9%
	WA Slum	41.7%	80.2%	12.5%	78.6%	14.2%	0.0%	1.5%	0.3%	12.2%
National Average (N=3,970)		**29.3% (1162)**	**78.4% (3113)**	**3.8% (152)**	**58.8% (2336)**	**17.6% (697)**	**3.7% (145)**	**2.5% (100)**	**14.3% (568)**	**14.1% (561)**

8.9 Water, Hygiene and Sanitation and Health Situation

8.9.1 Water Access and Treatment

Access to safe drinking water and sanitation facilities is key for the health and well-being of any community. Repeated episodes of diarrhoea, intestinal infestation with nematode worms and possibly tropical or envi¬ronmental enteropathy (in which faecal contamination causes changes to the intestines affecting permea¬bility and absorption) can impede nutrient absorption and diminish appetite, resulting in stunting and other forms of under-nutrition.[37'38]

Water Access

The household survey assessed the main sources of drinking water for the communities in order to understand households' access to clean and safe drinking water and water for cooking and personal hygiene. Accordingly the results show that protected shallow well (19.8%), HH connection/Stand pipe/ Tanker (21.7%) and Tube well (21.1%) were the main sources of water for around 62.6% of the households interviewed. Hence in Sierra Leone water availability was good as over two-third (65.5%) of the households surveyed have access to improved water[39], while the remaining 34.5% have access to unprotected water sources.

[37] *Humphrey, Jean H., 'Child Undernutrition, Tropical Enteropathy, Toilets, and Handwashing, Lancet, vol. 374, 19 September 2009, pp. 1032–1035; Improved water source definition include: a piped source within the dwelling or plot, public tap, tube well or borehole, protected well or spring and rainwater (WHO and UNICEF, 2010)*

[38] *Dangour, A. D., et al., Interventions to Improve Water Quality and Supply, Sanitation and Hygiene Practices, and Their Effects on the Nutritional Status of Children (Protocol), The Cochrane Library 2011, Issue 10.*

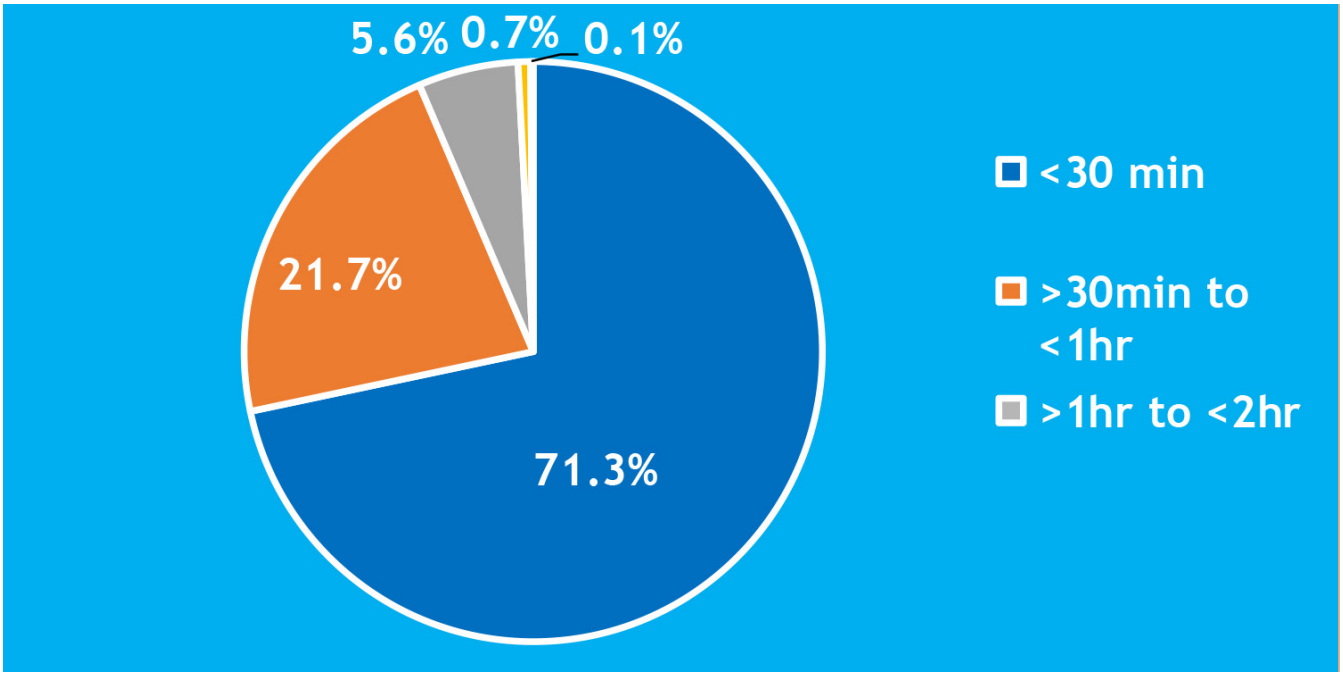
[39] *World Health Organization/United Nations Children's Fund (WHO/UNICEF), 'Joint Monitoring Programme for Water Supply and Sanitation and Drinking Water'; Geneva, Switzerland: WHO/UNICEF 2010.*

Table8.34: Proportion of Households by Main source of Drinking Water, by district and National Average, SLNNS 2014

Province	District	N	Households' Main Source of Drinking Water							
			Borehole (Tube Well)	Protected Shallow well	Open Shallow well	Protected Spring	River/ Stream	HH connection/ Stand pipe/ Tanker	Dam/ pond	Other
Northern	Koinadugu	283	26.9%	22.3%	1.4%	12.4%	26.5%	10.2%	0.0%	0.4%
	Bombali	319	44.2%	28.5%	3.8%	2.2%	20.1%	0.9%	0.0%	0.3%
	Tonkolili	307	10.1%	15.6%	3.3%	0.7%	60.9%	8.5%	0.0%	1.0%
	Kambia	417	18.5%	12.5%	15.1%	0.5%	43.6%	8.6%	0.7%	0.5%
	PortLoko	433	14.3%	26.6%	10.2%	5.8%	30.5%	7.6%	0.0%	5.1%
Eastern	Kono	288	24.0%	28.5%	6.9%	3.1%	29.5%	7.3%	0.0%	0.7%
	Kenema	425	20.5%	17.2%	9.2%	2.4%	16.7%	31.8%	0.2%	2.1%
Southern	Moyamba	443	24.6%	24.8%	8.4%	0.2%	40.4%	0.5%	0.5%	0.7%
	Bo	369	41.2%	33.1%	9.2%	0.0%	10.0%	4.1%	0.0%	2.4%
	Pujehun	295	21.4%	35.3%	3.7%	10.2%	27.1%	1.4%	0.0%	1.0%
Western	WA Rural	451	28.4%	15.7%	3.3%	0.9%	9.8%	40.6%	1.1%	16.9%
	WA Urban	412	5.3%	3.2%	0.7%	3.4%	4.9%	69.7%	1.0%	26.9%
	WA Slum	427	2.1%	4.9%	4.9%	0.2%	0.0%	65.8%	2.1%	12.2%
National Average		**4,869**	**21.1%**	**19.8%**	**6.4%**	**2.9%**	**23.7%**	**21.7%**	**0.5%**	**3.9%**

The majority of households spend acceptable duration of time to collect water as portrayed in ***Figure 8.17*** below. The utmost majority (93%) of the households spend less than one (1) hour collecting water including travel time (on foot) to and from water source and queuing time. In Sierra Leone women and children usually being the ones to fetch water the communities are more likely accustomed to using water sources based on proximity to their homes rather than whether they are safer or not. This exposes the community to high risks of disease burden especially with children under-five years of age.

Figure 8.17: Time spent to collect water by households, Sierra Leone, SLNNS 2014



The mean amount of water used by households per day for drinking, cooking and personal hygiene (excluding water for washing clothes) was 87.2 liters per household per day. This translates to 13.6litres per person per day (based on average household size of 6.4 from the findings of the current NNS) which is below the recommended SPHERE10 minimum of 15 liters per person per day, thus showing poor households' access to water in Sierra Leone, though it meets the internationally recommended basic survival water needs quantity.

Table 8.35: Proportion of Households by Time spent to collect water and Amount of Water (Lit) used per HH per day, by District and National Average, SLNNS 2014

Province	District	N	Time spent by Households - to Collect water (Including Travel to and From and Waiting)					Amount of water(Lit) used per HH/ Day(Mean)
			<30 min	>30min to <1hr	>1hr to <2hr	>2hr to <4hr	>4hr	
Northern	Koinadugu	283	73.9%	14.1%	10.2%	1.4%	0.4%	67
	Bombali	319	72.4%	27.0%	0.6%	0.0%	0.0%	66
	Tonkolili	307	66.1%	29.6%	3.9%	0.0%	0.3%	111
	Kambia	417	76.3%	18.9%	4.3%	0.2%	0.2%	80
	PortLoko	433	70.4%	26.1%	3.5%	0.0%	0.0%	113
Eastern	Kono	288	80.2%	17.4%	2.1%	0.3%	0.0%	99
	Kenema	425	80.5%	9.9%	8.7%	0.2%	0.2%	85
Southern	Moyamba	443	61.4%	28.7%	7.2%	2.3%	0.0%	65
	Bo	369	74.3%	21.7%	4.1%	0.0%	0.0%	84
	Pujehun	295	85.1%	8.8%	6.1%	0.0%	0.0%	111
Western	WA Rural	451	28.4%	15.7%	3.3%	0.9%	0.0%	68
	WA Urban	412	5.3%	3.2%	0.7%	3.4%	0.0%	95
	WA Slum	427	2.1%	4.9%	4.9%	0.2%	0.0%	97
National Average		**N=4869**	**71.3%**	**21.7%**	**5.6%**	**0.7%**	**0.1%**	**(N=4,812) 87**

Water Treatment

Water Safety is a key challenge within the surveyed households in the country as the majority of the households surveyed do nothing to water in order to improve microbiological water quality when using water from either improved or unimproved sources before drinking the water. This shows the existence of very poor water treatment practices. The use of water disinfectants or proper household level water treatment options ensures the prevention of the drinking water from post-delivery contamination. As the results of the NNS indicate around 79% of the households do not use any water treatment means to ensure the microbiological water quality before drinking, while only the remaining 21% of households use different household level water treatment options. This highly exposes to high disease burden thereby threatening the health and nutrition well being of the under-five child population in the country.

Figure 8.17: Time spent to collect water by households, Sierra Leone, SLNNS 2014

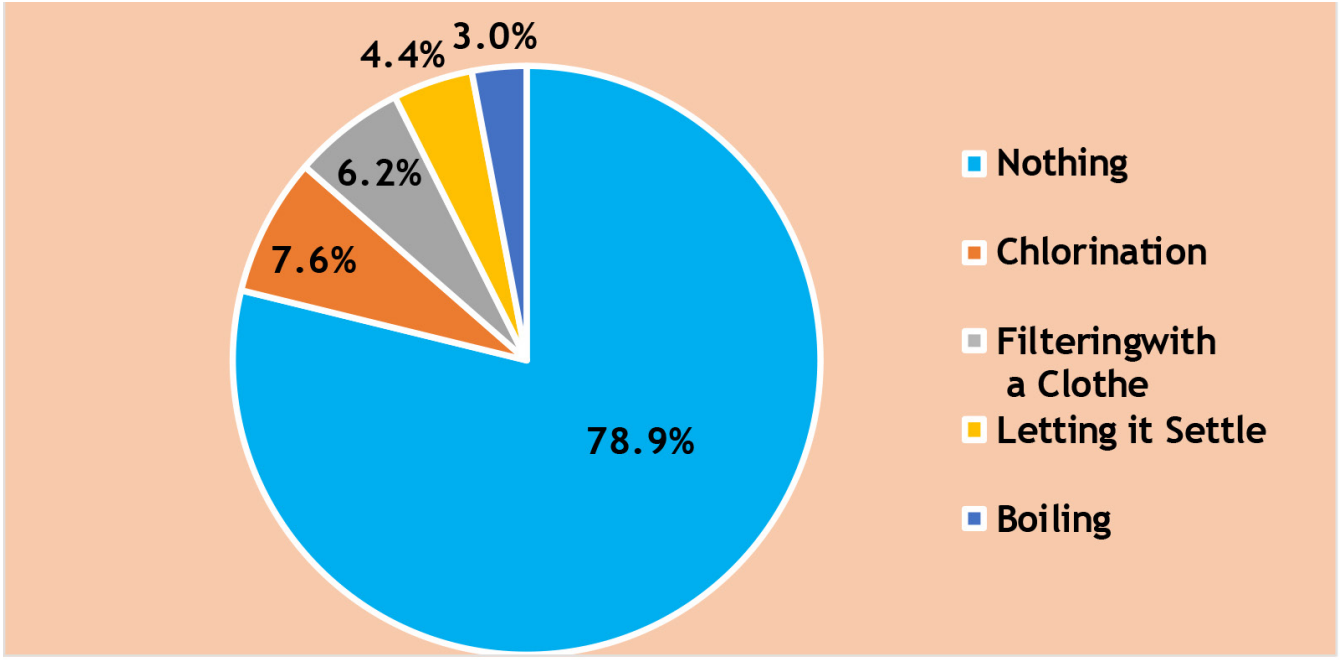
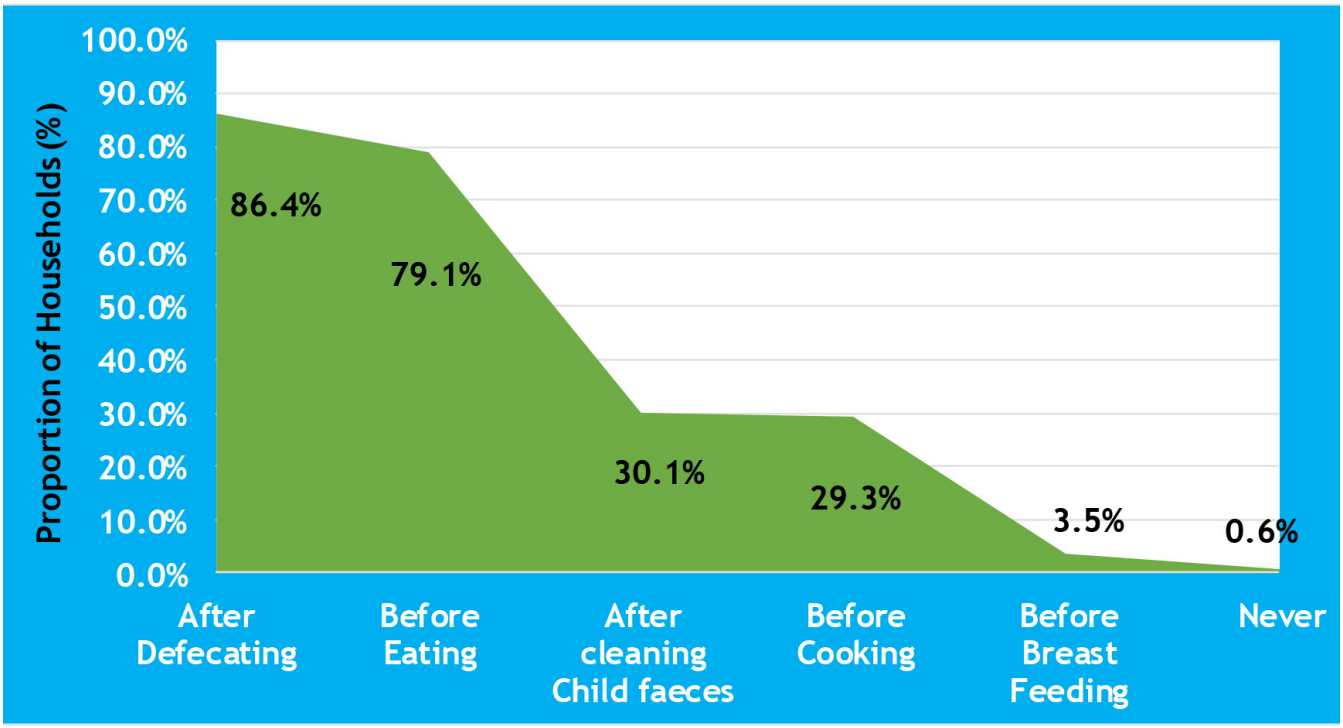


Table 8.36: Proportion of Households by type of Water treatment method used or not used, by district and National Average, SLNNS 2014

Province	District	N	Water Treatment				
			Nothing	Boiling	Filtering with a Clothe	Letting it Settle	Chlorination
Northern	Koinadugu	281	74.0%	3.2%	14.6%	1.8%	6.4%
	Bombali	319	85.9%	3.1%	2.5%	2.8%	5.6%
	Tonkolili	305	85.9%	100.0%	7.5%	3.0%	2.6%
	Kambia	413	83.8%	2.7%	3.6%	5.8%	4.1%
	PortLoko	428	82.5%	3.5%	5.4%	4.9%	3.7%
Eastern	Kono	288	77.5%	2.8%	7.0%	7.7%	4.9%
	Kenema	425	75.6%	3.8%	10.1%	5.5%	5.0%
Southern	Moyamba	439	76.8%	3.0%	4.6%	4.3%	11.4%
	Bo	368	65.2%	3.3%	7.3%	2.2%	22.0%
	Pujehun	295	73.6%	2.4%	2.0%	9.5%	12.5%
Western	WA Rural	450	75.3%	1.3%	5.6%	3.8%	14.0%
	WA Urban	387	76.7%	6.5%	9.0%	4.7%	3.1%
	WA Slum	427	91.6%	1.6%	2.6%	1.6%	2.6%
National Average		**N=4815**	**78.9%**	**3.0%**	**6.2%**	**4.4%**	**7.6%**

8.9.2 Hygiene and Sanitation

Hygiene and sanitation practices and availability of facilities for proper sanitation are key for a healthy community and reducing increased exposures to disease. Proper hygiene and caring practices indirectly contribute to the nutrition status of children. Accordingly the NNS results show that over three quarters of the households interviewed wash hands after defecating and before eating, where 86% -after defecating, 79% before eating and 30% after cleaning child feces (see ***Figure 8.18*** below). These results show that on average the community has relatively good hand washing practices.



The fact that primary care takers of children in the community have poor hand washing practice before breastfeeding, where only 3.5% of the care takers responded to washing their hands before breastfeeding, is a concern for the infants under 5 months of age. This is because it is a risk factor of infection for the infant. Hand washing before breast feeding should thus be promoted during WaSH hygiene and health education campaigns, together with other hygiene practices.

Table 8.37: Proportion of Households by Hand Washing Frequency, by District and National Average, SLNNS 2014

			Hand Washing					
Province	**District**	**N**	**Never**	**After Defecating**	**After cleaning Child faeces**	**Before Cooking**	**Before Eating**	**Before Breast Feeding**
	Koinadugu	283	0.0%	79.2%	14.8%	31.1%	77.7%	4.6%
	Bombali	318	0.3%	75.5%	28.6%	31.4%	71.7%	2.5%
Northern	Tonkolili	306	1.3%	83.7%	16.0%	20.6%	79.4%	3.3%
	Kambia	414	0.7%	85.7%	31.9%	19.8%	81.4%	2.2%
	PortLoko	432	0.7%	91.2%	23.8%	19.9%	84.3%	4.9%
	Kono	282	0.4%	78.7%	28.4%	29.4%	80.1%	5.0%
Eastern	Kenema	416	0.7%	79.1%	18.3%	39.2%	82.0%	1.7%
	Moyamba	441	1.1%	89.3%	29.5%	27.4%	71.0%	3.9%
Southern	Bo	369	0.0%	83.7%	42.3%	34.4%	84.3%	7.0%
	Pujehun	295	0.3%	94.2%	42.4%	22.7%	90.2%	2.0%
	WA Rural	450	0.9%	89.1%	18.7%	22.4%	69.3%	3.3%
Western	WA Urban	402	0.2%	99.0%	39.6%	35.8%	91.3%	2.0%
	WA Slum	426	0.2%	88.0%	53.8%	45.3%	70.0%	3.3%
National Average		**N=4,834**	**0.6%**	**86.4%**	**30.1%**	**29.3%**	**79.1%**	**3.5%**

Households were also interviewed about what they use for hand washing. Reportedly over three quarters of the households use water and Soap for hand washing while some 20% of the households responded they only use water for hand washing.

Table 8.38: Proportion of Households by Hand Washing Practice, by District, and National Average SLNNS 2014

			Hand Washing			
Province	**District**	**N**	**Nothing**	**Water Only**	**Water+Soap**	**Water+Ash/ Mud/Sand**
	Koinadugu	283	0.7%	17.%4	79.5%	2.5%
	Bombali	319	1.9%	13.2%	84.3%	0.6%
Northern	Tonkolili	307	1.3%	30.3%	63.5%	4.9%
	Kambia	417	7.0%	28.5%	62.8%	1.7%
	PortLoko	432	3.7%	33.6%	59.5%	3.2%
	Kono	288	5.6%	24.3%	67.0%	3.1%
Eastern	Kenema	420	2.6%	23.1%	69.1%	5.2%
	Moyamba	443	1.4%	18.3%	78.1%	2.3%
Southern	Bo	368	0.0%	19.3%	80.4%	0.3%
	Pujehun	295	3.1%	26.1%	69.5%	1.4%
	WA Rural	451	1.3%	12.4%	85.6%	0.7%
Western	WA Urban	406	0.5%	8.1%	91.4%	0.0%
	WA Slum	426	3.3%	11.7%	84.5%	0.5%
National Average		**4,855**	**2.5%**	**20.3%**	**75.3%**	**2.0%**

Sanitary practices of the survey communities were assessed using Household interviews. It was discovered that over 14% of the households use unimproved sanitary facilities (designated and undesignated open area)[40]. This is well below the average for sub-Saharan African countries, which is 63%[41], showing the presence of relatively good sanitary facilities coverage. The remaining considerable proportion of the community (86%) use improved sanitary facilities. Use of latrine was only reported in 9.8% of the surveyed households.

Table8.39: Proportion of households by type of Latrine usage, District and National Average, SLNNS 2014

			Toilet Facility			
Province	**District**	**N**	**Undesignated Open Area(Bush)**	**Designated Open Area**	**Hole/Pit latrine**	**Latrine (Flush/ Pour flush)**
Northern	Koinadugu	281	13.5%	4.6%	82.2%	1.1%
	Bombali	312	5.1%	1.0%	92.0%	2.6%
	Tonkolili	303	30.0%	0.3%	69.0%	0.7%
	Kambia	396	18.2%	4.3%	78.5%	0.8%
	PortLoko	408	14.0%	0.7%	82.8%	2.5%
Eastern	Kono	287	17.4%	0.3%	73.5%	11.1%
	Kenema	417	17.3%	1.0%	75.5%	6.2%
Southern	Moyamba	437	18.8%	1.4%	78.9%	0.9%
	Bo	356	13.5%	0.6%	75.6%	15.7%
	Pujehun	291	11.0%	2.1%	85.9%	1.4%
Western	WA Rural	435	5.5%	0.0%	80.2%	14.5%
	WA Urban	407	0.2%	0.5%	57.5%	42.3%
	WA Slum	373	0.3%	7.0%	71.8%	21.2%
National Average		**N=4703**	**12.4%**	**1.8%**	**76.0%**	**9.8%**

8.9.3 Health Situation and Access to Primary Health Care services

The status of basic health services and health environment influences exposure to infectious disease. Environmental factors that increase exposure to disease include: limited water supply, poor sanitation, a crowded household with many young children, contaminated water, unhygienic food preparation and a hot and dusty dry season. In order to understand the contribution of the health services and primary health care access issues some pertinent data was collected on the same, in the areas of disease outbreak, physical and geographic access issues as they are directly correlated with access to primary health care services.

Accordingly there was a reported disease outbreak in 4.6% (3.2-6.0), n=223, of the surveyed clusters. Of these 44.1% (n=78) was reported to be Cholera, 24.3% (n=43) was Ebola, 14.1% (n=25) was Measles, 85% (n=15) was Malaria, 6.2% (n=11) was Chicken pox (10 cases were reported in Kono and 1 case in Bo), 2.3% (n=4) was Typhoid and 0.6% (n=1) was reported as Polio case in Kambia. A total of 2,200 people were affected as reported by the households in around the 494 different villages visited. Only 1.7% of the communities reported that there was a response to the outbreak in their respective villages.

The mean travel time (on foot) to the nearest health facility was reported to be 2.2 hours. The mean travel time (on foot) to the nearest private clinic was reported as 1.7 hours while the mean travel time to the nearest hospital was reported as 3.4 hours.

[40] *Core questions on drinking water and sanitation for HH survey, WHO and UNICEF 2006, used for the definition of improved and unimproved sanitary facility*

[41] *Water and Sanitation target WHO and UNICEF joint report, 2006*

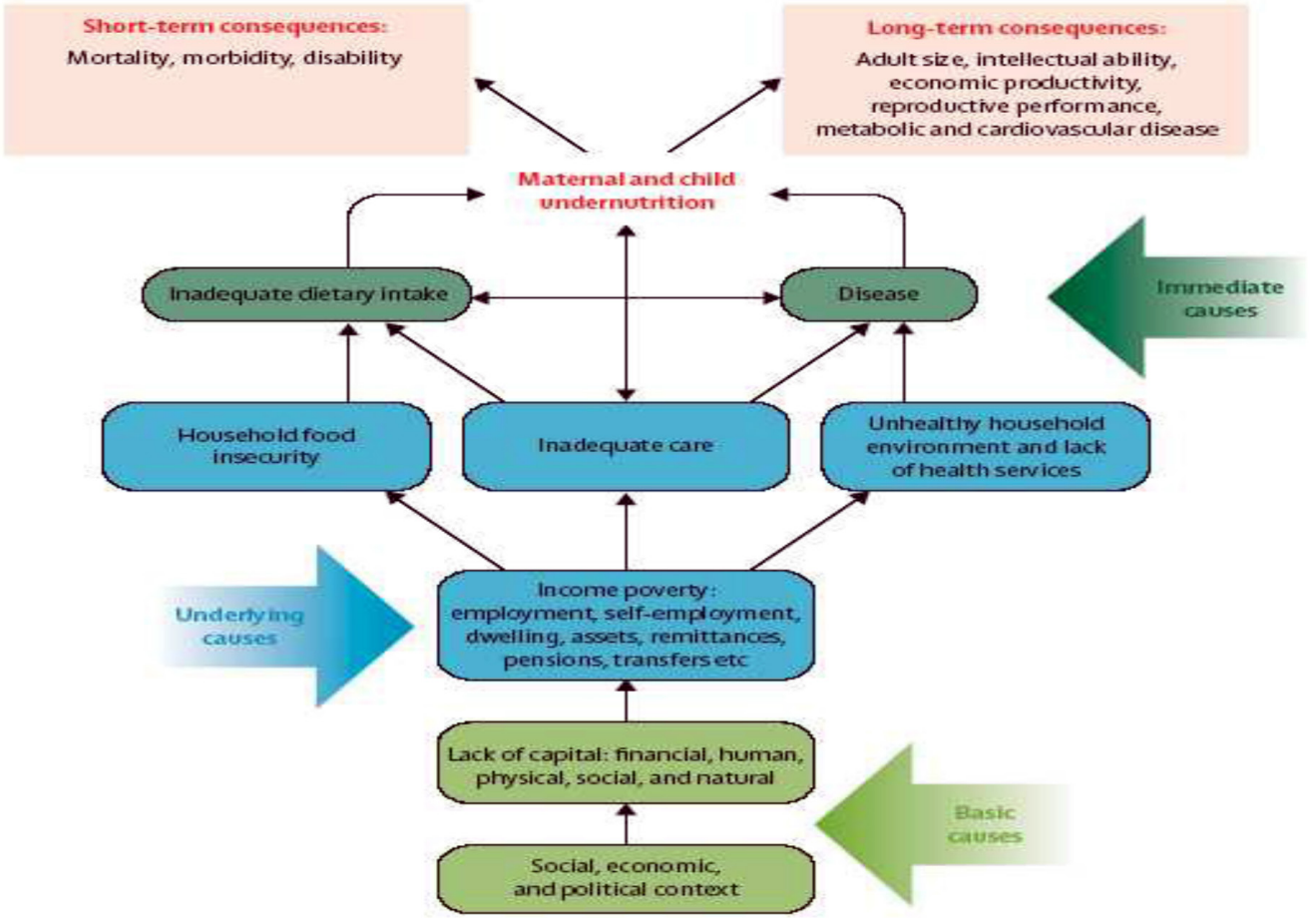
The causes of malnutrition are directly related to inadequate dietary intake as well as disease, but indirectly to many factors, among others household food security, maternal and child care, health services and the environment. While most nutrition interventions are delivered through the health sector, non-health interventions can also be critical. Actions should target the different causes to reach sustainable change, which requires a multi-sectoral approach. This approach is also recognized and suggested in the National Food and Nutrition Security Policy (NFNSP) as well as the Implementation Plan (NFNS-IP) 2012-2016 documents. As a step forward sector specific national targets should include measureable nutrition indicators including agriculture and social protection sectors to ensure the same.

Strategies to improve nutritional status and growth in children should include interventions to improve nutrition of pregnant and lactating women; early initiation of breastfeeding with exclusive breastfeeding for six months; promotion, protection, and support of continued breastfeeding, complementary feeding from six months through two years and optimal feeding of young children 2-5 years of age.

Essential Nutrition Actions (ENA) are vital in improving maternal, newborn, infant and young child health and nutrition along with appropriate complementary feeding from six months up to two years and beyond; these also include micronutrient supplementation, targeted fortification and food supplementation, when needed.

Improving nutrition also involves actions at health facility and population levels. At district level, these could include monitoring nutrition, identifying sub-populations at risk of nutrition problems, implementing nutrition policies and protocols, and providing resources and tools to implement nutrition activities at health facilities and at community venues.

Nutrition actions targeting women, infants and young children can help improve health and reduce mortality among these groups.



As portrayed in the conceptual frame work in ***Figure 8.20*** above (Lancet, 2008) malnutrition is a composite effect of immediate, underlying and basic causes that spans through a range of service delivery systems and lack thereof across sectors. Morbidity and malnutrition have interchangeable cause-effect relationship based on the context and terminally result in mortality. Hence to break such a vicious cycle improvements made in the nutrition of children and women alone are not enough. Development oriented integrated intervention models that address all levels of the problem as indicated on the conceptual framework, with continued development and adaptations of emergency response protocols and capacity in mitigating slow-onset and rapid-onset emergencies have time and again proved to be effective. This is, as proven by research findings, the most feasible and effective approach to enable maintain current gains in child nutrition outcomes, improve and celebrate better outcomes in nutrition in the future in Sierra Leone.

9. CONCLUSIONS

The level of Wasting in Sierra Leone has over the past four years (since 2010) shown significant Improvements, thus the current level of global wasting at 4.7% (4.3 – 5.2 95% CI) deemed as “acceptable” based on international benchmarks for wasting.

The level Stunting has also shown significant improvements over the past four years (since 2010), where Serra Leone has joined the group of developing countries in sub-Saharan Africa with moderate level of Stunting at 28.8% (27.5 – 30.2 95% CI) having made a reduction of 15.5% to the level it was in 2010.

The level of underweight has shown significant improvement as well with moderate level of underweight prevalence based on the results of the current NNS which stands at 12.9% (11.9 - 14.0 95% C.I.), much lower than the western-African and the sub-Saharan averages.

The national IMAM program and supportive treatment programs have proven to be effective in addressing the problem of acute malnutrition in the country in the past four years. There were also seen significant improvements in timely initiation of exclusive breastfeeding (a 22% increase from the level it was in 2010) as well as exclusive breast feeding with a staggering 84% increase from the level it was in 2010.

An improvement was observed from 9.9% in 2010 to 6.2% in 2014 in the level of under nutrition in women. Also an increase in the level of over nutrition (overweight and obesity) prevalence was observed from 17.9% in 2010 to 22.3% in 2014 showing a growing risk of the problem of overweight and obesity in the country as is the case in most developing countries .

10. RECOMMENDATIONS

10.1 Immediate/Short Term Recommendations

Given the Ebola outbreak Emergency in the country the positive improvements on stunting and wasting made so far will face the risk of reversal, especially in the prevalence of wasting. Thus the significant nutrition gains, which have been made so far, need to be protected in the face of such new stressors including the subsequent humanitarian crisis, and food price volatility.

Hence it is advised to scale up existing IMAM program in the country both in terms of geographic coverage as well as intervention packages.

Alternatives to infant feeding that fit into the current context should be investigated, approached and strengthened to ensure that the positive gains made on the nutrition outcomes are not severed by the current outbreak situation.

As many households will most likely be food insecure due to the impacts of the Ebola outbreak which in the coming months will result in a precarious food security situation in the country, it is a priority need to strengthen the ongoing food supply provided to vulnerable households/food insecure households to ensure nutrition outcomes are kept at acceptable levels.

10.2 Medium/Long Term Recommendations

Food and agriculture based interventions should complement national nutrition programs that focus on preventive and treatment layers in the management of malnutrition.

Integrated Program delivery approaches should be strengthened to ensure optimal impact using community based high-impact interventions such as IYCF and micronutrient interventions.

Lessons should be drawn from the success of the national IMAM and IYCF program to achieve better outcomes in Stunting as part of the national Program Implementation review process.

The national Nutrition Surveillance System in integration with the HMIS should be strengthened to better monitor the implementation of direct and indirect nutrition programs and the evolution of the nutrition situation in the country to achieve optimal child survival outcomes.

Periodic annual nutrition surveys (using SMART Methodology) should be carried out during the hunger-gap period/lean season to provide timely data in monitoring the nutrition situation as well as compare nutrition outcomes for evidence base of national program and policy reviews as well as strategy adaptations.

Further in-depth analysis of the nutrition situation using qualitative tools such as Nutrition Causal Analysis (NCA) should be done to have a critical and in-depth understanding of the link between the different immediate, basic, and underlying causes of malnutrition in the context of Sierra Leone so as to guide programming priority areas, provide intervention focused empirical evidences for advocacy, and national policy and implementation strategy reviews.

National guideline or protocol for nutrition assessments specific to the context in Sierra Leone should be

developed in order to standardize the process of design, implementation, analysis and reporting of nutrition surveys in the country to ensure both methodological soundness, comparability and consistency of nutrition surveys among stakeholders operational in the country.

Focus should be given to the improvement of the agricultural production system to produce diversified cereals with better nutritional quality and improved quality of cash crops.

Food based dietary guidelines should be developed which are specific to the context of Sierra Leone in order to guide national programmes focusing on the same.

Policies relating to nutrition and food security must be updated based on new empirical evidence and translated into practice, backed by strong political and public support in order to maximise impact. For this to happen, adequate and efficient human and financial resources, policy coordination and delivery mechanisms must be put in place. To this account the National Food and Nutrition Security Implementation Plan 2012-2016 targets should be revised based new empirical evidence from the current NNS and other most recent national surveys to reflect the country's current progress in the sector.

There is a need for a multi-sectoral approach to malnutrition through improved partnership and coordination within and across government institutions (though this has been recognized lately in the national food and nutrition security policy and its supplementing Implementation plan documents, the progress of implementation is slow so far) , , as well as with other stakeholders to ensure nutrition is put high on the agenda and continues to translate into real change.

10.3 Program Specific Recommendations Based On Gaps Identified

Reduce gender inequality and improve the nutritional status of women

A reduction in low birth-weight rates requires greater care for women before and during pregnancy. Greater care and improvement of women's and girls' status overall will result in heavier, healthier babies and children.

Increasing awareness of and support for the nutritional needs of pregnant women, combined with an increase in a household's ability to secure its nutritional needs, should be integrated with broader work related to reducing early marriage and pregnancy, increasing girls' access to education, and supporting women to benefit from improved livelihood options and opportunities.

Together these interventions can support improvements in women's decision-making power so that they can make informed choices to improve their nutrition and that of their children.

Improve infant and young child feeding practices and micronutrient Supplements

Exclusive breastfeeding for the first six months of a child's life could save 12-20% of child deaths and appropriate complementary feeding a further 6%. Hence aawareness must be increased in communities, inclusive of women and men, on how to improve IYCF practices in order to help reduce child malnutrition.

Support must come through IYCF interventions carried out by well-trained health workers and volunteers, and must be combined with efforts to increase incomes to enable households to put what they have learnt into practice.

Nutrition education, assessment and counselling of primary care takers and mothers or women of reproductive age should be strengthened to ensure continued positive progress towards meeting the MDGs and the post 2015 development agendas.

Food fortification of micronutrients with staple foods that are affordable to the poorest of households in order to reduce stunting significantly.

Promote locally available foods that are rich in micronutrients that are detrimental in a child's development and growth.

Improve access to healthcare, water and sanitation

Direct interventions are required to improve access to a healthy environment and to reduce morbidities associated with malnutrition. These include iron-folate supplementation for pregnant women, zinc supplement in the management of diarrhoea, Vitamin-A fortification or supplementation for children under five, hygiene promotion, improved access to safe drinking water in communities and institutions, and increased vaccination coverage.

Promotion of safe water access and treatment and safe storage options, both at community level and at the level of program and policy implementations by development stakeholders in the country needs to be facilitated.

Further Research Needs

Further research is needed across different issues that impact the nutrition status of women and children in Sierra Leone such as the impact of current social protection schemes on nutrition of women and children in the country. Such researches should focus on generating a broader evidence base of the underlying causes of malnutrition that can inform the design of interventions to tackle these causes at scale.

Operational researches should include developing a better understanding of the impact of current intra household gender relations (between women, and between women and men) on child and maternal nutrition; causes and impact of the gender disparity in the prevalence of malnutrition between boys and girls as uncovered by this NNS; relations between women's nutrition status and low birth weight outcomes in Sierra Leone; the causal link between food security and malnutrition and the prevailing disease burden as well as maternal child caring practices; stunting and IYCF practices from the point of direct impact of existing interventions (formative research); maternal and child caring practices and malnutrition in the context of Sierra Leone.

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12. APPENDICES

Appendix 12.1: Child Anthropometric Data Quality Evaluation Summary- All Districts

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Missing/Flagged data (% of in-range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	**0(1.2 %)**
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	**0(p=0.364)**
Overall Age distribution (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	**10(p=0.000)**
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**0(1)**
Dig pref score - height	Inc	#	0-7 0	8-12 2	13-20 4	> 20 10	**0(4)**
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**0(2)**
Standard Dev WHZ . .	Excl Excl	SD SD	<1.1 and >0.9 0	<1.15 and >0.85 2	<1.20 and >0.80 6	>=1.20 or <=0.80 20	**0(1.02)**
Skewness WHZ	Excl	#	<±0.2 <±0.4 0 1	<±0.6 3		>=±0.6 5	**0(-0.09)**
Kurtosis WHZ	Excl	#	<±0.2 <±0.4 0 1	<±0.6 3		>=±0.6 5	**0(-0.04)**
Poisson dist WHZ-2	Excl	p	>0.05 >0.01 0 1	>0.001 3		<=0.001 5	**5(p=0.000)**
Timing	Excl	Not determined yet 0 1		3		5	
OVERALL SCORE WHZ =			**0-9**	**10-14**	**15-24**	**>25**	**15 %**

The overall score of this survey is 15 %, this is acceptable.

Percentage of values flagged with **SMART flags:WHZ:** 1.2 %, HAZ: 3.2 %, WAZ: 1.1 %

Age distribution:

Month 6 : ######################
Month 7 : ##
Month 8 : ##
Month 9 : ##
Month 10 : ##
Month 11 : ##
Month 12 : ##
Month 13 : ##
Month 14 : ##
Month 15 : ##
Month 16 : ##
Month 17 : ##
Month 18 : ##
Month 19 : ##
Month 20 : ##
Month 21 : ##
Month 22 : ##
Month 23 : ##
Month 24 : ##
Month 25 : ##
Month 26 : ##
Month 27 : ##
Month 28 : ##
Month 29 : ##
Month 30 : ##
Month 31 : ##
Month 32 : ##
Month 33 : ####################################
Month 34 : ####################################
Month 35 : ################################
Month 36 : ##
Month 37 : ##
Month 38 : ##
Month 39 : ##
Month 40 : ##
Month 41 : ####################################
Month 42 : ################################
Month 43 : ################################
Month 44 : ################################
Month 45 : ################################
Month 46 : ################################
Month 47 : ##############################
Month 48 : ##
Month 49 : ################################
Month 50 : ##

Month 51 : ####################################
Month 52 : ###################################
Month 53 : ##################################
Month 54 : ############################
Month 55 : ##############################
Month 56 : ############################
Month 57 : ##########################
Month 58 : ########################
Month 59 : ######################
Month 60 : ##########

Age ratio of 6-29 months to 30-59 months: 1.10 (The value should be around 0.85).

Statistical evaluation of sex and age ratios (using Chi squared statistic):

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	1486/1262.0 (1.2)	1441/1284.0 (1.1)	2927/2546.0 (1.1)	1.03
18 to 29	12	1377/1231.0 (1.1)	1447/1252.0 (1.2)	2824/2483.0 (1.1)	0.95
30 to 41	12	1216/1193.0 (1.0)	1219/1214.0 (1.0)	2435/2406.0 (1.0)	1.00
42 to 53	12	979/1174.0 (0.8)	1051/1194.0 (0.9)	2030/2368.0 (0.9)	0.93
54 to 59	6	382/580.6 (0.7)	377/590.7 (0.6)	759/1171.0 (0.6)	1.01
6 to 59	54	5440/5488.0 (1.0)	5535/5488.0 (1.0)		0.98

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.364 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.000 (significant difference)
Overall age distribution for girls: p-value = 0.000 (significant difference)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Digit preference Weight:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ##
Digit .7 : ##
Digit .8 : ##
Digit .9 : ##

Digit preference score: 1 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic); p-value for chi2: 0.931

Digit preference Height:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ##
Digit .7 : ##
Digit .8 : ##
Digit .9 : ##

Digit preference score: 4 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic); p-value for chi2: 0.000 (significant difference)

Digit preference MUAC:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ##
Digit .7 : ##
Digit .8 : ##
Digit .9 : ##

Digit preference score: 2 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic); **p-value for** chi2: 0.001 (significant difference)

Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures

. . .	No Exclusion	Exclusion from Reference mean (WHO flags)	Exclusion from Observed mean (SMART flags)
WHZ	1.10	1.09	1.02
Standard Deviation SD			
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
Observed:	4.7%	4.6%	3.9%
Calculated with current SD:	4.5%	4.4%	3.4%
Calculated with a SD of 1:	3.2%	3.2%	3.1%
HAZ	1.40	1.34	1.17
Standard Deviation SD			
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
Observed:	29.3%	29.2%	28.8%
Calculated with current SD:	30.6%	29.8%	27.9%
Calculated with a SD of 1:	23.9%	23.8%	24.6%
WAZ	1.10	1.09	1.03
Standard Deviation SD			
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
Observed:	12.9%	12.9%	12.3%
Calculated with current SD:	14.1%	14.0%	12.4%
Calculated with a SD of 1:	11.9%	11.9%	11.7%
Results for Shapiro-Wilk test for normally (Gaussian) distributed data:			
WHZ	p= 0.000	p= 0.000	p= 0.000
HAZ	p= 0.000	p= 0.000	p= 0.000
WAZ	p= 0.000	p= 0.000	p= 0.000
(If p < 0.05 then the data are not normally distributed. If p > 0.05 you can consider the data normally distributed)			
Skewness			
WHZ	-0.16	-0.17	-0.09
HAZ	0.24	0.36	0.03

WAZ	-0.17	-0.18	-0.14

If the absolute value is:
-below minus 0.4 there is a relative excess of wasted/stunted/underweight subjects in the sample
-between minus 0.4 and minus 0.2, there may be a relative excess of wasted/stunted/underweight subjects in the sample.
-between minus 0.2 and plus 0.2, the distribution can be considered as symmetrical.
-between 0.2 and 0.4, there may be an excess of obese/tall/overweight subjects in the sample.
-above 0.4, there is an excess of obese/tall/overweight subjects in the sample

Kurtosis			
WHZ	1.40	0.85	-0.04
HAZ	5.75	1.53	-0.40
WAZ	0.92	0.75	-0.01

WHZ < -2: ID=1.95 (p=0.000)
WHZ < -3: ID=0.64 (p=0.975)
Oedema: ID=0.89 (p=0.679)
GAM: ID=1.96 (p=0.000)
SAM: ID=0.77 (p=0.878)
HAZ < -2: ID=7.07 (p=0.000)
HAZ < -3: ID=3.50 (p=0.000)
WAZ < -2: ID=5.07 (p=0.000)
WAZ < -3: ID=2.36 (p=0.000)

Subjects with SMART flags are excluded from this analysis.

The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

Are the data of the same quality at the beginning and the end of the clusters?
Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

Time point	**SD for WHZ** **0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3**
01: 1.45 (n=48, f=3)	############################
02: 1.12 (n=48, f=1)	############
03: 1.02 (n=48, f=0)	#########
04: 1.18 (n=48, f=1)	################
05: 1.12 (n=48, f=2)	############
06: 1.04 (n=48, f=0)	##########
07: 1.35 (n=47, f=2)	########################
08: 0.97 (n=48, f=0)	#######
09: 1.18 (n=48, f=0)	################
10: 1.01 (n=48, f=0)	#########
11: 1.07 (n=47, f=1)	###########
12: 1.12 (n=48, f=0)	############
13: 1.15 (n=48, f=1)	##############

14: 1.16 (n=48, f=0) ###############
15: 1.36 (n=48, f=2) ########################
16: 0.98 (n=48, f=0) ########
17: 1.06 (n=48, f=1) ###########
18: 1.51 (n=47, f=1) ################################
19: 1.12 (n=48, f=1) #############
20: 1.23 (n=48, f=0) ##################
21: 1.15 (n=47, f=2) ################
22: 1.03 (n=48, f=0) ##########
23: 1.05 (n=48, f=0) ###########
24: 1.27 (n=48, f=1) ####################
25: 1.20 (n=48, f=0) ##################
26: 0.99 (n=48, f=0) ########
27: 0.86 (n=48, f=0) ##
28: 1.10 (n=48, f=1) ############
29: 0.97 (n=47, f=0) #######
30: 1.12 (n=48, f=0) #############
31: 0.96 (n=48, f=0) #######
32: 1.07 (n=48, f=0) ###########
33: 0.98 (n=48, f=0) #######
34: 0.96 (n=48, f=0) #######
35: 0.90 (n=48, f=0) ####
36: 0.88 (n=48, f=0) ###
37: 1.08 (n=48, f=0) ############
38: 1.25 (n=48, f=1) ####################
39: 1.20 (n=48, f=0) ##################
40: 1.04 (n=47, f=0) ##########
41: 1.15 (n=47, f=1) ################
42: 0.99 (n=48, f=0) ########
43: 1.15 (n=47, f=1) ################
44: 1.17 (n=47, f=0) #################
45: 0.92 (n=48, f=0) #####
46: 1.24 (n=47, f=1) ####################
47: 1.24 (n=48, f=1) ####################
48: 1.11 (n=47, f=0) #############
49: 1.10 (n=47, f=0) #############
50: 1.20 (n=48, f=2) ##################
51: 1.19 (n=48, f=2) ##################
52: 1.06 (n=48, f=0) ###########
53: 0.95 (n=48, f=1) ######
54: 0.95 (n=47, f=0) ######
55: 1.23 (n=47, f=2) ##################
56: 0.92 (n=47, f=0) #####
57: 1.05 (n=46, f=0) ##########
58: 1.01 (n=47, f=0) #########
59: 1.07 (n=46, f=1) ###########
60: 0.88 (n=47, f=0) ###
61: 1.15 (n=47, f=2) ################
62: 0.96 (n=47, f=0) #######
63: 0.86 (n=47, f=0) ##
64: 1.14 (n=47, f=2) ###############
65: 1.01 (n=44, f=0) #########
66: 1.16 (n=47, f=0) ################

APPENDIX12.2: PERSONS INVOLVED IN THE SLNNS 2014

Appendix12.2.1 National Technical Committee for Nutrition Surveys

Appendix12.2.2: SLNNS 2014 FIELD IMPLEMENTATION TEAM

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ##
Digit .7 : ##
Digit .8 : ##
Digit .9 : ##

Digit preference score: 2 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic); **p-value for** chi2: 0.001 (significant difference)

(District Coordinators, Supervisors, and Team Leaders, Enumerators)

District Coordinators for SLNNS 2014

Marian Bangura	Nutrition Officer
Hannah Yankson	Nutrition Officer
Mutivah Kappia	National Nutrition Officer
Melrose Tucker	National Nutrition Consultant
Kaddie Fofana	National Nutrition Officer
Hamjatu Khazali	Nutrition Officer
John Baimba	M&E Officer-CSD

National Supervisors for SLNNS 2014

Bernadette Allien	Nutrition Officer (National)
Fodey A. Sesay	Nutrition Officer
Hannah Yankson	Nutrition Officer
James P. Mariba	Nutrition Officer (National)
Jeneba Kamara	Nutrition Officer
Kadie Y. Kandeh	Nutrition Officer
Mariama M. Lalia	Nutrition Officer
Mariama Margai	Nutrition Officer
Marian Bangura	Nutrition Officer
Mary K. Koroma	Nutrition Officer
Nancy Njavombo	Nutrition Officer
Sandra Jabati	Nutrition Officer

Sylvia E. Yagah	Nutrition Officer
Dr. Tuina H. Novat	Nutrition-Intern
Umaru Tarawally	Statistician
ZeinabBarie	Asst. Statistician
Mumin Kalan	Nutrition Officer
Elsie M. Linganiza	Nutrition Manager
Ansumana B. Sandy	Survey Supervisor
Francess Kafula	Nutrition Monitor
Edward Benya	Nutrition Monitor
Isatou J Kamara	Nutrition Monitor
James Ngebeh	Nutrition Monitor
Mossess	Nutrition Officer

Data Collectors for SLNNS 2014 (Team Leaders, Enumerators and Interviewers)

Team Leaders

Adama S Kamara	Muctarr Sheriff
Alhaji E.M. Rogers	Rugiatu Kamara
Augusta Jenneh Kpakra	Salamatu A.S. Conteh
Fasineh Kamara	Solomon Bomeh
Frederick I. Ngebeh	Sulaiman Massaquoi
Ibrahim M. Turay	Sylvia Waata Mansaray
Justin Alpha	Umu Bayoh
Lucy Tommy	Valentina B.C. Nicol
Momojah J. Momoh	Wango Lahai

Enumerators and Interviewers

Abu Bakarr Kamara	Mamud Bai Kamara
Abu Bakarr Salim Kamara	Marcel Ryan-Coker
Abubakarr Charm	Mariam Y. Kamara
Abubakarr Sheriff	Martin Nyakeh Aruna
Adama Yambasu	Matthew Moigboi
Agnes Sosokoneh	Mawonday Marrah
Ahmed Yessa Turay	Minkailu Massaquoi
Alfred Walters	Mohamed Barrie
Alhaji Hemoh	Mohamed Ahbibu Kamara
Aloysious Wai	Mohamed I. Kamara
Augustine L. Moijueh	Mohamed Jalloh
Bai Sheka Wurie	Mohamed Sannoh
Bernadette Sesay	Nanah Dumbuyah
Davidson Ogunade	Osman Momoh Kamara
Elizabeth Jattu Momoh	Peter Tommy
Fatmata Kargbo	Prince J. S. Walters
Fatmata Mansaray	Sallay Linda Massaquoi

Fatmata Samura Bangs
Francess Nasu Jimmy (Ssl)
Francis Brima Marah
Francis Nyakeh Tommy
Gamoh Sanoh
Hamid Bakie Kallon
Heidrick Barrow
Jusufu Sillah
Kumba Satta Feika
Sannah Marian Stevens
Sarah Francess Kamara
Sorie Bombay Samura
Sorie Waritay
Suphian Vandi Koroma
Thomas Koroma
Unisa Kamara
Yadalieu Allahsan Mahmoud
Zainab Kamara

Appendix12.3: SLNNS 2014 QUESTIONNAIRES

Section 1: MORTALITY QUESTIONNAIRE, NNS SIERRA LEONE 2014

Date (D/M/Y): ……/……/…… Cluster No: …… Team No: …… Province: …… District: ……
Chief Dom: …… Section/Village (EA): …… Cluster Code: …… Team Leader: ……

HH	HH Members		Joined HH since start of **recall DATE (Refer to your note)**		Left HH since Start of **recall DATE**		No. births Since start of **recall DATE**	Deaths since Start of **recall DATE**		Remark- Causes of deaths in Children Under-Five (1-7)
	Total	< 5	Total	< 5	Total	<5	< 5	Total	< 5	
1										
2*										
3										
4*										
5										
6*										
7										
8*										
9										
10*										
11										
12*										
13										
14*										
15										
16*										

88= No death 1= Diarrhoea 2= Fever 3= Difficulty breathing 4= Malnutrition 5= Measles 6= Accident 7= Violence 66= Other

Section 3: INFANT AND YOUNG CHILD FEEDING (IYCF) PRACTICE QUESTIONNAIRES

(Interview for mother/Primary caretakers of children 0 to 23.9 months)
To be conducted in **EVERY HH WITH CHILDREN 0-23.9 MONTHS**, and should be completed for all infants under two years but **NOT completed for children between 24-59 months**)

	Date: __ / __ / _____ Cluster Number: _____ Cluster Code: _____	Team number:_____			
	Province: _____ District: _____	Chiefdom (Village/EA): _____			
	Name of the child: _____	Age (in months): ____ _____			
	Household number: _____ Child No:_____	IYCF Interviewer: _____			
NO.	QUESTIONS AND FILTERS	CODING CATEGORIES			SKIP TO
	Now I would like to ask you more about you (mother of child) and (NAME)				
1	Has this child ever been breastfed (NAME of child)?				
	YES	1			
	NO	2			Section 4
2	How long after birth did you (NAME of mother) first put this child (NAME) to the breast?				
	LESS THAN ONE HOUR	1			
	BETWEEN 1 and 23 HOURS(the 1st Day)	2			
	MORE THAN 24 HOURS (2nd Day)	3			
	DON'T KNOW	8			
3	Are you (NAME of mother) still breastfeeding (CHILD NAME)?				
	YES	1			
	NO	2			
The following question is only for children 0 -5 months. For children 6 to 23 months go to Question 6					
4	Did you feed this child (NAME OF CHILD)with colostrum/**Yellow colour**(local language)				
	YES	1			
	NO	2			
5	Now I would like to ask you about all liquids or solid foods (NAME of child) has drank or eaten yesterday during the day or at night.				
	Did (NAME of child) take:	Yes	No	DK	
	Plain water?	1	2	8	
	Infant formula such as Lactogen, peak Milk or Nido?	1	2	8	
	Any other milk such as tinned, powdered,	1	2	8	

	Sugar cane, coconut water, palm wine (Poyo), other fruit juice or other drink?	1	2	8	
	Any other liquids such as sugar water or soup?	1	2	8	
	Any solid or mashed foods?	1	2	8	
The following questions are only for children 6 to 23 months. If the child is below 6 months thanks the mother, the interview is over					
6	At what age did you start giving anything other than breast milk to this child (CHILD NAME) (including water)?		(Enter Age of child in months)		
7	During **the last 24 hours (Since this time yesterday)**, what food groups have (NAME of the child) eaten?				
	Did (NAME of child) take:	Yes	No	DK	
	Cereals, roots and tubers (like rice, cassava, sweet potatoes…?)	1	2	8	
	Legumes, pulses and nuts (like beans, peas, peanuts…)	1	2	8	
	Dairy products like milk, yogurt, cheese… ? (without breast milk)	1	2	8	
	Meat, poultry and fish (like chicken, fish, Eggs)	1	2	8	
	Vitamin A rich fruits and vegetables (like carrots, pumpkin?)	1	2	8	
	Others fruits and vegetables?	1	2	8	
8	During the last 24 hours (**since this time yesterday**), how many times has (NAME of the child) eaten **food*** other than liquid? (**without breastfeeding**)	YES	NO	DK	
	0 meal	1	2	8	
	1 meal	1	2	8	
	2 meal	1	2	8	
	3 meal	1	2	8	
	4 meal	1	2	8	
	More than 4 meal	1	2	8	
The following question (question 9) is only for children who are **not breastfed**					
9	During the last 24 hours (**since this time yesterday**), how many times (NAME of the child) consumed/has had milk?	YES	NO	DK	
	0 time	1	2	8	
	1 time	1	2	8	
	2 times	1	2	8	
	3 times	1	2	8	
	4 times	1	2	8	
	More than 4 times	1	2	8	

Section 4: MATERNAL NUTRITION QUESTIONNAIRES, NNS SIERRA LEONE 2014

(Weight, Height and MUAC Measurement of Women 15 to 49 Years)

(To be conducted in **EVERY HH** from the random starting point)

Date (D/M/Y): ……/……/…… Cluster No: …… Team No: ……. Province: ……
District: ……..…… Chiefdom: ……..…….. Village (EA): ……..Cluster Code: ……

Woman No.	HH No.	Woman's name	Age of the Woman (in Years)	Woman's height (cm) (±0.1cm)	Woman's weight (kg) (±100g)	MUAC (±0.1cm)	Pregnant (P) or Lactating (L)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

Section 5: HOUSEHOLD QUESTIONNAIRES, NNS SIERRA LEONE 2014

5.1 FOOD SECURITY QUESTIONNAIRES, NNS SIERRA LEONE 2014

(To be conducted in **EVERY OTHER HH** from the random starting point)

Date (D/M/Y): ……/……/…… HH No: ……..Cluster No: …… Team No: ……
Province: ……. District: ……..…… Chief Dom: ……..……
Village (EA/Section): ……..…. Cluster Code: …… Team Leader: ……

1	**Main Staple Food (Types and Source)**	
	Normally, what is your **main staple food** at **this time** of the year? 1= Sorghum 2= Wheat 3= Spaghetti/Pasta 4= Rice 5= Maize 6= Millet 7= beans 8=peas 9=Cassava 10=Sweet Potatoes 11=Other - specify	[____]
2	What is the most important **source of your main staple food** at *this time of the normal year*? (mention one) 1= Own crop production 2 = Cereal purchase 3= Relief food 4=Labour exchange through grain 5= Borrowed (grain) 6=Remittance (grain) 7=Other specify)	[___]
3	What will be the most important **source of your main staple food** in the ***next 3 months?*** (mention one) 1= Own crop production 2 = Cereal purchase 3= Relief food 4=Labour exchange through grain 5= Borrowed (grain) 6=Remittance (grain) 7= Remittance (cash) 8=Other specify	[___]
4	**Source of Income**	
	What was your Household's **main income** activity in the **last 30 days**? (choose 1 option) 1= Sale of crops 2 = Sale of livestock 3 = Sale of animal products 4 = Brewing 5 = Sale of fish 6 = Sale of food aid 7= Casual labour 8 = Skilled labour 9 = Salaried work 10 = Sale of natural resources (firewood; charcoal; grass) 11 = Other	[____]
5	**Household Dietary Diversity**	
	What did your family **eat yesterday**? (List all applicable) 1=Cereals 2=Milk & Milk Products 3=Meat/Fish 4=Vegetables 5=Fruits 6=Pulses 7=Tubers/Root Crops 8= Eggs 9=Sugar/Honey 10=Condiments 11=Others- Specify) ***N.B: (More than at least two choices for each households)**	[___] [___] [___] [___] [___] [___] [___] [___] [___] [___] [___] [___] _____ ___
6	**Household Food Consumption**	
	How many **days** in **past 7 days** did your household consume the following items?	Number of Days

a)	**Cereal and tubers:** (Maize/ sorghum/ cassava/ potatoes/ sweet potatoes/millet/ pasta/ bread/ rice/ other cereals and tubers)	[___]
b)	**Pulses:** beans/ lentils/ groundnuts/ cashew nuts/ sesame/ peas/Vegetables/ green leaves	[___]
c)	**Fruits:** (like Orange, Mango, etc)	[___]
d)	**Animal protein:** Beef, goat, pork, poultry, eggs, fish	[___]
e)	**Milk and other dairy products:** (yoghurt, curd)	[___]
f)	Sugar, honey, sweets	[___]
g	Vegetables	[___]
h)	Oil (palm Oil), fats, butter	[___]
7	**Source of Food**	
	What was the **main Source of food** in the **past 7 days**? (choose 1 option) 1 = Own production 2 = Gifts 3 = Market/ shop purchase 4 = Work for food (any applicable equivalent) 5=Borrowing/ debt 6 = Food aid 7 = Hunting 8 = Fishing 9 = Gathering 66 = Others	[____]
8	**Food Cultivation**	
	Did you **cultivate** in the recent last season? 0 = N0 1 = Yes	[____]
9	**Household's income expenditure** pattern for food Purchase (Choose only one)	
	Out of your HH monthly expenditure, how much was allocated to food purchases? 0 = 0% 1 = 1-50% 2 = 50-65% 3 =>65%	[____]
10	**Negative Coping Mechanisms**	
a)	If **yes**, which **coping strategies** were used? (List all options mentioned by the Interviewee) 0 = No 1 = Yes	[____]
b)	If **yes**, which **coping strategies** were used? (List all options mentioned by the Interviewee) 1 = Rely on less preferred/ cheaper food 2 = Borrowing/ kinship support 3 = Limit portion size at meals 4 = Restrict adults' consumption for children 5 = Reduce number of daily meals 6 = Sell more animals than usual 7 = Consume seed stocks 66=Other (specify)	[____] [____] [____] [____] [____] [____] [____] [____] [____] _____
11	What are the **main Shocks** ***(challenges or extreme circumstances that affect the livelihood of households)*** currently faced by the HH? (list up to 3 options) 1 = Insecurity 2 = Expensive food 3 = Floods 4 =Human sickness 5 = Limited access/ movement 6 = Livestock diseases 7 = Delay of rains 8 = Pest/crop disease 9=Lack of water 66 = Other (specify) 88 = No shocks	[____] [____] [____]
12	What is the **main food crop** usually planted in this village?	[____]
13	What are the **main cash crop** usually planted in this village?	[____]
14	When was the most recent final harvest of the main food crops here?	[____]

5.2 WaSH QUESTIONNAIRES, NNS SIERRA LEONE 2014

(To be conducted in **EVERY OTHER HH** from the random starting point)

Date (D/M/Y): ……/……/…… Cluster No: …… HH No: …… Team No: ……
Province: …… District: ……..…….. Chief Dom: ……..……
Village (EA): …… Cluster Code: …… Name of Team Leader: ……

1	What is the household's main **Source of drinking water**? 1 = Borehole (Tube Well) 2 = Protected shallow well 3 = Open shallow well 4 = Protected spring 5 = River /Stream 6 = HH connection/ stand pipe/ tanker 7 = Dam/ pond 66 = Other (specify)	[____]
2	**How long does it take** to collect HH water (including travel to and from and waiting)? 1 = <30 min 2 = >30min to <1hr 3 = >1hr to < 2hr 4 = >2hr to < 4hr 5 = >4hr	[____]
3	How many **litres [Five (5) gallon** of water did the HH use yesterday in total (excluding water for washing clothes)? Consider balance of the fetched amount & left over) (in Litres) (total of 22 Litres)]	[____]
4	What is done to the water before household members drink it? 0 = Nothing 1 = Boiling 2 = Filtering with a cloth 3 = Letting it settle 4 = Chlorination 66 = Other (Specify)	[____]
5	When do you usually **wash your hand**s during the day? (list all options mentioned) 0 = Never 1 = After defecating 2 = After cleaning child faeces 3 = Before cooking 4 = Before eating 5 = Before breast feeding 66 = Other (specify)	[____]
6	What do you use for washing hands? (Choose only one) 0 = Nothing 1 = Water only 2 = Water + soap 3 = Water + Ash /Mud / Sand 66 = Other (specify)	[____]
7	**Where** does the household usually go for **toilet?** (include more than one if necessary) 1 = Undesignated open area (Bush) 3= Hole (Pit latrine, Bucket) 2 = Designated open area (No facility, Field) 4 = Latrine (Flush / Pour flush) 66 = Other (specify)	[____]
	Health Issues	
8	A). Have there been any **outbreaks of disease** in this locality in the last three (3) months? (Such as Chollera, Ebolla, Measeles) (0=No, 1=Yes)	[____]
	B). If yes, what was the outbreak disease?	_____
	C). If yes, how many people were affected?	[____]
	D). Has there been any response or treatment for the problem? (0=no outbreak, 1=No, 2=Yes	[____]
9	**How long** does it take to walk to the nearest health facilities? (ONE WAY)	
	A) The nearest Community Health Facility (CHP/CHC) travel time? (in hrs)	[____]
	B) The nearest Clinic (Private) travel time? (in hrs)	[____]
	C) The nearest Hospital travel time? (in hrs)	[____]