FINAL REPORT

NUTRITION CAUSAL ANALYSIS

October 2022 – March 2023

Bonthe District, Sierra Leone

Irish Aid
Rialtas na hÉireann
Government of Ireland

ACTION AGAINST HUNGER

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ABBREVIATIONS

ACF	Action Contre la Faim
ANC	Antenatal Care
ARI	Acute Respiratory Infections
CI	Confidence Interval
CMAM	Community Management of Acute Malnutrition
CSB	Corn-Soya Blend
DHS	Demographic and Health Survey
EBF	Exclusive Breastfeeding
FEWSNET	Famine Early Warning System
FGD	Focus Group Discussion
FSL	Food Security and Livelihoods
GAM	Global Acute Malnutrition
GBV	Gender-Based Violence
HH	Household
HAZ	Height for Age Z-Score
HHS	Household Hunger Scale
HDDS	Household Dietary Diversity Score
IYCF	Infant and Young Child Feeding
IYCN	Infant and Young Child Nutrition
LZ	Livelihood Zone
MAHFP	Months of Adequate Household Food Provisioning
MAM	Moderate Acute Malnutrition
MCH	Maternal and Child Health
MHPSS	Mental Heath and Psychological Support
MICS	Multiple Indicator Cluster Survey
MUAC	Mid-Upper Arm Circumference
NCA	Nutrition Causal Analysis
NGO	Non-Governmental Organization
PNC	Postnatal Care
PPS	Probability Proportionate to Size
rCSI	Reduced Coping Strategy Index
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SMART	Standardized Monitoring for Assessment in Relief & Transitions
TBA	Traditional Birth Attendant
UNICEF	United Nations' Children's Fund
USD	United States Dollar
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WAZ	Weight for Age Z-Score
WHO	World Health Organization
WHZ	Weight for Height Z-Score

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EXECUTIVE SUMMARY

Bonthe District belongs to the Southern Province of Sierra Leone and it is divided into 11 chiefdoms. The main sources of livelihoods are agriculture, fishing and mining. Apart from individual farmers who largely rely on subsistence farming, various farming groups exist and engage in cassava, swamp rice and vegetable productions. Fishing is the second major income generating activity, if not the first for most people in the riverine areas. Mining is conducted in large land portions of Kpanda-Kemoh chiefdom.[1]The district remains one of the poorest and least developed in Sierra Leone. The overall poverty level is 50%.[2] Latest assessments have disclosed the necessity to address the high needs of the population that have further increased due to the crisis provoked by the price spikes and the consequent loss of purchasing power. Unaffordability of foods forces households to adopt unsustainable coping strategies. The district has a high vulnerability index, and it has been ranked 5th (out of the previous "old" 12 districts) most vulnerable district in Sierra Leone.[3] Bonthe is in fact prone to seasonal hazards like, for example, floods. Heavy rains can wash out crops and make roads inaccessible so it is difficult and costly to take crops to markets. Delayed rains may result instead in the need for a second planting or sowing or the reduction of yields due to interrupted growth.[4] Boats are the major means of transportation in the district and nearly 60% of villages are inaccessible by vehicle.[5]

Action Against Hunger is implementing Irish Aid-funded programme in three chiefdoms of Bonthe district, namely Jong, Kpanda Kemoh and Yawbeko. The program focuses on the multisectoral community-led approach to improve Nutrition (MCA-Nut), which includes Integrated Management of Acute Malnutrition (IMAM), Infant and Young Child Feeding (IYCF) and nutrition education components while Food Security and Livelihoods (FSL), Water, Sanitation and Hygiene (WASH) and Mental Health and Psychosocial Support (MHPSS) also form an integral part of the program, with the aim to address underlying causes of malnutrition.

As a member of the Nutrition sector, Action Against Hunger conducted a Nutrition Causal Analysis (Link NCA) to identify the causes of chronic undernutrition and to identify the key areas of programme adaptations to improve its nutrition security approaches. Action Against Hunger anticipates that a Link NCA study will lead to a common understanding among relevant stakeholders on the causes of undernutrition and will provide a more holistic view of the dynamics of undernutrition in the study zone

Key findings

The analyses undertaken during this Link NCA study allowed to identify 20 risk factors, believed to have an impact on the prevalence of undernutrition in the study zone. Following

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[1] Bonthe District Council, 'Bonthe District Council Development Plan 2020-2022' (Bonthe District Council, 2020), 2020–22; Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review' (Freetown Sierra Leone: AAH SL, 2022).

[2] United Nations Office for the Coordination of Humanitarian AffairsHA, 'Sierra Leone - Bonthe District Profile' (OCHA, 2016), https://reliefweb.int/report/sierra-leone/sierra-leone-bonthe-district-profile-04-december-2015.

[3] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

[4] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

[5] World Food Programme, 'State of Food Security in Sierra Leone 2020. Comprehensive Food Security and Vulnerability Analysis' (Rome: WFP, 2021), https://www.wfp.org/publications/state-food-security-sierra-leone-2020-comprehensive-food-security-and-vulnerability.

a triangulation of data from diverse sources, 2 risk factors were identified as having a major impact, 10 risk factors were classified as having an important impact and 8 risk factors were judged to have a minor impact on the prevalence of undernutrition in the zone of study. Among the major risk factors, one was identified in the sector of health and nutrition, namely **limited access to health services** while the other one, **low access to income sources**, was identified in the sector of food security and livelihoods.

The community perception of the causal mechanism of undernutrition has its roots in the limited access to income sources, which can be worsened by the limited access to markets, particularly during the rainy season. Low access to income sources directly affects low social support for women[6], which translates into increased women's workload with a negative effect on their wellbeing and consequently inadequate care practices. At the same time, limited access to income sources also impact access to a quality diet and non-optimal maternal nutritional status of women, leading to inadequate child care practices, especially exclusive breastfeeding. Limited income sources alongside low decision making of women lead to the deployment of inadequate coping mechanisms, such as intimate relationships and early marriage, which translate in early and unwanted pregnancies, increased women's workload and inadequate care practices. Adopting inadequate care practices in terms of child-caregiver interactions, breastfeeding and hygiene practices may in fact lead to a sub-optimal child's nutritional status, increased vulnerability to disease and consequently undernutrition. Lastly, low female decision making alongside low access to income sources impacts negatively on access and subsequently on use of health services, potentially leading to increased risk of disease and therefore undernutrition.

Based on available quantitative data (DHS 2019 and MICS 2017), the calculation of statistical associations between individual risk factors and nutritional status of children in surveyed households allowed to differentiate between risk factors of wasting, stunting, concurrent wasting and stunting, underweight and anaemia.[7] No risk factors were applicable for all conditions.

Common risk factors for *wasting* and *underweight* include lower **child's age, number of breastfeeding months** and living in a **household with a smaller number of rooms[8]**. A child who is **less than 24 months** and who leaves in a **household where beating is justified if the wife burned food** was associated with higher probability of being *wasted* or *concurrently wasted and stunted*. A child having **fever in the 2 weeks** prior the survey was identified as common risk factor for *wasting, concurrent wasting and stunting* and *underweight*. Lastly, common risk factors for *stunting* and *underweight* include **having a disabled mother** or a **mother that did not want to go alone to seek medical help**

Having a higher **birthweight** was also found to be a protective factor of *wasting, stunting* and *underweight*. Common protective factors for *wasting* and *underweight* include a higher **maternal BMI** and living in a household with higher **number of chickens.** Having a higher **birthweight**, **current weight or child's height** were associated with a lower probability of a

[6] Women are mostly financially dependent on men which means that if men don't have enough resources women are not supported

[7] Depending on the priority focus of each survey, the studied indicators did not fully cover all indicators commonly considered with the framework of a nutrition causal analysis. Therefore, the supporting evidence presented in this report, may have gaps and further research is necessary to build a more comprehensive understanding of causal mechanisms of various forms of undernutrition in the study zone.

[8] Proxy indicator for household income

child being *stunted* or *underweight*. A higher **height** was also associated with lower probability of child's *anaemia*.

Summary of ongoing interventions

Action Against Hunger Sierra Leone is currently implementing two health system strengthening projects to improve essential health services, with a focus on prevention and treatment of acute malnutrition and prevention of chronic malnutrition in two districts (Freetown and Bonthe). These integrated projects serve to address the underlying causes of undernutrition with a strong emphasis on the prevention through sustained behaviour change. They are designed to address the high rates of stunting which is characterised by high prevalence of chronic malnutrition and moderate level of acute malnutrition. These are multi sectorial projects that include Health and Nutrition, Food Security and Livelihood, WASH, Gender and advocacy and Mental and Psychosocial Support;

1) The MCA-Nut is a multi-sectorial community-led project to improve Nutrition in Bonthe district, funded by Irish Aid and implemented since August 2022. It aims to address the root causes of undernutrition at the facility and community level, while strengthening the operational capacities of line ministries and health facilities. At the national level, the project engages in advocacy activities with government establishments like SUN movement (Scaling up Nutrition), with whom ACF is working to influence the government's nutrition policies since 2017 with a focus to scale up nutrition services in ACF implantation areas;

2) The PROSSAN project funded by AFD aims at health system strengthening and is being implemented in Sierra Leone and Liberia. This project in the in first year of phase two implementation that started in May 2022. It aims at improving health service delivery through training and supportive supervision of health care works. It also supports school health clubs and community structures such as mother support groups to improve health and nutrition practice, established adolescent friendly spaces for MHPSS activities and create demand for quality services.

Recommendations

- Support community-led initiatives, such as market fairs, seed banks (rice, groundnuts, vegetables), kombi or VSLA groups, to reinforce the internal community capacity to create and further develop income generating activities as well as a sense of unity within each community;
- Support the development of income generating activities that will sustain the community especially during the lean season with a focus on a proper evaluation of both positive and negative impact of these on respective communities in order to protect their environment and maintain a healthy power dynamic among community members ahead of any implementation;
- Support health system strengthening activities at district level, focusing on quality of care across available health facilities, to boost the utilisation of services and increase trust of communities toward health staff through respectful behaviour;
- Explore possibilities through local financial institutions and/or VSLA, Osusu to provide short-term healthcare loans to boost early access to health services, if needed, especially during lean season;

- Support community empowerment initiatives, enabling community members to analyse and prioritise problems that affect them and to design and implement appropriate solutions. The problems may include community access to healthcare, education, markets, drinking water or any other issue of importance;
- Promote the re-creation of community systems and structures that were present in the past but are currently lost to re-create the sense of unity in the community and to provide intra-community support during periods of high distress and economic hardship, with a focus on adequate coping mechanisms. This may include the support of women's support groups for company, information sharing and income-generation purposes. Community consultations will need to be implemented before the initiation of any activity to reflect community preferences.
- Improve access of women to income sources and the increased decision-making power in women's priory areas.
- Promote optimal childcare practices aimed at a variety of caregivers including grandmothers.

I. INTRODUCTION

Bonthe District belongs to the Southern Province of Sierra Leone. The district is divided into 11 chiefdoms, which are further divided into 18 wards. Mattru Jong, in the Jong chiefdom is the headquarter town of Bonthe District Council. Bonthe is characterized by navigable rivers, vast area of arable land (Mangrove swamps, Inland Valley Swamps, Uplands, and Bolly-lands). In fact, boats are the major means of transportation (49%) in the district and nearly 60% of villages are inaccessible by vehicle, a number that increases during the rainy season.[9] Although in bad conditions, the roads within the district are relatively motorable.[10]

The main sources of livelihoods are agriculture, fishing and mining. Bonthe hosts the CARMANOR oil palm plantation, Sierra Rutile and Bauxite Mining Companies. Half of Kpanda-Kemoh chiefdom was once major cassava and rice producing area in the country but it is now mined out thoroughly and farmers are forced to cluster together to compete for small fertile pieces of land. Most communities in the district still depend largely on **agriculture** as source of livelihood. Apart from the individual farmers who largely rely on subsistence farming, various farming groups exist which engage in cassava, swamp rice and vegetable productions. **Fishing** is the second major income generating activity, if not the first for most people in the riverine areas. However, artisanal fishing is done in small scale due to poor and inadequate fishing equipment. Lastly, the Sierra Rutile Limited (SRL) and VIMETCO companies are the largest foreign earners, employers and tax payers for the Government of Sierra Leone in the district. The two companies are **mining** in large land portions of Kpanda-Kemoh chiefdom.[11]

The district, however, remains one of the poorest and least developed in Sierra Leone. The overall poverty level is 50% with the Gini coefficient 0.3 (scale between 0 and 1).[12] 31-52% of homes are roofed with thatch, 72% of houses are built with mud/mud bricks, 25% of children ever born to women aged 15-49 years have died.[13] Latest assessments have disclosed the necessity to address the high needs of the population that have further increased due to the crisis provoked by the price spikes and the consequent loss of purchasing power. A part of the poorest layer of the society who is now not able to fully meet their food needs, the increased cost of food and non-food commodities also reduced the profitability of livelihoods and the volume of the related businesses due to the increased costs to carry out the livelihood

[9] World Food Programme, 'State of Food Security in Sierra Leone 2020. Comprehensive Food Security and Vulnerability Analysis' (Rome: WFP, 2021), https://www.wfp.org/publications/state-food-security-sierra-leone-2020-comprehensive-food-security-and-vulnerability.

[10] World Food Programme, 'State of Food Security in Sierra Leone 2020. Comprehensive Food Security and Vulnerability Analysis'.

[11] Bonthe District Council, 'Bonthe District Council Development Plan 2020-2022' (Bonthe District Council, 2020), 2020–22; Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review' (Freetown Sierra Leone: AAH SL, 2022).

[12] United Nations Office for the Coordination of Humanitarian AffairsHA, 'Sierra Leone - Bonthe District Profile' (OCHA, 2016), https://reliefweb.int/report/sierra-leone/sierra-leone-bonthe-district-profile-04-december-2015.

[13] Statistics Sierra Leone, '2015 Population and Housing Census. Summary of Final Results' (Freetown Sierra Leone: Statistics Sierra Leone, 2016), https://www.statistics.sl/images/StatisticsSL/Documents/final-results_-2015_population_and_housing_census.pdf.

activities. Unaffordability of foods forces households to adopt unsustainable coping strategies. The poorest households are in need to increase their income for matching the higher costs of their same previous basic needs[14]. The district also has a high vulnerability index[15,] and it has been ranked 5th (out of the previous "old" 12) most vulnerable district in Sierra Leone. Bonthe is also prone to seasonal hazards such as landslide, flooding, epidemics, storm surge, sea level rise, coastal erosion, tropical storm, thunder and lightning. Heavy rains can wash out crops and make roads inaccessible so it is difficult and costly to take crops to markets. Delayed rains may result instead in the need for a second planting or sowing or the reduction of yields due to interrupted growth.[16]

Justification of the study

Action Against Hunger is implementing Irish Aid-funded programme in three chiefdoms of Bonthe district, namely Jong, Kpanda Kemoh and Yawbeko. The program focuses on the multisectoral community-led approach to improve Nutrition (MCA-Nut), which includes Integrated Management of Acute Malnutrition (IMAM), infant and young child feeding (IYCF) and nutrition education components while Food Security and Livelihoods (FSL), Water, Sanitation and Hygiene (WASH) and Mental Health and Psychosocial Support (MHPSS) also form an integral part of the program, with the aim of addressing underlying causes of malnutrition.

In recent SMART surveys conducted in 2017 and 2021, the GAM rates have remained below the emergency thresholds while stunting and underweight have remained a problem overall in the country, at 31.5% (95% CI 30.0-32.6) and 26% (95% CI (25.0-27.5), respectively. Further investigation was therefore required to understand the causes of stunting and underweight in targeted chiefdoms.

As a member of the Nutrition sector, Action Against Hunger conducted a Nutrition Causal Analysis (Link NCA) to identify the causes of chronic undernutrition and to identify the key areas of programme adaptations to improve its nutrition security approaches. Action Against Hunger anticipates that a Link NCA study will lead to a common understanding among relevant stakeholders on the causes of undernutrition, their interplay with nutrition outcomes, and will provide a more holistic view of the dynamics of undernutrition in the study zone. Findings will be used for to inform future programming in the study area which will be discussed and coordinated with concerned stakeholders.

II. STUDY OBJECTIVES

Global objective

The main objective of this Link NCA study is to understand causal mechanisms of undernutrition in the Action Against Hunger intervention zone in Bonthe district, Sierra Leone, to improve the relevance and efficiency of its nutritional security programming.

Specific objectives

The study will aim to answer the following specific objectives:

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[14] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

[15] Pacific Disaster Center, 'Sierra Leone National Preparedeness Baseline Assessment' (Pacific Disaster Center, 2020), https://www.pdc.org/wp-content/uploads/NDPBA_SLE_Final_Report.pdf.

[16] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

1. To identify and categorize risk factors responsible for stunting among the population in the study area;
2. To understand how risk factors responsible for stunting among the population in the target area interact with each other in order to determine which causal pathways to undernutrition are likely to explain most cases of stunting in the target area;
3. To understand how risk factors responsible for stunting among the population in the target area have evolved over time and/or evolve in different seasons;
4. To identify vulnerable groups of stunting among the population;
5. To identify the needs and capacities of communities to respond to the identified underlying mechanisms;
6. To identify with the communities, the levers and barriers likely to influence the main causal mechanisms of stunting;
7. To use study results and develop a Theory of Change with actionable multi-sectoral recommendations to address identified risk factors, targeting most vulnerable communities.

III. METHODOLOGY

Type of methodology

A Link NCA Nutrition Causal Analysis is a mixed method for analysing the multi-causality of under-nutrition as a starting point for improving the relevance and effectiveness of multi-sectoral nutrition security programming in a given context. It is a structured, participatory and holistic study that builds on UNICEF's conceptual framework with an objective to build an evidence-based consensus on plausible causes of undernutrition in a local context[17].

Key stages

A. Preparatory phase & Identification of hypothesised risk factors and causal pathways (October 2022)

The main objective of a preparatory phase was to define key parameters of the study, including its objectives, geographical coverage and feasibility. Safeguarding a mixed method approach of the Link NCA methodology, the qualitative data collection was complemented by statistical analyses of existing datasets, namely the 2019 Sierra Leone Demographic and Health Survey[18] and the 2017 Sierra Leone Multiple Indicator Cluster Surveys (MICS)[19].

After a validation of Terms of Reference, a full study protocol with a complete set of tools was developed and submitted to the Office of the Sierra Leone Ethics and Scientific Review Committee for an ethical approval on 31st October 2022[20]. In the meantime, the study team

[17] For more information about the methodology, please refer to www.linknca.org.
[18] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019', Stats SL and ICF (Freetown, Sierra Leone, and Rockville, Maryland, USA, 2020), https://sierraleone.unfpa.org/en/publications/sierra-leone-demographic-and-health-survey-2019?utm_source=google&utm_medium=pmax&gclid=Cj0KCQjwnvOaBhDTARIsAJf8eVOO1Q_OZq6DEmo_Ou1690eIISLeHNqyMpOLhvb9qLIBJmB2wMaW92kaAv_9EALw_wcB.
[19] Statistics Sierra Leone, 'Sierra Leone Multiple Indicator Cluster Survey 2017, Survey Findings Report.' (Freetown Sierra Leone: Statistics Sierra Leone., 2018), https://mics.unicef.org/news_entries/106/SIERRA-LEONE-2017-MICS-RELEASED.
[20] Reference No: SLESRC No : 007/11/2022

proceeded with a systematic literature review, using the *Link NCA Pathways to Undernutrition* module and all grey literature available locally). The review covered past surveys and research applicable to the study zone, including SMART[21] surveys, national nutrition surveys, peer-review research on nutritional status among women of reproductive age (WRA) and children under five (CU5) years, food security as well as AAH-SL reports of recent assessments conducted in the study area, ensuring collation, analysis and synthesis of available secondary data sources.

The aim of the exercise was to identify a set of risk factors and their interactions, which might trigger undernutrition among the target population. The identified hypothesised risk factors were reviewed by the head of departments of Action Against Hunger Sierra Leone country office and contextualised accordingly. Out of 25 hypothesised risk factors (presented in greater detail in the *Findings* section of this report), all were retained for field-testing.

B. Secondary quantitative data analysis (October – November 2022)

The 2019 Sierra Leone Demographic and Health Survey (DHS) and the 2017 Sierra Leone Multiple Indicator Cluster Surveys (MICS) were used for the quantitative analysis of this study.

Access to Sierra Leone DHS 2019 data was requested from the Demographic and Health Surveys Program archive while access to Sierra Leone MICS 2017 was requested to UNICEF MICS team for analysis.

Data for each survey included a range of information on child's (6-59 months) anthropometrics and health status, household food security situation, dietary diversity, water and sanitation situation, as well as mother's anthropometrics, health, education status and decision-making powers. Specific variables differed by survey as they were collected by different agencies and in different years (2017 & 2019).

Eligibility criteria:

Inclusion criteria	Exclusion criteria
a. Children 6-59 months, including both males and females, disaggregated for children 6-23 months and children 24-59 months, whenever possible	a. Children 0-5 months and/or older than 59 months
b. Women of reproductive age (15-49 years)	b. Girls and young women less than 15 years old and/or women older than 49 years
c. Groups a) and b) residing in Bonthe District	c. Groups a) and b) not residing in Bonthe District and/or rural/peri-urban areas of Sierra Leone
d. Datasets published from 2015 onwards relevant to Bonthe District and/or Southern Province, notably datasets including anthropometric measurements of children in group a) and household indicators	d. Video/media files, advocacy briefs, country protocols
	e. Admission reports for treatment of acute malnutrition at health facility/province/country level, unless risk factors of undernutrition are recorded

Upon reception of data, the datasets were cleaned, merged and subset by districts of interest. CU5 were selected as unit of analysis in both surveys and the various records were merged in a unique dataset. After merging children, women and household records of the DHS 2019 and MICS 2017 data, relevant variables to the study hypothesis were selected to conduct the analyses. Survey specific codes to define missing data across variables were coded as NA in both datasets. Variables with high percentage of missing data were excluded. Due to the restricted availability of data, some variables with missing data were used and disclaimers in the analysis tables are included.

WHO flags were applied to find outlier data. The number of observations (children 6-59 months with relevant information available) and WHO flags are outlined below:

[21] Standardized Monitoring and Assessment of Relief and Transitions, www.smartmethodology.org.

DHS 2019: Bonthe District children under 5 nutritional status				
Outcome	Malnourished	Non-malnourished	Total	WHO flags +/-5 SD
HAZ	80	179	259	5
WHZ	18	239	257	1
WAZ	41	218	259	0
WAST[22]	9	248	257	0

Table 1: Summary of observations and WHO red flags – DHS 2019

MICS 2017: Bonthe District children under 5 nutritional status				
Outcome	Malnourished	Non-malnourished	Total	WHO flags +/-5 SD
HAZ	166	535	701	4
WHZ	28	675	703	2
WAZ	84	621	705	3
WAST[22]	11	688	699	4

Table 2: Summary of observations and WHO red flags – MICS 2017

Both logistic and linear regression were undertaken to determine the associations between various risk factors and child nutrition status, taking into consideration the survey design. Where possible, data was coded to 0 and 1 to enable logistic regression. Child sex was re-coded as male (1) and female (0). Child suffering from specific health issues prior to the survey such as diarrhoea, cough, fever or anaemia was coded as yes (1) and no (0). Households owning assets were recoded as having any given asset (1), or no asset (0). Household location was coded as rural (1) and urban (0). Households having toilets, soap or treating water were recoded as yes (1) or no (0). Toilet type and water source were recoded as improved (0) or unimproved (1). In the DHS dataset it was possible to calculate the anaemia and BMI status for women as well as anaemia status for CU5. Based on the reported haemoglobin level, women were recoded as anaemic when their haemoglobin was less than 12g/dl (1) or non-anaemic when 12g/dl or higher (0). Child breastfeeding and dietary diversity variables were recoded as eating a certain food/being breastfed (1) or no (0). A part from HAZ, WHZ, WAZ and WAST was included as additional outcome variable in the DHS 2015 data analyses as child haemoglobin level indicator was available. This was not possible for MICS 2019 data.

For continuous variables, like child and mother's age, child's weight, or household wealth index, linear regression was undertaken. These analyses, including both logistic and linear regression, made it possible to differentiate between the risk factors of wasting, stunting, underweight and anaemia in order to help prioritize and adapt interventions aimed at reducing undernutrition in Bonthe district.

C. Primary data collection (November- December 2022)

The qualitative study lasted four weeks, spanning from 23rd November 2022 to the 17th December 2022. It comprised of an in-depth inquiry on all risk factors identified during the preparatory stage through semi-structured interviews and focus groups discussions as two principal data collection methods.

Qualitative data collection

Sampling framework

[22] Children that are both wasted and stunted

The qualitative data collection was organised in three qualitatively representative locations in order for the collected qualitative data to represent realities of a majority of households living in the Bonthe intervention zone. For this reason, purposive sampling was used to select the three villages, one within each chiefdom in the study zone.

Considering that there are three key livelihoods represented in targeted chiefdoms, villages in each chiefdom were selected based on their primary economic activity. For example, in Kpanda-Kemoh was selected prior data collection as a village where mining is the principal activity was selected; in Jong a village with fishing as the principal activity while in Yawbeko a village where agriculture is the principal activity.

Chiefdom	Village	Justification
Jong	Nyendehun	Agriculture as the primary source of income for most households.
Kpanda Kemoh	Gbongeh	Selected prior to data collection for the presence of mining activity. However, most households in the area live off agriculture as the primary source of income.
Yawbeko	Gbangba	Fishing and agriculture as the primary sources of income.

Table 3: Sampling framework for the NCA Qualitative study at village level, Bonthe District, Sierra Leone

On the village level, the following categories of participants will be selected to participate in semi-structured interviews and focus groups discussions:

a. Community leaders (village leaders, religious leaders and other prominent community figures);
b. Traditional healers or birth attendants;
c. Health centre personnel (doctors, nurses, community health workers);
d. Representatives of community-based organisations;
e. Mothers and fathers of children under 5 years of age;
f. Grandparents of children under 5 years of age

Sample size

At a village level, the data collection team completed 47 focus group discussions and 52 key-informant interviews using the sampling frameworks below.

Chiefdom	Village	FGDs [23]	KII +BA[24]	Obs[25]	Restitutions	Days	No. M+F [26]	No. F[27]
Kpanda-Kemoh	Gbonghe	20	14	6	1	-	147	94
Jong	Nyendehun	14	22	5	1	-	132	85
Yawbeko	Gbangba	13	16	5	1	-	118	81
TOTAL*		**47**	**52**	**16**	**3**	**21**	**397**	**260**

* Number of participants per community restitution.

Table 4: Summary of community consultations at a village level during the Bonthe Qualitative study, Sierra Leone

The data collection team spent approximately 6 consecutive days in each selected village. The length of semi-structured interviews or focus group discussions was limited to 1h or 1h15min

[23] Focus Groups Discussions
[24] Key informant Interviews
[25] Observations
[26] Total number of male and female participants
[27] Total number of female participants

maximum. Focus group discussions took place mainly in the mornings starting at 9am in order to accommodate the community's availability and fit in with their daily routine.

The last day of data collection in each sampled community was dedicated to a restitution of findings to community representatives with an objective to seek their feedback on the interpretation of collected data and, more importantly, to engage them in a design of community-based solutions for identified problems and their prioritization.

Data collection tools

The two principal data collection methods included semi-structured interviews and focus groups discussions, which were guided by interview guides (14), covering key topics related to validated risk factors. The content of interview guides reflected available findings for the study zone and instead of repeating certain inquiries, it aimed to deepen the understanding of individual risk factors and their context-specific interactions.

The qualitative survey team also used a variety of participatory tools, aiming to reveal real determinants of undernutrition in the area. The selection of participatory tools included (but was not limited to):

a. Historical calendar
b. Seasonal calendar
c. Ranking
d. Storytelling
e. Daily activities chart
f. Meal composition chart
g. Household expenses
h. Health journey / Therapeutic itinerary

For more information about qualitative study methods and tools, please refer to the Qualitative Study Guide in Annex C.

Team composition and training

Data collection was led by a qualitative researcher (principal investigator and /or co-principal investigator) with the help of two research assistants (one female research assistant) and two community facilitators. The main role of a community mobiliser Bonthe district team was to ensure equitable selection of participants for each focus group discussion in coordination with community leaders and to carry out any support functions, as needed.

The team's movement was carefully coordinated in order to allow for daily debriefings, allowing the principal investigator to make prompt adaptations to study approaches based on community feedback. Daily debriefings allowed to triangulate incoming data in real time and allow all three teams to cross-check and look deeper into inputs from various stakeholders to uncover trends, which may be difficult to uncover during quick survey methods.

Prior to the commencement of data collection, team members followed a detailed 2-day in-person training with the Link NCA Technical Advisor, which took place in Bonthe on 24-25th November 2022. The training covered the survey methodology and tools as well as a detailed explanation of ethical considerations to be respected during the study.

Main challenges

- **Language barrier**: Most participants of focus group discussions preferred to speak Mende while not all members of a local research team spoke the language. This required the team to switch roles to meet the language needs of the interviewees. As the team manage to accommodate to their needs, the implications on the data collection process are deemed limited.
- **Low community empowerment in terms of problem-solving**: Selected communities displayed great difficulties when asked to input on potential solutions to identified problems. More often than not they lacked ideas how to approach an obstacle on a local level, rather than awaiting a help from the exterior in the form of assistance from the government or non-governmental organisations. For that reason, the data collection team encountered limitations in terms of community inputs with regards to recommendations.

D. Synthesis of results (January - February 2023)

Upon completion of the data collection stage, all collected data were duly analysed and triangulated in order to categorise risk factors according to their relative impact on undernutrition in the study zone. The categorisation of risk factors considered all sources of information collected in the course of study. The final results were presented to key decision-makers and operational partners in the district on 5th April 2023.

Data management and analysis

The qualitative data was recorded manually in a notebook and reproduced electronically at the end of each data collection period in a sampled community. The data was coded in NVivo for a more efficient analysis, making sure that a confidentiality of speakers is guaranteed. All views were analysed using qualitative content analysis methods.

Ethical considerations

a. All relevant authorities were duly informed about the study conducted by AAH-SL and expressed their agreement with the study implementation;
b. The community leaders were informed of the selection of their community for the purpose of a qualitative study at least two days in advance. During the initial meeting they received a detailed planning of research activities in their village in order to facilitate the participant selection process and ensure the participants' availability at stated times. The detailed planning was subject to change, if required by community members. The qualitative data collection team accommodated to their routine as much as possible, considering time constraints of the study;
c. The participants were selected equitably and their informed consent was sought to ensure that they participate in the study voluntarily;
d. The participants of a qualitative study were able to participate in more than one focus group discussion, if they chose to, but considering their other engagements, community leaders were advised to spread the selection of participants across the whole village;
e. The anonymity of participants was ensured during all stages of the study (data collection, data analysis and data storage). Their names were not collected nor shared;
f. The data collection team organised a community wrap-up discussion during the last day of the data collection in order to allow communities to review their findings, rank identified risk factors and prioritise actions for the way forward;

g. All children aged 6 – 59 months who were identified as suffering from severe acute malnutrition and/or other medical condition were referred to the nearest health facility for appropriate treatment.

Study limitations

- **Unavailability of certain key Link NCA standard indicators**: While the use of DHS 2019 and MICS 2017 datasets represented a valuable insight, the datasets did not include all indicators used during a NCA exercise involving primary quantitative data collection. For this reason, certain risk factors could not be sufficiently triangulated due to missing analyses. Consequently, the categorisation of these risk factors could have been impacted as they generally ranked lower than other risk factors, for which quantitative analyses could be conducted. Therefore, the interpretation of the categorisation of risk factors should be done with caution as the unavailability of data does not imply a lack of contribution of a respective risk factor to the undernutrition in the study zone. In such cases, available qualitative data should be duly considered to inspire informed decisions for nutrition-sensitive programming in the study zone.
- **Statistical associations**: It is advised to appraise statistical associations with caution as observed links do not necessarily prove the causality, while unobserved links do not mean that the causality does not exist. Correlations thus must be considered within a larger framework, triangulated with other sources of data, and as such can be used for a prioritization of current and future interventions. In the narrative of this report, all p-value associations of <0.05 are referred to as '**significant**' associations with the outcome of interest, i.e. wasting, stunting or underweight with the intention of inspiring future research on the relationship between that risk factor and said nutrition outcome.
- **Confounding variables**: Statistical analyses conducted within the framework of this study are based on unadjusted regression models that do not consider the effects of confounding variables. The aim of these analyses is to determine relationships between a child's nutritional status and a variety of individual and household indicators based on their independent significant associations to enrich the triangulation with other data sources. However, these associations need to be considered with caution as they could change in multiple regression models.
- **Temporal limitations**: Although extremely valuable, DHS 2019 and MICS 2017 datasets used for the secondary quantitative data analyses could be considered quite outdated due to dramatic shifts, which were potentially caused by the Covid-19 pandemic and related events. Considering that it was not possible to run regressions on newer, population-representative data made available for this study due to issues with merging, presented statistical associations do not account for incurred temporal changes as they could not be compared with more recent data and, therefore, cannot speak to potential impacts of Covid-19.

IV. FINDINGS

UNDERNUTRITION

SECONDARY DATA REVIEW

ACUTE MALNUTRITION

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
GAM (WHZ<-2 and/or oedema)	5.2% (SLNNS 2021)			6.2% (SLNNS 2021)
GAM by MUAC (<125mm)	2.7% (SLNNS 2021)			2.9% (SLNNS 2021)
Global Acute Malnutrition (cGAM)[28]	6.6% (SLNNS 2021)			
SAM (WHZ <-3)	1.7% (MICS 2017)	1.7% (MICS 2017) 1.1% (DHS 2019)	2% (MICS 2017) 1.3% (DHS 2019)	2.3% (MICS 2017) 2.6% (DHS 2019)
SAM (WHZ<-3 and/or oedema)	1% (SLNNS 2021)			0.2% (SLNNS 2021)
SAM by MUAC (<115mm and/or oedema)	1% (SLNNS 2021)			0.6% (SLNNS 2021)
(cSAM)	1.4% (SLNNS 2021)			
Kwashiorkor (>=-3 z-score + odema)	0.5 % (SLNNS 2021)			
Marasmic kwashiorkor (<-3 z-score odema)	0.1% (SLNNS 2021)			
MAM (WHZ≥-3 and ≤-2)	4.2% (SLNNS 2021)			6% (SLNNS 2021)
MAM (WHZ <-2)[29]	5.1% (MICS 2017)	5.1% (MICS 2017) 4.9% (DHS 2019)	5.8% (MICS 2017) 6.2% (DHS 2019)	5.2% (MICS 2017) 6.5% (DHS 2019)
MAM by MUAC (≥115mm and ≤125 mm, and no oedema)	1.6% (SLNNS 2021)			2.3% (SLNNS 2021)

- The 2021 Sierra Leone National Nutrition Survey (SLNNS 2021) showed a poor nutrition situation (GAM rate of 5-9.9%). A slightly higher proportion of boys (5.8%) was more acutely malnourished than girls (4.7%) although not statistically significant (p>0.05). The distribution of acute malnutrition among the younger (6-29 months) was higher than in the older (30- 59 months) age groups. This finding was confirmed by z scores and MUAC measurements.

[28] WHZ<-2 and/or MUAC<125 mm and/or oedema

[29] For DHS 2019 - Includes children who are below -3 standard deviations (SD) from the WHO Child Growth Standards population median

- Significant increase in GAM rates were noted in Bonthe (from 4.1% to 6.5%), which went from acceptable/low in 2017 to poor/medium nutrition situation in 2021. In the most recent comprehensive food security & vulnerability assessment most districts in Southern Province like Bonthe experienced a deterioration in acute nutrition cases (GAM 5-9.9%).[30]
- 87% of rural children in Sierra Leone live in poverty.[31] Even though severe malnutrition affects a relatively low proportion of children, moderate malnutrition prevalence remains high among children under five.

CHRONIC MALNUTRITION

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Stunting (HAZ<-2)	26.2% (SLNNS 2021)			23.3% (SLNNS 2021)
Moderate HAZ (<-2)[32]	19.5% (SLNNS 2021) 26.4% (MICS 2017)	32% (DHS 2019) 30.3% (MICS 2017)	31.5% (DHS 2019) 29.6% (MICS 2017)	16.9% (SLNNS 2021) 31% (DHS 2019) 22.6%% (MICS 2017)
Severe HAZ (<-3)	6.7% (SLNNS 2021) 9.7% (MICS 2017)	11% (DHS 2019) 11.1% (MICS 2017)	11% (DHS 2019) 10.7% (MICS 2017)	6.3% (SLNNS 2021) 13% (DHS 2019) 6.1%% (MICS 2017)

- The 2021 Sierra Leone National Nutrition Survey (SLNNS 2021) indicated a *poor/high* (20-29.9%) chronic malnutrition rate remaining the most prevalent form of malnutrition in the country. Stunting (HAZ<-2) was significantly more prevalent among boys (30.0%;). A significant reduction has been seen when compared to the previous SLNNS 2017 survey findings when global stunting, moderate stunting and severe stunting rates of 31.3%, 21.3% and 10.0 respectively but it remains still high.
- A national study[33] reported the following stunting risk factors: living in rural settings, having a stunted mother, having a younger (15-19years) or less educated mother as well as being 24-59 months and male. In urban settings having a father with lower education, whose mothers were more parous and being male. Another study showed that child stunting prevalence was less among women who participated in household decision-making than among those who did not participate. Women's empowerment was significantly

[30] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021' (MoHS/UNICEF, 2021), https://mohs.gov.sl/wpfd_file/sierra-leone-national-nutrition-survey-2021-final-digital/.
[31] Statistics Sierra Leone and United Nations International Children's Emergency Fund, 'Multidimensional Child Poverty in Sierra Leone' (Sierra Leone: Statistics Sierra Leone/UNICEF, 2019), https://www.unicef.org/sierraleone/media/306/file/MCP-Report-2019.pdf.pdf.
[32] For DHS 2019 - Includes children who are below -3 standard deviations (SD) from the WHO Child Growth Standards population median
[33] Quraish Sserwanja et al., 'Rural and Urban Correlates of Stunting Among Under-Five Children in Sierra Leone: A 2019 Nationwide Cross-Sectional Survey', *Nutrition and Metabolic Insights* 14 (2021): 117863882110470, https://doi.org/10.1177/11786388211047056.

associated and protective of stunting.[34] Chronic malnutrition has been also associated with poor WASH, IYCF practices and limit access to health care services[35]

[34] F Maguiraga, 'Women's Empowerment and Stunting in Children 6 to 23 Months in Sierra Leone. Master's Thesis', 2014, https://etd.library.emory.edu/concern/etds/fn106z01z?locale=it.
[35] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

UNDERWEIGHT

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Underweight (WAZ<-2)	11% (SLNNS 2021)			10.2% (SLNNS 2021)
Underweight (WAZ<-2)	8.9% (SLNNS 2021) 11.7% (MICS 2017)	13% (DHS 2019) 13.2% (MICS 2017)	14.9% (DHS 2019) 15.4% (MICS 2017)	7% (SLNNS 2021) 15.3% (DHS 2019) 12% (MICS 2017)
Underweight (WAZ<-3)	2.2% (SLNNS 2021) 3.7% (MICS 2017)	4.2% (DHS 2019) 4.3% (MICS 2017)	3.9% (DHS 2019) 5.1% (MICS 2017)	3.2% (SLNNS 2021) 5.5% (DHS 2019) 3.4% (MICS 2017)

- The latest prevalence of underweight among children (6-23 months) was 12.4% compared to older children (24-59 months) were the prevalence was 10.3%. This indicates a probable higher vulnerability of this age group to undernutrition. In both younger and older age groups, global underweight and severe underweight rates were equally distributed among boys and girls.[36]
- Significant risk factors include place of residence, mother's education, media exposure, and institutional delivery.[37]

ANAEMIA AND MICRONUTRIENT DEFICIENCIES

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe
Childhood anaemia	68% (DHS 2019)			63% (DHS 2019)

- **Anemia** is considered a severe public health problem in Sierra Leone. 68% of children 6-59 months are anaemic. Of these 30% are mildly anaemic, 35% moderately anaemic, and 3% severely anaemic. 63% in Bonthe district are anaemic. The prevalence is highest among children age 6-8 months and 12- 17 months, among boys and those whose mothers have no education and lower household wealth.38 Anemia levels generally decrease with increasing household wealth.[39] A National Multi-Sectoral Strategy to Prevent and Control Anaemia has been running since 2018.[40]

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[36] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.

[37] Bal Govind Chauhan, Satish Chauhan, and Himanshu Chaurasia, 'Decomposing the Gap in Child Malnutrition between Poor and Non-Poor in Sierra Leone', *Journal of Public Health* 27, no. 1 (2019): 119–27, https://doi.org/10.1007/s10389-018-0924-6.

[38] Dhs 2019

[39] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.

[40] Ministry of Health and Sanitation Sierra Leone, 'Sierra Leone National Multi-Sectoral Strategy to Prevent and Control Anaemia 2018–2025' (Ministry of Health and Sanitation Sierra Leone, 2018), 2018–2025, https://www.afro.who.int/sites/default/files/2018-03/National%20Multi-Sectoral%20Strategy%20to%20Prevent%20and%20Control%20Anaemia%20%282018-2025%29.pdf.

- Interestingly iron deficiency does not appear to be a major driver of anemia in Sierra Leone. Instead malaria and inflammation were identified as two key causes. Other direct (e.g. genetic variations, other infections) and indirect (e.g. inadequate birth spacing, education) factors are also likely to contribute to anemia. Increased open defecation may have contributed to the increase in the incidence of infection and inflammation, leading to an exacerbation of anemia cases.[41] Vitamin A deficiency is considered a risk factor of anaemia[42]
- **Vitamin A** deficiency affects 17% of Sierra Leonean children. Consumption of foods rich in Vitamin A is overall poor[43] as few (38.3%) children are fed on vitamin A rich foods. Most importantly, very few children 6-23 months are fed a diversified diet at the right frequency. In 2021 the national coverage for vitamin A supplementation among children 6-59 months was 93.9% which is above SPHERE recommendations.[44]

QUALITATIVE INQUIRY FINDINGS

Community perceptions of undernutrition

Local terminology used to describe undernutrition reveals how communities perceive undernutrition and how they approach it. The study of local terminology is a crucial entry point for understanding the local socio-cultural context in which the phenomenon occurs and in which the program for prevention of undernutrition operates.

The population in sampled communities referred to undernutrition using 14 terms, of which 7 were used to identify the marasmic form of acute malnutrition, 4 to describe kwashiorkor, and 3 for chronic malnutrition.

Marasmus is referred to as "*do begoi"* meaning dry child, "*lima gale*", meaning exposed bones,"*gomabe*", meaning pot belly or "*kpengbeii*", meaning a child that resembles a monkey in the bush. Marasmus is often referred to as kwashiorkor within the community. The main body charachteristics are: dry limbs, weak neck, bigger head in comparison to the body size and pot belly. Marasmus is also referred to as "chameleon disease" because sick children develop dry skin. Marasmic children are present in the community but not in great numbers. Similarly to kwashiorkor, marasmus cases have reduced over the years thanks to the Plumpy'Nut® treatment provided at health facilities and vaccination campaigns.

Kwashiorkor is referred to as "*fefei*" meaning swollen body (used for children that are swollen in the whole body) or "*behei*" meaning that all sickness in the body has run into the feet (used for children that have only swollen feet). Because of the severe swelling, the child does not move and everything is done for them. This is perceived as if the child is commanding respect "*behei*" from others because they need to be helped with walking, bathing, dressing, etc. The swelling and bloated belly was the symptom that made women say that the child was sick. Respondents reported that Kwashiorkor is not visible at the moment in the community but

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41 SPRING, 'A Landscape Analysis of Anemia and Anemia Programming in Sierra Leone' (SPRING, 2015), https://www.spring-nutrition.org/sites/default/files/publications/reports/spring_sierra_leone_anemia_landscape_analysis_2.pdf.

42 Ministry of Health and Sanitation Sierra Leone, 'Sierra Leone National Multi-Sectoral Strategy to Prevent and Control Anaemia 2018–2025', 2018–2025.

*43*Montrose, 'Vitamin A and Deworming Programme (2020)', 2020, https://montroseint.com/projects/vitamin-a-and-deworming-programme-2020/.

44 Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.

cases increase during the rainy season "*hamin*", particularly at the peak of the season in August. Reduction of Kwashiorkor cases was also associated with the presence of NGOs treating malnourished children at the community level.

Stunting is referred to as "*gbendeh*". The community perceived stunting as a consequence of kwashiorkor, that is a slowdown of child's growth after an episode of acute malnutrition. Therefore, stunting is also commonly referred to as kwashiorkor[45]. The community perceives stunting as the moment prevalent form of malnutrition with many children suffering from the condition.

The table below outlines all the terms used by the community to refer to the different types of child malnutrition.

KWASHIORKOR	
Fefei	Swollen body
Behei	"All sickness in the body has run into the feet"
Kuifaa	Linked to chronic malaria
Kwashiorkor	Kwashiorkor
MARASMUS	
Do Begoi	Dry child
Lima gale	Exposed bones
Gombe	Pot belly
Kpengbeii	A child that resembles a monkey in the bush
Doirkoi Lengasia	Chameleon children; marasmus is referred to as Chameleon disease
Kwashiorkor	Kwashiorkor[46]
Tohebe	Dry cough, which is perceived as one of the main causes of marasmus
STUNTING	
Gbendeh	Stunted
Kondogborkie	Someone who is short
Kwashiorkor	Kwashiorkor[47]

Table 5: List of local terms used to describe undernutrition

Malnurished children are often stigmatised as the condition is associated with witchcraft and a belief that the disease will spread onto other children as well as God's will or unknown causes. Some community members refuse to handle or carry such children because they are very fragile and some parents do not want to be associated with them. Parents do not want their children to be malnurished and when they get sick, they have to deal with provocations.

They have their own special days to attend clinic and when seen from a far, other parents will start saying: chameleon children "Doirkoi Lengasia" are coming, let me take my child before they arrive". Because of this insult, some mothers do not want to be associated with them.

KII Community Health Officer, Nyenehun, Jong, Bonthe

Children are mostly screened using MUAC tapes and treated at the health centre. However, therapeutic and supplementary foods are often sold by mothers instead of being given to children, which impacts on treatment effectiveness. Local supplementary foods like Benimix are perceived as less effective.

None is working well, as most times this food supplements provided by the government is sold out by health care workers at the market and also by mothers to buy food items for the house. The local food

[45] Not referring to kwashiorkor per se nor marasmus (also referred to communities as kwashiorkor). This term is generally used to describe malnutrition

[46] Marasmus is incorrectly referred as Kwashiorkor in the studied communities.

[47] Stunting is also incorrectly referred to as Kwashiorkor but in this case, it is perceived to be caused by child's previous episode of acute malnutrition.

supplement (Benimix) is also not working well as most of this food items needed for its composition like beni (sesame), beans, fish, rice cannot be accessed due to lack of money to buy them or cultivate them.

FGD Imam and Pastor, Gbonghe, Kpanda-Kemoh, Bonthe

Some respondents reported boys being more vulnerable because they are perceived to have a weaker immune system, carry heavier loads[48] and because girls are cared more than boys. This is linked to the fact that girls support parents more later on in life while boys tend focus on their family instead. Conversely, other respondents perceived girls as more vulnerable to undernutrition especially when living in a female- headed household and having a young mother. There was no community consensus on a specific age range during which children were more vulnerable, however, the weaning period (around 12-18 months) was mentioned as a critical point for an increased risk of undernutrition. Participants also highlighted that vulnerability to stunting is influenced by genetic predisposition.

A summary of perceived causes, vulnerability, prevention and treatment of different forms of undernutrition is presented in table 6below.

ACUTE MALNUTRITION – MARASMUS	
Perceived causes	▪ Inadequate /unbalanced child's diet, especially consumption of excess carbohydrates and low protein foods ▪ Inadequate breastfeeding practices ▪ Early introduction to solids (before 6/7 months) ▪ Drinking contaminated water ▪ Eating accidental things from the ground ▪ Inadequate hygiene practices ▪ Sickness like cough, pneumonia or tuberculosis ▪ Witchcraft - witches tying ropes on the child
Vulnerability	▪ Boys
Prevention	▪ Vaccination ▪ Feeding a child with a balanced diet
Treatment	▪ Health facility (Plumpy'Nut®, supplementary blended foods and local supplementary foods like corn flour and milk)
ACUTE MALNUTRITION – KWASHIORKOR	
Perceived causes	▪ Increase of water in the body due to inadequate /unbalanced child's diet ▪ igh intake of salt (mostly eaten with cassava in periods of shortage of food). ▪ Repetitive fever ▪ Eating accidental things from the ground ▪ Unknown causes, God's will ▪ Witchcraft - witches pouring hot water on the child "Honaya Gbandi"
Vulnerability	▪ No available information
Prevention	▪ Vaccination ▪ Feeding the child with a balanced diet, for example meat, egg, plantain, potato or cassava leaves, groundnuts, palm oil, beans, when a child is weaned. ▪ Optimal hygiene practices (not letting a child to sit on the ground or walk with bare feet)
Treatment	▪ Health facility (Plumpy'Nut®, supplementary blended foods and local supplementary foods like corn flour and milk) ▪ ORS / Multivitamins/ Cold medicine ▪ Injections ▪ Herbal remedies[49] ▪ Foods like potato or plantain with palm oil alongside breast milk and monkey soup.
CHRONIC MALNUTRITION - STUNTING	

[48] E.g. carrying heavier buckets when fetching water, a basket of palm kernels.

[49] Lime seed, ymbuyamba, bundukueh, boodaa, gigbo hinei and bangbei are boiled and give to the child to dring. This mixture is believed to help the child to pass urine to reduce swelling. Children are also bathed in water with the stem peel of the mango tree and black soap and a mixture of Yanigbei and clay is applied on the child's body to reduce swelling.

Perceived causes	▪ Inadequate /unbalanced child's diet ▪ Inadequate maternal care, especially non-optimal birth spacing and diet during pregnancy ▪ Children carrying a heavy load on their head (a big bucket of water, a basket of palm kernels) ▪ Living in big households with the mother as the main provider ▪ Genetic factors or God's will ▪ Unknown causes or w ▪ Witchcraft - witches giving the child a load to carry
Vulnerability	▪ Boys
Prevention	▪ Feeding the child with a balanced diet, including ▪ eggs from local fowls ▪ Optimal hygiene practices (not letting a child to sit on the ground or walk with bare feet)
Treatment	▪ No cure
ANAEMIA[50]	
Perceived causes	▪ Inadequate /unbalanced child's diet ▪ Convulsions ▪ Not sleeping under a mosquito net (mosquito suck child's blood and make them anaemic) ▪ Reduced availability of palm oil (particularly during the rainy season)
Vulnerability	▪ N/A
Prevention	▪ Feeding the child with a balanced diet, e.g. "*kplorkplor yolaa*" a potato leave sauce made with beans, potato leaf, greens and palm oil or "*gbuhin*" made with green leaves, water snail and served with rice, "f*asei*" shrimps served with rice, raw eggs and meat[51]. ▪ Feeding the child with dark leafy greens[52]
Treatment	▪ Herbal remedies[53] ▪ Palm oil is given as a supplement (2-3 table spoons/day)

Table 6: Summary of community perceptions of causes and treatment of different forms of undernutrition

Community perceptions of causal mechanisms of undernutrition

The community perception of the causal mechanism of undernutrition has its roots in the limited access to income sources, which can be worsened by the limited access to markets, particularly during the rainy season. Limited access to income sources directly affects low social support for women[54], which translates into increased women's workload with a negative effect on their wellbeing and consequently inadequate care practices. At the same time, limited access to income sources also impact access to a quality diet and non-optimal maternal nutritional status of women, leading to inadequate care practices, especially exclusive breastfeeding. Low income sources alongside low decision making of women lead to the deployment of inadequate coping mechanisms, such as intimate relationships and early marriage, which translate in early and unwanted pregnancies, increased women's workload and inadequate care practices. Adopting inadequate care practices in terms of child-caregiver interactions, breastfeeding and hygiene practices may in fact lead to a sub-optimal child's nutritional status, increased vulnerability to disease and consequently undernutrition. Lastly, low female decision making[55] alongside low access to income sources impacts negatively on

[50] Anaemia applies only to Gbangba- Yawbeko
[51] Meat is mostly available during the festive season
[52] Dark leafy greens were said to release a dark red juice which was perceived as good for the child to boost their blood and energy.
[53] Yumbu yamba" and "Jasui
[54] Women are mostly financially dependent on men which means that if men don't have enough resources women are not supported
[55] Mostly due to societal norms for which women need to ask permission to men for the majority of their decisions

access and subsequently on use of health services, potentially leading to increased risk of disease and therefore undernutrition.

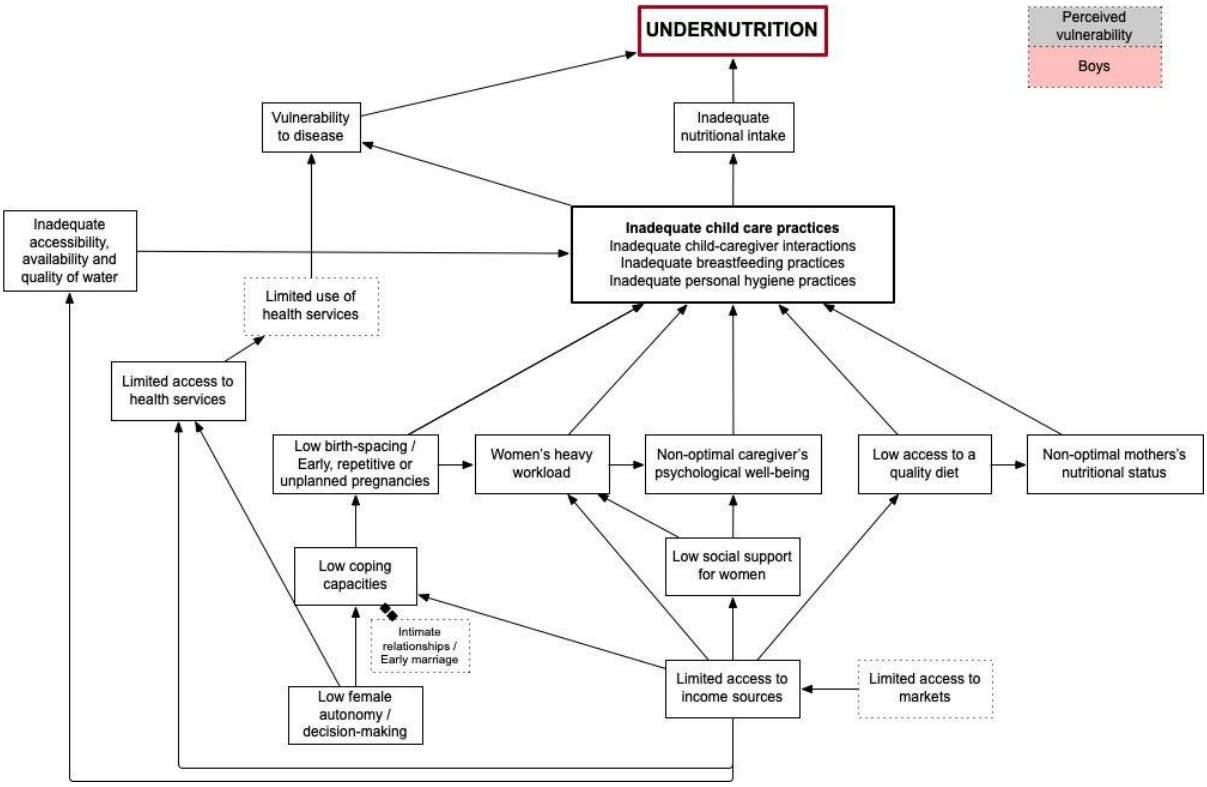

Figure 1: Community perceptions of causal mechanisms of undernutrition, Bonthe District, Sierra Leone

Seasonal & historical variations

Despite the presence of malnourished in the community the numbers have decreased compared to the past 10-15 years. This is because the government together with UNICEF, INGOs have been implementing nutrition programmes programmes to treat malnutrition providing Plumpynut, blended foods and health services. The local health centers have also been providing sensitisation sessions for the community about health and hygiene. However, the rainy season represents the period of the year when malnutrition among children under 5 years of age is perceived to be more prevalent. August is a particularly difficult month as it represents the peak of the rainy season and also the moment when income opportunities are scarce and therefore access to food is extremely limited.

When it starts to rain we see more kwashiorkor and marasmus children. During this period some children play in dirty ditches around the town and eat from the ground. There is also not enough food to give to children in this period, they eat mainly cassava. Sometimes there is no food in the morning and the child will eat from the ground and get sick.

FGD participant, Nyendehun, Jong, Bonthe

Participants mentioned several historical events highlighted in the table below that influenced the community's access to income sources and levels of undernutrition among children under-five years of age.

Date	Event
Since 2007	***Malnutrition treatment for children*** *provided by the Government of Sierra Leone and UNICEF in collaboration with implementing partners. This led to a decrease in cases of Marasmus and Kwashiorkor*
2014	***Ebola outbreak*** *halted all economic activities due to lockdowns, curfews and movement restrictions. Market access was completely blocked as people were not allowed to assemble.*

Since 2017	***Land depletion*** *has been affecting yields for around 6 years. Reduced access to land led to an overuse of the available land that is not yielding as before. This has an impact on harvests and household income.*
Since 2020	***The increasing inflation*** *started with the Covid-19 pandemic. Because of the economic hardship children have been eating reduced food portions. Parents have been focussing on quantity rather than quality of food due to constant increase in commodity prices.*
2020	***Covid-19 pandemic*** *exacerbated the already difficult economic situation resulting from the Ebola outbreak. Despite less strict restrictions (only intra-district lockdowns) it still reduced access income sources, caused a decrease in commodity prices, difficulties in getting food and increased cost of transportation.*

Table 7: Historical timelines of shocks

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Logistic regression of DHS 2019 data showed that a child living in a rural area had probably higher likelihood of being stunted (p=0.03) (Cf. **Annex A).** Linear regression analyses reported that higher weight and height were probably associated with lower weight for age z-scores (p<0.01) (Cf. **Annex B).** The same findings were reported by linear regressions analyses from MICS 2017 (p<0.01). Additionally, MICS 2017 showed that child's age was associated with a decrease in height for age z scores, representing a risk factor for stunting (p<0.01) (Cf. **Annex D).**

HEALTH AND NUTRITION

A variety of health services was provided at the local health facilities and by the local community health worker assigned to the catchment area. Services provided by the community health workers were usually free of charge while some services available at the health facility required payments for the medicines as well as, at times, a fee for specific services. These included child delivery, antenatal and postnatal care, family planning, vaccination and Vit A supplementation, malaria treatment, provision of malaria nets, (when available) and outreach services to the communities. Sensitization sessions on hygiene practices and maintaining healthy relationships were also provided.

COMMON CHILD MORBIDITIES

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
ARI	1.9% (MICS 2017) 2% (DHS 2019)	2.1% (MICS 2017) 1.9% (DHS 2019)	1.9% (MICS 2017) 1.2% (DHS 2019)	0% (MICS 2017) 1.5% (DHS 2019)
Fever	21% (MICS 2017) 17% (DHS 2019 8% (SLNNS 2021)	20.9% (MICS 2017) 16.7% (DHS 2019)	19.8% (MICS 2017) 18.6% (DHS 2019)	17.4% (MICS 2017) 23.1% (DHS 2019) 7.5% (SLNNS 2021)
Diarrhea	7.7% (MICS 2017) 7% (DHS 2019 1.7% (SLNNS 2021)	8.3% (MICS 2017) 7%% (DHS 2019)	8% (MICS 2017) 5.9% (DHS 2019)	2.5% (MICS 2017) 2.3% (DHS 2019) 0.4% (SNNNS 2021)

Cough	3.8% (SLNNS 2021)			3.1% (SNNNS 2021)
Skin infection	0.9% (SLNNS 2021)			0.4% (SNNNS 2021)
Insecticide Treated Nets (ITNs) available in HH	71% (MICS 2017 80.5% (SLNNS 2021)			
Children sleeping under ITNs	60% (MICS 2017			

- Nationally the most reported child illnesses were: fever (8%), cough (3.8%) and diarrhoea (1.7%) contributing to 64.8%, 31.2% and 13.5% of the morbidity burden in children under five. Other common illnesses included skin infections and, eye infections. However, it is important to note that the 2021 SLNNS survey was conducted during the Covid-19 and these illnesses are part of the main symptoms experienced by suspected Covid-19 cases.
- Malaria was the first major cause of morbidity among children under five in Bonthe district, with a total of 87,498 consultations and 18 deaths registered in 2021, representing a 50% of the total morbidity. ARI was the second most significant morbidity accounting for 12% followed by pneumonia at 9%. Diarrhoea in children is one of the main childhood morbidities in the district affecting 6% of children. The prevalence of diarrhoea rises gradually after the first 6 months of life, when children are introduced to complementary foods and start crawling.[56]
- A recent study also found that participants who were underweight were 18.56% more likely to contract malaria.[57]

QUALITATIVE INQUIRY FINDINGS

Community perceptions of common child morbidities (ARI, Diarrhoea, Fever, Malaria)

Participants described a healthy child as active and running around, playing with other children, eating or breastfeeding well, not crying constantly, sweating naturally after being active. On the other hand, an unhealthy child was reported to be clingy to the mother, not wanting to be with other children, not breastfeeding or feeding well and having fever. The most common child morbidities are fever, diarrhoea and malaria. Convulsions, stomach infections "*makroo*" and scabies were also mentioned. In Nyendehun village, participants also reported the presence of "*fire born disease*"[58] that has been rampant recently among children which causes blisters and soreness over the body. A common perception within the community is that children get sick because they catch diseases from the ground. This is linked to the possibility of the child eating something from the floor or catching pneumonia because of the cold. If a child walks without shoes they could step on an infected ground with faeces (e.g. garden or the toilet area) and then get sick. The table below provides the local terms, perceptions of causes and management of common child morbidities identified during the qualitative data collection.

Illness/local terminology	Perceived causes	Treatment

[56] Bonthe Assessment Report 2nd-8th of May 2022

[57] Caroline Smerdon and Hyun Kim, 'Association of Malnutrition Measures with the Risk of Malaria in Sierra Leone', *Current Developments in Nutrition* 4, no. Supplement_2 (2020): 908–908, https://doi.org/10.1093/cdn/nzaa053_113.

[58] A disease that causes blisters and rushes on the skin

Malaria (*Kuifaa*)	• Mosquito bites (as the community is surrounded by bushes), children not sleeping under mosquito nets • Inadequate environmental hygiene (not sweeping backyards and around the house, empty tins around the house that become mosquito breeding sites) • Lack of exclusive breastfeeding	• Malaria drugs • ATC (artesunate), Amoxicillin, Novalgin, Zinc Sulphate and paracetamol. • Boiled mixture of Bundukoi with lime which needs to be drunk • Boiled mixture of *Fencima*[59], *Hojogboi*[60], *Yumbu yamba*[61], *Jasui*[62], Lemon grass, Lime &Moringa. • Boiled mixture of mango tree bark, dry banana leaf and papaya leaf to drink and bath the child adding black soap
Diarrhoea (*Agboabai*)	• Inadequate household hygiene conditions and hand-to-mouth contamination by potentially picking and eating things from the ground	• ORS and zinc sulphate • Flagyl[63] • Boiled guava leaves
Pneumonia/ARI (*Korlei*)	• Low temperatures due to abundant bushes, hills, streams • Child sitting on the ground • Mothers introducing foods and water too early which causes child's cough	• Drugs like Amoxicillin, Novalgin
Fever (*Duugbadi*)	• Malaria • Streams, high hills and bushes in the community lower the temperature in the community • Frequent bathing of children with cold water • Children playing in the rain • Poor hygiene practices • Not practicing exclusive breastfeeding	• Usually treated at the HC as linked to malaria in most cases
Cough (*Torhehn*)	• Coughing is caused by the pollution and inhaled dust from the road	• Cough concoction made with "*tombi*" leaves[64] • Amoxicillin syrup
Convulsions (*Swen-swen*)	• Lack of vaccination among pregnant women • Constant fever occurrences which cause shortage of blood • Inadequate hygiene practices during delivery (health personnel cutting umbilical cord with dirty hands) • Scaring the child repeatedly	• Traditional herbs like *Kumulei*
Stomach infection (*Makroo*)	• Women eating gari and raw rice during pregnancy	• Yumbu yamba and moringa • Drinking "Pegga Gin" diluted with water if given to children • Jasui tea
Scabies (*Norhuin*)	• Same water used to lauder and bath children	▪ N/A
Measles and skin rush[65]	▪ N/A	• "Kronso Bean" leaves and white clay crushed and applied on the body

Table 8: Local terminology, perceived causes and treatment of common child morbidities

Seasonal variations

Child morbidities are particularly prevalent during the rainy season. August is an especially difficult month as the rain reaches its peak and it is accompanied by increased vulnerability to illness among children. This is caused mainly by the reduced mobility to seek care at health

[59] Momordica charantia
[60] Tabebuia rosea
[61] Nauclea Nyasica
[62] Noni/Morinda Citrifolia
[63] Metronidazole, sold under the brand name Flagyl
[64] Scientific name not available
[65] Also referred to as fire born disease

facilities due to the roads becoming muddy and therefore inaccessible with bikes. Decreased farming income opportunities due to the heavy rain also affect access to treatment and transport to reach health facilities. As a consequence, malnutrition was also reported to be the most prevalent in August. To tackle the colder weather of the rainy season mothers, use natural ointments to keep their children warm and prevent sickness.

We buy "donney" which is goat fat with Mentoleto to warm the skin of the child, burn palm oil mix with camphor which also helps to keep the skin hydrated.

FGD participant, Gbonghe, Kpanda-Kemoh, Bonthe

Malaria is one of the most prevalent childhood morbidities with most cases usually observed during the rainy season. Cases start increasing in April, which is the transition month in between the seasons. This is because water puddles emerging after the first rains provide a breeding ground for mosquitos. However, during the heaviest months of the rainy season, water puddles are disrupted by constant rains and mosquito eggs are washed away. The nationwide distribution of mosquito nets to pregnant and lactating women has been introduced to reduce the spread of malaria, however, those nets are not always available at the health centre and not used in all households. Moreover, the dirt washed from the land contaminates the water in the stream, which is then used as drinking water, leading to increased cases of diarrhoea among children under five years of age.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Climate												
Rainy season (*Hamin*)				+++	+++	+++	+++	+++	+++	+++		
Dry season (*Gelevui*)	+++	+++	+++								+++	+++
Child Illness												
Malnutrition (*Honhuen*)				+++	+++	+++	+++	+++	+++	+++		
Diarrhoea (*Agboabai*)				+++	+++	+++	+++	+++	+++	+++		
Malaria (*Kuifaa*)				+++	+++	+++	+++					
Pneumonia (*Korlei*)				+++	+++	+++	+++	+++	+++	+++		
Fever (*Duugbadi*)				+++	+++	+++	+++	+++	+++	+++		

Table 9: Seasonal calendar for predominant childhood illness in Bonthe district, Sierra Leone

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Despite availability of indicators, both DHS 2019 and MICS 2017 did not demonstrate any significant association between common child morbidities and stunting (Cf. **Annex A, B & C**).

HYPOTHESIS A: LIMITED ACCESS TO HEALTH SERVICES

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	+++
Technical experts' rating during Initial Technical Workshop	+++
Community rating during qualitative inquiry	+++
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	++
Overall interpretation	+++

SECONDARY DATA REVIEW

- The latest crude and under five death rates (**0.14** and **0.29)** are both below the SPHERE *alert* thresholds.[66]
- 72% of women nationally and 85% in rural areas report at least one problem among getting permission, getting money, distance and not wanting to go alone associated with accessing health care.[67]Payment for services, health workers' attitudes and large traveling distances negatively impact the access to healthcare services.[68] 96% of women in Sierra Leone do not have insurance coverage.
- Bonthe reports a 6% coverage of BEMONC services however most referrals are poorly managed due to lack of transportation. Challenges to service provision effectiveness are: 1) inadequate availability of essential drugs and medical supplies, 2) staff capacity and turnover, 3) women's mistrust of healthcare workers due to payment demanded for 'free' healthcare.[69]

QUALITATIVE INQUIRY FINDINGS

Barriers of access to health care

Geographical barriers

Apart from Gbongeh, where a health centre was located within a walking distance from the settlements, other villages were located at a greater distance (3 miles away) from the health facility and a distance was perceived as a barrier of access. Respondents reported accessing health facilities on foot or on a motorbike, paying 5 Leones each way. Distance was reported as the cause of delayed treatment, main challenge during an emergency and the cause of death of some children.

When our wives are in labour and we find it difficult to have access to motorbikes we place the pregnant woman on a hammock and or we carry her on the shoulders, until we have access to a motorbike.

KII Deputy Town Chief, Gbangba, Yawbeko

Access to motorbikes is not always possible due to fuel shortages and income constraints. Those that cannot afford the ride, often start walking in hope for someone to pick them up on the way. Respondents reported that not all services can be accessed at the local health facility and therefore they sometimes need to seek treatment in a general hospital in Mattru Jong. This translates into bigger travelled distances and higher transportation costs. While rainy season is a moment of greater need for health service use, the access is most difficult due to poor road infrastructure and impassable streams. As bikes are less available during this time, and their use is more dangerous on muddy paths people access health facilities on foot. The access to treatment is therefore delayed while some pregnant women may miss their antenatal care visits as the journey is too difficult for them to undertake.

Financial barriers

[66] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.
[67] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[68] United Nations International Children's Emergency Fund, Irish Aid, and Action Against Hunger, 'A Summary of the National Mixed Methods Study on the Knowledge, Attitude, Practice and Barriers on Maternal, Infant and Young Child Nutrition in Sierra Leone' (UNICEF/IA/AAH, 2019), https://kit2018.wpenginepowered.com/wp-content/uploads/2020/10/Maternal-Infant-and-Child-Nutrition-in-Sierra-Leone.pdf.
[69] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

Despite the national Free Healthcare Initiative all respondents reported paying for most services at health facilities. Lack of income therefore represents an important barrier of access and children are not attended by health staff if parents do not have resources for treatment. The burden is caused not only by treatment fees but also by transportation costs to reach the health centre and additional costs for the necessary medicine. Some respondents in Gbongeh reported that the nurses would see their child even without money, but the fee needed to be repaid promptly, otherwise the child would not be consulted again. Particularly during the rainy season, parents would resort either to take loans to pay for the child's medical care, buy modern pharmaceutical products from drug peddlers in the community or use traditional herbs to treat their children.

They will not do anything to your child until you bring the money. This approach discourages parents from going to the health centre as our children are not cared for and we are not respected. This is why sometimes we prefer to use traditional herbs to cure some disease or to buy medicines independently.

FGD participant, Nyendehun, Jong

Some of the mentioned treatment fees included: 40-60 Leones for severe dehydration treatment and wound treatment, 40 Leones for drugs like paracetamol, anti-malaria pills, syrup and multi vitamin "bico", 30 Leones for pneumonia test and drugs and 10 Leones for malaria test. Women also reported paying a fee for child's vaccinations, despite it being covered by the Free Health Care initiative, and delivery services. Charges for delivery change based on the sex of the baby (50 Leones for girls and 60 Leone for boys) and increase if the woman experiences complications (around 150 Leones as she will need medications). Pregnant women are also required to bring several items to the health facility when going to deliver which include: two bottles of scent soap, one big bottle of antiseptic liquid and two pairs of big size batteries for the torches.

In addition, due to the limited income sources, some women are unable to visit the health centre for regular pregnancy check-ups as advised by the nurses, and resort to TBAs to check the positioning of the baby in the womb and to monitor the progress of the pregnancy.

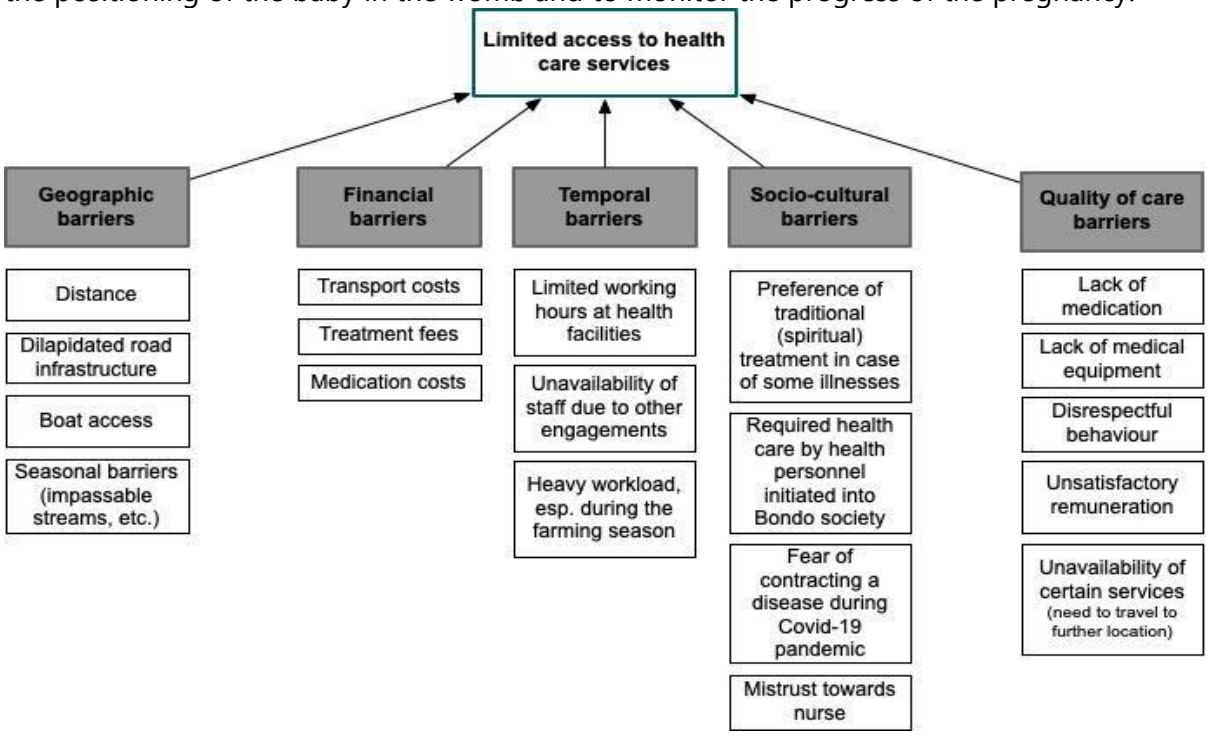

Figure 2: Summary of key barriers to health care, Bonthe district, Sierra Leone

Temporal barriers

Health services are mostly available during the day. The access to treatment is problematic at night when only the hospital in Mattru Jong can be accessed.

At night when you go for treatment they will not open their doors for night treatment because they are sleeping or not even there. In this case we go to Mattru Jong to access treatment and we pay 40 Leones to get there.

FGD Participant, Gbangba, Yawbeko

Some respondents also reported unattended health facilities during a regular work week, when staff participates in DHMT meetings, trainings or personal bereavements, which are not widely communicated. Therefore, at times, when they make an effort to come to a health facility, it is of great discouragement to them to seek services elsewhere, which represents further financial and temporal burden. During the dry season the intense farming activities also represent a temporal barrier of access for parents.

Socio-cultural barriers

A socio-cultural issue preventing optimal health seeking was the resorting to herbal remedies in first place to cure the most common child sicknesses. Traditional healers are present in the community and provide local herbs to help with diseases like malaria, convulsion, allergic reactions, stomach issues as well as removing curses causing the disease. At times respondents reported going to healers because they did not have money for treatment at the health centre. As child illnesses are often associated with witchcraft, traditional rituals and practices are used to facilitate their removal. During Covid-19 pandemic, healthcare access was affected by people being scared to visit health facilities for fear of the of the virus and of being vaccinated by nurses. For this reason, many community members did not allow their children to be vaccinated as they were afraid they would die as a result of. Pregnant women also refrained from attending ANC services regularly. Moreover, some respondents reported a feeling of mistrust towards the nurses. This is because nurses were found to disclose personal information on their patients to other community members which was specifically mentioned in relation to STIs. Lastly, nurses and most health professionals need to be initiated into Bondo society to be able to attend to initiated patients. Non-initiated nurses, for example, are not allowed to support the delivery of an initiated patient.

Quality of care barriers

Several barriers of quality of care were highlighted by respondents: lack of medicines and medical equipment as well as disrespectful behaviour from healthcare staff. Lack of medicine is particularly felt in August, when due to the heavy rains, the government supply chain is affected. This forces people to go to Mattru Jong in search of a pharmacy or to seek treatment at the local hospital. Lack of equipment including delivery kits, limited space for delivery (often one small room), lack of light, water, toilet facilities and overall maintenance of the facility affect the quality of care delivered for the community.

There was a time we had three pregnant women at the same time and all of them were in labour at the same time. It was not easy for us. One woman was attended in the labour room, another one on a bench and the third one was lying on the floor crying.

KII Community Health Officer, Gbangba, Yawbeko

Healthcare staff often shout at caregivers when they bring a child that is too sick to the facility. This is usually because parents are looking for funds to pay for treatment and not because of lack of care, as it is perceived by the healthcare workers. Mothers and pregnant women do not feel encouraged to go to the health facility because of the lack of respect and dignity that is perceived from the healthcare staff. Women feel ashamed of going to the health centre when experiencing breaks in their menstrual cycle or when having STI because nurses disseminate personal information or make quick assumptions about them being pregnant because of the irregularities. To treat STIs women would either choose traditional remedies or go to other health centres to seek treatment to maintain their privacy. Favouritism, meaning preferential treatment of friends and family, was also mentioned. Moreover, the majority of health staff reported working at the health centre without pay or with pay, which is perceived as insufficient compared to the workload that they handle on a daily basis.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Logistic regression analyses on DHS 2019 showed that children of women that experience distance to the facility as barriers to access to healthcare were potentially associated with a higher risk of stunting (p=0.02). Similarly, children of women that did not want to go alone to the health facility presented higher odds of becoming stunted (p=0.03) (Cf. **Annex A**). MICS 2017 data did not present any relevant indicator for analysis.

HYPOTHESIS B: LIMITED UTILISATION OF HEALTH SERVICES

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	+
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	+
Overall interpretation	+

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Women attended by a skilled birth attendant	87% (DHS 2019)	83% (DHS 2019)	87.3% (DHS 2019)	96.3% (DHS 2019)
Adolescent birth rate	137/1000births (MICS 2017)			
ANC visits (women 15-49)	98% (DHS 2019)			
Delivery in HF	83% (DHS 2019)	79.6% (DHS 2019)	83.2% (DHS 2019)	92% (DHS 2019)
Children (12-23m) received all basic vaccinations	56% (DHS 2019)			65% (DHS 2019)

- The introduction of Free Health Care Initiative (FHCI) in 2010 has marked improvements in MNCH coverage indicators, yet, increased service utilization has not translated to positive health outcomes.[70]
- 83% deliveries take place at health facilities, a decrease in home deliveries of 16% since the previous survey.[71] 87% of women are assisted by a skilled birth attendant or unskilled providers, such as traditional birth attendants (10%), relatives and others (3%). Less than 1% do not receive any assistance and only 3% of births are caesarean sections. 86% of mothers and 83% of new-borns receive a postnatal care within 2 days after birth.[72]
- Vaccination coverage is highest for the BCG vaccine (96%). For multi-dose vaccines, coverage is highest for the first dose. 56% of children (12-23 months) and 51% of children (24-35 months) received all basic vaccinations and only 2% are un-vaccinated in 2019.[73]
- 94% of children 6-59 months received vitamin A supplementation, and 92% of children (12-59 months) have been dewormed in the preceding 6 months. In Bonthe, 98% and 100% of children 12-35 months received Vitamin A supplementation and at least one dose of measles vaccine.[74]
- 60% of children under-five use insecticide treated bed nets.[75]

QUALITATIVE INQUIRY FINDINGS

Curative services

Treatment of common child morbidities

Traditional herbs are often used by mothers to cure their children's common illnesses. These are the first treatment of choice for many child's illnesses, however, when they see that the disease is not improving after some days, they would go to the health centre. Herbs are also used when there is a lack of money to buy modern pharmaceutical products. Several mothers also reported giving medications as preventative measure their children.

We give medications like Novalgin, blood tonic (multivitamin) and Panadol to boost their system. I give this every day (morning and evening) when medicines are available as a preventative measure.

FGD participant, Gbangba, Yawbeko, Bonthe

Modern pharmaceutical products drugs are purchased at the health centre or from drug peddlers that come to the village. When unavailable, respondents reported going to pharmacies in nearby towns like Mattru Jong.

It is worth mentioning that apart from malaria and fever, at the occurrence of which mothers would tend to seek treatment directly at the health facility, other child's illnesses, like stomach ache, diarrhoea or cough are initially treated at home using traditional herbs or drugs bought from local peddlers. Consequently, this may delay effective treatment with an impact on child's malnutrition.

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[70] United Nations International Children's Emergency Fund, 'Maternal, Neonatal and Child Health Lack of Quality and Uninterrupted Delivery of Comprehensive Life-Saving Services Still Deny Children Their Right to Life and Survival.', 2019, https://www.unicef.org/sierraleone/maternal-neonatal-and-child-health.
[71] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[72] Statistics Sierra Leone (Stats SL) and ICF.
[73] Statistics Sierra Leone (Stats SL) and ICF.
[74] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.
[75] The World Bank, 'Use of Insecticide-Treated Bed Nets (% of under-5 Population) - Sierra Leone', 2017, https://data.worldbank.org/indicator/SH.MLR.NETS.ZS?locations=SL.

Childbirth

Institutional delivery is now compulsory and required by law to combat previously high prevalence of new-born and maternal deaths caused by delivery complications. Home deliveries are no longer permitted and can be punishable by 500 Leones, even in case of spontaneous delivery.

Some women deliver very quickly and do not reach the health centre in time. The chief will have to testify and give money to appease the nurses. Sometimes this happen beyond our wish, but because of nature some women deliver on the way to the health centre as a result of the distance. The health workers refuse to attend to them thinking that these women did it out of neglect.

FGD Participant, Gbangba, Yawbeko

Even during Covid-19 pandemic, the majority women delivered at the health facility because of the law. However, some respondents said that home deliveries were also happening for fear of the disease. Despite the change in regulations enforcing institutional delivery, traditional birth attendants maintain an important role within the community, advising women during the course of the pregnancy, along nurses and their own mothers and/or mothers-in-law. When delivery complications occur, women need to be transferred to the nearest hospital in Mattru Jong. After delivery, nurses extract the placenta and check if the children are well by giving them a gentle slap of the bottom to ensure they cry. They then clean them, apply burned palm over the body and dress them before handing them to the mother for their first breastfeed. This is also the time when nurses sensitise women on appropriate care practices. To aid a smooth delivery some women drink a mixture of herbs that helps the child to become active in the woman's belly and aid a speedy delivery. Other herbal remedies are also given for women to chew to ensure a safe delivery.

During the barrier analysis, a comparison between doers and non-doers was not possible as home deliveries are officially not permitted. Cited advantages of childbirth at health facility included prevention of maternal and child deaths, including management of bleeding after birth. However, distance to health facilities was cited as a critical barrier, followed by the cost for delivery.

Preventive services

Vaccination

All visited health facilities were providing vaccinations against common child illnesses. Mothers reported having to pay 10 Leones for the vaccination. Children receive the Pentavalent vaccine (3 doses), which includes Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib[76], and the BCG[77] vaccine to prevent tuberculosis. The Pentavalent vaccine is charged 1 Leone per dose while the BCG is free when purchasing the vaccination card. Participants also reported about their increased awareness of the importance of vaccinating their children.

We are now aware that, vaccines are essential to develop the child immune system in other to fight against certain deadly diseases that we have been associating with demonic attacks or witchcraft.

FGD Teacher and Youth Leader, Gbonghe, Kpanda-Kemoh

[76] Haemophilus influenzae type b

[77] Bacillus Calmette–Guérin vaccine is a vaccine primarily used against tuberculosis

Vitamin A supplementation and deworming

Children under-five years of age receive Vitamin A supplementation free of charge at the health facility every 3-6 months. Deworming tablets are also provided for free at the health centre after the child reaches 1 year of age.

Antenatal care

The health facilities provide antenatal and postnatal card to registered women. After registration, which costs 10 Leones for the card, women have to pay an additional fee of 2-3 Leones for each visit. Nurses usually advise to come every month but women attend the visits when they can afford it. Those that cannot go every month only attend if there are complications. Women also reported that they did not want to spend the money "just to check". Women recognise that they are pregnant when they stop having periods, start having morning sickness, feel constantly sleepy and lose appetite. Loss of appetite is usually associated with being pregnant with a girl while big appetite signifies that a woman is pregnant with a boy. TBAs support women since the early stages of the pregnancy, ensuring their wellbeing and correct development of the pregnancy, referring them to the health facility when danger signs appear or when women are ready for delivery. They do not charge any fees for their work but receive thank you gifts at times.

Postnatal care

Similarly to antenatal care, postnatal care services are provided at the health centre. Nurses advice women to attend postnatal care from 3 weeks till 9 months post-partum. The postnatal care card costs 10 Leones and women have to pay 2-3 Leones additionally per each visit. In one of the catchment areas, women reported being asked by the health centre staff to sweep and root the grass around the compound before attending their postnatal care appointments. Other women said that they had to bring condiments like maggi, onion, pepper and fish for the health workers when attending the visits.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Despite availability of data, DHS 2019 data did not show any statistically significant associations between indicators of healthcare utilisation and stunting. (Cf. **Annex A & B**) However, Logistic regression analyses from MICS 2017 data showed an association between children who were ever given Vitamin A supplementation and a lower probability of being stunted ($p<0.01$). Other indicators were also available but did not show any statistically significant associations (Cf. **Annex C**)

HYPOTHESIS C: SHORT BIRTH-SPACING / EARLY, REPETITIVE OR UNWANTED PREGNANCIES

Strength of the association with undernutrition in the *scientific literature*	+++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	++
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	+
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	+
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Average HH size	5.3 (DHS 2019) 6 (SLIHS 2018) 5.3 (CFSVA 2020)	5.4 (DHS 2019) 6.2 (SLIHS 2018) 5.3 (CFSVA 2020)		4.4 (CFSVA 2020)
HH Female headed	20% (CFSVA 2020) 32% (DHS 2019)	18% (CFSVA 2020)		
Fertility rate (women 15-49 years)	4..2 (DHS 2019) 4.1 (MICS 2017)	5.1 (DHS 2019) 5.1 (MICS 2017)	5 (DHS 2019)	5.3 (DHS 2019)
Median birth interval (months)		38.3 (DHS 2019)	37 (DHS 2019)	37.4 (DHS 2019)
Median age at 1st birth		19.4% (DHS 2019)	19.5 % (DHS 2019)	19.6 % (DHS 2019)
Early child bearing (birth <18y)	30.6% (MICS 2017)	37.8% (MICS 2017)	33.7% (MICS 2017)	33.8 % (MICS 2017)
Women using any contraception method	53.3% (DHS 2019) 23% (MICS 2017)	52% (DHS 2019)	57% (DHS 2019) 21% (MICS 2017)	76% (DHS 2019) 14% (MICS 2017)

- The national fertility rate is 4.2 children per woman and reaches 5.1 in rural areas.[78]
- The median interval between births is slightly above 3 years (39.5 months)[79]and the median age at first birth among WRA is 19.5 years. Nationally, 21% of women age 15-19 and 32% in rural areas started childbearing. Adolescent fertility is an important issue in the country.[80]
- Knowledge about contraception is widespread. 98% of married women and 99% of currently married men know at least one modern method. Injectables (9%) and implants (7%) are the most commonly used modern methods. Use of contraception decreases in rural areas. More than one out of every three women (35%) discontinues use within 12 months.[81]
- 73% of households in Sierra Leone are male headed and the average size is 5.3 people and 4.4 in Bonthe.

QUALITATIVE INQUIRY FINDINGS

Average household size

According to the community the smallest household size is 6 members, commonly around 12. Polygamy is widely practiced and therefore all wives and children live in the same compound. Men reported having two wives on average and at least 3-4 children with each. In the past, men married more wives but now this number has decreased due to a higher cost of living. Several reasons, apart from the polygamic relationships, have been disclosed as to why women have many children. Children are seen as assets, who are deemed to help parents when they are older. If a person has many children, they can be sure that at least a few will provide

[78] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[79] Statistics Sierra Leone (Stats SL) and ICF.
[80]Statistics Sierra Leone (Stats SL) and ICF.
[81] Statistics Sierra Leone (Stats SL) and ICF.

financial support when they are older. There is also an expectation that not all children might survive and therefore one needs to have more children to "replace" the lost ones. Foster parenting was also mentioned as a common coping strategy when household situation becomes difficult. In this case, more financially stable families foster children of close family and friends. They take on all responsibilities from the biological parents to alleviate their financial difficulties. Some children are also sent to relatives in the nearby cities like Mattru Jong to attend school.

Early childbearing

Early marriages and childbearing at early age are often the result of coping mechanisms, deployed by girls when available resources do not meet their needs. In fact, due to the lack of resources girls start having boyfriends and engaging in sexual intercourse at an early age in order to support themselves and/or the needs of their families (**Cf.** Hypothesis M). Moreover, due to the distance between the village and secondary schools and the lack of means to pay for transport girls ask for motorcycle rides to men or boys which often expect sex in return.

Principally, parents do not want their daughters to become pregnant and try to protect them by limiting encounters with boys. They may encourage them to finish school but it is on the way to school that some girls get pregnant. Due to substantial distances to secondary schools, if parents are not able to provide for transport fees, girls have to choose between walking for hours or taking a ride with boys or men, who then might require sexual intercourse in exchange. Some girls also get pregnant by men who come to the village to do business, with whom they engage in sexual activities in exchange of money. These men often do not take responsibility for the pregnancy and leave girls alone.

All reasons combined, some girls become pregnant at around 15 years old while they are perceived by the community as not ready for a pregnancy at such an early age. It is believed that their bodies are not ready for a delivery because of their young age, as some were said to experience complications or even die throughout. Pregnancy advice is provided by nurses, mothers, grandmothers and friends. Being a young mother often means being a single mother as men do not always assume a responsibility for the pregnancy and leave the girls. Moreover, due to their early age, girls are perceived to be unable to care properly for their child and some were said not to practice exclusive breastfeeding. Teenage girls also get pregnant as a result of not using contraception or by using natural methods like traditional ropes "*loi klo*[82]", which may not be efficient.

Birth-spacing and family planning / Use of modern contraceptive methods

Women usually wait around two years or more in between pregnancies because they want to ensure that their child is well taken care of. Majority of women reported waiting at least 7-8 months or even longer 16-20 months, till they stopped breastfeeding. If they become pregnant before that time the living baby tends to be neglected as a result of a new pregnancy symptoms, such as morning sickness and tiredness. These symptoms impact on a woman's energy levels and ability to care for other children. Other reported reasons for spacing births were: economic constraints or wanting children to respect each other by having a larger age-gap. Conversely, some women reported not waiting less than 1 year because they wanted

[82]. Loi klor means stand still. It is a rope that women tie around the waste to prevent unwanted pregnancies.

more children by seeing other women having babies and wanting to "catch up" with them or because their perceived their role as giving birth to children.

A commonly practiced natural way of ensuring birthspacing is not having sex for a longer period of time after delivery. However, women also start to use contraceptives as they are afraid of losing their husbands as a result of refusing sex for longer periods. In fact, a wide range of contraceptives is used within the community. These include injections "*depo*" (every 3 months), pill "*microlute*"or "*granat*" (daily) and implant "*captain band* " (every 4-5 years). Perceived disadvantages of injections included an increase in menstrual flow while the implants were perceived to cause infections. Condoms are not used or liked in the community as they are percieved to decrease pleasure. One woman even said that she was afraid of the condom getting stuck in her vagina.

Traditional methods like ropes made by local herbalists are also used. Ropes are tied around the waist and used by women who want to prevent pregnancies but are afraid of getting sick from modern means of contraception. These are, however perceived, as less effective. Additional ropes are also used for the child to prevent them from the negative consequences of hot milk as a result of mother's sexual activity.

Women can buy contraceptives at the health facility (cca. 10 Leones for the injection or the implant) or from the Marie Stops vehicle that comes to some communities on a regular basis and provides free contraception. Some muslim men refer to it as "*Kpema Mortui*[83]" and said it was stopping them from having more children. Interestingly, it was disclosed that religious leaders (both Christian and Muslim) have been encouraging women to use family planning, a big historical change compared to the past.

During a barrier analysis, both doers and non-doers agreed that family planning helped to prevent unwanted pregnancies and to enable optimal birth spacing. However, a key barrier to non-practice was a fear of potential side-effects like bleeding, feeling unwell including also the perception of irreversible infertility. While doers were aware of a possibility of these side effects, they considered them of lesser importance than an unplanned pregnancy. In addition, at the level of self-efficacy, doers found it easy to use contraceptive methods while non-doers found the practice difficult due to cost, husband disapproval and lack of support.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Despite availability of data, DHS 2019 data did not show any statistically significant associations between indicators of birth spacing and unwanted pregnancies and stunting (Cf. **Annex A & B**). Instead, Linear regression of MICS 2017 reported an increase in weight for age z scores in bigger households (p=0.04) and household with higher numbers of WRA (p=0.04). The positive association between higher number of household members and decreased likelihood of stunting feels a bit contradictive and requires further investigations (Cf. **Annex D**). Other indicators were also available but did not show any positive associations with stunting outcome measures (Cf. **Annex C & D**).

HYPOTHESIS D: LOW BIRTH WEIGHT

Strength of the association with undernutrition in the *scientific literature*	+++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	++

[83] Contraceptive vehicle

Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	N/A
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	N/A
Overall interpretation	+

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Percentage of low birth weight cases	5% (DHS 2019)	4.3% (DHS 2019)	3.3% (DHS 2019)	4.3% (DHS 2019)

- Sierra Leone has one of the highest incidences of low birth weight in Sub-Sahara Africa.84 5% of children nationally and 4.3% in Bonthe are born with a low birth weight.[85]
- Low birth weight is a key determinant of stunting, wasting and underweight.[86] Factors associated with low birth weight identified are unemployment, anaemia during pregnancy, < 2 years inter-pregnancy interval and cigarette smoking during pregnancy.[87]

QUALITATIVE INQUIRY FINDINGS

Community perceptions of an "ideal baby"

Participants said that an ideal baby is active, plays with other children and has a good appetite. This baby does not sit still, runs towards the parent when they come back from work and want to be with other children and plays with the mother. To ensure child wellbeing parents carry children, give them hugs and kisses, keep them clean, feed them well and give them medicines when needed.

Community perceptions of low birth weight

Low birth weight is relatively frequent in the community. Children are born small but are thought to pick up weight as soon as they are breastfed. To avoid low birth weight, mothers are told to eat foods like meat intestines, egg, papaya and have a good rest. However, limited access to income sources can reduce access to these foods. If a child is born with a low birth weight, the mother is advised to feed them well because her breastmilk is full of nutrients, and therefore the child will grow well and catch up on their optimal weight. Other perceived causes of delivering small babies are: morning sickness preventing mothers from eating in the first trimester and God's will. Moreover, some women eat smaller portions or drink herbal mixtures to avoid having a large child in the womb and therefore related complications during delivery.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Linear regression results from DHS 2019 data showed a positive association between increased weight and decreased likelihood of being stunted ($p<0.01$) (Cf. **Annex B**). Other indicators

[84] The World Bank, 'Low-Birthweight Babies (% of Births) - Sierra Leone', 2015, https://data.worldbank.org/indicator/SH.STA.BRTW.ZS?locations=SL.

[85] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.

[86] Richard Gyan Aboagye et al., 'Birth Weight and Nutritional Status of Children under Five in Sub-Saharan Africa', ed. Sanjai Kumar, *PLOS ONE* 17, no. 6 (2022): e0269279, https://doi.org/10.1371/journal.pone.0269279.

[87] David Kabba Kargbo et al., 'Determinants of Low Birth Weight Deliveries at Five Referral Hospitals in Western Area Urban District, Sierra Leone', *Italian Journal of Pediatrics* 47, no. 1 (2021): 212, https://doi.org/10.1186/s13052-021-01160-y.

were also available but not significant in relation to stunting outcomes. (Cf. **Annex A**). No available indicators of LBW were found in MICS 2017.

HYPOTHESIS E: MOTHER'S NUTRITIONAL STATUS

Strength of the association with undernutrition in the *scientific literature*	+++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	+
Community rating during qualitative inquiry	+
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	+
Overall interpretation	+

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Maternal mortality ratio (women 15-49)	717 deaths per per 100,000 live births (DHS 2019)			
Women age 15-49 with anaemia	47% (DHS 2019)	51.6% (DHS 2019)	48.9% (DHS 2019)	47.4% (DHS 2019)
Pregnant women age 15-49 with anaemia	55.7% (DHS 2019)			
Women (15-49) with BMI <18.5	7%% (DHS 2019)	8.3% % (DHS 2019)	7.7 % (DHS 2019)	7.3 % (DHS 2019)
Minimum diet diversity met (>/=5) for women age 15-29	56% (DHS 2019) 74.2% (SLNNS 2021)			58% (SLNNS 2021)
Women (15-49) with HIV	1.8% (DHS 2019)			

- Women's anemia is a severe public health problem in Sierra Leone. Nearly 1 in 2 women nationally and in Bonthe is anemic. 28% of women reported taking iron supplementation for at least 90 days and 84% deworming medication during their most recent pregnancy.88
- The national prevalence of underweight (BMI<18.5) and severe underweight (BMI<16.0) among WRA is 5 % and 0.6 % respectively, while overweight and obesity reach 21% and 9% respectively. This indicates a high double burden of malnutrition in the country. In Bonthe 4% of WRA are underweight while 25% overweight and 10% obese.[89]
- Similarly, to children, the dietary consumption pattern of WRA is dominated by intake of grains, followed by meat, poultry or fish and dark green leafy vegetables. Eggs are the least consumed followed by dairy and other fruits. The mean dietary diversity score (MDDS-W)

[88] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[89] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.

is 5.7 nationally and 5.1 in Bonthe. 74% of WRA meets their minimum dietary diversity at national level and 58% Bonthe. The minimum meal frequency for WRA is 3.6 meals nationally and 3.1 in Bonthe.[90]

- More women than men are affected by HIV in Sierra Leone (1.8% vs 1.3%). HIV risk factors include: age, place of residence, region, marital status, working status, household head and parity.[91]

QUALITATIVE INQUIRY FINDINGS

Community perceptions of maternal malnutrition

Participants recognised the importance of an optimal maternal diet while income constraints were mentioned as a main negative factor influencing access and diversity of foods eaten by mothers. Women reported being only seldom satisfied with the food that they consumed.

I want to eat good sauce with enough fish but I cannot eat it because the fish is expensive. I would like to buy fish for 50 Leones and instead I buy it for 20 Leones to feed the whole family.

FGD participant, Nyendehun, Jong

Respondents referred to "good food" as a meal with all the necessary ingredients e.g. cassava leaf sauce with plenty fish, groundnut, pepper, maggi, onions and palm oil. Women reported wanting to change diets and eat other dishes like "*soup*[92]" but because of lack of resources most times they have to limit the ingredients. When women are hungry, they struggle to breastfeed their children and will spend a lot of time outside of the household looking for food. Women said to feel hungrier during the rainy season when food becomes scarce.

Nutritional intake during pregnancy/breastfeeding

Women are advised by nurses and elderly women in the community to eat specific foods during pregnancy to aid a good blood production and therefore wellbeing of the child. These include brown rice or plantain with potato or cassava leaves pumpkin, beans, egg, *egusi seeds*[93] and palm oil. In fact, the community perceived that if a woman does not eat nutritious food during pregnancy, the child "drinks" the water in the womb. Women reported losing appetite especially during the first trimester because the morning sickness and the smell of certain foods. Once the initial sickness is over they are able to eat again. Women usually eat twice a day during pregnancy but some said to eat only once.

Instead, women said to have more appetite while breastfeeding as the child is suckling milk. A common perception is that the breastmilk includes all the food nutrients that a mother eats. Therefore, breastfeeding mothers are advised to eat foods like palm oil, beans, peanuts, cassava, row groundnuts, row fish and rice in order to boost the breast milk. Beans and fish were perceived as particularly important.

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[90] Ministry of Health and Sanitation and UNICEF Sierra Leone.

[91] Joseph Kawuki, Kassim Kamara, and Quraish Sserwanja, 'Prevalence of Risk Factors for Human Immunodeficiency Virus among Women of Reproductive Age in Sierra Leone: A 2019 Nationwide Survey', *BMC Infectious Diseases* 22, no. 1 (2022): 60, https://doi.org/10.1186/s12879-022-07037-7.

[92] Sauce made from cassava leaves, fish, groundnut, paper, maggi, onions and palm oil, usually eaten with rice.

[93] Egusi seeds come from the Egusi gourd, which looks very similar to a watermelon. The seeds are similar in size to small pumpkin seeds and a bit creamier in flavor. They make up a really important component of many West African staples, including Egusi soup, which is widely enjoyed in countries like Nigeria, Ghana, Sierra Leone, and Cameroon.

We eat palm oil, beans, peanuts, cassava, row groundnuts, row fish and rice to boost our breastmilk. The beans and fish are responsible for the mother to have lots of blood, to be healthy, have strength and energy. If you don't have enough blood, you will feel weak.

FGD Participant, Gbangba, Yawbeko

The community highlighted several foods that are considered taboo for pregnant and breastfeeding mothers.

Food	Reason for being a taboo	Applicable to
Gari	Will cause the child to have a stomach infection, constipation and pot belly	Pregnant women
Brown rice	Will cause the child to have a stomach infection	Pregnant women
Snake	The child will have difficulties to walk even for their entire life	Pregnant women
Electric fish	The child will have electric shocks	Pregnant women
Crab, water snail, land snail	The child will have a runny mouth	Pregnant women
Rat	The child will have sleepless nights	Pregnant women
Ripe banana	The child will be a thief	Pregnant women
Monitor lizard	It will cause rough skin of the child like a lizard	Pregnant women & breastfeeding women
Pumpkin	Causes child skin infection	Breastfeeding women

Table 10: Summary of reported food taboos for pregnant and lactating women, Bonthe District

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Linear regression analyses of DHS 2019 data show a slight positive association between increased maternal BMI and higher weight for age z-scores (p=0.06) (Cf. **Annex B).** Other maternal nutritional status indicators were present in DHS 2019 data but did not show any significant associations (Cf. **Annex A)**. No available indicators of maternal nutritional status were found in MICS 2017.

MENTAL HEALTH & CARE PRACTICES

HYPOTHESIS F: CAREGIVER WELL-BEING

SECONDARY DATA REVIEW

Strength of the association with undernutrition in the *scientific literature*	+++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	++
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	++
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	++
Overall interpretation	++

SECONDARY DATA REVIEW

- Neglecting behaviour from mothers towards children was reported as a common practice and a source of distress in Bonthe. These included: not paying attention to their needs, physical and verbal violence, rejection, and dropping them out from school to prioritize labour work. Common beliefs such as curse and witchcraft have a big impact on individual and family wellbeing and stigma is one of the key problems. People with mental health conditions are considered « *Mad* », « *Kreze* » or « *Kpowie* » and typically rejected or abandoned by community members.

- Bonthe counts on a single Mental Health Nurse that provides psychosocial support and psychological first aid. Some community health workers have been trained in mental health.[94]
- Pregnant adolescents suffer from stigma and social abandonment. Lack of support from men and abandonment are some of the main stressors mentioned by women. Being an unmarried woman has consequences on women's wellbeing both economically and socially. The stress of having to provide financially for one's children without any support. [95]

QUALITATIVE INQUIRY FINDINGS

Community perceptions of caregiver well-being

According to the community, stress is an important factor affecting caregiver's wellbeing referred to as "*Kahugbue*". Both women and men reported to feel stressed. Women said to be stressed because of lack of support, income generating activities and control over their income, heavy workload, polygamy and cheating.

It is very difficult to balance household work and bush work if you do not have support. When you have to launder for example the child is with you on your back all the time and it is very exhausting. Later when you go to the bush your mind is with the child constantly and after you rush back home to prepare food and take care of your family.

FGD participant, Gbangba, Yawbeko

Other women added that it is challenging to sleep when "*our mind wonders about next day's work as to how to get what we need to feed our children. Most times we fend for the day and eat what we are able to find."*[96]

Husband's unfaithfulness it is an important factor causing stress and conflict in the household as women depend largely on husbands as a source of revenue. When a husband finds a new girlfriend, they will invest a substantial part of their earnings in a new girlfriend, leaving the current wife and children unattended. Women expressed feeling both stressed and distracted by having to control their husband's whereabouts instead of focusing on childcare. Cheating tends to happen around 6 months after delivery if women do not engage in sexual activities and men search for other sources of pleasure.

If you abstain now from sex just to nurse your child for a long time, other women will snatch your husband away from you because they will spoil him with a lot of sex. This will cause your husband to abandon the family.

FGD participant, Gbonghe, Kpanda-Kemoh

The role of the side chick

In the past it was very common for women to accept a presence of another woman, a "side chick", for the husband to engage with sexually while the wife took time off from sexual activities to breastfeed the baby[97]. This was done to prioritise the wellbeing of the children and avoid being abandoned by keeping their husbands happy. However, at that time side chicks were perceived to respect wives and accepted that

[94] Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.
[95] Horn et al., 'Factors Contributing to Emotional Distress in Sierra Leone'.
[96] FGD participant, Nyendehun, Jong, Bonthe.
[97] A common belief is that women should not be engaging in sexual activities while breastfeeding because the milk becomes hot due to the sperm travelling to the breast, which makes the child sick with diarrhoea, fever and even malnutrition.

their role was only temporary. Now, due to the constant battle for resources, respect has decreased and side chicks try to take over by stealing men from their actual wives as well as their benefits like a house, a business, or a plantation. Some women were said to resort to the help of an herbalist to be able to take over. Wives also go to the herbalist to protect their family and scare side chicks with chants and herbal concoctions. Women do not want to share their husbands anymore for multiple reasons: to avoid losing their propriety and their husband and contracting STIs. In fact, women that are left by husbands because of the side chicks are in a position of a constant stress trying to justify themselves in the community as to why the husband left them and a subject to constant provocations. Because of this stress they mentioned to struggle to take care of their children and if the pressure continues they are sometimes forced to leave their children with the man and leave the community.

Women disrespect men when unable to provide for the family and when cheating, however, as a consequence of the disrespect, men deprive wives of financial support and restrain from their caring responsibilities towards their children. Men reported that despite knowing that their promiscuous behaviour will cause conflict in the household they would still engage in sexual activities with other women.

Men are greedy and want a variety of women. We like young women because when a woman has given birth to more than 2 children, their body firmness reduces so we go in search for young girls to have more sexual pleasure.

FGD Participant, Gbangba, Yawbeko

Husbands were said to support women and children mainly financially and never emotionally. Some women mentioned asking their mothers and friends for advice when in need, however, most women reported having no emotional support.

There is no emotional support from women, no one encourages you or pampers you during difficult times!

FGD participant, Nyendehun, Jong, Bonthe

Polygamy, despite being common among Muslim families, is a source of stress for women because as soon as a new wife comes into the household, all focus is on her, leaving the other ones behind in terms of provision, support and affection.

When a new wife comes into the home, the husband will never treat me again as usual and the responsibility of caring and providing for the child will be left for me to do. There will be no quality time with me when a new wife comes in. Instead, when I am the only wife my husband sits and discusses with me, gives me time and accompanies me when going somewhere but all these changes and his attention is diverted with a new love.

FGD participant, Nyendehun, Jong

In the past men used to have even 10 wives but despite the current drastic decrease in number, women accept the presence of other women in their household. If a husband abandons a woman she will engage in income generating activities like cassava gardening or casual work (fruit gathering, palm oil processing or weeding) to earn income and support her children. There are many single mothers in the community that feel the pressure of being the main income provider of the family. This is due to death or abandonment of a husband or a man that got them pregnant and refused their parental responsibilities. The community often judges these women and new men take advantage of them without wanting to commit to a woman with children.

It is not easy to become a single mother because people will see you as a whore with no land and money. When men know that you are not married, they will come to you as if they want to assist you but they will

just satisfy their sexual desired and go. More men are attracted to women without children because, men are afraid of taken more responsibilities of both child and mother who don't have means.

FGD participant, Nyendehun, Jong, Bonthe

Men also reported feeling stressed mainly because they are not able to provide for their families due to the limited income opportunities within the community.

If we do have money we will not be able to provide for our children and as a father you feel stressed because you know that your children are crying around because of lack of food. If there is no food there will also be conflict in the household with your wife as she will ask for housekeeping money.

FGD Participant, Gbangba, Yawbeko

August is a particularly difficult month because of the heavy rains that impact on the ability to earn income in the bush. To alleviate the immediate stress, community members take loans to survive and support their families. However, this practice brings even more stress down the line when households are unable to repay. Sometimes there is no money to buy food and the women keep asking men for housekeeping money which makes them more stressed and irritable. Moreover, due to the persistent stress and engagement in various activities to provide income to their families, some men reported experiencing a decrease in sexual desire. This was linked to the mental load perceived by men during the rainy season.

Stress also affects the sexual desire of the man because sex normally works with the mind and when the mind is affected there will be no work done

FGD participant, Gbonghe, Kpanda-Kemoh

Another reason of stress mentioned by men was women cheating and disrespecting them. In contrary to men cheating, which is socially accepted, cheating by women is not. Under these circumstances, men leave the household for a period of time until the pain goes away. If afterwards they decide to separate, the new wife will take care of their children. Usually, by local, men need to wait until the child is 7 years old to take over the custody from the mother. However, in cases where the mother cannot take care of the child this can happen even earlier.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Logistic and Linear regressions on DHS 2019 data did not show any statistically significant associations with the available indicators. (Cf. **Annex A&B**). Linear regression of MICS 2017 data reported that a worsening in caregiver's life satisfaction was negatively associated with a decrease in child's weight for age z-scores (0.007) (Cf. **Annex D**). Moreover, having a mother with disability (cognitive or physical) was found to probably increase the risk of stunting ($p<0.01$) (Cf. **Annex C**).

HYPOTHESIS G: NON-OPTIMAL BREASTFEEDING PRACTICES

Strength of the association with undernutrition in the *scientific literature*	+++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	+++
Community rating during qualitative inquiry	+
Qualitative team rating	+++
Strength of historical and/or seasonal variations on undernutrition trends	++
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Exclusive breastfeeding	54% (DHS 2019) 52% (MICS 2017) 52.7% (SLNNS 2021)	57.2% (MICS 2017)	52.1% (MICS 2017)	22.4 % (MICS 2017) 54.3% (SLNNS 2021)
Median duration of exclusive breastfeeding	3 months (DHS 2019) 2.7 months (MICS 2017)	3.2 months (MICS 2017)	3.1 months (DHS 2019) 2.7months (MICS 2017)	0.7 months (MICS 2017)
Continued breastfeeding at 1 year (12-15m)	85% (MICS 2017) 78.1% (SLNNS 2021)	89% (MICS 2017)	88.3% (MICS 2017)	68% (MICS 2017)
Continued breastfeeding (20-23 months)	38.2% (MICS 2017)	47.1% (MICS 2017)	44.3% (MICS 2017)	36.9% (MICS 2017)
Child put at breast within 1h	89.9% (SLNNS) 75% (DHS 2019)			89.5% (SLNNS)
Skin to skin immediately after birth		60.2 % (DHS 2019)	65.9% (DHS 2019)	92.5% (DHS 2019)
Child bottle fed	9.7% (SLNNS) 9% (DHS 2019) 17.8% (MICS 2017)	9.1% (MICS 2017)	13.6% (MICS 2017)	15.7% (SLNNS 2021) 21.2% (MICS 2017)
Pre-lacteal feed given to child	17.5% (SLNNS 2021) 10% (DHS 2019)			24.8% (SLNNS)

- Breastfeeding is overall a widespread practice in Sierra Leone. 98% of children (0-23 months) were ever breastfed, although only 53% of children (0-6 months) are breastfed exclusively.
- The median duration of any breastfeeding is 19.5 months in rural areas, and 17 months in urban areas. 19% of children under 6 months are breastfed while also consuming plain water, and 16% also consume complementary foods.[98]
- Nationally 59% of new-borns were put to breast immediately and 31% within the first hour of birth. In Bonthe 61% immediately and 28% within 1 hour from birth. 54% are exclusively breastfed until the 5th month while nearly 56% continue to be breastfed until the 23rd month.[99]
- In Bonthe district the community is aware of some key IYCF messages such as the importance of exclusive breastfeeding (EBF); these messages are delivered by health facility staff and by mother and father support groups.[100]

[98] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[99] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.
[100] Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.

- Despite the awareness of the benefits of EBF the most common challenge is the belief that breastmilk becomes spoiled by having sex. Other key challenges for breastfeeding are: lack of food for breastfeeding women, the difficulty of combining jobs, farming, school attendance

QUALITATIVE INQUIRY FINDINGS

Early initiation of breastfeeding

Participants reported introducing breastfeeding within 1 hour of delivery. More specifically the initiation usually happens after 30 minutes. Mothers give the child colostrum, which participants referred to as first milk.

Mothers give to the child the first milk that comes out from the breast. The colour is red and yellow. At the health centre nurses told us that it is the child's first vaccine.

FGD participant, Gbonghe, Kpanda-Kemoh

Women agreed that the yellow colour of the milk is not perceived as bad as the only bad milk is the infected one, which is manifested by painful breasts. But even in this case women would keep breastfeeding. Infected milk is treated by burning mint and putting the breast over the heat to disinfect it. Participants mentioned that some women do not have milk after giving birth. In this case the child would still be put to the breast to suck on an "empty breast" and make the breast milk come naturally.

When there is no breastmilk for the child to suckle, we make the mother eat rice with cassava leaf or potato leaf sauce. This recipe is very good for producing breastmilk in a mother. After eating the rice and cassava leaf recipe let say at 8 am or 9 am, the mother will produce enough milk at 4 pm for the child.

FGD participant, Gbonghe, Kpanda-Kemoh

Non-exclusive breastfeeding

Participants confirmed that non-exclusive breastfeeding is common in the community. Children younger than 3 months are given breastmilk alongside water and herbal teas, made out of boiled *yumbu yamba*[101] and *hojogboi*[102], is provided to relieve stomach infection "*maccru*" and constipation.

We give the liquid from boiled "Yumbu Yamba" root when we notice that the child is crying as a result of constipation and stomach grippling. The liquid will ease bowel movement which makes the child relaxed, sleeps a lot and develop well.

FGD participant, Nyendehun, Jong

Between 3 to 6 months mothers start to introduce baby food made of flour/rice porridge with other ingredients like peanut butter, jumbo[103] or maggi, smoked fish, and salt or sesame "*beni*", big beans, smoked fish and salt. Papaya porridge is also common. It is made of ripe papaya and palm oil, mothers give children spoonful 3-4 times a day. This is because of the perception that breast milk is not enough for the child. Children were said to be breastfed on demand,

[101] Nauclea Nyasica
[102] Tabebuia rosea
[103] Maggi fortified with Vitamin A

especially when they cry. However, heavy workload and low access to food impact on the ability of mothers to exclusively breastfeed their children.

Most mothers do not practice exclusive breast feeding as a result of too much workload, and low access to food. Some mothers really want to breastfeed their children, but because of hunger it is difficult to practice.

FGD Imam and Pastor, Gbonghe, Kpanda-Kemoh

Some participants said that women are usually not allowed to work in the field till the child is six months and after they extract the milk before they leave. It is believed that if a mother is out the whole day, the breast milk becomes hot, hence women discard the first milk after they return home before breastfeeding their children. Breastmilk is also perceived as "hot" when a mother engages in sexual intercourse while breastfeeding. According to a local belief, the breast becomes hot when the "*hot sperm"* reaches during the intercourse, which consequently makes the child sick. For this reason, many women abstain from sex until they finish breastfeeding. Healthcare workers sensitise mothers to exclusively breastfeed for 6 months and participants believed that if the husband takes care of the mother she will be more likely to exclusively breastfeed.

When women give birth in the health facility, they get sensitised by the nurse on exclusive breastfeeding for 6 months. If a husband takes care of the woman by providing food, she is well nourished, and will exclusively breastfeed her child. If he does not take care of her, she will not practice exclusive breastfeeding but mixed feeding. In this case, the child gets unwell compared to one that is exclusively breastfed.

FGD participant, Gbonghe, Kpanda-Kemoh, Bonthe

During a barrier analysis, key barriers to exclusive breastfeeding were found at the level perceived self-efficacy, with doers finding it easy to practice while non-doers finding the practice difficult, and at the level of perceived social norms, with doers receiving more support from family members than non-doers. Both groups acknowledged the importance of exclusive breastfeeding to reduce risk of child illness and enchance good health. Crying was mentioned as a common cue that prompted mothers to breastfeed. A common disadvantage shared by both doers and non-doers was breastfeeding when a mother was hungry, which eventually leads non-doers to introduce other liquids or foods to their children prematurely to tackle a perceived brestmilk insufficiency.

Median duration of breastfeeding

Participants perceived breastmilk as being good for the child because it makes them grow faster. Most did not find it difficult to practice breasfeeding as it was for the wellbeing of their children. The median duration of breastfeeding was 18 months. Some women said that they stop breastfeeding after six months to re-engage in sexual activities with their husband (Cf. Hypothesis F + side chicks box). However, the majority of consulted women would breastfeed longer and pause any sexual activities till they stopped breastfeeding. Mothers usually stop breastfeeding when the child develops teeth as they are afraid of injuries to the nipples, when a child is too keen on breasts and they want them to start eating solid foods only or when pregnant with a new child as there is a perception that the child will get sick (fever and diarrhoea) because of the hot milk.

Boys were perceived to demand more breastmilk than girls and therefore girls were given more attention when comes to feeding to make sure they are fed well.

Boys breastfeed more than girls and they ask for breast more often because they know that this will be temporary. Mothers give more attention to girls when breastfeeding because they know that boys will demand it independently while girls don't eat enough.

FGD participant, Gbonghe, Kpanda-Kemoh

SECONDARY QUANTITATIVE ANALYSES FINDINGS

DHS 2019 data did not show any statistically significant associations with the available indicators (Cf. **Annex A&B**). Logistic regression analysis from MICS 2017 showed that giving a child anything else other than breastmilk in the first 3 days of life was probably associated with a higher risk of stunting ($p<0.01$) (Cf. **Annex C**).

HYPOTHESIS H: NON-OPTIMAL COMPLEMENTARY FEEDING PRACTICES FOR CHILDREN 6-23 MONTHS

Strength of the association with undernutrition in the *scientific literature*	+++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	+++
Technical experts' rating during Initial Technical Workshop	+
Community rating during qualitative inquiry	N/A
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	+
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Timely introduction of child to semi-solid foods (6-8 m)	60.2% (SLNNS 2021) 69.4% (DHS 2019)			53.3% SLNNS 2021)
Minimum acceptable diet (MAD) for children (6-23)	9% (DHS 2019) 4.9% (SLNNS 2021)	8% (DHS 2019)	12% (DHS 2019)	20% (DHS 2019) 0% (SLNNS 2021)
HH food consumption score (poor)	27% (CFSVA 2020)			37% (CFSVA 2020)

*specified as continued breastfeeding (no months indicated)

- Nationally 60% of children are introduced in time to complementary feeding.[104] However, children are often introduced either too early or too late, despite increased awareness.[105] The main reasons are: 1) sleep, or 2) the mother not being available (at work, at school) 3) misunderstandings about development such as a child being considered small for its age and food being necessary.[106]

[104] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.
[105] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[106] National Mixed Methods Study on the Knowledge, Attitude, Practice and Barriers on Maternal, Infant and Young Child Nutrition in Sierra Leone

- The main reasons for not providing enough food after the age of six months are: child refusing to eat or not having enough money to buy food. [107] In Bonthe poverty and deprivation, rather than lack of knowledge, were felt to be key reasons.[108]
- The mean number of food groups consumed by children aged (6-23 months) is 3.1 out of a total of 8 food groups. In Bonthe, children eat 2.8 out of 8 food groups and 53% are introduced to complementary feeding between 6-8 months.[109]
- Only 33% of children nationally meet their minimum meal frequency for their ages (34% in Bonthe). The minimum acceptable diet (MAD), is met by very few children, only 5% nationally and 0% in Bonthe, indicating poor feeding practices for children 6-23 months. [110]
- Most of children's diet is composed of staple grains, roots & tubers in all the districts, (87% in Bonthe). The consumption of protein source foods including animal sources is generally poor. Consumption of Vitamin A rich vegetables (38%) as for other fruits & vegetables (28%) is similarly poor. In Bonthe, the consumption of Vitamin A rich foods is among the lowest across all districts. 13% and 24% of children never consume Vitamin A and Iron rich foods.[111]
- Certain foods are taboos during complementary feeding: 1) if there is an issue with breastmilk flow, the child should not be breastfed for fear that the insufficient production will leave them hungry and under-nourished; 2) parents should not be giving children certain parts of poultry except the legs (fowl foot) to help teeth grow strong; 3) Eating oranges causes malaria; 4) eggs may lead to stealing.[112]
- To support optimal complementary feeding practices the MoHS developed a feeding recipe booklet to promote appropriate foods for infants 6-23 months through the use of local nutrient dense foods available in every part of the country.[113] The 'eat what you grow' initiative is another example of increasing knowledge and awareness of good nutrition for weaning infants.[114]

QUALITATIVE INQUIRY FINDINGS

Delayed initiation of complementary feeding

Introduction to complementary foods starts as soon as 3 months. Some children were said to be greedy with food because they are introduced early to complementary feeding. No homogeneous response was given in terms of introduction to solids. Some participants said 8-9 months and some other from 12 to 18-19 months. It was clear that mothers keep breastfeeding while providing children with additional foods. Several foods were highlighted as to foods that a child enjoy eating: egg, plantain, potato leaves, groundnuts, palm oil, soya

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[107] National Mixed Methods Study on the Knowledge, Attitude, Practice and Barriers on Maternal, Infant and Young Child Nutrition in Sierra Leone

[108] UNICEF Sierra Leone, 'Media Analysis for The National SBCC Strategy for Maternal, Infant and Young Child Nutrition in Sierra Leone' (UNICEF Sierra Leone, 2021).

[109] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.

[110] Ministry of Health and Sanitation and UNICEF Sierra Leone.

[111] Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.

[112] UNICEF Sierra Leone, 'Media Analysis for The National SBCC Strategy for Maternal, Infant and Young Child Nutrition in Sierra Leone'.

[113] Ministry of Health and Sanitation, 'Local Complementary Food Recipe Booklet For Health Workers, Mothers And Care Givers Children Aged 6-23 Months In Sierra Leone' (GoSL, n.d.).

[114] UNICEF Sierra Leone, 'Media Analysis for The National SBCC Strategy for Maternal, Infant and Young Child Nutrition in Sierra Leone'.

beans. Fish was mentioned as a good source of protein and palm oil is refer to as their natural "blood medication" which is given daily to children.

During a barrier analysis, a key barrier to complementary feeding was found at the level perceived self-efficacy with doers finding it easy to practice while non-doers finding it difficult. Non-doers reported difficulties and concerns regarding the lack of diversity of foods provided to the child, notably a focus on carbohydrates. Both doers and non-doers agreed that complementary feeding is important to keep the child healthy and that non-practice could lead to child's disease and undernutrition. Doers and non-doers perceived crying as the cue to action for mothers to feed their child. Perceived advantages of optimal complementary feeding were: enhancing child's growth and health and creating more time for mothers to do other domestic or business activities.

Infrequent and non-responsive feeding

Perceived factors affecting regular child feeding practices were: women's workload, conflict in the house because of the husband not providing for the family and women spending more time outside of the house in the search of food. Mothers said to leave extracted milk and food before going to the farm for the child to be fed as needed by other caregivers. However, they would also come home late after work and start cooking when the child is already tired. This meant having to wake up children to feed them which affected the feed. During the rainy season in particular its more difficult to find food and children were said to lose weight because they do not eat on time. Moreover, due to the economic constraints it was stated that some children eat a full meal only once a day which is prepared for the whole family in the evening.

Inadequate quality and quantity of complementary foods

To provide food for their children, parents engage in cassava farming and gardening. Gardening allows households to provide a variety of vegetables like potato leaf, peppers, okra, aubergines, especially in moments of economic constraints. Participants reported that insufficient income sources do not allow to differentiate foods prepared for children of different age groups.

There is no separation of food between a 10 months' old and a 2 years' old child, insufficient food and money do not create room for preparation of separate foods.

FGD participant, Nyendehun, Jong

Some parents reported giving powdered milk to their children. Children natural appetite was perceived to have an impact on the quantity of foods or breastmilk consumed. A big appetite was associated with eating habits installed by the parents. Those that gave more food to children also made them hungrier. However, some children were said to have a good appetite and some others not.

Inadequate feeding during illness

During sickness children under 2 years are frequently breastfed, even forced if they do not feel hungry. This is because it is believed that the breastmilk will boost their immune system. For older children mothers are said to prepare a special meal like smoked fish pepper soup or baby food made with rice flour, sugar and milk. When the child has diarrhoea during the night parents rehydrate them with a homemade rehydration salt solution by mixing salt, sugar and water.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Logistic regression on DHS 2019 data showed that children being fed by mothers with tinned, powdered or fresh milk had a probable lower likelihood of being stunted (p=0.02) (Cf. **Annex A)**. Instead a child eating solid or semi-solid foods the day prior the survey was probably associated with a higher risk of being stunted (p=0.03) (Cf. **Annex C**).

HYPOTHESIS I: LOW QUALITY OF INTERACTIONS BETWEEN A CHILD AND A CAREGIVER

Strength of the association with undernutrition in the *scientific literature*	+
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	+
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	+
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe
% children not living with a biological parent	28% (DHS 2019)	26% (DHS 2019)	30% (DHS 2019)	23% (DHS 2019)

- 12% of children under 18 are orphans and 28% do not live with a biological parent. 5% of children age 2-4 are orphans.[115]
- Relationships between children and their families were said to be influenced by poverty, with children not respecting parents who were unable to provide for their needs. Parents who had financial problems mistreat their children by sending them to work, forcing them into early marriages, or not making efforts to support them.[116]
- Physical discipline "beating" or withholding food are widely accepted and common. However, parenting has changed since the war because of child rights movements. Discipline is seen a central component of child-rearing and a means of ensuring safe and proper development.[117]
- Many men take responsibly for their children only in terms of financial provision and mothers claim that they fail to provide wider emotional and household support during pre and post-natal stages.[118]

QUALITATIVE INQUIRY FINDINGS

Inadequate child stimulation and activity

[115] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[116] Rebecca Horn et al., 'Factors Contributing to Emotional Distress in Sierra Leone: A Socio-Ecological Analysis', *International Journal of Mental Health Systems* 15, no. 1 (2021): 58, https://doi.org/10.1186/s13033-021-00474-y.
[117] Stephanie Simmons Zuilkowski et al., 'Parenting and Discipline in Post-Conflict Sierra Leone', *Child Abuse & Neglect* 97 (2019): 104138, https://doi.org/10.1016/j.chiabu.2019.104138.
[118] UNICEF Sierra Leone, 'Media Analysis for The National SBCC Strategy for Maternal, Infant and Young Child Nutrition in Sierra Leone'.

Participants recognised the importance of spending quality time with their children. Women highlighted how workload was the main factor affecting the quality of interactions with their children. They said that this affects specifically their ability to detect child illnesses and to feed them as needed. During work, women are often in physical discomfort and after farm work they come back home tired which sometimes leads them to push away their children when they come over to play. March to September (particularly April) are particularly difficult months for child interactions due to the increase of farming activities like cassava holes digging and palm kernel processing. Some women take their children with them to the farm to keep them safe while others leave them in the village with other family members like grandmothers. In the dry season children cry more and become exhausted because they miss their mother that is away working. On the contrary during the rainy season, despite the increased hardship, mothers have more time to interact with their children and the quality of care increase. Mothers appreciate the increased time with their children as they believe it has positive impact on the wellbeing of their children.

In the rainy season we are almost always with them, we breastfeed immediately when they cry and care for them when we suspect that they are sick. The child is always happy and laughs often and we play together as we have more time. This makes them grow up well because the interaction increases.

Kemoh FGD Participant, Gbangba, Yawbeko

Women said that Fridays, being a holy day for Muslim communities, are days when they have more time to play with their children. They usually go to prayer and spend the rest of the day with their families as there is no bush work to carry out.

Child care by other caregiver than a mother

Mothers leave their children with other caregivers when they have to carry out farm work or house chores. Women said that they often leave their children with grandmothers, husbands, sisters, sisters-in-law or older children. Older children take care of a young child only if the child is 2 years or above. Husbands help only when they do not have to go to the bush and sometimes, when children are very young, they work shifts with their wives. Men said that they often interact with their children in the morning before going to work or in the evening while the wife is cooking dinner. Activities like playing with children by making them scratch the father's back, playing music, dancing or teaching them the alphabet and numbers were mentioned while describing quality time moments.

When mothers leave their children, they sometimes worry that they will not be taken care of properly (e.g. a diaper will not be changed when wet). Women start leaving their children as early as they reach 3-4 months of age to work in the farm for a period of 7-8 hours a day. Before leaving a child with another caregiver, women clean and feed the child, boil water and put it in a flask, clean the wrappers and extract breastmilk. Some mothers are either unable or don't want to leave their child in the village and therefore bring them along to the farm/grassland "*boli*" and leave them under the shade of a tree while they work or keep them on the back while fetching water. Children age 3-5 years are sometimes taken to the farmland will be around mother while they dig cassava holes. Mothers would also carry children on their back.

The role of the grandmother

Grandmothers are one of the main caregivers with whom mothers leave their children when they have to work in the farm or do housework. They, sometimes care for children even every day cooking them food, feeding them, monitoring and protecting them. Grandmothers were said to have exceptional love for their grandchildren and for this reason

they were always in search of opportunities to spend more time with them. Some grandmothers take parental responsibilities towards their grandchildren in the case of early pregnancies so that a mother can go back to school or support mothers when they get pregnant with a new baby to avoid neglecting the other children. The mother would still be responsible for the provision of food, medication and clothing and care is given back when the child reaches school age or parents want to move to the city. By caring for their grandchildren, grandmothers feel supportive to their children so that women feel less exhausted and have more time to do other tasks. They also take the role of childcare advisors.

"As grandmothers we are advisers for child care. We tell mothers to make sure their children do not pick things from the ground and put them into their mouths and take care of child's food by covering it so that flies do not sit on it and cause runny stomach"

FGD Participant, Gbangba, Yawbeko, Bonthe

However, while some mothers receive their advice in good faith, others refuse it because they believe to know better as they have given birth to the child and are usually more educated than grandmothers. In fact, some women believe that grandmothers overpamper children leading to bad behaviours while mothers try to correct them. Grandmothers were also said to give children cold leftovers from the previous day as breakfast (which would make them sick) while mothers always try to give fresh food and ensure that children are clean first thing in the morning. The role of grandmothers as carers was also perceived as more effective than mothers because they can focus their whole attention on the child while mothers need to carry other tasks, like preparing a meal, while caring for their children.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

DHS 2019 data did not have any relevant indicator for analysis. MICS 2017 data, despite availability of indicators, did not report any significant associations. (Cf. **Annex C & D**)

FOOD SECURITY AND LIVELIHOODS

HYPOTHESIS J: LOW ACCESS TO A QUALITY DIET

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	+
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	++
Overall interpretation	+

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Minimum meal frequency for children (6-23)	32.2% (DHS 2019) 33% (SLNNS 2021)	28% (DHS 2019)	40% (DHS 2019)	57% (DHS 2019) 34% (SLNNS 2021)
Minimum diet diversity for children (6-23)	25.1% (DHS 2019) 23% (SLNNS 2021)	24% (DHS 2019)	30% (DHS 2019)	43% (DHS 2019) 23.6% (SLNNS 2021)
Minimum meal frequency for WRA	3.6% (SLNNS 2021)			3.1% (SLNNS 2021)
Poor HH food expenditure (>/=65%)	50% (CFSVA 2020)			67% (CFSVA 2020)
HDDS (4 or less food groups)	57% (CFSVA 2020)			

- Agricultural seasonality imposes significant fluctuations on household dietary diversity and food security. Households, especially in rural areas, experience significant deteriorations in dietary diversity and food security during the lean season[119]
- Poverty is often main reason that children and pregnant women do not receive enough meals in terms of both quantity and diversity.[120] 87% of Sierra Leoneans are spending above 65% of their overall expenditure on food needs, and 69% more than 75%. The main reasons are: stagnant wages, high inflation, and rapidly increasing food prices.
- The price of rice dramatically increased by 27% (imported) and 29% (local) between August 2021 - August 2022.[121]
- In Bonthe more than half of households are poor and very poor. Rice, cassava and groundnuts are the main food crops grown mainly for consumption and are also not cash crops. Middle and higher wealth households also produce palm oil. Livestock holdings are small and animals are slaughtered for special occasions.[122] Food is by far, the largest expenditure because of the limited access to land which makes them depend on the market for their food security.[123]
- The prevalence of severely food insecure households is higher among physically and mentally disabled household heads (16 and 18 % respectively).[124] Children living only with their mother, father or without any parent have a higher risk of receiving fewer meals per day. This increases in the case of children living only with their father. children whose fathers have multiple wives are more likely to be stunted.
- Grandmothers play an important role. The often care for children and give advice when parents are at work.[125]However, their views are sometimes outdated and their advice is in conflict with MIYCN recommendations.[126]

QUALITATIVE INQUIRY FINDINGS

Food expenditure

Food was one of the main household expenses, accounting for 20-30% of the budget. Participants referred to the money for food purchases as "housekeeping money", which is provided by husbands to buy food items for cooking a main family meal, usually a dinner. Food items that are commonly bought are rice, salt, pepper, maggi. Other foods are sourced

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[119] Isaac Bonuedi, Lukas Kornher, and Nicolas Gerber, 'Agricultural Seasonality, Market Access, and Food Security in Sierra Leone', *Food Security* 14, no. 2 (2022): 471–94, https://doi.org/10.1007/s12571-021-01242-z.

[120] United Nations International Children's Emergency Fund, Irish Aid, and Action Against Hunger, 'A Summary of the National Mixed Methods Study on the Knowledge, Attitude, Practice and Barriers on Maternal, Infant and Young Child Nutrition in Sierra Leone'.

[121] World Food Programme, 'WFP Sierra Leone Food Security Monitoring System Executive Summary' (Sierra Leone: WFP, October 2022).

[122] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

[123] Famine Early Warning System Network, Save The Children, and USAID, 'Sierra Leone Livelihood Baselines Report 2017' (FEWS NET/Save the Children/USAID, n.d.), https://fews.net/sites/default/files/documents/reports/SL_National_Overview_Report_2017_HEA_baselines.pdf.

[124] World Food Programme, 'State of Food Security in Sierra Leone 2020. Comprehensive Food Security and Vulnerability Analysis'.

[125] United Nations International Children's Emergency Fund, Irish Aid, and Action Against Hunger, 'A Summary of the National Mixed Methods Study on the Knowledge, Attitude, Practice and Barriers on Maternal, Infant and Young Child Nutrition in Sierra Leone'.

[126] UNICEF Sierra Leone, 'Media Analysis for The National SBCC Strategy for Maternal, Infant and Young Child Nutrition in Sierra Leone'.

from agriculture, backyard gardens, bush or river. The housekeeping money is provided on a daily or a weekly basis and usually depends on what food items are already available in the house and how much money is available. It ranges between 30-70 Leones per day depending also on the size of the household.

If we have other food items like maggi, onions, paper I usually give my wife 30 Leones but if there are no items available, I give her 50 Leones for food.

FGD participant, Gbonghe, Kpanda-Kemoh, Bonthe

In periods when money is limited some women reported using their own money to contribute to the family food expenses.

Meal frequency

Average reported meal frequency was 2 times a day for adults and 3 times a day for children[127]. However, a full meal is usually eaten at night for dinner and left overs are eaten the following day for breakfast. Most respondents said that are able to eat a nutritious meal[128] once a week and this changes with the seasons. During periods of hardship, especially during the rainy season, participants reported decreasing their meals to one called "*Gloimei*[129]" which would usually be served in the evening. The number of meals increases in December, when participants reported eating on average 3 meals a day. This is because December is rice harvest time and there is plenty of fish in river streams. Another good moment of the year is April-May, just before the start of the rainy season, thanks to a small harvest of specific crops[130]. However, the access to food has been changing drastically, because of constant inflation which makes market prices increase, consequently reducing a number of meals, which a household can consume. The husband, as a main provider, usually eats first, followed by children while the wife eats last. In woman-headed households, mothers feed the children first, and themselves after. When consuming meat, the best part is always given to the husband, followed by children. It was also mentioned that, especially in the past and sometimes nowadays, children are only given bones of a consumed animal/bird but this is changing thanks to the sensitisation messages provided at the health centre.

In the past but also now, children are deprived of the most nutritious foods in the household and if a fowl is killed, the best part is given to the husband as the head of the household and the breadwinner. Instead, feet and bones are given to the child. Sometimes we give the child the end product of the rice that settles at the bottom of the pot "manyie". This is because the husband is the provider and if the fleshy part is not given him, he will think that the nutritious part has been given to the wife's lover. There is also the belief that if the child starts to eat meat they will start to steal by dipping hands in the soup to search for meat.

KII Community Leader, Nyanehun, Jong, Bonthe

Dietary diversity

Participants reported that food diversity was influenced mainly by income and seasonal availability. Overuse of land and the subsequent unpredictability of yields directly impacts on availability of income and food diversity for the family. Foods like cassava, cassava leaf sauce made with the addition of pieces of fish were mentioned as regularly eaten. Examples of

[127] During the month of December, thus during the rice-harvest period (October-December), which is normally the best period of the year with regards to food consumption and income opportunities.
[128] "Soup/sauce that includes fish, tomato, onion, pepper and maggi served with rice. The combination of the "sauce" served with rice depends on food and income availability, which increases during harvest/dry season.
[129] One meal a day
[130] Cassava, palm fruit and ginger. Palm fruit is then processed into oil and cassava into gari.

nutritious meals shared by the community included rice with smashed okra and a sauce made with fish, tomato, onion, pepper and maggi served ra or rice served with potato leaf sauce with palm oil, peanut butter, maggi, onion and fish. In the table below the community outlined a combination of meals that they would typically eat during a day in the dry season compared to those that they would have liked to eat.

Current Meals			
District	Breakfast	Lunch	Dinner
Bonthe	▪ Boiled banana and palm oil ▪ Cassava and potato leaf ▪ Cassava and bean ▪ Potato or yam and palm oil ▪ Rice and sauce from the evening meal	▪ Gari, palm oil and salt ▪ banana and palm oil ▪ Cassava	▪ Rice, palm oil and pepper ▪ Potato and palm oil ▪ Yam and palm oil
Desired Meals			
District	Breakfast	Lunch	Dinner
Bonthe	▪ Rice and chicken soup ▪ Rice and potato leaf sauce ▪ Rice and sauce ▪ Rice and groundnut soup	▪ Cassava leaf, rice and sauce ▪ Tea, bread and salad	▪ Rice and potato/cassava leave sauce

Table 11: Reported meal composition per day vs. desired meals, Bonthe District

When foods are not available, the community purchase commodities from local markets such as Mattru or Gbapi which, however, includes extra transportation costs to reach the market. When there is not enough money, particularly during the rainy season, the daily diet revolves around starches: cooked rice and sweet potato with palm oil, boiled plantain, plain yam, or cassava with salt without any sauce. In these periods food is eaten just to "fill the belly". Due to the lack of financial resources participants reported reducing quality and quantity of meals.

Sometimes I want to change diet and eat soup[131] with enough groundnut, fish, jakato, pepper, and enough onions, palm oil but because of the lack of money I will just use spring onions, little fish, paper, and maggi. If I am given 30 Leones to buy food which is not enough for the family, I reduce the quantity of rice and cook fish in tomato sauce and not a healthy meal with diverse ingredients.

FGD participant, Nyendehun, Jong, Bonthe

Participants said: "we eat what we have". The community associated lack of nutritious and diverse foods with childhood common diseases. Respondents outlined the following commodities as available in the community. Their availability is subject to harvest, which happens mainly between October and December. A smaller harvest is also available between April and May.

Available commodities during the dry season	
Grains and starches	Plantain, cassava, yam, cocoyam, rice, sorghum
Pulses	Black eyed beans*
Meat and Fish	Fish, chicken**
Nuts and seeds	Groundnuts, peanut butter, kola nut
Vegetables	Okra, aubergine "jakato", leafy greens (cassava, and potato), pepper, onion and ginger
Fruit	Coconut, mango, banana, pineapple, oranges
Saturated and unsaturated fats	Palm oil
Other	Cocoa bean, maggi

** have not had good yields in the past 2 years*

***used mostly for sale or given to visitors as a hospitality present. Eaten by community only during the festive season*

[131] Sauce that accompanies the rice

Table 12: Available commodities during the dry season in the communities, Bonthe District, Sierra Leone

Moreover, having vegetable gardens was perceived to help to increase food diversity but not enough to avoid having to buying additional foods from the market. During the dry season, women process "*gari*[132]" and sell it to buy rice which, however, often finishes in the early months of the rainy season.

Seasonal variations

Significant seasonal variations were reported in households' diets between the dry and rainy seasons. During the dry season there is more availability of locally produced foods because of the harvest and the increase availability of income to buy the necessary commodities. August is the most difficult month for the community as the rain is heavy, income opportunities reduce and food is scarce. In this period the community said to consume mostly plain carbohydrates like cassava or rice just to "fill the belly" and to take loans to buy food. Climate change was perceived to have an effect on the diversity of foods available in the community due periods of the inconsistent rains followed by floods that contribute to the damage of crops and shortage or challenges in catching fish.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Logistic regressions based on DHS 2019 data did not present any significant associations (Cf. **Annex A).** MICS 2017 included several indicators that were not statistically significant (Cf. **Annex C**)

HYPOTHESIS K: LOW ACCESS TO INCOME SOURCES

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	++
Technical experts' rating during Initial Technical Workshop	+++
Community rating during qualitative inquiry	+++
Qualitative team rating	+++
Strength of historical and/or seasonal variations on undernutrition trends	+++
Overall interpretation	+++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Poverty rate	56.8% .(SLIHS 2019) 78.5% (CFSVA 2020)			82.5%[133] (SL MPI 2017)
Employment rate	88% (SLIHS 2019)	85% (SLIHS 2019)		
Unemployment rate (relaxed definition)	12% (SLIHS 2019)	15% (SLIHS 2019)		
HH food expenditure (>65% of total income)	87% (FSMS 2022)			

[132] Cassava flour

[133] Multidimensional poverty for Bonthe district

Women who don't own a land	68% (DHS 2019)	51% (DHS 2019)	61% (DHS 2019)	58% (DHS 2019)
HH monthly average expenditure on food	63% (CFSVA 2020)			

- The national poverty rate at 57% with 13% living in extreme poverty and 55% suffering from food poverty. Since 2011 Food poverty has increased significantly (8.4%), particularly in rural areas.[134]
- The main household economic activity is agriculture comprising crop product livestock, forestry and fishing activities.[135] In Bonthe, the most common livelihoods activities are fishing (22.9%), production and sale of food crops (21.7%), production and sale of cash crops (11.9%), petty trading (9.6%), salaries and wage (long term employees) (6.3%), palm oil extraction (5.3%), and skilled wage labour (5.2%). Mining and mining labor are actually minor income sources[136]
- In kind payments are particularly important for very poor and poor households who labour the fields of the wealthier. Fishing is a supplementary seasonal activity. The most common livestock is poultry with chickens sold within villages or in periodic markets (lumas). Poor households also sell small quantities of crops, firewood and charcoal but spend very little on productive inputs (seeds, fertilizer and tools) due to lack of capital to invest in their own activities.[137]
- In Bonthe property ownership is in the hands of men (properties, land, houses and assets) at household level. Men have control over these and even the children.[138] 74% earn less than their husband and 10% about the same.[139]

QUALITATIVE INQUIRY FINDINGS

Household income sources

The population in Bonthe district relies mostly on agriculture and fishing as sources of income. While mining is also present in Kpanda-Kemoh chiefdom, majority of employees are outsourced by the mining company, Vimetco, from outside the adjacent communities and, therefore, only very few residents work in mining. This is because the job requires skilled people who know how to operate the machines, while there are no training schools in the proximity where village members could learn the required skills.

The common crops farmed are cassava, rice, sweet potato, groundnut, beans, banana and corn. The community also mentioned farming some cash crops like coffee, cocoa and ginger but some participants reported that these take a lot of time to grow and can be harvested only once a year, therefore in some cases the community cuts them to cultivate crops that are easily sold like cassava. However, the overuse of lands and lack of "*manure*" in the soil impacts

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134 Statistics Sierra Leone, 'Sierra Leone Integrated Household Survey (SLIHS) Report 2018' (Freetown: Statistics Sierra Leone, 2019), https://www.statistics.sl/index.php/sierra-leone-integrated-household-survey-slihs.html#:~:text=The%20Sierra%20Leone%20Integrated%20Household,all%20segments%20of%20the%20population.

135 Statistics Sierra Leone.

136 Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

137 Famine Early Warning System Network, Save The Children, and USAID, 'Sierra Leone Livelihood Baselines Report 2017'.

138 Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.

139 Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.

on farming outputs giving poor yields. The community perceived that it was also God's will to have a good or bad yield.

Women engage in palm kernel processing, palm oil production, cassava farming, and petty trading of fish, salt, maggi, cooked goods like cassava or sweet potatoes, onions and peppers. "*Fesei*[140]" or search for wild cassava in the bush is also another activity women engage in to provide food for their family and to sell especially during the rainy season. Farming and palm kernel processing activities are also affected by the occasional rains in the dry season that do not allow it to dry properly. During the dry season, if there is scarcity of food, women do river fishing. Both men and women also engage in casual work activities "*jagaja*[141]" which include brushing[142] of the oil palm plantation and fields, weeding, construction work (for men). Casual work is often conducted in August and September due lack of other income opportunities and at the beginning of the year (January and February) when farming activities start and more income is needed to pay the workers. Farming activities are usually conducted in groups (kombi[143]) to increase the production.

It difficult to mobilize people to work now, we go in search of people within and outside the community and pay them a higher price of 30 Leones per person just to encourage them to work in order to maintain the quantity of production.

FGD participant, Gbonghe, Kpanda-Kemoh, Bonthe

However, respondents highlighted that having to pay other people for their work reduces their income, which is becoming a real challenge. Other mentioned farming challenges were: lack of appropriate tools and seeds or the inability to repair the current ones, animals destroying crops and the overarching problem of low availability of land which leads to overused of the current fields and forces community members to rent pieces of land from neighbouring villages. Participants from Gbangba reported that in their village all households contribute to the rental of a larger section of land which is then divided among all members. Sometimes the cost of land rental is accompanied by additional costs like rental of a machinery for land preparation, which improves the ability of the community to conduct farming at larger scale.

We contribute 5 Leones per household to pay for the rented land, the chief will then go and negotiate the rental and will split the land in sections to give everyone in the village a portion. We used to pay 500 Leones for the use of the machine to plough an acre of land but this year it was 700 Leones, which amounts to 18 tins of rice to be given if money is not available.

FGD Participant, Gbangba, Yawbeko, Bonthe

Access to neighbouring land is sometimes denied or provided late which impacts on farming outputs. Participants reported being late at times also because of additional casual work that they undertake which affects their timing to start land preparation activities. Moreover, seeds are at times unavailable and the community has to purchase them from markets like Kpaku in Moyamba District and Bumpe in Bo District.

Fishing is also subject to several challenges like the lack of nets, boats and tools like fishing guns which do not allow the community to fish further from the shore where availability of

[140] Gathering of wild vegetables in the bush
[141] Casual work
[142] Field brushing
[143] Community self-supporting system where several farmers get together and move from one farm to another helping each other out during critical moments

fish increases. Seasonality also has an effect on fishing. During the rainy season it is very difficult to get fish because the water from the sea increases the water levels in the stream that overflow to the swamp. The community uses a fishing trap *bombui* to catch fish. Therefore, there is shortage the only way to access fish is to buy the imported one from markets in Mattru or Bo. For these reasons, the community engages in fishing only alongside farming and not as the main livelihood source. Fishing is conducted mostly at night using nets while farming is conducted during the day. In fact, despite challenges agriculture remains a more stable source of income for the community. To overcome some farming challenges the community uses organic fertiliser "*manure*" when available, to boost the soil fertility, weeds the land to allow crops to grow better, fences the land, sets traps, throws stones at birds to prevent animals (particularly rodents, monkeys) from destroying the crops and does not plant crops or dig cassava holes in the same place as the previous year.

Rearing of animals like chickens, goats and sheep is also a source of income but on a much smaller scale than farming or fishing. Women are usually responsible for rearing chickens but need husband's approval before selling them. Participants outlined several challenges linked to animal rearing: goats destroying crops if not tied, theft of animals by both community members or outsiders, diseases killing the animals, especially in April when the rains start. The community separates the sick animals to avoid spread of disease and pays veterinary workers that come to the village to treat the sick animals.

Despite the varied income generating activities, in which the community engages, these are not enough to provide a stable income.

Land tenure

Generally, men own the land and decide how to use it. Women do not own the land as some are not from the community or will marry men from other communities and follow them. Man usually stay in the same village, even if they marry women from other communities and carry the family name and property. Women are only able to buy a space at the market fair where they trade. However, access to land is generally a big challenge in the district for both men and women. The government's palm tree plantation and the mining companies have reduced the community access to land leaving them with very little pieces of land available for crop cultivation. Each community member is given a portion of the remaining land by the village chief and can cultivate only in that section, which throughout the years has led to overuse. The initial agreement with the mining company was that they had to request permission from the land owner before starting any activity, but this has not always been respected and the compensation received for the loss or damage of land by passing machinery was perceived as not enough or even non-existent. In fact, the mining companies usually negotiate with the community leader and are focused on their interests. Similarly, the community leaders focus on their interests and do not protect the farmers To increase their access to land the community pays for additional portions of land from neighbouring villages to conduct their farming activities.

We do not have any farming land or bush in this community and we pay 200 Leones to the neighbouring communities for an acre of land to farm for 1 year which will end after harvest. After harvest we also have to give a portion of the produce to the landowners. The limited size of land has prevented largescale farming and while more food is needed because of the increase of the population the land to farm is not enough.

FGD participant, Nyendehun, Jong, Bonthe

Seasonal and historical variations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seasons												
Rainy season				+++	+++	+++	+++	+++	+++	+++		
Dry seasons	+++	+++	+++								+++	+++
Income Opportunities												
Agricultural labour	+++ a	+++ a	+++ b	+++ b	+++	+++	+++	+++ c	+++ c	+++ d	+++ e	+++ e
Fishing	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Livestock labour	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Casual labour (Jagaja)	+++	+++						+++	+++			

a Brushing and felling
b Clearing of the land from grass. Ploughing and planting of crops (April)/ also harvest of some products (palm oil, ginger, cassava)
c Weeding
d Protect crops from animals: fencing/scaring birds
e Harvest
red = worse period of the year
green = best period of the year

Table 13: Seasonal calendar of income opportunities, Bonthe district

Different agricultural activities are carried out throughout the year. Fish is more available in the dry season, especially November and December because the water level is low and it gets easily stuck in the net. Instead during the rainy season, it is more difficult (especially in April and May) because the water from the sea increases the water in the stream that overflows to the swamp and the fish moves in the swamp. In this case community uses a fishing trap "*bombui*" to catch fish. Respondents reported to use mostly fishing nets until August because the water is dirty while after August, as the water clears, they switch to fishing gun and hooks. However, since 2019 the shortage of rains has led to shortage of water in the stream as well as fish.

Historical milestones associated with decline in income sources were the Civil war (1991-2002), Ebola epidemic, Covid-19 pandemic and inflation. Before the civil war, communities engaged in large farming activities, which brought big yields (especially rice). Moreover, the value of the national currency was higher and enabled people to have more purchasing power.

Before the war there were good yields in our faming activities and we normally enjoyed ourselves together during the harvesting season with our bubu dance "butti," which is our traditional way of celebrating our produce. There was a lot of food, high yields and value in our currency, which is very much different now.

FGD participant, Gbonghe, Kpanda-Kemoh, Bonthe

Mining and palm oil production have been seizing the land which is causing land overuse and a constant decrease in yields. This has also caused a switch in the main crop production, from rice to cassava.

Rice was a major crop planted in the past but now because it is not doing well as the soil is exhausted we have turned to cassava which does not need much "manure" like rice.

FGD participant, Nyendehun, Jong, Bonthe

The past 6 years had been particularly difficult for the community in terms of agricultural outputs.

In the past, when you plant 1 tin of groundnuts you get 8 tins. Now we plant 1 tin you get barely 2 tins and sometimes even struggle to get 1 tin. Similarly, with rice, before we planted 1 tin and got 10 tins as output but now we get 3 tins when you cultivate 1 tin.

FGD participant, Nyendehun, Jong, Bonthe

Both Ebola epidemic and Covid-19 pandemic affected the community income opportunities due to the movement restrictions, lockdowns and curfews. Ebola was perceived by some to have a bigger impact than Covid-19 as the restrictions were much stronger. However, others mentioned that Covid-19 brought less assistance provided by external organisations compared to Ebola times making perceive somehow harder due to the lack of support. Movement restrictions reduced opportunities to do business as access markets was not allowed and affected the community engagement in the usual farming activities due to the spread of the disease. Hunting was also prohibited due to the spread of Ebola. Even though during Covid-19 pandemic there were only intra-district lockdowns, respondents perceived that the economic hardship already brought by Ebola was exacerbated by Covid-19 pandemic, leaving the community in an even more difficult economic situation. In fact, movement restrictions, briberies and increased transport costs to reach markets all greatly affected the community income sources. This situation resulted in customers paying less for commodities and vendors selling them at those reduced prices just to make a living.

During Covid-19 pandemic there was a reduction in the price of our commodities and we would accept a price, which is less than our expectations, because we needed to get at least some income. Price of gari decreased from 150.000 to 80.000 as markets were closed and whole-sellers did not come.

FGD participant, Gbonghe, Kpanda-Kemoh, Bonthe

Barter trade, which already existed before Covid-19 pandemic, flourished during this period. People would exchange gari for other commodities available in the community due to shortage of resources. Inflation was also perceived to have worsened year by year since Covid-19 pandemic and contributed to the further decrease in purchasing power. Respondents reported that in the past there was more variety and access to foods due to the lower commodity prices but now, constant inflation has made people switch the focus on quantity rather than quality of foods.

Slowly leaving the village life behind – the increasing migration phenomenon among young generations

The younger generation perceives the current life in villages as non-conducive to achieving their dreams. This is because farming does not provide the necessary income to invest in their aspirations. They expressed the desire of being economically independent as "farming has not taken their parents anywhere apart from their suffering". They do not believe in agriculture because the government is not supporting farmers anymore through subsidies and seeds and the work feels repetitive without any room for learning new skills. The youth wants to learn new skills in carpentry, construction, auto-mechanics or establish themselves in professions in health or legal sectors (doctors, nurses, lawyers). This gradual shift started to happen after the end of the civil war when land availability became limited, due to the creation of the palm plantation, and not enough land to carry large scale farming activities to make a living. This situation has been gradually leading to a reduction in agricultural workforce, which could engage in kombi groups and consequently this has been affecting the ability of farmers to work on larger pieces of land and to increase crop production.

In the past we had many people to help us with our farm work. Now even if you have the money, there is not enough people to help you, which affects our crop production in the community.

FGD participant, Nyendehun, Jong, Bonthe

Migration has now become common among the youth due to the economic hardship. Parents migrate to bigger

towns like Mattru Jong, Freetown to provide children with education and better opportunities for their future. In fact, the main opportunities in the communities revolve around agriculture while in the cities children can become "more educated and civilised". This phenomenon started around 10 years ago and it is increasing every year. Wife and children relocate to bigger towns, while husbands work in the farm and provide for the family, to allow children access to secondary school as education has become a big priority for parents.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Logistic regression results from DHS 2019 data reported that children who lived in a house with a floor made out of cement had a probably lower risk of being stunted ($p<0.01$) while those that lived in a house with the floor made of sand had a probably higher risk of being stunted ($p<0.01$). Similarly, children who lived in a house with the roof made of leaves had a probably higher likelihood of being stunted ($p=0.01$) (Cf. **Annex A).** Additionally, Linear regression results showed that a higher household wealth index was associated with higher weight for age z-scores, this way being a protective factor for stunting (Cf. **Annex B**). MICS 2017 data included several income status indicators but none was statistically significant. (Cf. **Annex C & D**)

HYPOTHESIS L: LIMITED ACCESS TO MARKETS

Strength of the association with undernutrition in the *scientific literature*	+
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	**N/A**
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	+
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	++
Overall interpretation	+

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator	National	Rural	Southern Province	Bonthe District
Percentage of population having challenges in accessing the market	53% (WFP 10/2022)			55% (WFP 10/2022)

- Food and essential commodity prices continued to skyrocket in the first and second quarter of 2022. Fuel increased by 120% (from Le 10,000 to 22,000) having a domino effect on the prices of other commodities (such as food and transportation.
- 56% of the population reported challenges in accessing markets and lack of money is the main barrier.[144] The purchasing power is currently significantly affected by a stagnation in incomes and higher fuel and staple food prices. This is caused by global supply chain issues brought on by the war in Ukraine and the annual inflation.[145]
- Bonthe is among the districts with the highest prevalence of challenges accessing the markets (55%) showing a trend in drastic increase.[146] Trade and market access is made

[144] Action Against Hunger Sierra Leone, 'For SIDA. FSL Update September 2022', September 2022.
[145] World Food Programme, 'Market Monitor Report.Sierra Leone | April — June 2022' (Sierra Leone: WFP, June 2022), https://actioncontrelafaim.sharepoint.com/mis/SierraLeone/TECHNICAL%20ENVIRONMENT/Research/LINK_NCA_%20Bonthe%202022/2.%20Literature%20review/WFP%20MoA%20market%20buletin,%20June%202022.pdf.
[146] World Food Programme, 'HungerMapLIVE: Western Africa Insights and Key Trends' (Rome: WFP, October 2022).

difficult by the lack of well-maintained, all-season roads. Vegetables are the main cash crops sold followed by palm, rice, cassava transformed into flour (gari) due to its higher market value and groundnuts. The most common livestock is chickens, goats and sheep which are sold locally. Fish is sold daily depending on the volume of catch.[147]

QUALITATIVE INQUIRY FINDINGS

Market accessibility

Respondent highlighted the availability and access to several markets and trade fares within the district and nearby districts, for example Mattru Jong and Gbangbatoke (Moyamba district) markets, Yagoi (Imperi chiefdom), Gbapi (Gbapi chiefdom), Bamoi (Kambia district)[148] trade fares "*drowei*", to name a few. Bamoi is used to sell commodities in larger quantities while Mattru Jong is used for the sale of smaller quantities and the purchase of daily necessities. Commonly sold commodities include: cassava, gari, palm oil, nut oil, groundnuts and vegetables. Traders also come directly to villages to buy these commodities. However, these are often sold at lower prices because of income needs, lack of coordination, no transport fees, pre-establish price by traders, no negotiation power. The lack of unity among farmers was particularly highlighted as a current challenge.

If we are united even if a customer come to buy with their set price we would not sell to them because we have already set out our target price.

FGD participant, Gbonghe, Kpanda-Kemoh, Bonthe

A similar situation takes place at trade fares where traders come with a desired price in mind, which often ends up being the final price.

When they come to buy, we have no negotiating power, they come with their own prices for every item and do not want to compromise even when we try to sell for a higher price. In the end, we still sell at their price because we need the money. For example, we want to sell our palm oil for 300 Leones per 20 litre container "Batta" but they buy it at 200 - 250 Leones.

FGD Participant, Gbangba, Yawbeko, Bonthe

Moreover, participants reported that is only when the produce is sold that they are able to purchase goods. Most times, due to the restricted resources, they are unable to purchase what they want and have to prioritise based on needs. Despite challenges, some respondents acknowledged the preference of selling directly from the village as they are able to make more profit. This is because in this instance there are no transportation costs, which usually affect the expected profit when selling from markets.

We pay 10 Leones as transportation fee for a 20-litre-container from Gbangba to Yagoi. We sell 20 litres of palm oil at 270 leones at Yagoi and after paying we are left with 260 Leones.

Bonthe FGD Participant, Gbangba, Yawbeko, Bonthe

Moreover, at the market, palm oil containers and gari bags sometimes get damaged during loading and unloading procedures and some traders do not pay immediately for the goods as they do not have cash or try to buy time with the seller.

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[147] Famine Early Warning System Network, Save The Children, and USAID, 'Sierra Leone Livelihood Baselines Report 2017'.

[148] Over 300 Km distance from Bonthe district at border with Guinea in the north of Sierra Leone It is the main market place for trading between Sierra Leone and Guiana.

Market supply & price trends

Local markets tend to be well supplied and therefore the availability of items has not been highlighted as a challenge. However, limited financial resources and fluctuating commodity prices represent the main constraints. Price of commonly consumed commodities like gari, palm oil, rice has steadily increased over the last years due to inflation.

The price of commodities has changed over the years. For example, 1 bag of gari was 50 Leones but it is now 250 Leones even though the value of the money has not increased.

FGD participant, Nyendehun, Jong, Bonthe

Participants reported that they are able to investigate the price of commodities before going to the market which allows them to prioritise their purchase. Typical goods purchased from the market are: food items (like salt, pepper, maggi, rice, onions, groundnut), household items, electronics (phone, radio, solar light), clothes, medicines, zinc, nails, cement, containers to transport palm oil and nylon bags to transport gari.

Increase and decrease in commodity prices was reported to be affected by inflation and seasonality. Prices tend to be lower during harvest and rise during the rainy season due to the decreased availability of commodities.

Commodity	Decrease	Increase
Rice	March-October 2 Leones/cup	November - December 3 Leones/cup
Gari	Dry season – 150 Leones/bag	Rainy season esp August – 300 Leones/bag
Palm oil	April – 100 Leones per 5 gallons	July & December – 250 Leones per 5 gallons
Groundnuts	July– 80 Leones/can	March-May - 120 Leones/can
Ginger	December – 300 Leones per 50 kg	Rest of the year – 700 Leones per 50 kg
Pepper	Rest of the year – 3-5 Leones/kg	August -October 7/10 Leones/kg
Plantain	December - 30 Leones/bunch	March-April - 50 Leones/bunch

Table 14: Price fluctuation of regularly purchased commodities[149]

Seasonal & historical variations

In the rainy season it is difficult to access markets because of the poor road infrastructure, vehicle breakdown and inability to buy fuel. Therefore, from June to September there are not enough traders because of the reduced access. January is also a difficult month as less traders come to the markets to buy because they have spent their income during the festive season.

Historical milestones that had an impact on access to markets were Covid-19 pandemic and increasing inflation (**Cf**. hypothesis K)

SECONDARY QUANTITATIVE ANALYSES FINDINGS

No available data.

HYPOTHESIS M: LOW COPING STRATEGIES / RESILIENCE

Strength of the association with undernutrition in the *scientific literature*	+ +
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+ + +
Strength of the association with undernutrition based on statistical analysis	**N/A**

[149] In general, in 2022 the food prices' usual seasonal fluctuation was often influenced by the huge food inflation (that reached 40% in October 2022), and depreciation of the local currency against the US dollar (about 70% loss of value in 1 year). Due to the inflation, higher productive inputs costs, higher transportation costs, depreciation on the local currency, the cost of rice for example did not drop at rice harvest period compared to the rainy season, and instead it continued to increase (particularly the imported rice)

Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	++
Qualitative team rating	+++
Strength of historical and/or seasonal variations on undernutrition trends	+++
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator %	National	Rural	Southern province	Bonthe District
% HH adopting unsustainable coping strategies	83% (FSMS 2022)			
HH adopting crisis coping strategies	29% (CFSVA 2020)			24% (CFSVA 2020)
HH adopting emergency coping strategies	22% CFSVA 2020)			30% CFSVA 2020)

- 83% of households reported adopting some form of unsustainable coping strategies to survive due to the current economic situation. 34% of households adopting "crisis" coping strategies and 22% "emergency" strategies. In Bonthe, 54% of the population is adopting either crisis or emergency strategies150
- The most common strategies to meet food needs are: 1) reducing expenditure on non-essential items to buy cheaper staples; 2) increasing labour income; The poorest households try to increase income from sale and production of firewood and charcoal; Gathering and selling of wild foods is a coping mechanism mainly employed by female headed households.151

QUALITATIVE INQUIRY FINDINGS

Coping strategies

Participants reported implementing several coping strategies to face the persistent economic hardship. Common coping strategies adopted by men include taking loans from vendors in the community, family or friends and increasing labour both from farming activities and casual work, like brushing and harvesting palm fruit or carpentery. These are used in conjuction with coping strategies deployed by women, such as reduction of food portions, reduction of a number of meals (from 3-2 to 2-1) per day and a reduction of quality of meals. Another common coping strategy is selling household items because they are valued in the community and easily sold.

We sell household items because they are valued in this community and not readily available. People always want to have household items but they are difficult to get and when people see them for a cheaper price, they will buy them quickly from the seller.

FGD participant, Nyendehun, Jong, Bonthe

Women also collect and sell wood for cooking or collect wild fruits like wild cassava or wild yam. This is more frequent in August due to extreme shortage of food. Firewood is a valuable

[150] World Food Programme, 'Sierra Leone Food Security Monitorying System Report' (Freetown Sierra Leone: WFP, 2022).

[151] World Food Programme, 'State of Food Security in Sierra Leone 2020. Comprehensive Food Security and Vulnerability Analysis'.

commodity because some people are not able to go to the bush while others are ashamed to carry it on their head.

Intimate relationships and early marriage have also been mentioned as an existing coping strategy in the district. Due to economic hardship, girls look for boyfriends to support themselves and their families. Girls usually ask money to buy food, clothes or soap. Support is provided by boyfriends and sex partners and some girls reported to have multiple boyfriends (1-3) which do not know about each other. Parents permit young girls to have boyfriends if they know that they support the family. Some girls take contraceptives while others do not use it or do not know how to protect themselves against unplanned pregnancies. As a consequence, some girls can get married at 15 years old. In some occasions parents give girls willingly into early marriage to cope with the challenges caused by the rainy season.

These marriages are called "Hama Maidi'' which means "rainy season marriage." This is because the child will endure even if she is abused by the husband during the rainy season and in the dry season when food starts to be available the daughter will go back to her parents if she wants to and parents will support her. Some men will request a refund of the bride price paid to legalize the marriage if the woman decides to return to her parents after the rainy season.

FGD participant, Nyendehun, Jong, Bonthe

Early marriage

During teenage years, when the breast appears, girls start engaging in sexual life. If they get pregnant at an early age they are usually pushed into marriage by the family. Despite a new law, instituted around 5 years ago, which prohibits girls from getting married before 18 years of age, early marriage is still very common within the community. Respondents reported that some girls get married at 15 years and some even before. This was perceived to be caused mainly by the current economic hardship which pushes teenage girls to look for boyfriends who are able to support them financially when parents do not have the means to do. Also, attending secondary school in nearby towns makes girls more vulnerable to pregnancies. In fact, many girls nowadays get pregnant when they are 18-19 years old and get married soon after. In the past, women got married later compared to now because parents were able to control their children more, as they were not going away from the village to go to school, and they had more resources to support them.

Girls often choose partners that will be able to support them and their families and despite acknowledging that they are not ready to get married and start a family at such an early age, they do it anyway to survive. This trend has been increasing in the recent years. Women agreed that girls are neither mature enough to endure in marriage nor mentally prepared which could lead to conflict in the household and possibly divorce. Respondents mentioned that girls become more disrespectful when they start having sex as they start sleeping outside of the household and sometimes discontinue their studies. Moreover, in the past it was expected from men to marry a virgin but nowadays it not the required anymore.

Also older and married women engage in intimate relationships with men or even boys to cope with the economic challenges. Young boys are able to support women because they earn income from palm fruit harvesting, fishing and casual work. According to the participants, this practice has always been happening but now is even more common as the economic situation is worsening.

Taking a loan or making purchases on credit from local traders is another form of a coping mechanism when household resources are restricted. Repayment of such loans with interest can sometimes be aided by family and friends living in bigger towns, who transfer money for the purpose.

Lastly, male respondents also mentioned storing away a part of their production like palm oil, ground nuts and gari to be able to sell it in case of emergency. This strategy is also used to

increase household's income during periods when the item's prices increase due to a lower availability.

Social and financial support mechanisms

Participants highlighted the importance of community-based groups in accessing financial assistance. Among these, Village Savings and Loan Association (VSLA), thrift groups called osusu and kombi groups are common.

When we need money, we will take a loan from the VSLA and osusu to do business and repay later. Also, when we have to pay for medical or funeral costs, the group will contribute to support you or allow you to obtain a loan to solve your problems. The loan will have to be repaid with interest.

FGD participant, Nyendehun, Jong, Bonthe

The idea behind all these groups is that community members can loan money when in need and repay with interest. VSLA is mostly used for big loans, it is easily accessible as most community members are part of the group. To become a member, every person needs to pay a small access fee (5 Leones). Osusu groups require every member to contribute with a specific amount on a regular basis and members take turns to receive financial support. On the other hand, kombi group individuals for the purpose of facilitating farm work when labour is most needed, e.g. planting, harvesting.

Both men and women can take loans, but women usually need to consult their husbands first. To qualify for a VSLA loan, a specific procedure needs to be followed while the loan has to be repaid within 3 months, inclusive of the applied interest rate.

A member needs to do a "knocking on the door", which implies a declaration of intent for a loan, which costs 10 Leones. After an approval, the person takes the loan (the highest loan amount is 100,000 Leones) but has to repay it with a 30% interest in 3 months.

FGD Participant, Gbangba, Yawbeko, Bonthe

SECONDARY QUANTITATIVE ANALYSES FINDINGS

No available data.

WATER, SANITATION AND HYGIENE

HYPOTHESIS N: INADEQUATE ACCESSIBILITY, AVAILABILITY AND QUALITY OF WATER AT HOUSEHOLD LEVEL

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	++
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	++
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator %	**National**	**Rural**	**Southern province**	**Bonthe District**
HH access to safe water sources	75.8% (SLNNNS 2021)	53% (MICS 2017)	59% (MICS 2017)	67.4% (SLNNNS 2021)

	67% (DHS 2019) 68% (MICS 2022)	49% (DHS 2019)	60% (DHS 2019) 56% (DHS 2019)	35.7% (MICS 2017) 48% (DHS 2019)
HH treats drinking water	86.9% (SLNNS 2021)			68.6% (SLNNS 2021)
Less up to 30 min to fetch water	69.2% (SLNNNS 2021) 47% (MICS 2017)	41.5% (MICS 2017) 73% (DHS 2019)	41.7% (MICS 2017)	69% (SLNNNS 2021) 27% (MICS 2017)
HH meeting optimal/sufficient water use	66.4% (SLNNNS 2021) 71.3% (MICS 2017)	73.6% (MICS 2017)	84.6% (MICS 2017)	59% (SLNNNS 2021) 87% (MICS 2017)
HH with water not available for at least 1 day		26% (DHS 2019)		

- Nationally 76% households have access to safe water sources and takes them less than 30 minutes to fetch water. 99% of households reported using treated drinking. 66% of households meets the SPHERE requirement of 15 liters/person/day.
- In Bonthe there are approximately 3656 functional water points of which 22% (797) are currently dysfunctional. The main sources of water are boreholes (62%), protected wells (5%), open wells (4%), river/stream/dam (29%), household connection/public standpipe (0.2%).[152]
- In the district the community-led management systems for water supply is facing serious challenges leading of the non-functionality of water points. This is associated with the INGO dominance for the provision of WASH services which made communities dependent on external support.[153]

QUALITATIVE INQUIRY FINDINGS

Barriers of access to drinking water

Geographical and temporal barriers

Distance was perceived to be a barrier of water access because the compounds are not located in the proximity of the stream. This is particularly problematic during a dry season as water is fetched from the wells in the forest, which are even further away than the stream. Some girls reported that the bucket is very heavy and it is very tiring to fetch water multiple times a day. Longer distances are therefore associated with longer periods of time consecrated to the activity and therefore an increased daily workload (**Cf.** Hypothesis R).

Financial barriers

Pump water wells have been constructed by non-governmental organisations like CARE or ILO but they have not been functioning for many years. The community reported trying to repair the broken pumps multiple times but due to financial constraints they are not able to contribute to the repairs anymore. Respondents stated that the pump repair itself is very costly while additional resources are needed for the rehabilitation of the well as well as for the payment of a technical expert as that capacity is lacking within the community.

[152] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.
[153] Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.

The tap we had in the past is no longer functioning because of mechanical problems. Since our income is low and the cost of the new parts is high, we have not been able to repair it again. Therefore, we are drinking water from the stream nearby.

KII Chair lady, Nyanehun, Jong, Bonthe

Socio-cultural barriers

Water fetching is carried out exclusively by women and children as husbands do not perceive it as part of their responsibilities. As household providers, husbands would not fetch water even in the case of wife's sickness but rather would ask wife's sister to fetch water for them.

Water quality

Sources of drinking water

Gbonghe was the only village where functioning hand pump and solar powered wells were available and ensured the consistent availability of water during all seasons. Access to water in other studied communities was reported as a major challenge. As water pumps in those locations were not functional, most participants accessed water from the stream.

Water from the stream is perceived as contaminated by birds' faeces and millipedes, while the stream is also used for laundering, bathing, and washing dishes. Some people, often referred to as "deviants", were also said to defecate in the stream, as they believe that "*God is cleaning the streams every Friday*". Respondents living close to mining areas in Kpanda-Kemoh reported the stream contamination by mining activities.

Participants perceived that drinking contaminated water from the stream has health consequences on their children, including diarrhoea and swollen belly. In addition, between March and April the stream and swamp water levels decrease and become salty, if close to the sea. When this happens, community members dig new or clean old wells in the nearby forest to be able to maintain water access. During the rainy season, the community reported moving back to collecting water from the stream as the water increases and the salt content reduces.

Water storage and treatment

Water is fetched by either women or children and stored mostly in the same buckets called *rubbers* within the community. Accessing bigger water containers and therefore storage is very difficult, not allowing allow them to reduce a number of trips to the stream, forest or well. Water is usually not treated. Some people were said not to be patient enough, not knowing how to treat water or not having enough containers to separate treated from un-treated water. Instead when fetched, water is left to settle for 1-2 hours before drinking. Some people treat water with camphor and boil it after but others believed that it is not good for drinking purposes. This practice is, therefore, not very common.

Water consumption

Quantity per person per day

Each woman fetches around 60 litres of water per day. This depends on the size of the bucket she carries (usually 10-20 litres). They are usually helped by other women in the household and children, who also fetch water multiple times a day usually in the morning and evening, sometimes even at midday. During the dry season water, when water shortages are common, parents monitor and prioritise the water usage. Less water is used for hygiene practices like handwashing while drinking, cooking and bathing are prioritised. It was also mentioned that

children sometimes get beaten during this period, if they play around water containers, if they put their hands in them or if they use water to demarcate lines on the floor while playing.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Both DHS 2019 and MICS 2017 included some indicators for access and quality of water but none showed to be statistically significant (Cf. **Annex A, B, C, D**).

HYPOTHESIS O: INADEQUATE HOUSEHOLD SANITATION PRACTICES

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	N/A
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	N/A
Overall interpretation	+

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator %	National	Rural	Southern province	Bonthe District
HH with access to improved sanitation facilities	62.6% (SLNNS 2021)		43% (DHS 2019)	37% (DHS 2019) 28.4% (SLNNS 2021)
HH access to basic sanitation	16% (MICS 2017)	8% (MICS 2017)		
Open defecation	26% (SLNNS 2021) 17% (MICS 2017)	28% (MICS 2017)	34% (MICS 2017)	21% (SLNNS 2021) 59% (MICS 2017)
Appropriate disposal of child faces	64% (DHS 2019) 63% (MICS 2017)	62% (DHS 2019) 59% (MICS 2017)	49% (DHS 2019) 53% (MICS 2017)	49% (DHS 2019) 25% (MICS 2017)

- 63% of households nationally reported having access to a sanitation facility (latrine/toilet), 25% use hole/bucket while 18% practices open defecation.[154]
- In Bonthe, 28% households have access to a latrine, 30% use the bush, 36% a hole or a bucket and 21% goes to open fields. The type of toilet facilities available in the district are mainly VIP and pit latrines. The number of households which have access to toilet facilities is very low but most toilets and latrines available need rehabilitation. [155] The sanitation situation at the community is deplorable and open defecation is widely practiced. [156]
- Child stools are disposed largely by putting into a latrine (60%), thrown in garbage (17%) and rinsed into a drain/ditch (16%), Only 4% of households leaves stools in the air or burns them. In Bonthe, households dispose of child stools by rinsing into a toilet (43%), throwing them into the garbage (38%) and 12% rinses them into a drain/ditch.[157]

QUALITATIVE INQUIRY FINDINGS

[154] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.
[155] Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.
[156] Action Against Hunger Sierra Leone.
[157] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.

Toilets are generally available in the community and their contruction has often been motivated by projects of organisations like World Vision. Some toilets have been built using a CLTS approach, however, the community reported that they have to be dug multiple times during the year as they have tendency to collapse due to the weight of the mud and weak holding sticks. A reported barrier to a construction of new, durable toilet facilities was the inability to afford the necessary materials and tools like iron rod, zinc, sand and cement.

As the number of toilets across communities can be limited, available toilets are shared among multiple households while people also practice open defecation in the nearby bush. It was reported that some people also defecate in the stream but this is not a very common practice as community members are aware of water contamination as a consequence.

As to children, mothers reported using diapers for very young children while toddlers would use a potty. The stools are then discarded in a toilet. Some children were said to defecate around the village because they unable to go to the bush. Children were reported walking barefoot on the ground which exposed them to sicknesses if stools were laying around.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Despite availability of sanitation indicators, Logistic regression analyses on DHS 2019 and MICS 2017 did not report any significant associations (Cf. **Annex A & C**)

HYPOTHESIS P: INADEQUATE PERSONAL HYGIENE PRACTICES

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	+
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	N/A
Overall interpretation	+

SECONDARY DATA REVIEW

KEY INDICATORS

- Nationally most households wash hands with running water after defecation (97%) or before eating (90%). However, only 22% wash their hands, before cooking and 11% before feeding the baby. 54% use soap while washing hands but only 12% consistently wash their hands at all the three critical times (after defecation, before eating and before cooking/preparing food).[158]
- In Bonthe specifically, 97% wash hands after defecating and 88% before eating. Only 5% wash their hands before cooking, 6% before feeding their baby and 0.5% at critical times. Less than half of households, 42%, washes their hands with soap.[159]
- There is evidence of good knowledge on appropriate hygiene practices at community level (Bonthe) but implementation is lacking. 57% of the population has access to basic hand washing facilities. Menstrual hygiene remains taboo.[160]

QUALITATIVE INQUIRY FINDINGS

[158] Ministry of Health and Sanitation and UNICEF Sierra Leone, 'Sierra Leone National Nutrition Survey 2021'.
[159] Ministry of Health and Sanitation and UNICEF Sierra Leone.
[160] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

To ensure child's good hygiene mothers usually bath a child at night or in the morning and launder diapers and clothes in the stream. Heavy workload was mentioned as a common challenge impacting optimal child hygiene as mothers return home tired and therefore unable to perform all hygiene practices, as desired or needed. When mothers are not around, they reported little or no control over their child's hygiene as other caregivers would not take care of the child in the same way as themselves. Among others, this might include children's diapers not being changed when they defecate. During the qualitative inquiry, several children were spotted walking across the community with dirty clothes and bodies. During focus group discussion, some children were left sleeping or crawling on the ground, flagging lower levels of sensitivity to personal hygiene in the community. While the awareness sessions during the Ebola outbreak and then Covid-19 pandemic were said to have increased hygiene practices in the community, especially handwashing, the improved behaviour stopped as the perceived risks of the pandemic subdued.

During the barrier analysis, both doers and non-doers agreed that hygiene practices were crucial to avoid child's sickness, and therefore saving money for health treatment and having more time for other responsibilities. Key barriers to hygiene practices were found at the level of perceived self-efficacy and divine will. Non-doers highlighted difficulties in practicing good hygiene practices due to a heavy workload, which entails leaving children with other caregivers.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

DHS 2019 data did not have any relevant indicator for analysis. MICS 2017 data, despite availability of indicators, did not report any significant associations between hygiene and stunting (Cf. **Annex C**).

HYPOTHESIS Q: INADEQUATE ENVIRONMENTAL AND FOOD HYGIENE PRACTICES

Strength of the association with undernutrition in the *scientific literature*	+++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	+++
Community rating during qualitative inquiry	+
Qualitative team rating	+
Strength of historical and/or seasonal variations on undernutrition trends	N/A
Overall interpretation	+

SECONDARY DATA REVIEW

- Waste management in Bonthe remains a challenge, poor /no waste management facilities and burning rubbish around the homes is observed.[161]
- The importance of using clean water to wash utensils is not always obvious.[162]

QUALITATIVE INQUIRY FINDINGS

Mothers reported being very attentive to maintaining hygiene during food preparation and storage. This includes washing hands before food preparation and covering food to avoid flies sitting on it as they believe that flies spread diarrhoea.

[161] Action Against Hunger Sierra Leone.

[162] United Nations International Children's Emergency Fund, Irish Aid, and Action Against Hunger, 'A Summary of the National Mixed Methods Study on the Knowledge, Attitude, Practice and Barriers on Maternal, Infant and Young Child Nutrition in Sierra Leone'.

Through observation, the community maintains a clean environment by sweeping the compounds every day, removing tall grass, keeping the toilets clean, drying dishes on dedicated drying racks. Due to the presence of sanitation officers or similar figures whose role is to sensitise the population about personal and environmental hygiene practices, the environmental hygiene has been said to improve substantially. The community associated good environmental hygiene practices with good health.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

No available data.

GENDER

The role of secret societies

The West African region is home to a number of all-male and all-female secret societies, which continue to play an important role in communal life especially in the rural areas. In Sierra Leone, Bondo society is perceived as a "repository of gendered knowledge that bequeaths members with privileges and power is safeguarded by secrecy". The Bondo symbolizes a girl's entrance into female fecundity and adult female sexuality. It is a women's only secret society that practices female genital mutilation. There are two main procedures performed—sunna, the removal of the hood of the clitoris, with the body of the clitoris remaining intact; and clitoridectomy or excision, which is the removal of the clitoris and all or part of the labia. Bondo women elders believe and teach that excision improves sexual pleasure by emphasizing orgasms reached through stimulation of the g-spot, which is said to be more intense and satisfying for an experienced woman. Excision of the protruding clitoris is said to aesthetically and physiologically enhance the appearance of the vulva and facilitate male/female coitus by removing any barrier to complete, full and deep penetration. 163

However, during a Link NCA qualitative data collection, participants justified female genital mutilation by chastity.

The cutting of the clitoris helps the woman to be a free person, because it reduces woman's sexual drive. The presence of the clitoris increases desire for sex, making women chase men to reduce the yearning. Non-initiated women always need multiple sex partners because of the persistent itching of the clitoris that demands for more sex and attention.

FGD participant, Bonthe

It might be inferred that a "freedom from promiscuity" is a requirement dictated by men, who want their wives to be initiated to be sure of their fidelity. In addition, women who are not initiated are rejected by the society, discriminated against, and subject to provocation as they failed to complete their womanhood. They are not allowed to mingle with those who have completed the process.

"*Boys can be initiated into a Poro society as early as they reach 7 years of age. Their ceremony happens less frequently and causes a havoc in the community. When they are initiated, women are not allowed to go out of the house and carry out their normal activities. It lasts a whole week!*

Girls are usually initiated between 13-18 years, ideally before the first sexual encounter. The ceremony lasts 3-4 weeks. The ceremony brings all initiated girls together and teaches them how to keep secrets together. A special bond is created within the group as they are going through the process together.

After a circumcision a girl lays down and wears a diaper infused with herbs applied to the wound. While she bleeds, other members feed her. When the bleeding stops, approximately, after five days, she might still be in pain but she resumes all daily activities - fetching water, collecting firewood, pounding rice and cooking with other initiated girls. All these activities are accompanied by singing initiation songs. This helps a girl to distract her attention from pain or tiredness, which she would otherwise feel. It is believed that the process helps to prepare a girl for an adult life and hardship – and even resume housework shortly after giving birth.

[163] Laws 2019, 8, 17; doi:10.3390/laws8030017.

The initiation process instils discipline and morals necessary to maintain balance in the community. It teaches endurance and perseverance, which are regarded as signs of maturity and adulthood. Therefore, during the ceremony, adults and youth are treated as equals and are given equal punishments, if anyone breaks the society's law.

The cost of the initiation ranges from 1000-2000 Leones. If parents fear not to have enough money, they might decide to initiate their daughters earlier and save some money on gifts, which are part of the ceremony, as older girls have higher expectations.

Initiated men and women cannot be identified visually but the associations can be detected through certain words or songs, which they learned during the initiation ceremony."

Key informant, Bonthe

Relationship between men and women: two sides of a coin

Problems between men and women revolve around provisioning of money, unfaithfulness, refusal of a sexual intercourse and a lack of support. Women expect from their husbands to be respected, cared for, surprised and sexually satisfied. Some men were said to care more for their children than for their wives which prompted some women into extramarital affairs in search of care and attention while others were happy to have a husband that provides for the child. Women disrespect, refuse sex and some even leave their husbands when they cheat or if they do not fulfil their family responsibilities. Men stated that disrespect happens more when women have their own income and/or boyfriends. As a consequence, men deprive them from housekeeping money, clothes and slippers and stop fulfilling their responsibilities, like attending family funerals with their wives. A part from disrespect, refusal of sexual intercourse by women is a dominant cause of conflict between men and women. Women refuse to have sex when they are tired or when the husband does not provide for the family. Repeated refusal could translate in men seeking pleasure elsewhere, further aggravating the conflict in the household. Despite laws protecting women from physical violence, household conflicts can develop into episodes of gender-based violence (GBV). Men were said to get violent if they are disrespected by women in public, if asked multiple times for housekeeping money while they have no money or if the wife is found cheating. When disrespect or conflict happens, men usually report the situation to the mother in law to open a dialog and seek clarification on the wife's behaviour or the situation is reported to elders in the community and women go to their parents' house till the issue is resolved.

HYPOTHESIS R: CAREGIVER'S HEAVY WORKLOAD

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	**N/A**
Technical experts' rating during Initial Technical Workshop	+
Community rating during qualitative inquiry	++
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	++
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator %	National	Rural	Southern province	Bonthe District
Female headed HHs	20% (CFSVA 2020)	18 % (CFSVA 2020)		
Women (15+) collecting water	60% (MICS 2017)	63% (MICS 2017)	53% (MICS 2017)	44% (MICS 2017)

- 20% of households are headed by women nationally and 18% in rural areas. Polygamy is common, especially in rural areas, and on average 19% of the male headed household have more than one wife.
- Female headed households were reported to have a higher dependency ratio of 88 compared to their male headed. This could be a result of the role played by women as care givers and providers of economic support to the household.[164]Female headed households own less assets but are more active in income generating activities. Women engage in petty trade on the streets (43%) and other commercial activities (21%). Female headed households are more reliant on external support, such as remittances, due to the limited income generating opportunities.[165]
- One key issue for women is that the "household time overhead" or the number of hours spent on basic chores is high. Taking care of children, elderly, preparing meals, washing clothes, cleaning the dwelling and fetching water and wood represents a full-time occupation for several household members. They have therefore limited time to engage in productive activities making them often victims of that "time poverty". The workload of an adult rural female reaches more than 46 hours a week.[166]
- In 60% of households' women (15+) are responsible for collecting water. 44% in Bonthe.[167]

QUALITATIVE INQUIRY FINDINGS

Daily routine

Women's daily activities start with prayers and housework. This includes activities like taking care of children (feeding, bathing, dressing, getting them ready for school), sweeping the compound, fetching water and collecting firewood, and laundering chlothes. During the dry season, after completing the house chores they drop children with other caregivers and go the the farm to dig holes for planting cassava, harvest palm fruit or engage in palm kernel drying and processing. Women usually come back from the bush at around 3-4pm, collect children from other caregivers, collect housekeeping money to buy food for dinner, fetch water, cook dinner for the family, feed children, bath, pray and go to sleep.

Community perceptions of caregiver's workload

Workload was perceived as a burden for women. To describe their workload, women used words, such as "painful", "strenuous" and "difficult". They agreed to feel stressed due to the amount of work they have to carry out every day.

In fact, women said that a part from the usual household chores they also have to go to the bush to do farm work or engage in casual jobs to complement their husbands' income due to the economic hardship. Moreover, women sometimes do not get paid for their work on time and experience food shortages as they do not have time to do more work to boost their income.

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[164] World Food Programme, 'State of Food Security in Sierra Leone 2020. Comprehensive Food Security and Vulnerability Analysis'.
[165] World Food Programme.
[166] Q Wodon and Y Ying, *Gender Disparities in Africa's Labor Market. Domestic Work Time in Sierra Leone*, Africa Development Forum (World Bank Publications, 2010), https://books.google.co.uk/books?id=ennt4UERzQQC.
[167] Statistics Sierra Leone, 'Sierra Leone Multiple Indicator Cluster Survey 2017, Survey Findings Report.'

On the other side, educated women were perceived to have less workload because they are more aware of their roles and responsibilities and therefore they are not forced to work in the bush. Some women felt they are currently carrying out "men's work". They should instead focus on taking care of the house and children while men should do the hard work in the bush.

Women should keep to jobs like sweeping, taking care of children, laundering, preparing children for school and meals for the family. Men should go to the bush to do the hard work. Instead, women after doing all these household tasks still go to the bush to brush and plant cassava or groundnuts. Women should stick to their gender specific jobs.

FGD participant, Nyendehun, Jong, Bonthe

Some women said that they pray to God in hope of a change in circumstances. Single women or women coming from other communities reported having an even tougher situation as they have limited or no support alongside their heavy workload.

Seasonality also affects women's workload. Two peaks of increased workload have been mentioned by respondents: March -April as it is both farming and palm oil and palm kernel processing season and November and December due to harvest. Moreover, as everyone in the community is very busy with the mentioned activities, women perceive less support during these periods. During the rainy season, women's workload decreases as it is mostly focused on palm kernel processing. Overall, there is a perception of no rest for women even during the remaining months of the year. Historically, women's workload has always been hard, even more than now, this is because women did not have access to machines to crack palm kernel or to process gari but everything was done manually on top of their housework.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

No available data.

HYPOTHESIS S: LOW FEMALE AUTONOMY/ LOW DECISION-MAKING POWER

Strength of the association with undernutrition in the *scientific literature*	+
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	+++
Strength of the association with undernutrition based on statistical analysis	+
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	++
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	N/A
Overall interpretation	++

SECONDARY DATA REVIEW

KEY INDICATORS

Indicator %	National	Rural	Southern province	Bonthe District
Women participation in health, family and major HH purchases	44% (DHS 2019)	43% (DHS 2019)	48% (DHS 2019)	38% (DHS 2019)

- Nationally 68% of married women participate alone or jointly with their husband in decisions about their earnings. Women in the Southern province are more likely than those in other provinces to make decisions jointly with their husband and control over their

earning.[168] Even if women in rural areas are involved in doing small-scale trading and farming, they don't determine how their money is being spent.[169]

- The percentage of women who own a house has remains unchanged at 39% since 2013 but the percentage who own land has declined marginally from 36% to 32%. Women in rural areas are more likely to own a house (53%) and have a title deed to the property with their name on it.[170]
- In Bonthe men have decision making power in the communities however they sometimes consult with their wives when necessary.[171]

QUALITATIVE INQUIRY FINDINGS

Decision making power

Women agreed that majority of household decisions, including decisions about health-seeking in case of their or their children's illness, have to be consulted with their husbands, who are heads of the family. The need to consult husbands is, of course, not applicable in case of single women as they don't have a husband to report to. If decisions are made without consultation, this may lead to conflict. During one focus group discussion, male participants expressed that "*women should be there to follow instructions*". Women reported wanting to have more decision-making power in some areas of life, like freedom of movement within or outside of the community to visit family or attend funerals, freedom to buy or sell clothes, freedom to use contraception or freedom to defend themselves when someone disrespects them without having to wait for the husband to solve the issue. Only a few women stated that they do not have to consult their husband in these circumstances. However, in the past women had even less decision-making power and their duty was to be happy with decisions made solely by their husbands.

In my times I never took any decision and it was always my husband who decided on everything. My duty was to be happy about those decisions to ensure my children's happiness.

FGD participant, Nyendehun, Jong, Bonthe

Food purchases and household nutrition

As husbands provide housekeeping money to buy the necessary food items to feed the family, it is them who decide what the household consumes. A few men mentioned that they consult their wives with regards to food choices but their openness seems to be linked with women's contribution to the household functioning. In those households, husbands admitted feeling supported by their wives, who engage in vegetable gardening, which is then used for household consumption or for sale. In this way, women's efforts equalise the power dynamics within the household and their opinion is accounted for in certain household decisions. If women do not receive money to buy food, the food choice as well responsibility to fend for

[168] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[169] United Nation Developmen Programme, 'Developing UNDP Sierra Leone Gender Equality Strategy 2021-2023: Levelling the Playing Field for Gender Actions' (UNDP, 2021), https://www.undp.org/sierra-leone/speeches/developing-undp-sierra-leone-gender-equality-strategy-2021-2023-levelling-playing-field-gender-actions?utm_source=EN&utm_medium=GSR&utm_content=US_UNDP_PaidSearch_Brand_English&utm_campaign=CENTRAL&c_src=CENTRAL&c_src2=GSR&gclid=Cj0KCQjwteOaBhDuARIsADBqRejbG7Z05f4423r_53rUHR4JqgHRonigeiSrQvKYX57I3R0dIN1kw6waAu5bEALw_wcB.
[170] Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.
[171] Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.

food is theirs. In this case, they somehow have more decision-making power but the actual choice might be restricted by the availability of food items, which they are able to find. When women need to fend for food, they usually go to the bush to look for wild cassava and vegetables or palm kernel in the palm tree plantations to generate income and buy food or go fishing in the dry season.

Management of household income

Household income is managed by a husband and women need to ask permission before making any purchase or payment. Husbands also decide when to take a loan for the household, notably when there is a shortage of food, but loans are never approved for less essential items, such as clothes or slippers.

I have savings together with my husband but if I want to spend money on something I want, he needs to agree because he is in charge of the finances. When we process palm oil, for example, I would like to give some oil to people I know but my husband will say "no" because this is his oil.

FGD Participant, Gbangba, Yawbeko, Bonthe

In certain cases, women admitted that they were able to use the household money for a "valid reason" and report it to their husband retrospectively. In fact, women's decision-making power was said to be linked with their economic capacity. Therefore, a woman might have more decision-making power when working and financially contributing to the household. On the other hand, women who are financially dependent on their partners, have very limited decision-making power.

Management of own income

In most cases, women can decide how to spend their own income. However, some men thought that women needed to report how much they earn. Women's own income is usually spent for household food, clothes or medical costs. If it happens that they lend money to their husbands, they need to keep quiet if a loan is not repaid in order to avoid conflict.

We use the earned money to buy food but sometime we need to lend it to our husbands. They say that they will repay us later but some do and some other do not. If a husband does not repay, women cannot say anything because this would lead to a conflict. In addition, the community would also not hesitate to comment that women created problems for such small amounts. Before lending the money, we are not allowed to ask how our husband will spend the borrowed money.

FGD participant, Nyendehun, Jong, Bonthe

Access to health care

Women need to seek a permission from their husbands before seeking medical attention as it is usually the husband who covers the financial cost. If household resources are low, husbands may not authorise a visit at a health facility. The same applies if a woman spent a lot of time at the health facility during her previous visit and there is a lot of farm work in the bush. At times, women might need to or choose to pay themselves (for example, to pay for means of contraception) but a husband would need to be informed about a trip to a health facility nevertheless.

Use of modern contraceptive methods

Women need to consult their husbands before taking any modern contraceptives. However, many women reported taking contraception without their husbands' knowledge if they fear

that the latter would not accept. Women deciding to use contraceptives secretly either desire to avoid having more children, especially if they felt unsupported and neglected during the previous pregnancy. It was also reported that Muslim men do not want their wives to start family planning as they believe this would prevent them from having children.

Decisions about children

Husband and wife share the responsibility of the child jointly but the husband, as the head of the household, has more decision-making power. Unilaterally taken decisions by women can be a cause of conflict as the child morally belongs to the father. Husbands also felt that it was their role to decide about their children's education as they are the ones who pay for school fees. This also applied to sending children to nearby towns to continue education. Women have to consult husbands about the child's nutrition (when they want to change their diet) and about their welfare (if they want to send the child to a foster care or initiate the child). Men perceived that women are more permissive with children hence if they had more decision-making power this would cause disrespect towards the fathers. Men also feared that women would not listen to them anymore if they had more power over their children. This was also done out of love to ensure the best for their children, boys and girls equally.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Logistic regression analyses of DHS 2019 and MICS 2017 included some female decision-making indicators, however none was significant for stunting. (Cf. **Annex A & C**)

HYPOTHESIS T: LOW SOCIAL SUPPORT FOR WOMEN

Strength of the association with undernutrition in the *scientific literature*	++
Strength of the association with undernutrition based on *secondary data review* relevant for the study zone	++
Strength of the association with undernutrition based on statistical analysis	++
Technical experts' rating during Initial Technical Workshop	++
Community rating during qualitative inquiry	++
Qualitative team rating	++
Strength of historical and/or seasonal variations on undernutrition trends	N/A
Overall interpretation	++

SECONDARY DATA REVIEW

- In Bonthe there are no community-based support nor do peers support groups.[172]Village Savings and Loan Association (VSLA) are operating in the district. They enable community people, to come together and form a group to work together towards economic growth.[173] An example of women farming group in Bonthe is the Sherbro Women Agricultural Cooperative (SWACO).[174]

QUALITATIVE INQUIRY FINDINGS

Women support groups

There are no women support groups nor activities in the community. Women are supported mostly by their mothers or older children concerning childcare and housework. It was also

[172] Action Against Hunger Sierra Leone, 'Bonthe Assessment Report - 2nd-8th of May 2022'.
[173] Awoko Publications, 'VSLA Restored Our Integrity-Beneficiaries Maintain', 2019, https://awokonewspaper.sl/vsla-restored-our-integrity-beneficiaries-maintain/.
[174] Action Against Hunger Sierra Leone, 'Action Against Hunger: Bonthe Desk Review'.

mentioned that when they leave their children with other community members due to lack of options, the others do not take care of children as they should.

Women said that they would not talk to their husbands as they were usually responsible for their worries by not providing for them or cheating.

Women mentioned other women gossiping about them if they shared their problems and this was said to be a consequence of general loss of trust towards others brought by the war.

There are no women support groups in the community, women would actually gossip about you or "bite" you when you are struggling. This is the effect of the war as a lot of killing brought a lot of mistrust between people. So now you do not want to overshare and talk about your problems for fear that it will be used against you.

FGD Participant, Gbangba, Yawbeko, Bonthe

The support received by women was mainly financial through VSLA, osusu, Kombi groups or from the Bondo society. Women could request a loan from these groups and get support for their businesses, child initiation, funerals or other needs.

Multiple women within the community reported being single parents due to abandonment or death of the spouse/boyfriend. At times, they are supported by their parents through financial contributions and sometimes by other community members with laundry soap and clothes for children, especially during the festive season.

Access to education / information

Majority of women in the community are either illiterate or only finished primary school. Year 6 was the highest completed school year mentioned by women. The main barriers of access to school was financial while distance was only a problem for secondary education. Primary schools are located close to villages. Financial challenges were also reported as the main reason why women dropped out from school. Other reasons included early pregnancy, feeling not intelligent enough for formal education, or having to care/support parents with farming activities. Some women perceived that a lack of education was not allowing them to engage with more educated people, advocate for women in the community to address their needs and be overall more confident. Respondents highlighted the need for people to be educated to start making changes in the community, as now, it is only a few people that are educated. Low level of education, was also perceived to cause limited income opportunities and low earnings for women that can mainly access farming work.

Most women or even our husbands are either not educated or partially educated and therefore have limited income opportunities. We go to the bush to work but the company does not pay us enough and sometimes we do not have enough money to reach the end of the month.

FGD participant, Nyendehun, Jong, Bonthe

A shift in values: the older and the younger generations

A clear shift in relationship dynamics between the older and younger generation was highlighted by the community. Nowadays parents are more encouraging towards their children rather than being physically severe and therefore, children do not fear or listen to them like in the past. Many children are sent to nearby towns to continue education and parents feel that they are not able to control them as before. Moreover, the current law protects children which became more aware of their rights, and stops parents from adopting physical discipline. When children are particularly difficult to manage, parents would not take any physical action for fear of the law repercussions. This whole situation leads the younger generation to have less respect for their parents and elders

due to several reasons 1) boys start earning money at young age and become independent, which makes them equal to their parents. They highlighted that parents and elders do not support them in terms of education, finances, food or clothes hence not "doing anything helpful for them" which does not oblige them anymore to show respect 2) early sexual encounters, even as early as 12 years old, make boys and girls feel like adults. Some boys have been sent to prison due to sexual abuse and pregnancies which was perceived by elders as a consequence of the current lack of discipline 3) Initiation into secret societies has also a big role in the disrespect. In fact, the ceremony enables children to enter adulthood and puts them at the same perceived "level" of parents and elders. In the past the younger generation would bow or kneel down to elders, open door and always show respect. Now this is not happening anymore representing a big shift in values of the younger generation who said to bow down only in front of God.

In terms of housework, girls are taught by mothers, aunts or older sisters how to cook, sweep, lauder and take care of the household as well as personal hygiene during menstruation and respect for elderly. Sex education is sometimes a taboo, usually discussed with peers and not with mothers.

Women reported accessing information through mobile phones from relatives in bigger towns like Mattru Jong or the radio. The main channels listened to were: obituary announcements, information about new recruitment of health staff at the health centre and mobile outreach for specific health issues like eye problems or hernia. Respondents also mentioned listening to a talk show where people from different communities in the area would share challenges and requests of support from the appropriate institutions.

SECONDARY QUANTITATIVE ANALYSES FINDINGS

Despite availability of indicators, both DHS 2019 and MICS 2017 did not report any significant association between low social support and stunting (Cf. **Annex A, B, C, D**)

V. CONCLUSION AND RECOMMENDATIONS

Causal mechanisms of undernutrition

The calculation of statistical associations between individual risk factors and nutritional status of children in surveyed households allowed to differentiate between causal mechanisms of wasting, stunting, concurrent wasting and stunting, underweight and anaemia.

The causal pathways presented below are based on the pathway designed during the community consultations (Cf. Figure 2) while the findings of the statistical analyses have been added to it to visually summarize the available evidence and help prioritise key areas of concern.

Acute malnutrition

Based on available evidence, two causal pathways built around seven key risk factors can likely explain most cases of acute malnutrition in the study zone. Firstly, *low access to income sources* translates into *low social support for women* which increases their *workload* and consequently may trigger *inadequate care practices*. At the same time, *limited access to income* translates into *low access to quality diet* and subsequently to *low maternal nutritional status* which impacts *care practices*, specifically the practice of *exclusive breastfeeding*. In addition, *limited access to income sources* has an effect on household's ability to *access* to and therefore *use of health services* consequently increasing the child's *vulnerability to disease* and acute malnutrition.

In terms of general characteristics, younger children, especially those less than 24 months, children of lower height, children belonging to the Sherbro ethnic group and those living in households with a lower number of members appeared to be more vulnerable to wasting. Odds of wasting potentially increased also for children living in households with less women of reproductive age but decreased for children with a higher weight and/or belonging to the Mende ethnic group.

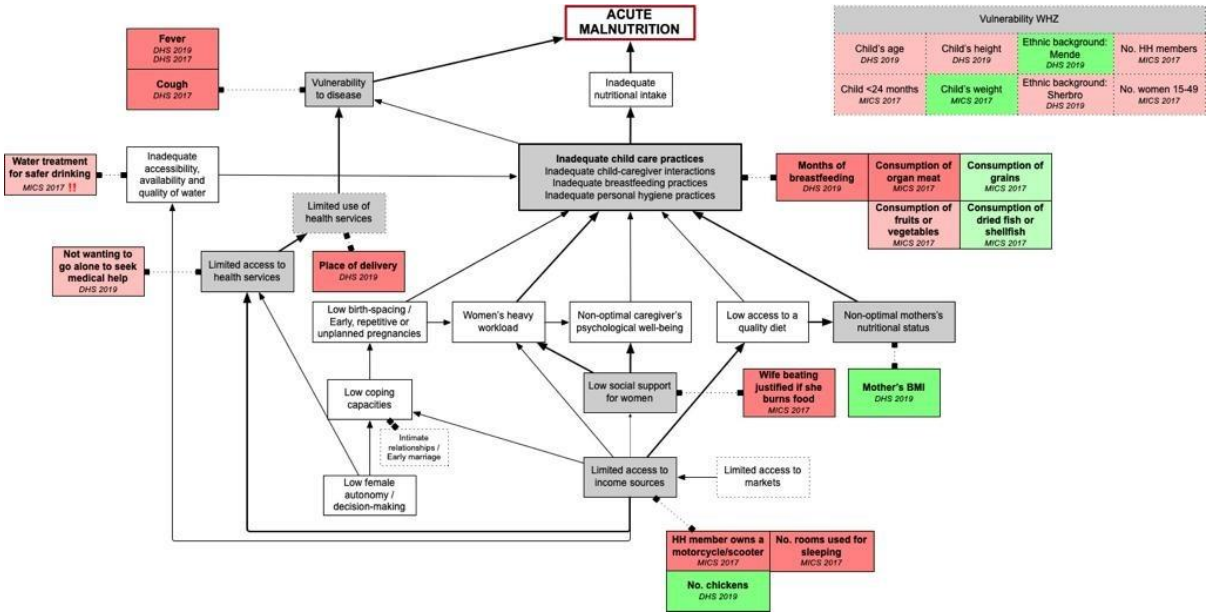

Figure 3: Causal pathway for acute malnutrition, Bonthe District, Sierra Leone

Risk factors: Children living in households that own a motorcycle[175] households with a lesser number of rooms for sleeping[176] or households where wife beating was justified if a woman burned food[177] were associated with an increased probability of being wasted. In addition, children who were breastfed for a lesser number of months, children who consumed organ meat 24 hours prior the survey, children having fever or a cough in the last 2 weeks prior the survey and children delivered at home instead of at a health facility were also associated with an increased probability of being wasted. Probable risk factors of wasting[178] included: consuming fruit and vegetables in the 24 hours prior the survey, children of a mother that did not want to go alone to seek medical help.

Protective factors: Children living in households with a higher number of chickens or having a mother with a higher BMI were associated with a decreased probability of being wasted. Probable protective factors of wasting included: consuming grains or dried/shell fish in the 24 hours prior the survey

Chronic malnutrition

Similar to acute malnutrition, based on available evidence, two causal pathways built around five key risk factors can likely explain most cases of chronic malnutrition in the study zone. Firstly, *limited access to income sources* translates into *low social support for women* which decreases their *psychological wellbeing* which influences directly on the quality of *child care practices,* notably personal hygiene practices and mother-child interactions. In addition, *limited access to income sources* has an effect on household's ability to access and therefore use health services, consequently increasing the child's *vulnerability to disease* and chronic malnutrition.

In terms of general characteristics, younger children, children living in rural areas and/or living with a disabled mother appeared to be more vulnerable to stunting. Conversely, children's vulnerability to stunting decreased for children of bigger height, higher birthweight or current weight, children who lived in larger households or with a higher number of women of reproductive age.

[175] This may seem as a contradictory finding as it came out as protective factor for other forms of malnutrition and therefore needs to be considered with caution.
[176] Proxy indicator for household income
[177] Proxy indicator of low social support for women
[178] P value < 0.10

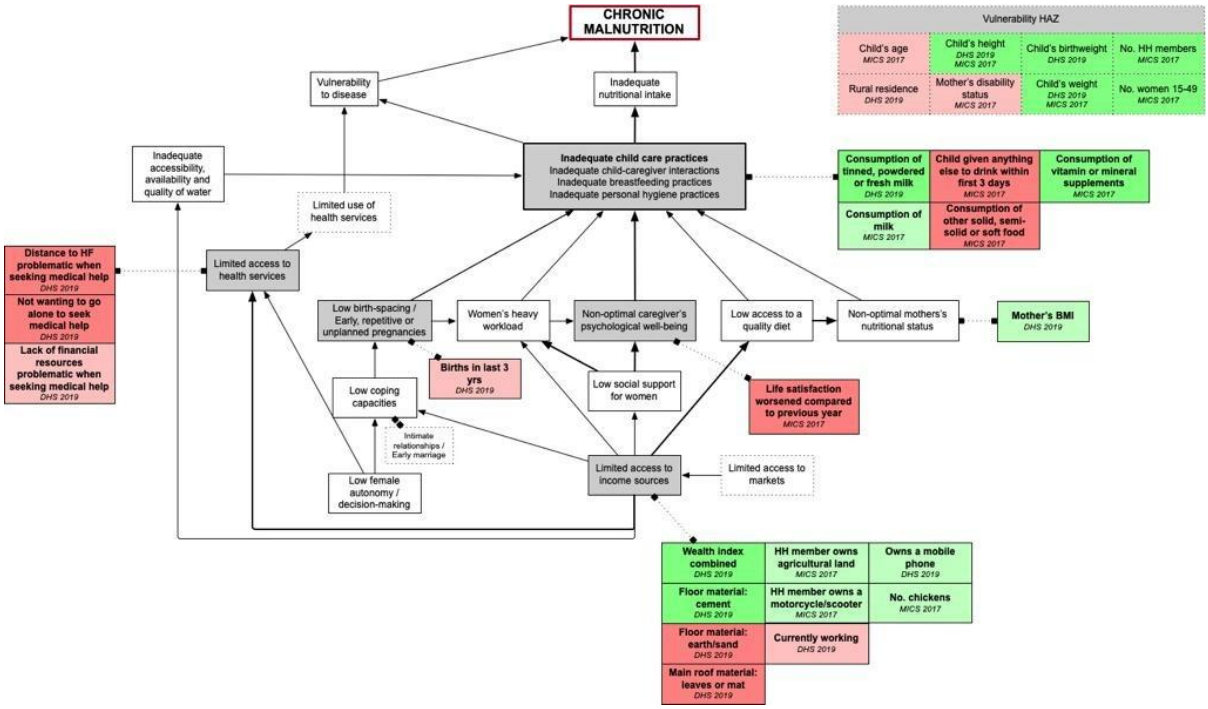

Figure 4: Causal pathway for chronic malnutrition, Bonthe District, Sierra Leone

Risk factors: Children living in households with a sand floor and/or roof made of leaves[179], children living in households where the life satisfaction decreased compared to the previous year[180] were associated with an increased probability of being stunted. In addition, children who were given foods other than breastmilk in the first three days of life or children who consumed other solid or semi-solid foods in the 24 hours prior the survey were also associated with an increased probability of being stunted. The same applied to children whose mothers did not want to go alone to the health centre or perceived distance as a barrier of access to health services. Probable risk factors of stunting included: children of mothers who found it problematic to access health services due to financial resources, children of mothers employed at the time of the data collection or mothers that had multiple births in the past 3 years.

Protective factors: Children living in households with a higher wealth index or households with a cement floor[181] were less likely to be stunted. The same applied to children who consumed tinned, powdered or fresh milk or who took mineral or a vitamin supplements the day prior the survey. Probable protective factors of stunting included: living in households, whose members owned a land, a motorcycle or a phone[182], having a mother with a higher BMI or consuming milk in the 24 hours prior the survey.

Underweight

Based on available evidence, two causal pathways built around five key risk factors can likely explain most cases of underweight in the study zone. Firstly, *low access to income sources* translates into *low access to quality diet* and subsequently to *low maternal nutritional status* which impacts on *care practices*, specifically the practice of *exclusive breastfeeding*. At the same time, *limited access to income* translates into *low coping strategies* consequently repetitive

[179]Proxy indicator for household income
[180] Proxy indicator of caregiver's psychological wellbeing
[181] Proxy indicator for household income
[182] Proxy indicator for household income

pregnancies which influences directly on the quality of child care practices notably mother-child interactions, exclusive breastfeeding and personal hygiene practices playing a role on child's nutritional intake. In addition, *limited access to income sources* has effect on the ability to *access* and therefore *use health services*, consequently increasing the child's *vulnerability to disease* and underweight.

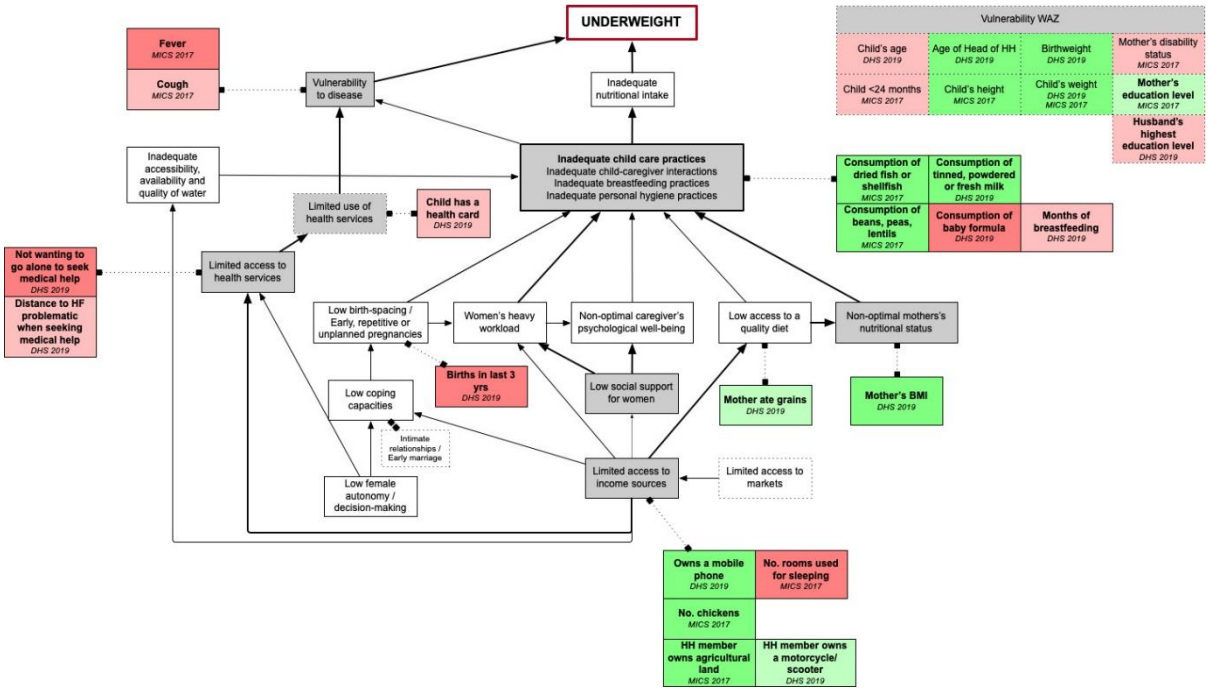

Figure 5: Causal pathway for underweight, Bonthe District, Sierra Leone

In terms of general characteristics, younger children, especially those less than 24 months' old, and children living with a disabled mother appeared to be more vulnerable to underweight. The vulnerability to underweight decreased for children with a higher height, higher birthweight or higher current weight as well as for children living in households with an older head of household.

Risk factors: Children living in households with less rooms for sleeping[183], children who received baby formula or had fever in the 2 weeks prior the survey were associated with an increased probability of being underweight. Children born to mothers that experienced higher number of births in the past three years or that did not want to go alone to the health centre were also associated with increased likelihood of being underweight. Probable risk factors of underweight included: children who were breastfed for a lesser number of months, children who had a cough in the 2 weeks prior the survey and children whose mother perceived distance as a barrier of access to health facility.

Protective factors: Children who lived in households whose members owned a mobile phone[184], had a higher number of chickens[185] and owned a land[186] were less likely to be underweight. Children of mothers with a higher BMI and children who were given tinned, powdered, or fresh milk, dried or shell fish or pulses in the 24 hours prior the survey were

[183] Proxy indicator for household income
[184] Proxy indicator for household income
[185] Proxy indicator for household income
[186] Proxy indicator for household income

associated with a decreased likelihood of being underweight. Probable protective factors of underweight included: children living in households whose members owned a motorcycle and children of mothers who ate grains in the 24 hours prior the survey.

Concurrent wasting and stunting

Based on available evidence, two causal pathways built around three key risk factors can likely explain most cases of concurrent wasting and stunting in the study zone. Firstly, *low access to income sources* translates into *low social support for women* which increases their *workload* and consequently may trigger *inadequate care practices*. In addition, *limited access to income sources* impact on the ability to *access* and therefore *use health services,* consequently increasing child's *vulnerability to disease* and concurrent wasting and stunting.

In terms of general characteristics, children who were less than 24 months' old were found to be more vulnerable to concurrent wasting and stunting while those that lived in a household with a male head were found to be less vulnerable.

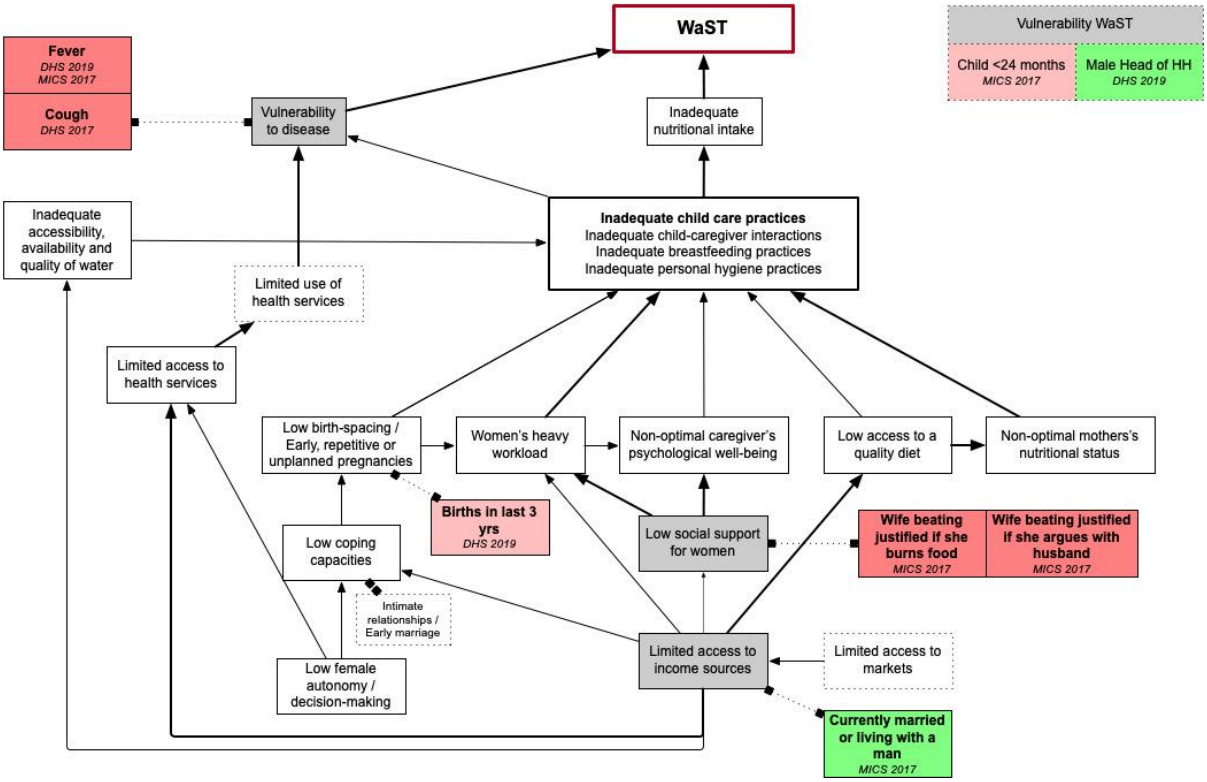

Figure 6: Causal pathway for concurrent acute and chronic malnutrition, Bonthe District, Sierra Leone

Risk factors: Children living in households where wife beating was justified if the mother burnt the food or if she argued with the husband were associated with an increased risk of concurrent wasting and stunting. Children who had a cough or fever 2 weeks prior the survey were also associated with an increased risk of concurrent wasting and stunting. Having a mother who had multiple births in the past 3 years was identified as a probable risk factor of concurrent wasting and stunting.

Protective factors: Children of mothers currently married or living with a partner were associated with a decreased likelihood of concurrent stunting and wasting.

Anaemia

Based on available evidence, it was not possible to identify a causal pathway of anaemia. However, this study was able to identify some risk and protective factors associated with anaemia, which are described below.

Risk factors: Children who consumed Vitamin A rich fruits or other fruits in the 24 hours prior the survey were associated with an increased likelihood of anaemia. Probable risk factors of anaemia included: children consuming green leafy vegetables, fish or shellfish.

Protective factors: Children living in households who shared a toilet with other households were probably associated with a decreased likelihood of becoming anaemic.

In terms of general characteristics, children with a larger height or higher weight were found to be less vulnerable to anaemia. Children who were less than 24 months and children who lived in rural areas were probably more vulnerable to anaemia. On the other hand, older children and children with an older mother were probably less vulnerable to anaemia.

Undernutrition

Based on the pathway designed during community consultations (**Cf**. Figure 2) the causal pathways for acute malnutrition, chronic malnutrition, concurrent acute and chronic malnutrition underweight and anaemia follow the same pattern but differ in composition of the available evidence with a potential impact on programmatic responses.

Limited access to income sources and limited access and use of health services with varying evidence can be observed across pathways for wasting stunting, underweight and concurrent wasting and stunting. Low social support for women and heavy women's workload can be observed in pathways for wasting and concurrent wasting and stunting but evidence is missing in others. Low access to quality diet and low maternal nutritional status can be observed in pathways for wasting and concurrent wasting while inadequate care practices can be observed in pathways for wasting, concurrent wasting and stunting and underweight but evidence is missing in others.

No risk factors were applicable for *wasting, stunting, concurrent wasting and stunting, underweight* and *anaemia*.

Common risk factors for *wasting* and *underweight* include lower **child's age, number of breastfeeding months** and living in a **household with a smaller number of rooms**. A child who is **less than 24 months** and who leaves in a **household where beating is justified if the wife burned food** was associated with higher probability of being *wasted* or *concurrently wasted and stunted*. A child having **fever in the 2 weeks** prior the survey was identified as common risk factor for *wasting, concurrent wasting and stunting* and *underweight*. Lastly, common risk factors for *stunting* and *underweight* include **having a disabled mother** or a **mother that did not want to go alone to seek medical help.**

Having a higher **birthweight** was also found to be a protective factor of *wasting, stunting* and *underweight*. Common protective factors for *wasting* and *underweight* include a higher **maternal BMI** and living in a household with higher **number of chickens.** Having a higher **birthweight**, **current weight or height** were associated with a lower probability of a child being *stunted* or *underweight*. A higher **height** was also associated with lower probability of child's *anaemia*.

Summary of categorisation of risk factors

The analyses undertaken during this Link NCA study allowed to identify 20 risk factors, believed to have an impact on the prevalence of undernutrition in the study zone. Following a triangulation of data from diverse sources, 2 risk factors were identified as having a major impact, 10 risk factors were classified as having an important impact and 8 risk factors were judged to have a minor impact on the prevalence of undernutrition in the zone of study. Among the major risk factors, one was identified in the sector of health and nutrition, namely **limited access to health services** while the other one, **low access to income sources**, was identified in the sector of food security and livelihoods.

Risk factor		Overall interpretation/ Impact of risk factor[187]
A	Limited access to health services	+++
B	Limited utilisation of health services	+
C	Low birth spacing/ early, repetitive or unwanted pregnancies	++
D	Low birth weight	+
E	Low nutritional status of women	+
F	Caregiver's well-being	++
G	Non-optimal breastfeeding practices	++
H	Non-optimal complementary feeding practices	++
I	Low quality of interactions between a child and a caregiver	++
J	Low access to a quality diet	+
K	Low access to income sources	+++
L	Malfunctioning market or supply system	+
M	Low coping capacities	++
N	Inadequate accessibility, availability and quality of water at household level	++
O	Non-optimal sanitation practices	+
P	Non-optimal personal hygiene practices	+
Q	Non-optimal environmental and food hygiene practices	+
R	Heavy workload of women	++
S	Low female autonomy/ decision-making	++
T	Low social support for women	++

Table 15: Summary of categorisation of risk factors, Bonthe District, Sierra Leone

The overall categorisation of risk factors reflects the community rating, during which the said two risk factors were also categorised as major.

Summary of ongoing interventions

Action Against Hunger Sierra Leone is currently implementing two health system strengthening projects to improve essential health services, with a focus on prevention and treatment of acute malnutrition and prevention of chronic malnutrition in two districts (Freetown and Bonthe). These integrated projects serve to address the underlying causes of undernutrition with a strong emphasis on the prevention through sustained behaviour change. They are designed to address the high rates of stunting which is characterised by high prevalence of chronic malnutrition and moderate level of acute malnutrition. These are multi

[187] Risk factors perceived as having a major impact on undernutrition in the study zone (i.e. risk factors with solid evidence on strong links with one or multiple forms of undernutrition) are highlighted in red, important factors (i.e. risk factors with emerging evidence on possible links with one of multiple forms of undernutrition) are marked in orange while risk factors with minor impact (i.e. risk factors with limited or unsubstantiated evidence on links with either form of undernutrition) are coloured green.

sectorial projects that include Health and Nutrition, Food Security and Livelihood, WASH, Gender and advocacy and Mental and Psychosocial Support;

1) The MCA-Nut is a multi-sectorial community-led project to improve Nutrition in Bonthe district, funded by Irish Aid and implemented since August 2022. It aims to address the root causes of undernutrition at the facility and community level, while strengthening the operational capacities of line ministries and health facilities. At the national level, the project engages in advocacy activities with government establishments like SUN movement (Scaling up Nutrition), with whom ACF is working to influence the government's nutrition policies since 2017 with a focus to scale up nutrition services in ACF implantation areas;

2) The PROSSAN project funded by AFD aims at health system strengthening and is being implemented in Sierra Leone and Liberia. This project in the in first year of phase two implementation that started in May 2022. It aims at improving health service delivery through training and supportive supervision of health care works. It also supports school health clubs and community structures such as mother support groups to improve health and nutrition practice, established adolescent friendly spaces for MHPSS activities and create demand for quality services.

Recommendations

- Support community-led initiatives, such as market fairs, seed banks (rice, groundnuts, vegetables), kombi or VSLA groups, to reinforce the internal community capacity to create and further develop income generating activities as well as a sense of unity within each community;
- Support the development of income generating activities that will sustain the community especially during the lean season with a focus on a proper evaluation of both positive and negative impact of these on respective communities in order to protect their environment and maintain a healthy power dynamic among community members ahead of any implementation;
- Support health system strengthening activities at district level, focusing on quality of care across available health facilities, to boost the utilisation of services and increase trust of communities toward health staff through respectful behaviour;
- Explore possibilities through local financial institutions and/or VSLA, Osusu to provide short-term healthcare loans to boost early access to health services, if needed, especially during lean season;
- Support community empowerment initiatives, enabling community members to analyse and prioritise problems that affect them and to design and implement appropriate solutions. The problems may include community access to healthcare, education, markets, drinking water or any other issue of importance;
- Promote the re-creation of community systems and structures that were present in the past but are currently lost to re-create the sense of unity in the community and to provide intra-community support during periods of high distress and economic hardship, with a focus on adequate coping mechanisms. This may include the support of women's support groups for company, information sharing and income-generation purposes. Community consultations will need to be implemented before the initiation of any activity to reflect community preferences.
- Improve access of women to income sources and the increased decision-making power in women's priory areas.

- Promote optimal childcare practices aimed at a variety of caregivers including grandmothers.

ANNEX A: LOGISTIC REGRESSION DHS 2019

Table 16: Unadjusted associations between risk factors and binary classification of wasting, stunting and underweight demonstrated by logistic regression (SOURCE: Sierra Leone 2019 Demographic and Health Survey (DHS))

Risk factor					**Stunting [HAZ] <-2)**		**Wasting (GAM) [WHZ<-2]**		**Underweight [WAZ <-2]**		**WAST (HAZ &WHZ <-2)**		**Child Anemia (Hg/dl)**	
Descriptive statistics and Logistic regressions					*Children 6-59 months*		*Children 6-59 months*		*Children 6-59 months*		*Children 6-59 months*		*Children 6-59 months*	
Indicator	**N**	**n**	**Proportion in analysed sample [95% CI]**	**Design effect**	**Odds Ratio [95% CI]**	**P-value**	**Odds Ratio [95% CI]**	**p-value**	**Odds Ratio [95% CI]**	**p-value**	**Odds Ratio [95% CI]**	**p-value**	**Odds Ratio [95% CI]**	**p-value**
Type of place of residence (rural)	259	217	83.18 [75.62 - 88.75]	1.9	2.53[1.13:6.47]	0.034	3.52[0.69:64.31]	0.228	1.47[0.58:4.5]	0.449	1.58[0.28:29.79]	0.668	1.97[0.96:4.1]	0.065
Religion (Muslim)	259	224	86.74 [80.16 - 91.37]	1.6	1.93[0.85:5]	0.139	.	.	.	.			0.85[0.36:1.92]	0.705
Sex of household head (Male)	259	231	89.08 [82.41 - 93.43]	1.8	0.94[0.41:2.27]	0.879	0.39[0.13:1.46]	0.121	0.85[0.32:2.66]	0.756	0.13[0.03:0.57]	0.004	0.46[0.14:1.22]	0.142
Child Age (less 24_months)	259	126	48.46[43.75 53.19]	0.5	0.94 [0.55:1.59}	0.805	0.85 [0.31:2.22]	0.738	0.71 [0.36: 1.38]	0.317	1.36 [0.35:5.59]	0.656	2.45 [1.37 :4.49]	0.002
Child sex (Male)	259	124	47.01 [38.98 - 55.19]	1.6	1.31[0.77:2.22]	0.320	0.86[0.32:2.26]	0.764	0.65[0.32:1.28]	0.218	0.53[0.11:2.07]	0.382	0.8[0.46: 1.38]	0.421
Place of delivery	258	17	6.02 [3.19 - 11.09]	1.5	0.46[0.1: 1.45]	0.228	5.38[1.37:17.88]	0.009	1.14[0.26:3.72]	0.838	1.93[0.1: 11.59]	0.547	1.28[0.39:4.92]	0.696

Size of child at birth	249	4	1.69 [0.49 - 5.69]	1.5	2.31[0.27:19.56]	0.407	.	.		0.990	.	.	1.26[0.12:27.46]	0.849
Did eat any solid, semi-solid or soft foods yesterday	123	87	70.22 [61.65 - 77.58]	0.9	1.5[0.64:3.75]	0.364	1.24[0.27:8.74]	0.800	2.11[0.64:9.6]	0.265	1.66[0.23:33.08]	0.656	1.33[0.18:7.37]	0.750
Child put on mother's chest and/or bare skin after birth	256	242	95.01 [90.07 - 97.56]	1.6	2.8[0.74:18.28]	0.185	.	.	.	.	.	.	2.62[0.84:8.96]	0.101
Child has health card	168	135	79.88 [71.29 - 86.39]	1.4	1.23[0.55:2.9]	0.624	1.97[0.34:37.2]	0.531	3.52[0.97:22.64]	0.099	1.2[0.18:23.46]	0.869	1.09[0.43:2.63]	0.852
Child had dhiarrea past2weeks	259	3	1.09 [0.33 - 3.59]	1	1.12[0.05:11.86]	0.927							1.28[0.12:27.83]	0.841
Had fever in last two weeks	259	64	24.86 [20.3 - 30.06]	0.8	1.13[0.61:2.04]	0.701	2.61[0.96:6.95]	0.0538	1.14[0.52:2.38]	0.732	4[1.03:16.64]	0.044	1.23[0.67:2.3]	0.505
Had cough in last two weeks	259	47	18.62 [12.65 - 26.55]	1.9	0.94[0.46:1.84]	0.857	1.3[0.36:3.84]	0.655	1.11[0.45:2.49]	0.805	2.32[0.48:9.15]	0.247	1.36[0.69:2.77]	0.384
Vitamin A in last 6 months	259	142	55.63 [45.86 - 64.99]	2.3	0.81[0.48:1.38]	0.440	0.8[0.3:2.11]	0.643	0.59[0.3:1.16]	0.128	1.01[0.26:4.18]	0.985	1.19[0.68:2.08]	0.549
Mother is anemic	248	121	49.45 [41.23 - 57.7]	1.6	1.16[0.68:1.98]	0.595	0.56[0.17:1.67]	0.312	0.87[0.43:1.76]	0.708	0.51[0.11:1.97]	0.347	1.22[0.7:2.12]	0.489
Currently pregnant	259	18	7.29 [4.14-12.52]	1.5	1.88[0.69:4.95]	0.203	0.77[0.04:4.11]	0.803	1.58[0.43:4.68]	0.445	.	.	0.61[0.23:1.63]	0.320
Births in last three years	259	272	74.79 [65.37 - 82.34]	2.3	1.67[0.98:2.9]	0.062	2.06[0.8:5.27]	0.131	2[1.02:3.94]	0.044	3.08[0.84:11.18]	0.085	1.18[0.69:2.05]	0.549

Contraceptive use women	259	55	20.03 [13.37 - 28.89]	2.3	0.56[0.27:1.1]	0.104	.	.	.	.	.	.	1.29[0.69:2.48]	0.436
Toilet facilities shared with other households	133	92	71.71 [54.37 - 84.36]	3.6	1.29[0.57:3.1]	0.556	.	.	2.87[0.89:12.84]	0.109	.	.	0.46[0.19:1.07]	0.078
Type of cooking fuel	255	244	95.33 [86.68 - 98.46]	3.5	2.11[0.53:14.08]	0.346	.	.	1.96[0.36:36.48]	0.526	.	.	2.04[0.52:8.46]	0.299
Owns a mobile telephone	259	58	22.57 [14.73 - 32.96]	2.9	0.51[0.24:1]	0.059	.	.	0.23 [0.06:0.68]	0.019	.	.	0.74[0.38:1.43]	0.364
Respondent currently working	259	193	76.90 [66.45 84.83]	2.9	1.73[0.92:3.39]	0.099	1.2[0.41:4.35]	0.756	1.8[0.8:4.63]	0.183	2.78[0.5:52.12]	0.339	1.04[0.54:1.95]	0.910
Mother works all year vs seasonally/casually	195	172	87.43 [69.74 - 95.45]	6.1	1.52[0.6:4.39]	0.405	1.81[0.33:33.67]	0.576	2.4[0.66:15.48]	0.253	0.94[0.16:17.98]	0.954	0.91[0.32:2.39]	0.846
Mother receives payments/in kind or not	195	22	12.33 [5.36 - 25.86]	4.1	0.4[0.11:1.12]	0.109	1.33[0.2:5.37]	0.719	0.44[0.07:1.62]	0.285	1.12[0.06:6.76]	0.916	0.69[0.25:1.93]	0.467
Owns a house alone or jointly	259	148	58.11 [45.52 - 69.73]	3.8	1.1[0.65:1.89]	0.727	0.73[0.28:1.94]	0.524	0.85[0.43:1.66]	0.623	0.93[0.24:3.85]	0.919	1.06[0.6:1.85]	0.840
Currently breastfeeding	259	160	61.91 [55.72 - 67.74]	0.9	0.9[0.52:1.55]	0.694	2.27[0.79:8.19]	0.159	1.4[0.7:2.94]	0.351	2.21[0.52:15.04]	0.329	0.98[0.56:1.71]	0.946
Gave child plain water	192	160	83.23 [73.7 - 89.79]	2.1	0.71[0.33:1.61]	0.405	.	.	.	.	.	.	3.31[0.95:13.19]	0.066
Gave child juice	192	4	2.13 [1.24 - 3.64]	0.3	0.73[0.04:5.83]	0.786	.	.	.	.	.	.	0.57[0.07:4.88]	0.581

Gave child tinned, powdered or fresh milk	192	27	14.03 [7.74 - 24.1]	2.4	0.24[0.05:0.71]	0.023	0.38[0.02:2]	0.358	0.17[0.01:0.83]	0.084	0.86[0.04:5.1]	0.888	1.66[0.64:4.9]	0.322
Gave child baby formula	192	52	25.92 [18.15 - 35.57]	1.8	0.97[0.48:1.91]	0.930	1.72[0.56:4.91]	0.319	2.12[0.95:4.67]	0.063	1.67[0.33:7.09]	0.491	1.12[0.54:2.39]	0.765
Gave child fortified baby food	192	49	25.81 [18.92 - 34.15]	1.4	0.64[0.3:1.31]	0.239	0.64[0.14:2.1]	0.504	0.97[0.38:2.24]	0.941	0.96[0.14:4.32]	0.958	0.97[0.47:2.06]	0.939
Gave child soup/clear broth	192	81	41.33 [30.57-52.99]	2.4	0.88[0.47:1.63]	0.679	0.79[0.26:2.23]	0.665	0.67[0.3:1.46]	0.329	0.8[0.16:3.36]	0.765	1.17[0.6:2.31]	0.644
Gave child other liquid	192	29	14.92 [9.73 - 22.21]	1.4	1.19[0.5:2.7]	0.684	1.31[0.29:4.43]	0.686	1.05[0.33:2.81]	0.928	1.91[0.27:8.82]	0.441	0.75[0.32:1.82]	0.517
Gave child bread, noodles, other made from grains	192	63	32.60 [22.48 - 44.66]	2.6	0.83[0.42:1.59]	0.576	0.65[0.18:1.96]	0.472	0.52[0.2:1.22]	0.154	0.66[0.09:2.97]	0.619	1.27[0.64:2.58]	0.496
Gave child potatoes, cassava, or other tubers	192	70	36.60 [26.07 - 48.59]	2.5	1.01[0.53:1.9]	0.968	0.76[0.23:2.2]	0.629	0.64[0.26:1.42]	0.286	1.76[0.4:7.65]	0.436	1.61[0.82:3.2]	0.173
Gave child eggs	192	9	4.12 [1.7 - 9.66]	1.5	0.62[0.09:2.64]	0.553	1.38[0.07:8.31]	0.767	0.61[0.03:3.52]	0.650	3.11[0.16:20.77]	0.315	1.17[0.3:5.74]	0.827
Gave child meat (beef, pork, lamb, chicken, etc)	192	1	0.4 [0.05 - 3.21]	0.8	.	.	.	.	.	.	.	.	.	.
Gave child pumpkin, carrots, squash (yellow or orange inside)	192	31	14.49 [8.51-23.57]	2	0.73[0.29:1.68]	0.476	0.71[0.11:2.74]	0.667	0.7[0.2:1.98]	0.541	0.72[0.04:4.28]	0.766	1.28[0.55:3.2]	0.576
Gave child any dark green leafy vegetables	192	59	30.63 [22.54 - 40.13]	1.7	1.07[0.54:2.04]	0.850	1.01[0.31:2.92]	0.986	0.71[0.28:1.64]	0.443	2.31[0.53:10.09]	0.249	1.87[0.93:3.89]	0.085

Gave child mangoes, papayas, other vitamin A fruits	192	54	27.40 [20.14 - 36.09]	1.5	1.14[0.58:2.22]	0.697	1.16[0.35:3.37]	0.793	1[0.41:2.26]	1.000	2.64[0.6:11.55]	0.181	2.28[1.1:4.94]	0.031
Gave child any other fruits	192	51	26.24 [18.4-35.93]	1.8	0.89[0.43:1.76]	0.741	0.9[0.24:2.73]	0.862	0.46[0.15:1.17]	0.132	1.67[0.33:7.09]	0.491	2.31[1.1:5.12]	0.032
Gave child liver, heart, other organs	192	3	1.31 [0.28 - 5.93]	1.4	1.1[0.05:11.72]	0.938	.	.	.	.	.	.	1.16[0.11:25.42]	0.902
Gave child fish or shellfish	192	56	29.05 [20.38 - 39.58]	2	0.94[0.47:1.83]	0.864	1.1[0.33:3.18]	0.871	0.63[0.24:1.5]	0.323	1.46[0.29:6.17]	0.613	1.97[0.96:4.22]	0.070
Gave child food made from beans, peas, lentils, nuts	192	58	28.55 [20.07-38.89]	2	0.78[0.39:1.52]	0.472	1.04[0.31:3.01]	0.948	0.6[0.23:1.41]	0.264	0.75[0.11:3.37]	0.730	1.21[0.6:2.47]	0.601
Gave child cheese, yogurt, other milk products	192	9	3.77 [1.28-10.56]	2	1.11[0.23:4.35]	0.890	1.38[0.07:8.31]	0.767	0.61[0.03:3.52]	0.650	3.11[0.16:20.77]	0.315	0.97[0.23:4.87]	0.963
Gave child other solid-semisolid food	192	106	53.50 [41.84 - 64.79]	2.5	0.74[0.4:1.36]	0.329	1.04[0.37:3.04]	0.934	0.9[0.42:1.95]	0.795	1.37[0.33:6.82]	0.675	1.09[0.53:2.19]	0.819
Currently residing with husband/partner	229	206	89.49 [82.64 - 93.84]	1.7	0.86[0.36:2.24]	0.753	0.77[0.2:5.14]	0.745	0.94[0.33:3.39]	0.914	0.32[0.07:2.26]	0.177	1.12[0.42:2.92]	0.812
Getting medical help: needs permission and big problem	259	125	48.43 [34.88 - 62.21]	4.8	1.19[0.7:2.02]	0.520	1.78[0.68:4.99]	0.249	1.15[0.59:2.26]	0.680	0.87[0.21:3.35]	0.835	1.29[0.74:2.26]	0.369
Getting medical help: needs money for treatment and big problem	259	210	81.30 [69.51 - 89.24]	3.9	1.95[0.95:4.34]	0.082	1.96[0.53:12.66]	0.381	1.82[0.73:5.53]	0.237	0.82[0.19:5.61]	0.807	0.9[0.43:1.83]	0.767
Getting medical help: distance to HF and big problem	259	163	63.43[51.99 - 73.54]	3.1	2.03[1.15:3.68]	0.017	2.19[0.76:7.91]	0.178	2.02[0.97:4.53]	0.071	2.14[0.5:14.54]	0.350	1.06[0.6:1.85]	0.850

Getting medical help for self: not wanting to go alone	259	145	57.22 [45.76 67.95]	3.2	1.86[1.08:3.24]	0.027	2.98[1.04:10.76]	0.060	2.12[1.05:4.53]	0.041	2.88[0.68:19.6]	0.192	0.93[0.53:1.61]	0.785
Source of drinking water (1: un-improved; 0 = improved)	256	140	55.25 [39.7 - 69.83]	5.9	1.59[0.93:2.75]	0.092	0.49[0.18:1.3]	0.158	1.07[0.55:2.12]	0.843	0.39[0.08:1.53]	0.195	1.08[0.61:1.88]	0.797
Type of toilet facility (1: un-improved; 0 = improved)	256	163	63.68 [51.73 - 74.15]	3.4	1.18[0.68:2.07]	0.563	0.68[0.26:1.84]	0.431	1.12[0.56:2.31]	0.751	0.69[0.18:2.84]	0.585	1.35[0.76:2.41]	0.306
Household has: radio	256	150	57.91 [46.24 - 68.76]	3.2	0.75[0.44:1.28]	0.289	0.89[0.34:2.4]	0.809	1.44[0.73:2.97]	0.305	0.56[0.14:2.17]	0.398	1.02[0.58:1.79]	0.951
Household has: bicycle	256	4	1.33 [0.38 - 4.59]	1.3	0.73[0.04:5.8]	0.787	.	.	.	.	.	.	.	.
Household has: motorcycle/scooter	256	27	9.81 [5.43 - 17.08]	2.2	0.47[0.15:1.19]	0.139	0.48[0.03:2.47]	0.478	0.18[0.01:0.9]	0.099	.	.	0.93[0.4:2.26]	0.876
Main roof material (1 = leaves or mat; 0 = Zinc or metal)	256	98	37.81 [27.63 - 49.19]	3.1	2.03[1.19:3.5]	0.010	1.71[0.65:4.55]	0.273	1.67[0.85:3.29]	0.134	1.33[0.32:5.15]	0.676	1.39[0.78:2.51]	0.261
Have mosquito bed net for sleeping (from household questionnaire)	259	254	97.87 [94.67 - 99.17]	1.1	0.29[0.04:1.78]	0.180	.	.	0.27 [0.04: 2.12}	0.161	.	.	2.4[0.39: 18.52]	0.343
Woman ate: Any foods made from cereal grains	259	226	87.8[77.69 - 93.7]	3.4	0.65[0.31:1.41]	0.260	0.46[0.15:1.73]	0.202	0.44[0.19:1.08]	0.059	0.48[0.11:3.33]	0.376	0.87[0.35:2.03]	0.746
Woman ate: Any vegetables or roots that are orange coloured inside	259	129	50.59 [39.16 - 61.95]	3.3	0.81[0.48:1.38]	0.444	0.79[0.29:2.08]	0.638	0.59[0.3: 1.17]	0.135	0.49[0.1: 1.91]	0.324	0.95[0.54:1.64]	0.845
Woman ate: Any white roots and tubers or plantains	259	172	66.00 [59.52 - 71.94]	1.1	0.91[0.53:1.6]	0.748	0.78[0.29:2.18]	0.614	0.85[0.43:1.75]	0.658	0.39[0.09:1.5]	0.167	1.05[0.59:1.87]	0.870

Woman ate: Any dark green leafy vegetables	259	173	60.28 [59.85 - 77.34]	2.2	1.24[0.71:2.21]	0.465	0.76[0.29:2.14]	0.588	0.74[0.37:1.49]	0.390	0.99[0.25:4.77]	0.987	1.19[0.66:2.14]	0.567
Woman ate: Any fruits that are dark yellow or orange inside	259	134	50.98 [39.92 - 61.94]	3	0.68[0.4:1.15]	0.148	1.18[0.45:3.19]	0.738	0.77[0.39:1.51]	0.452	0.74[0.18:2.85]	0.656	1.12[0.65:1.95]	0.679
Woman ate: Any other fruits	259	99	38.19 [27.46 - 50.2]	3.4	1.03[0.6:1.77]	0.907	1.3[0.48:3.42]	0.593	1.04[0.52:2.05]	0.909	1.29[0.31:4.99]	0.711	1.2[0.68:2.14]	0.529
Woman ate: Any other vegetables	259	151	57.56 [49.04 - 65.64]	1.7	1.29[0.75:2.23]	0.360	1.94[0.71:6.19]	0.223	1.29[0.65:2.62]	0.470	1.44[0.37:6.97]	0.609	0.92[0.52:1.6]	0.761
Woman ate: Any meat made from animal organs	259	39	15.94 [7.56 - 30.56]	5.8	1.31[0.63:2.64]	0.463	1.72[0.47:5.14]	0.362	0.96[0.34:2.32]	0.934	1.68[0.24:7.3]	0.527	1.19[0.55:2.71]	0.667
Woman ate: Any other types of meat or poultry	258	84	30.65 [21.1 - 42.21]	3.2	0.79[0.44:1.4]	0.433	2.22[0.83:5.9]	0.106	1.09[0.53:2.18]	0.813	1.7[0.41:6.6]	0.438	0.91[0.5:1.65]	0.742
Woman ate: Any eggs	259	70	27.78 [17.22 - 39.14]	3.8	0.94[0.51:1.7]	0.851	1.37[0.46:3.68]	0.548	0.85[0.38:1.79]	0.679	1.35[0.28:5.27]	0.677	0.82[0.45:1.52]	0.528
Woman ate: Any fish or seafood, whether fresh or dried	259	181	68.57 [61.25 - 75.07]	1.4	1.01[0.57:1.81]	0.978	2.24[0.71:9.89]	0.213	1.05[0.51:2.25]	0.897	3.53[0.63:66.15]	0.238	0.98[0.53:1.8]	0.961
Woman ate: Any beans or peas	259	100	38.98 [29.05 - 49.91]	2.9	0.93[0.54:1.6]	0.806	1.66[0.62:4.39]	0.304	0.9[0.44:1.78]	0.772	0.79[0.16:3.07]	0.745	0.69[0.39:1.22]	0.200
Woman ate: Any nuts or seeds	259	135	51.89 [49 - 58.23]	1	1.02[0.6:1.74]	0.935	0.9[0.34:2.37]	0.824	0.68[0.34:1.32]	0.253	0.71[0.17:2.76]	0.623	0.94[0.54:1.63]	0.822
Woman ate: Any milk or milk products	259	56	20.85 [13.56 - 30.66]	2.7	0.97[0.5:1.82]	0.923	1.45[0.45:4.06]	0.496	1.02[0.43:2.22]	0.955	1.05[0.15:4.5]	0.951	1.08[0.56:2.13]	0.813

Woman ate: Any insects and other small protein foods	259	83	31.19[22.99 - 40.77]	2.3	0.95[0.53:1.66]	0.854	1.39[0.49:3.68]	0.511	1.27[0.62:2.53]	0.498	0.6[0.09:2.55]	0.530	0.83[0.46:1.51]	0.528
Woman ate: Any red palm oil	259	234	91.51[84.17 - 95.63]	2.4	0.64[0.28:1.54]	0.303	0.81[0.21:5.34]	0.789	0.56[0.22:1.62]	0.245	.	.	1.32[0.51:3.33]	0.562
Woman ate: Any other oils and fats	259	125	47.74[35.14 - 60.63]	4.1	0.83[0.49:1.4]	0.483	0.85[0.31:2.22]	0.738	0.57[0.28:1.12]	0.106	0.52[0.11:2.04]	0.370	0.9[0.52:1.57]	0.714
Woman ate: Any savory and fried snacks	259	33	11.90[6.92 19.68]	2.3	0.56[0.22:1.3]	0.203	1.45[0.32:4.73]	0.576	0.7[0.2:1.92]	0.534	.	.	1.67[0.65:4.87]	0.308
Woman ate: Any sweets	259	57	21.44 [13.21 32.86]	3.5	0.75[0.38:1.43]	0.399	1.42[0.44:3.95]	0.525	1[0.42:2.16]	0.992	0.44[0.02:2.47]	0.442	1.05[0.53:2.13]	0.897
Woman ate: Any sugar-sweetened beverages	259	76	29.77 [19.38 42.7]	4.1	0.73[0.4:1.31]	0.306	0.93[0.29:2.56]	0.892	0.63[0.27:1.35]	0.260	0.68[0.1:2.91]	0.642	0.87[0.49:1.58]	0.651
Ethnicity: Mende	259	222	86.71[68.82 95.07]	8.2	1.46[0.68:3.43]	0.353	0.16[0.06:0.45]	0.000	0.78[0.33:2.04]	0.579	0.54[0.12:3.71]	0.450	1.14[0.47:2.67]	0.774
Ethnicity: Sherbro	259	29	10.33[3.17 28.82]	8.9	0.84[0.33:1.91]	0.683	9.26[3.2:26.39]	0.000	1.83[0.68:4.45]	0.199	2.55[0.37:11.25]	0.259	1.43[0.54:4.21]	0.491
Ethnicity: Temne	259	6	2.30[0.92 - 5.63]	1.2	0.44[0.02:2.79]	0.458	.	.	.	.	.	.	0.31[0.01:3.33]	0.347
Owns a land alone or jointly	259	148	58.11[45.52 69.73]	3.8	1.1[0.65:1.89]	0.727	0.73[0.28:1.94]	0.524	0.85[0.43:1.66]	0.623	0.93[0.24:3.85]	0.919	1.06[0.6:1.85]	0.840
Floor material Earth/sand	255	160	63.16[52.4 72.75]	2.7	2.25[1.27:4.12]	0.007	1.45[0.52:4.69]	0.496	1.69[0.82:3.7]	0.168	2.12[0.5:14.42]	0.356	1.1[0.61:1.96]	0.751

Floor material ceramic tiles	255	5	1.91[0.61 - 5.78]	1.5	1.47[0.19:9.04]	0.676	.	.	.	.	.	.	0.62[0.07:5.27]	0.638
Floor material cement	255	86	33.39[24.49 43.64]	2.5	0.41[0.22:0.75]	0.005	0.81[0.25:2.27]	0.706	0.61[0.27:1.28]	0.207	0.55[0.08:2.35]	0.468	0.93[0.52:1.69]	0.815
Floor material carpet	255	4	1.55[0.71 - 3.34]	0.6	0.73[0.04:5.77]	0.783	.	.	.	.	.	.	1.26[0.12:27.37]	0.851
Child is twin	259	12	2.05 [0.93 - 4.45]	0.8	2.34 [0.71-7.70]	0.153	1.22 [0.06 6.86]	0.854	1.83 [0.39 6.47]	0.379	2.69 [0.14 16.70]	0.37	0.89 [0.27:3.09]	0.843
Frequency of reading newspaper or magazine (1 = once a week or less; 0 = never)	259	6	1.18 [0.26 - 5.19]	1.6	.	.	.	.	.	.	.	.	1.94 [0.24:39.52]	0.569
Frequency of listening to radio (1 = once a week or less; 0 = never)	259	42	7.30 [4.09 12.73]	1.6	0.66 [0.29:1.37]	0.281	.	.	0.51 [0.15:1.37]	0.228	.	.	0.98[0.46:2.1]	0.956
Frequency of watching television (1 = once a week or less; 0 = never)	259	26	750[3.34 15.98]	3.1	0.64 [0.23:1.58]	0.367	.	.	0.19 [0.01: 0.95]	0.112	.	.	0.95 [0.38:2.54]	0.921

ANNEX B: LINEAR REGRESSION DHS 2019

Table 17: Unadjusted associations between risk factors and wasting, stunting and underweight demonstrated by linear regression (SOURCE: Sierra Leone 2019 Demographic and Health Survey (DHS))

Risk factor *Descriptive statistics and Linear regressions*					**Stunting [HAZ]** *Children 6-59 months*			**Wasting [WHZ]** *Children 6-59 months*			**Underweight [WAZ]** *Children 6-59 months*			**Anaemia [Hg/dl]** *Children 6-59 months*		
Indicator	**N**	**Mean [95% CI]**	**Standard error**	**Design Effect**	**Coeff.**	**SE**	**P-value**	**Coeff.**	**SE**	**P-value**	**Coeff.**	**SE**	**P-value**	**Coeff.**	**SE**	**P-value**
Wealth index combined	259	2.05 [1.81 - 2.3]	0.125	3.1	0.220	0.075	0.004	-0.023	0.073	0.753	0.1	0.064	0.119	1.227	0.759	0.107
Number of household members (listed)	259	6.44 [5.91 - 6.97]	0.27	3.2	0.052	0.035	0.142	0.005	0.034	0.894	0.034	0.030	0.248	-0.314	0.351	0.372
Number of children 5 and under in household (de jure)	259	2.04 [1.9 - 2.18]	0.07	1.7	-0.101	0.102	0.324	-0.066	0.099	0.506	-0.103	0.086	0.234	-0.502	1.073	0.641
Number of eligible women in household (de facto)	259	1.51 [1.34 - 1.6]	0.09	3.6	0.215	0.114	0.059	-0.102	0.110	0.354	0.047	0.096	0.626	-0.545	1.102	0.622
Age of household head	259	41.97[39.16 - 44.79]	1.43	3.3	0.012	0.007	0.095	0.010	0.007	0.131	0.014	0.006	0.015	-0.091	0.069	0.187
Child's age in months	259	26.04[24.39 - 27.6]	0.819	0.6	0.000	0.005	0.977	-0.015	0.005	0.001	-0.009	0.004	0.027	0.185	0.053	0.001
Preceding birth interval (months)	204	44.85[41.83 - 47.87]	1.54	0.8	0.002	0.004	0.658	-0.005	0.004	0.209	-0.002	0.003	0.581	0.009	0.037	0.814
Months of breastfeeding	114	9.37[7.82 - 10.92]	0.79	1.6	-0.016	0.021	0.458	-0.075	0.019	0.000	-0.046	0.018	0.010	-0.173	0.229	0.453
Number of antenatal visits during pregnancy	76	6.19[5.64 - 6.76]	0.286	1.1	0.009	0.077	0.911	0.065	0.070	0.360	0.048	0.061	0.440	0.482	0.714	0.502
Birthweight	217	3.100 [3.023- 3.178]	0.396	1.5	0.001	0.000	0.000	0.000	0.000	0.835	0.000	0.000	0.019	0.001	0.002	0.593
Child weight in kg	259	10.80[10.48 - 11.12]	0.163	0.6	0.089	0.024	0.000	0.019	0.024	0.417	0.080	0.020	0.000	0.788	0.273	0.004
Child height in cm	259	81.48[79.96 - 83]	0.775	0.7	0.024	0.006	0.000	-0.023	0.005	0.000	0.000	0.005	0.938	0.227	0.069	0.001
Child Hg (g/dl)	213	105.5[104.06 106.87]	0.716	0.7	0.005	0.008	0.478	0.001	0.006	0.919	0.003	0.006	0.689	.	.	.
Highest year of education (mother)	93	3.93 [3.53 4.33]	0.206	1.3	0.029	0.079	0.717	-0.043	0.067	0.520	-0.012	0.062	0.844	-0.324	0.898	0.720

Women age	259	29.03[28.05 - 30.02]	0.504	1.7	-0.009	0.014	0.528	-0.001	0.014	0.922	-0.005	0.012	0.647	0.267	0.141	0.060
Mother Hg (g/dl)	248	118.72[116.53 120.91]	1.117	1.6	0.007	0.006	0.266	-0.001	0.006	0.900	0.004	0.005	0.403	0.100	0.063	0.113
Births in past year	259	0.48[0.39 - 0.57]	0.048	1.9	0.136	0.158	0.389	0.117	0.152	0.443	0.099	0.133	0.458	0.951	1.572	0.546
Body Mass Index (mother)	258	22.80[22.14 - 23.47]	0.341	2.8	0.051	0.027	0.061	0.053	0.026	0.042	0.062	0.022	0.006	0.392	0.267	0.143
Respondent's rank among wives	61	1.6[1.42 - 1.85]	0.109	2.4	0.098	0.375	0.795	0.304	0.301	0.317	0.219	0.302	0.472	4.447	4.315	0.308
Husband highiest education level	69	4.09[3.29 - 4.9]	0.41	3.3	-0.055	0.084	0.516	-0.081	0.072	0.264	-0.132	0.073	0.074	1.073	0.921	0.249
Time to get to water source	255	10.76[8.66 - 12.87]	1.07	3.4	-0.012	0.009	0.187	-0.003	0.009	0.714	-0.009	0.008	0.240	-0.058	0.098	0.551

ANNEX C: LOGISTIC REGRESSION MICS 2017

Table 18: Unadjusted associations between risk factors and binary classifications of wasting, stunting and underweight demonstrated by logistic regression (SOURCE: Sierra Leone 2017 Multiple Indicator Cluster Surveys)

Risk factor *Descriptive statistics and Logistic regressions*					**Stunting [HAZ] <-2)** *Children 6-59 months*		**Wasting (GAM) [WHZ<-2]** *Children 6-59 months*		**Underweight [WAZ <-2]** *Children 6-59 months*		**WAST (HAZ &WHZ <-2)** *Children 6-59 months*	
Indicator	**N**	**n**	**Proportion in analysed sample [95% CI]**	**Design effect**	**Odds Ratio [95% CI]**	**P-value**	**Odds Ratio [95% CI]**	**P-value**	**Odds Ratio [95% CI]**	**P-value**	**Odds Ratio [95% CI]**	**P-value**
Sex child	707	344	48.20 [44.34-52.08]	1	0.78[0.55:1.11]	0.169	0.91[0.42:1.94]	0.804	0.81[0.51:1.28]	0.369	1.27[0.38:4.45]	0.694
Age child less 24m	707	262	37.03 [33.41-40.82]	1	0.7[0.48:1.02]	0.064	8.47[3.44:25.46]	0.000	1.94[1.23:3.07]	0.005	7.98[2.04:52.64]	0.008
Covered by any health insurance	702	16	3.08 [1.12-8.17]	5.4	2.19[0.72:6.16]	0.143	3.61[0.55:13.84]	0.101	1.05[0.16:3.84]	0.950		
Vaccination card for child	707	573	79.97 [72.87-85.59]	4.3	1.24[0.79:2.01]	0.360	1.07[0.43:3.25]	0.887	1.45[0.79:2.89]	0.255	1.03[0.26:6.8]	0.972
Child ever received any vaccinations	213	189	87.94 [76.43 - 94.29]	3.6	1.52[0.49:6.7]	0.517			0.97[0.25:6.41]	0.970		
Hit child on the bottom or elsewhere with belt, brush, stick, etc.	568	52	9.85 [6.78 - 14.13]	2	0.77[0.37:1.49]	0.461			0.64[0.19:1.65]	0.414		
Child drank or ate vitamin or mineral supplements yesterday	399	91	23.06 [17.68 - 29.49]	1.9	0.36[0.18:0.69]	0.004	0.96[0.34:2.32]	0.929	0.62[0.28:1.27]	0.220	0.73[0.11:2.9]	0.693

Child drank plain water yesterday	400	374	93.63 [89.76 - 96.1]	1.5	1.34[0.53:4.09]	0.573	0.86[0.24:5.57]	0.849	0.87[0.32:3.07]	0.807		
Child drank juice or juice drinks yesterday	397	25	6.15 [2.59 - 13.9]	4.5	1.54[0.61:3.59]	0.335	1.97[0.44:6.21]	0.299	0.52[0.08:1.84]	0.387	1.48[0.08:8.24]	0.713
Child drank clear broth / watery soup yesterday	400	36	8.33 [5.09-13.36]	2.01	1.26[0.56:2.64]	0.557	0.79[0.12:2.82]	0.759	0.76[0.22:2.03]	0.627	2.28[0.34:9.31]	0.304
Child drank milk yesterday	399	34	9.97 [6.65 - 14.71]	1.7	0.31[0.07:0.89]	0.057	0.39[0.02:1.94]	0.367	0.58[0.14:1.7]	0.383		
Child ate fortified baby food (gerber, hero, cerelac, nestum, etc.) yesterday	704	50	7.75 [5.04 - 11.25]	2.3	0.63[0.27:1.31]	0.251	1.04[0.16:3.65]	0.955	1.23[0.49:2.68]	0.622		
Child ate foods made from grains yesterday	706	575	80.67 [75.96 - 84.64}	2.1	1.2[0.77:1.95]	0.434	0.46[0.21:1.09]	0.063	0.69[0.41:1.21]	0.181	0.59[0.17:2.74]	0.445
Child ate pumpkin, carrots, squash etc. yesterday	704	104	15.11 [9.98 - 22.23]	4.9	0.9[0.54:1.47]	0.692	1.28[0.42:3.18]	0.630	0.67[0.3:1.32]	0.277	0.57[0.03:3.03]	0.596
Child ate green leafy vegetables yesterday	705	430	62.06 [57.66 - 66.27]	1.3	0.89[0.62:1.27]	0.516	0.85[0.4:1.86]	0.672	0.71[0.45:1.12]	0.137	1.12[0.34:4.32]	0.855
Child ate ripe mangoes, papayas yesterday	704	48	7.39[4.28 - 12.41]	3.9	0.84[0.39:1.66]	0.636	1.67[0.39:5.01]	0.413	0.65[0.19:1.66]	0.4249	1.36[0.07:7.32]	0.773
Child ate other fruits or vegetables yesterday	703	57	8.21 [5.41 12.27]	2.6	1.29[0.68:2.32]	0.416	2.65[0.86:6.75]	0.059	1.05[0.42:2.27]	0.901	1.14[0.06:6.14]	0.899
Child ate liver, kidney, heart or other organ meat yesterday	701	13	1.97 [1.14 - 3.37]	1	0.58[0.09:2.18]	0.480	7.92[1.7:27.82]	0.003	1.34[0.2:5.1]	0.707	5.58[0.29:32.87]	0.114

Child ate meat, such as beef, pork, lamb, goat, chicken, duck yesterday	701	13	1.70 [0.76 - 3.77]	1..9	0.58[0.09:2.2]	0.487	2.03[0.11:10.89]	0.504				
Child ate fresh or dried fish or shellfish yesterday	704	382	53.39[47.02 59.65]	2.8	0.97[0.68:1.38]	0.851	0.45[0.2:0.98]	0.050	0.54[0.34:0.86]	0.010	0.48[0.12:1.59]	0.239
Child ate beans, peas, lentils or nuts or any food made from these yesterday	705	116	16.94 [12.62 22.36]	2.9	1.05[0.65:1.65]	0.851	0.6[0.14:1.74]	0.403	0.43[0.18:0.9]	0.040		
Child ate cheese or other food made from milk yesterday	702	12	1.81 [1.06 - 3.08]	0.9	1.65[0.44:5.31]	0.418			0.66[0.04:3.47]	0.695		
Child ate white potatoes, white yams, manioc, cassava etc. yesterday	705	340	47.73 [41.98 53.54]	2.3	0.97[0.68:1.37]	0.856	0.58[0.26:1.26]	0.179	0.78[0.49:1.24]	0.295	0.39[0.09:1.37]	0.170
Child ate eggs yesterday	704	52	9.40 [4.82 17.55]	7.5	0.66[0.3:1.33]	0.277	1.53[0.36:4.56]	0.500	0.96[0.36:2.15]	0.921	1.24[0.07:6.68]	0.837
Child ate other solid, semi-solid or soft food yesterday	703	9	1.36 [0.45 - 4.09]	2.9	4.19[1.1:17.12]	0.034						
Child had diarrhoea in last 2 weeks	704	16	2.3 [1.34 - 4.06]	1.30	0.45[0.07:1.64]	0.296	1.62[0.09:8.48]	0.644	1.72[0.39:5.49]	0.4032	4.47[0.24:25.67]	0.166
Child ill with fever in last 2 weeks	703	118	17.41 [14.23 21.13]	1.40	0.86[0.52:1.38]	0.546	3.64[1.6:7.99]	0.002	1.68[0.95:2.87]	0.062	5.12[1.4:18.68]	0.011
Child ill with cough in last 2 weeks	697	62	9.07 [5.92 13.64]	2.90	0.95[0.49:1.72]	0.866	2.43[0.79:6.2]	0.084	1.9[0.93:3.63]	0.063	6.11[1.56:20.85]	0.005
Mother's disability status	642	47	6.94[3.81 12.31]	4	2.28[1.22:4.19]	0.008	0.52[0.03:2.53]	0.521	2.84[1.35:5.61]	0.004		

Mother's health insurance status	642	13	2.85[0.97 - 8.11]	5.2	0.63[0.1: 2.43]	0.557	2.29[0.12:12.51]	0.437	0.68[0.04:3.58]	0.716		
Child health insurance	702	16	3.07[1.12 - 8.17]	5.4	2.19[0.72:6.16]	0.143	3.61[0.55:13.84]	0.101	1.05[0.16:3.84]	0.950		
Access to listening to radio	639	189	31.18 [21.96 42.18]	7.5	0.81[0.53:1.21]	0.313	0.93[0.35:2.17]	0.866	0.67[0.37:1.16]	0.171		
Access to reading newspapers	639	13	2.13[1.19 - 3.82]	1.2	0.56[0.09:2.13]	0.461	2.08[0.11:11.25]	0.489				
Access to watching TV	639	18	3.14[1.68 - 5.77]	1.9	0.62[0.14:1.91]	0.455			0.46[0.03:2.31]	0.457		
Currently pregnant	638	17	3.06[1.78 - 5.2]	1.4	1.33[0.42:3.64]	0.601	1.55[0.08:8.1]	0.677	1[0.16:3.64]	0.999	3.77[0.2:21.57]	0.218
Ever used a method to avoid pregnancy	522	46	8.68 [5 14.66]	3.5	0.78[0.34:1.6]	0.520	1.18[0.18:4.29]	0.825	0.96[0.32:2.32]	0.929	1.32[0.07:7.41]	0.798
Live births in last 5 years	631	616	97.69[95.74 98.87]	1.5	0.47[0.17:1.42]	0.156			0.51[0.16:2.26]	0.300		
Currently using a method to avoid pregnancy	620	113	18.45 [13.57 24.59]	3	1.26[0.78:1.98]	0.329	1.2[0.39:3.05]	0.726	1.18[0.62:2.12]	0.590	1.12[0.17:4.55]	0.887
If she goes out without telling husband: wife beating justified	639	395	57.61 [46.1 68.36]	8.1	1.02[0.7:1.49]	0.925	1.1[0.49:2.64]	0.822	0.76[0.47:1.24]	0.2627	1.08[0.32:4.16]	0.903
If she argues with husband: wife beating justified	632	356	57.79 [43.18 64.07]	6.9	1.21[0.84:1.76]	0.316	1.93[0.82:5.04]	0.151	0.9[0.55:1.47]	0.663	7.18[1.34:132.89]	0.062

If she burns the food: wife beating justified	633	53	8.92[4.87 15.79]	5.2	0.83[0.4: 1.61]	0.606	2.97[0.96:7.73]	0.037	1.38[0.58:2.91]	0.425	4.33[0.93 :15.52]	0.034
Husband/partner has more wives or partners	571	91	17.74[14.29 21.81]	1.3	1.19[0.7: 1.97]	0.508	0.93[0.21:2.83]	0.905	1.17[0.58:2.22]	0.639	0.89[0.05 :5.31]	0.916
Currently married or living with a man	639	573	89.90[86.77 92.35]	1.3	1.07[0.6: 2.03]	0.828	0.43[0.17:1.34]	0.108	0.94[0.45:2.22]	0.884	0.19[0.05 :0.73]	0.009
Place of delivery (1=Home; 0= hospital/ HF/ HP)	615	64	8.82[1 4.76 15.81]	5.2	1.54[0.86:2.68]	0.132	1.18[0.27:3.53]	0.795	1.76[0.83:3.45]	0.115		
child given anything else to drink within first 3days	614	46	8.03[4.2 - 14.8]	5.2	1.79[0.93:3.35]	0.007	1.73[0.4: 5.24]	0.391	1.46[0.58:3.22]	0.379	1.22[0.07 :6.61]	0.849
HH has mosquito net	554	358	63.41[55.42 70.72]	3.4	1.01[0.67:1.53]	0.957	0.96[0.4: 2.45]	0.932	0.86[0.51:1.49]	0.588	1.11[0.29 :5.31]	0.884
Main material of floor (1=cement; 0=sand/wood/dung)	707	179	26.12[19.54 33.99]	4.7	1.19[0.8: 1.76]	0.376	0.98[0.38:2.25]	0.972	1.21[0.72:1.99]	0.456	0.3[0.02: 1.56]	0.246
Main material of roof (1= zinc; 0=leaves,sod/wood)	707	391	56.84[48.31 64.98]	4.9	1.26[0.88:1.8]	0.204	1.26[0.59:2.8]	0.564	1.36[0.86:2.19]	0.197	0.46[0.12 :1.52]	0.213
Household own any animals	704	408	58.24[50.21 65.86]	4.4	1.09[0.76:1.55]	0.652	1.55[0.71:3.65]	0.287	1.27[0.8: 2.05]	0.325	1.27[0.38 :4.88]	0.706
Any member of household own: Bicycle	705	32	5.03[2.99 - 8.33]	2.4	0.76[0.28:1.77]	0.558	1.71[0.27:6.12]	0.479	1.1[0.32: 2.89]	0.867		
Any member of household own: Motorcycle or scooter	707	56	8.94[5.1 15.21]	5.1	0.46[0.19:0.97]	0.059	2.78[0.9: 7.1]	0.047	1.09[0.44:2.34]	0.847	1.22[0.07 :6.57]	0.849

Any household member own bank account	702	66	11.06[6.86 17.35]	4.6	0.9[0.47: 1.63]	0.739	2.21[0.72:5.6]	0.120	0.87[0.35:1.87]	0.749		
There been any time in the last month without sufficient water	706	84	12.03[8.08 17.55]	3.5	1.25[0.73:2.06]	0.400	1.24[0.36:3.31]	0.698	0.87[0.39:1.73]	0.714	0.73[0.04 :3.87]	0.763
Treat water to make safer for drinking	707	90	13.78[6.95 25.49]	11.8	1.09[0.64:1.8]	0.756	2.38[0.91:5.52]	0.055	0.69[0.3: 1.41]	0.345	0.69[0.04 :3.67]	0.726
No toilet facility	706	490	65.13[53.21 75.41]	9.5	1.09[0.75:1.61]	0.660	1.33[0.58:3.41]	0.524	1.04[0.64:1.74]	0.869	4.4[0.84: 81.06]	0.159
Type of toilet facility (1 = un-improved)	706	548	73.94[62.64 82.76]	9.1	0.99[0.66:1.52]	0.959	1.05[0.44:2.89]	0.921	1.06[0.62:1.89]	0.838	2.87[0.54 :52.79]	0.317
Toilet facility shared	217	163	75.41[64.24 83.96]	2.8	0.64[0.32:1.32]	0.213	0.42[0.09:2.2]	0.269	1.06[0.42:3.06]	0.902		
Observed place for handwashing in HH	707	164	27.53[17.51 40.48]	11.6	0.86[0.56:1.3]	0.479	0.9[0.33: 2.13]	0.825	1.04[0.6: 1.76]	0.873	0.33[0.02 :1.74]	0.292
Soap/other material available for washing hands	674	117	18.36[12.44 26.25]	5.1	0.95[0.58:1.51]	0.839	0.56[0.13:1.62]	0.346	1.18[0.64:2.07]	0.588	0.47[0.03 :2.47]	0.468
What was done to dispose of the stools (1 = buried; 0 = disposed in toilet/ditch/garbage)	337	102	27.58[18.98 38.25]	3.8	0.82[0.47:1.41]	0.493	0.85[0.3: 2.13]	0.738	0.66[0.31:1.33]	0.266	1.13[0.23 :4.36]	0.868
Sex of household head (1 = male)	707	594	82.98[79.67 85.85]	1.2	1.11[0.69:1.83]	0.671	1.15[0.44:3.98]	0.795	0.79[0.45:1.46]	0.423	0.87[0.22 :5.73]	0.855
Education of household head (1 = primary or above; 0 = no education)	707	187	28.98[20.98 38.53]	6.5	0.83[0.55:1.23]	0.356	0.93[0.36:2.13]	0.875	0.74[0.41:1.25]	0.274	0.28[0.02 :1.47]	0.224

Religion of household head (1 = Muslim; 0 = Christian)	704	629	88.51[83.34 92.23]	3.2	0.98[0.57:1.76]	0.9379	1[0.34:4.27]	0.9979	1.16[0.56:2.69]	0.714		
Ethnic group of household head (1 = Mende; 0 = other minorities)	707	581	81.91[71.45 89.12]	8.9	1.22[0.77:1.99]	0.4039	0.99[0.4:3]	0.9886	1.2[0.66:2.34]	0.5648	0.97[0.25:6.41]	0.9691
Mother's education (0 = none; 1 = primary or above)	707	201	30.30[22.55 39.37]	5.8	0.73 [0.48:1.08]	0.121	1.02 [0.41:2.26]	0.971	0.77 [0.44:1.28]	0.324	1.47 [0.38 :4.91}	0.546
Life satisfaction worsened compared last year	636	13	2.23[0.93 - 5.26]	2.7	2.77 [0.88:8.45}	0.072			0.62 [0.03: 3.20}	0.645		
Mother feels happy	639	544	85.10[76.16 91.08]	6.6	0.86 [0.53 :1.44]	0.552	2.06 [0.6:12.9]	0.332	0.73 [0.40 :1.42]	0.33	1.76 [0.33:32.52]	0.591

ANNEX D: LINEAR REGRESSION MICS 2017

Table 19: Unadjusted associations between risk factors and binary classifications of wasting, stunting and underweight demonstrated by linear regression (SOURCE: Sierra Leone 2017 Multiple Indicator Cluster Surveys)

Risk factor *Descriptive statistics and Linear regressions*					**Stunting [HAZ]** *Children 6-59 months*			**Wasting [WHZ]** *Children 6-59 months*			**Underweight [WAZ]** *Children 6-59 months*		
Indicator	**N**	**Mean** **[95% CI]**	**Standard error**	**Design Effect**	**Coeff.**	**SE**	**P-value**	**Coeff.**	**SE**	**P-value**	**Coeff.**	**SE**	**P-value**
Child Age (months)	707	30.33 [28.88:31.77]	0.738	1.3	-0.012	0.003	0.000	0.004	0.002	0.135	-0.004	0.003	0.140
Days left in the care of another child, that is someone less than 10 years old, for more than one hour	707	0.49[0.35 0.63]	0.0705	2.3	-0.076	0.046	0.101	0.017	0.036	0.625	-0.024	0.036	0.515
Times child ate solid or semi-solid food	645	2.63 [2.48 2.78]	0.079	2.5	-0.041	0.045	0.354	0.052	0.033	0.111	0.032	0.034	0.344
Child's weight (kilograms)	707	11.50 [11.15 - 11.86]	0.182	1.8	0.070	0.015	0.000	0.081	0.011	0.000	0.112	0.011	0.000
Child's length or height (centimetres)	707	85.00 [83.69 - 86.3]	0.669	1.5	0.019	0.004	0.000	-0.001	0.003	0.786	0.015	0.003	0.000
Wealth index quintile	707	2.04 [1.85 - 2.23]	0.099	5.7	0.031	0.052	0.547	0.034	0.040	0.390	0.021	0.040	0.609
Mother's education	707	0.61[0.45 - 0.77]	0.081	4.4	0.062	0.055	0.263	0.065	0.042	0.125	0.081	0.043	0.061
Age of woman	639	29.04 [28.54 - 29.54]	0.257	0.9	0.002	0.008	0.798	0.001	0.007	0.903	-0.001	0.007	0.886
Age of husband/partner	529	37.75 [36.51 - 39.00]	0.634	2.3	-0.003	0.006	0.679	-0.004	0.005	0.388	-0.006	0.005	0.217

Life satisfaction in comparison with last year	636	.	.	.	-0.225	0.125	0.007	0.118	0.098	0.229	-0.035	0.100	0.727
Children ever born	639	3.19 [3.00 - 3.38]	0.096	2.1	-0.038	0.033	0.255	0.002	0.026	0.939	-0.030	0.027	0.263
Estimation of overall happiness (scale 1-5 where 1: very happy and 5: very unhappy)	639	.	.	.	0.004	0.073	0.959	-0.017	0.057	0.772	-0.002	0.058	0.968
Time baby put to breast (in hrs)	614	0.84[0.58 1.09]	0.128	2.6	0.015	0.029	0.606	0.001	0.023	0.970	0.012	0.023	0.612
Number of HH members	707	6.51 [6.13 6.9]	0.195	3.8	0.042	0.021	0.040	-0.041	0.016	0.010	-0.012	0.016	0.448
Number of women 15 - 49 years	707	1.43 [1.3 1.56]	0.067	4.3	0.135	0.064	0.037	-0.091	0.050	0.066	-0.019	0.050	0.710
Number of rooms used for sleeping	707	2.94 [2.74 3.15]	0.104	4.2	-0.006	0.041	0.883	-0.087	0.031	0.006	-0.067	0.032	0.037
Number of goats	408	1.75 [1.15 2.34]	0.104	4	0.035	0.024	0.141	0.017	0.018	0.329	0.020	0.018	0.278
Number of sheep	408	0.61 [0.36 0.86]	0.128	3.2	0.031	0.054	0.569	-0.005	0.040	0.903	-0.018	0.041	0.662
Number of chickens	408	10.50 [8.74 - 12.26]	0.896	4.6	0.015	0.009	0.092	0.014	0.007	0.039	0.016	0.007	0.017
Number of ducks	408	0.59 [0.01- 1.19]	0.306	4.5	-0.012	0.032	0.693	-0.049	0.023	0.037	-0.034	0.024	0.157
Acres of agricultural land members of household owns	503	6.18 [4.09 8.28]	1.07	3.2	0.010	0.005	0.072	0.006	0.004	0.116	0.010	0.004	0.017
Number of times person collected water in the last seven days	533	7.02 [6.14 7.9]	0.449	2.4	-0.004	0.009	0.675	0.001	0.007	0.869	-0.002	0.007	0.739
Rural wealth score	611	(-0.18 [-0.29 - -0.08])	0.053	3.9	-0.060	0.090	0.507	-0.037	0.071	0.604	-0.065	0.073	0.376

Time (in minutes) to get water and come back	545	13.17 [9.69 - 16.67]	1.781	3	0.002	0.003	0.507	0.000	0.002	0.892	0.001	0.002	0.670
Number of children under age 5	707	1.80 [1.69 1.92]	0.056	2.9	0.074	0.059	0.211	-0.068	0.046	0.140	-0.023	0.047	0.629

ANNEX E: QUALITATIVE STUDY GUIDE

INFORMATION NOTE[188]

Nutrition causal analysis Link NCA in Bonthe District, Southern Province, Sierra Leone is conducted by Action Against Hunger UK with an operational support of Action Against Hunger Sierra Leone. The main objective of the study is to identify the drivers of persistently high levels of chronic malnutrition in the study area in order to help strengthen the impact of nutritional security programming.

Name of principal researcher: Lenka Blanárová / Patrizia Pajak

INVITATION: We would like you to participate in a study conducted by Action Against Hunger Sierra Leone, whose programme covers health and nutrition, water supply, sanitation and hygiene and basic education.

STUDY OBJETIVES: The objective of this study is to improve our understanding of causes of child undernutrition in Bonthe District. We are hoping that this study will help us to identify risk factors triggering the undernutrition in your community so that together and with the involvement of local authorities and other partners we can reduce the malnutrition in the future. The study will take place from 28th November to 18th December 2022 in three purposively selected communities in Bonthe District.

PROCEDURE: In your community we would like to spend 6 consecutive days, starting today. We will share a detailed planning of our activities in order to facilitate the selection and mobilisation of participants for interviews and focus group discussions. The study will concern mainly parents of children under 5 years of age but other key informants may be solicited to contribute. Any person desiring to share his opinion outside of scheduled interviews and focus group discussions can approach the study team to do so. The study team would also like to conduct a number of observations and household visits in your community, if possible, in order for us to better understand your daily challenges. Focus groups discussions will be organised around themes, such as health, nutrition, care practices, water, hygiene and sanitation, food security and livelihoods, as well as gender. Each focus group discussion should be attended by 8-12 people, as outlined in the shared detailed planning. It should be noted that we will not be able to accommodate more people at the time. Participants are asked to come on time in order not to delay following focus group discussions. Do you agree to let us conduct this study in your community? Do you have any questions? If so, we will need you to appoint a community mobiliser. It needs to be someone that is known and respected by all members of your community. The role of this person will be to mobilise participants for semi-structured interviews and focus group discussions, as outlined in our detailed planning. Preferably, the selection of participants will be coordinated with you. Please note that it is preferable if selected participants attend only one focus group discussion. If they wish to contribute more than once, this is permitted only if it concerns different topics. However, we are interested in talking to as many community members possible and for this reason it would be better if more people in the village/cluster of villages were mobilised to participate. Please note that the participation of a community mobiliser will not be remunerated and needs to be fully voluntary.

Please note that there is no good or bad response to our questions, no good or bad opinion, and no good or bad way of doing things. We are sincerely interested in immersing into your daily lives and

[188] Used as an opening of each exchange with key informants, be it a semi-structure interview or a focus group discussion. Sentences in grey are relative only for an initial meeting with community leaders.

learning about your beliefs and practices. If you agree to participate, we will ask for about one hour of your time.

CONFIDENTIALITY: We will not ask for your name and will not share the content of our discussion with other people in your community. Your name will not appear in our study and no one will be able to identify what you shared with us.

RISKS: Unfortunately, apart from our sincere appreciation, we cannot promise you anything in exchange for your participation in this study. The participation in this study does not guarantee your selection in future Action Against Hunger activities nor should it have a negative effect on your involvement in ongoing activities. However, during focus group discussions we will share some water and snacks with you, which you may choose to take home with you, if you wish.

INFORMED CONSENT: The participation in this study is your choice. You are free to stop the interview or leave the focus group discussion at any time. Your participation is fully voluntary. If you do not wish to answer a question, you may decline to do so and we will move onto a next question. If you have any questions about us or the work we do, you can ask us any time.

SEASONAL CALENDAR[189]

A seasonal calendar is a diagram of changes over the seasons – usually over the period of 12 to months. Seasonal calendars are useful to identify seasonal patterns of change – for example, changing availability of resources, such as food or income, work and migration patterns; to explore relationships between different patterns of change – for example, the relationship between income levels and movements of key populations for work; to identify when people may be particularly vulnerable; to explore seasonal patterns of well-being and hardship and how different people are affected; or to identify when people are particularly vulnerable to infection.

During the qualitative survey, the study team will explore seasonal variations for each risk factor while the topic will be discussed. Respective risk factors will be listed on a printed template of a seasonal calendar, depicting twelve months of a universal year, aligned with 4 seasons of an Ethiopian year. During focus groups discussions, participants will be asked to define in what month each risk factor is most important and precise causes of these changes.

HISTORICAL CALENDAR

A historical calendar is a diagram that shows change over a certain period of time. For the purposes of this study, a period of 10-15 years will be considered. However, if participants mention key events dating prior the 15-year period, these will equally be noted. A historical calendar is useful for exploring change over time in a particular situation, and the reasons for change. This may include changes in behavior, knowledge and attitudes in a community. It is also useful when exploring the consequences of a particular event or assessing the effectiveness (impact) of a project or a community initiative.

During the qualitative survey, the study team will explore historical variations for each risk factor while the topic will be discussed. Respective risk factors will be listed on a hand-drawn template of a historical calendar (A2 format), depicting 15 universal years. During focus groups discussions, participants will be asked to define in what year each risk factor was most important and precise causes of these changes. All important events that marked the life in a community in a positive or negative way, be it political, socio-economic, environmental or other, will be noted as potential

[189] Participatory Learning and Action (PLA) tool no. 19 & 20 (https://www.aidsalliance.org/).

triggers. The aim will be to draw trends based on the community knowledge and potentially identify correlations between various risk factors.

STORYTELLING[190]

Storytelling involves participants discussing 'typical' stories from their community. This approach helps to open discussions on sensitive subjects in a non-threatening way and to identify the real-life situations and issues that affect people in their community. It helps to explore how people feel about those situations and what action they would like to take.

During the qualitative survey, the study team will introduce pre-prepared real-life stories during focus group discussions to test participants' standpoint on subjects, which may be particularly sensitive, and/or test their responses given in a classic question-answer exchanges. The aim of this method will be to shift the attention from them (which may make them feel uncomfortable) and rather involve as observers and counselors to other people in situations, which reflect their daily reality.

DAILY ACTIVITIES CHART

Daily activity charts show how people spend their time over the course of a day. They are useful to explore how men and women spend their day; to evaluate their workload and to discuss their different roles and responsibilities or to explore the factors that influence these differences.

During the qualitative survey, the study team will introduce printed images of daily activities in a given community and will asks participants of focus group discussions to place them on a timeline starting with the usual time when they get up and ending with the usual time when they go to bed. This will be done for men and women separately. Any other groups, such as children or elderly, or groups with different economic functions (farmers, herders or market sellers) may be introduced, if deemed relevant.

MEAL COMPOSITION CHART

Meal composition charts show what people usually eat over the course of a day. They are useful to explore community's perception of good nutrition and how that reflects on their eating habits now and in situations when money would not be a barrier to a procurement of desired foods. For the purpose of this study three scenarios will be considered: typical food intake during a fasting period, typical food intake during a non-fasting period and a typical food intake when money would not be a barrier.

During the qualitative survey, the study team will introduce a hand-drawn chart (A2 format), divided into three columns, representing each scenario. The participants of a focus group discussion will be asked to state how many meals a day they eat during each scenario and what actual meals they eat at those times of a day.

HOUSEHOLD EXPENSES

Household expenses is a participatory exercise, the main objective of which is to show how household income is distributed to cover its expenses. It may reveal household's priorities in terms of spending, identify harmful behaviour or decision-making mechanisms within the household.

During the qualitative survey, the study team will introduce a printed set of images representing different types of regular expenses incurred by a household in a given community. These images will be placed in front of participants. The participants will also receive a set of pebbles representing

[190] Participatory Learning and Action (PLA) tool no. 58 (https://www.aidsalliance.org/).

money, which a household has available to cover these expenses. The role of participants will be to distribute the income among various expense group, just as they would in a real life.

HEALTH JOURNEY / THERAPEUTIC ITINERARY[191]

This tool involves drawing the story of a person's health-seeking journey over a period of time. It involves tracing the development of person's health since falling ill, marking all different treatment options, which were explored in order to cure. The therapeutic itinerary is an engaging participatory exercise, which allows to open a discussion about traditional and non-traditional treatments in a non-threatening way. It also permits to explore people's understanding of current illnesses, which eventually trigger their choices. In addition, the tool allows to explore barriers of access to a biochemical treatment available in state-supported health facilities.

During the qualitative survey, the study team will introduce a blank sheet of paper (A2 format) and ask the participants to explain their typical health journey in case of current illnesses, which will be traced on a blank sheet of paper. The aim is to identify whether their knowledge of these illnesses triggers the same reaction and/or certain differences exist. A particular attention will be paid to an understanding and treatment of child undernutrition.

NOTE: Storytelling in the following interview guides will be adapted to a local context during the qualitative team training. Excerpts below serve only as examples.

INTERVIEW GUIDE: INTRODUCTION TO RISK FACTORS

1. How would you describe a healthy child? (size/characteristics/behaviour)
2. What do you do to keep your child healthy? What effort does it take to do this every day?
3. Have you observed that some parents take care of their children differently? What are they doing or not doing? Why/why not? What consequences on the growth and development of their children have you observed?
4. What challenges do parents in your community face in keeping children healthy? (Cf. *Hypotheses Flashcards*) What consequences do these challenges have on their health? Why?
5. How do these challenges change during the seasons? (Cf. *Seasonal calendar*) How have they changed over the past 10-15 years? (Cf. *Historical calendar*)
6. What type of child seems to be more vulnerable to health problems? (*PROBE: sex/age/household composition/birth size/birth spacing/head of household/mother's characteristics (age, education, workload, well-being)/economic means/breastfeeding/feeding practices/hygiene, etc.)*
7. What do you think of the children in the pictures (Cf. *Flashcards of childhood illnesses*) Are these illnesses present in your community? Which are the most common? (*PROBE: diarrhoea, fever, acute respiratory infections, malaria*)
8. How does the prevalence of these diseases change during the seasons? (Cf. *Seasonal calendar*) How has it changed over the past 10-15 years? (Cf. *Historical calendar*)
9. What are the causes of these diseases? (*NB: To be traced for each disease separately.*)
10. How are these diseases treated? (Cf. *Therapeutic itinerary*) (*NB: To be traced for each disease separately.*) How have the treatment options changed over the past 10-15 years? (Cf. *Historical calendar*)

[191] Participatory Learning and Action (PLA) tool no. 17 (https://www.aidsalliance.org/).

11. How do you decide which treatment to choose? Who advises you?

12. Other than medication, how do you treat a sick child? (*PROBE: breastfeeding/complementary feeding/hygiene practices - do they change with respect to care when the child is healthy?*)

INTERVIEW GUIDE: HEALTH

1. Where is the nearest health centre/hospital? How long does it take you to get there? How does your access to health facilities change during the seasons? (Cf. *Seasonal calendar*) How has it changed over the past 10-15 years? (Cf. *Historical calendar*)
2. How much does it cost to get there? How much does the treatment cost? During which period of the year is it more difficult to pay health costs (Cf. *Seasonal calendar*)
3. What types of services are available at the nearest health centre? Which ones do you use? (*PROBE: Antenatal/postnatal care, childbirth, family planning, treatment of childhood illnesses, vaccination, deworming, vitamin supplementation*) Why? What health services are not culturally acceptable? During what period of the year are health services unavailable? (Cf. *Seasonal calendar*) What health services are not available at all despite the community need?
4. What do you think of the availability/credibility of health personnel? How satisfied are you with their service? (*PROBE: knowledge, approach, communication, trust*) During what period of the year are health personnel unavailable? (Cf. *Seasonal calendar*)
5. What type of medication is easily/not readily available? During which period of the year is it more difficult to access these drugs (Cf. *Seasonal calendar*) Why? What are you doing to alleviate this problem?
6. What motivates you to seek treatment at the health centre? What discourages you from doing this? (*PROBE: quality of care, absence of staff, lack of medication, decision-making power, workload, distance from the health centre, costs, etc.*) During which period of the year are you least motivated seek care in health establishments (Cf. *Seasonal calendar*) Why? What are you doing to alleviate this problem?
7. What do you think of the sensitization sessions organized by health workers or community development workers from different NGOs? What do you think of the different topics they are talking about? Did you find them useful/relevant/easily applicable? Why/why not? What behaviours have you particularly struggled with? Why? (Advantages/disadvantages)

Recommendations

8. How did you try to solve these problems individually / collectively at the community level?
9. How do you think they could be resolved? (SOLUTIONS)
10. What could we do on your side? (LOCAL CAPACITIES)
11. What do you need to get there? (NEEDS)
12. Which solution should have the highest priority? (PRIORIZATION)
13. What period of the year should the action be taken? (SEASONALITY)
14. Who should be targeted by this priority action?

INTERVIEW GUIDE: MALNUTRITION

1. (*WARNING TO PARTICIPANTS*: *Some images may be disturbing. You may choose not to view them, if you think they might bring you distress*). What do you think of the children in these photos? (Cf. *Photos of malnourished children (marasmus/kwashiorkor/stunting*) What disease do they suffer

from? What words do you use to describe such children in your community? Are some words more sensitive/stigmatising than others? Why?

2. What are the causes of these diseases? What are the reasons why a child would become like this? (Cf. *Hypothesis Flashcards*)
3. What do you think of this disease? How is it similar or different from other childhood illnesses? Which type is more common in your community?
4. What type of child seems to be more vulnerable to this disease? (*PROBE: sex/age/household composition/birth size/birth spacing/head of household/mother's characteristics (age, education, workload, well-being)/economic means/breastfeeding/feeding practices/hygiene, etc.)*
5. In which season/month do you see more children being like this? (Cf. *Seasonal calendar*) Since when do children in your community suffer from this disease? (Cf. *Historical calendar*) Have you observed an increase/decrease in cases in certain years? How will you explain these variations?
6. Do you think your child could become like this? Why/why not? (*PROBE: What behaviours/practices can induce/prevent this condition?*)
7. Do you think you could become like this? Why/why not?
8. How do you treat this disease (marasmus/kwashiorkor) in your community? (Cf. *Therapeutic itinerary*) (*PROBE: What is the most common treatment?*)
9. *Narration*: *Fanta has a daughter aged 5 months. She had been breastfeeding her since birth, supplementing with herbal teas and concoctions to keep her strong. After the rest period, she began to feed her with the food, which she prepared for the rest of the family. Being in the field most of the day, Fanta left her daughter with her grandmother who was supposed to watch her. Her daughter started to lose weight and she was no longer smiling. Fanta decided to take her to a traditional healer to treat her with medicinal herbs. However, her daughter is not getting better. What do you think of this story? Fanta made the right decisions? Why / why not? What would you do differently? What would you suggest to Fanta next?*

Recommendations

10. How did you try to solve these problems individually/collectively at the community level?
11. How do you think they could be resolved? (SOLUTIONS)
12. What could be done on your side? (LOCAL CAPACITIES)
13. What do you need to get there? (NEEDS)
14. Which solution should have the highest priority? (PRIORIZATION)
15. What period of the year should the action be taken? (SEASONALITY)
16. Who should be targeted by this priority action?

INTERVIEW GUIDE: NUTRITION

1. What do you think of the meals of two children in the photo? (Cf. *Images of balanced/unbalanced meals*) + (Cf. *Images of food portions*)
2. How do you describe a nutritious/adequate meal (without limiting financial resources)? (*PROBE: quantity/composition/cooking preparation/taste*)? Why do you think this meal is good for you? How often do you eat this type of meal? What prevents you from eating it more often? (*PROBE: availability/accessibility/acceptability/ease of preparation*) (Cf. *Composition of meals*)

3. What do you think of the following foods: beans, cowpeas, pumpkin, spinach, fish, chicken, sweet potatoes, rice? (*PROBE: availability/accessibility/acceptability/taste/nutritional contribution/energy contribution/ease of preparation/frequency of consumption/right to eat as a priority*) Which of these foods is prohibited for members of this community? Why? How does availability/accessibility change throughout the year? (Cf. *Seasonal calendar*) How has availability/accessibility changed over the past 10-15 years? (Cf. *Historical calendar*)
4. How would you describe a favourite meal (much appreciated but not necessarily nutritious)? Why do you like it? How often do you eat this type of meal? What prevents you from eating it more often? (*PROBE: availability/accessibility/cultural habits*)
5. How do you describe your usual meals (eaten frequently)? What do you think of these types of meals? (*PROBE: quantity/composition/type of cooking/taste/capacity to satiate*) How often do you eat this type of meal? Who in the household decides what type of meal is cooked? How do you divide the meal available among all members of your household? Does the family eat together or in a specific order?
6. Have there been any changes in your eating habits over the past 10-15 years? (Cf. *Historical calendar*) Are there changes in your eating habits throughout the year? (Cf. *Seasonal calendar*) (Cf. *Composition of meals lean period vs. post-harvest period*)
7. How do the eating habits of children and/or pregnant and breastfeeding women differ from the eating habits of other household members? What foods cannot be eaten by children/pregnant and breastfeeding women? Why? How does the diet of girls/boys differ?
8. Where do you usually get your food? (*PROBE: agricultural production, purchase, food aid, barter/trade, gathering/hunting*) How does it vary throughout the year? (Cf. *Seasonal calendar*) How has this changed over the past 10-15 years? (Cf. *Historical calendar*)
9. *Narration*: *Fatu is 18 years old. She got married about three years ago. She is now pregnant with her second child. She noticed that she felt very weak and sometimes sick all day. She went to the health centre and the staff encouraged her to eat more to help the baby grow. Yet her mother-in-law has discouraged her saying that her baby will grow too big and she will suffer complications during childbirth. What do you think of this story? What do you think of Fatu's situation? Do women in your community face the same difficulties? Why/why not? What would you do differently?*
10. *Narration*: *Zaria has a husband and 5 children. Her husband's parents live with them. One day the husband gave her 500 SLE to prepare an evening meal. Zaria bought some rice and beans but it will not be enough for the whole family. At dinner time, she reserved a plate for her husband and parents. She gave the rest of the meal to her eldest children, two boys. Zaria and her three little daughters go to bed hungry. What do you think of this story? What do you think of Zaria's situation? Do women in your community face the same difficulties? Why/why not? What would you do differently?*

Recommendations

11. How did you try to solve these problems individually/collectively at the community level?
12. How do you think they could be resolved? (SOLUTIONS)
13. What could be done on your side? (LOCAL CAPACITIES)
14. What do you need to get there? (NEEDS)
15. Which solution should have the highest priority? (PRIORIZATION)
16. What period of the year should the action be taken? (SEASONALITY)
17. Who should be targeted by this priority action?

INTERVIEW GUIDE: CARE PRACTICES

1. What is your daily routine like with a baby under 3 months/6 months/over 6 months? How does your daily routine change with the child's age? (*PROBE: breastfeeding/complementary feeding/interactions with the child/play/babysitting/hygiene*) How does your routine change during the week? How does your routine change over the year? (Cf. *Seasonal calendar*) How did your routine change between the first and the successive children you had? What changes in child care practices have you observed between you and your parents/grandparents? (Cf. *Historical calendar*) What would you like to do differently than today? Why? What is stopping you from doing it?
2. What local beliefs influence childcare practices in your community? What beliefs prevent the appropriation of "new" practices promoted by health workers?
3. What challenges do you face when looking after your children? (*PROBE: lack of knowledge/resources/time/other*)
4. Who helps you take care of your children? What do they help you with? How often? How are fathers involved in childcare activities? What do you think of their involvement?
5. Who advises you on how to take care of your children? Are you under any obligation to follow these tips? What kind of child care decisions can you make on your own?
6. *Narration*: *Hawa is 30 years old. She has four children. The last one was born three months ago. She breastfeeds her when she is home in the morning and evening. In the meantime, she has many activities in the village (fetching water, collecting firewood, going to the market, working in the fields) and she does not bring her baby with her. She leaves the baby with her 10-year-old daughter. She teaches her how to take care of a baby and prepares the meal before leaving very early in the morning. The meal being different from family meals, the eldest daughter is tempted to eat it. She only gives her little sister a few spoons. What do you think of this story? What do you think of Hawa's situation? Do women in your community face the same difficulties? Why / why not? What would you do differently?*
7. When do you introduce complementary foods to your baby? What do your baby's meals consist of? How often do you feed him/her? (Cf. *Composition of meals*) What would you like to do differently than today? Why? What is stopping you from doing it? How do children's eating habits change throughout the year? (Cf. *Seasonal calendar*)
8. *Narration*: *Amina has a little boy. He is very active. He likes to play. He likes to run. Sometimes he's really disobedient. While Amina's husband works in the mines, Amina remains alone with her little boy. She is now pregnant with her second child. This morning the little boy woke up very energetic. He sings and jumps. Amina has just returned from the water point and has put a container next to the door. As the little boy ran around, he knocked over the can and water flooded the yard. Amina was really angry and slapped him for being mean. What do you think of this story? What do you think of Amina's situation? Do women in your community face the same difficulties? Why / why not? What would you do differently?*

Recommendations

9. How did you try to solve these problems individually/collectively at the community level?
10. How do you think they could be resolved? (SOLUTIONS)
11. What could be done on your side? (LOCAL CAPACITIES)
12. What do you need to get there? (NEEDS)

13. Which solution should have the highest priority? (PRIORIZATION)
14. What period of the year should the action be taken? (SEASONALITY)
15. Who should be targeted by this priority action?

INTERVIEW GUIDE: MARRIAGE, PREGNANCY AND CHILD SPACING

1. *Narration*: *Siabanda is 13 years old. She has 7 other siblings; she is the oldest. Her parents prepared a separate bedroom for her so that he could receive visitors during the day as well as at night. They have financial difficulties and the dowry could provide relief. Often, they do not have enough to eat so Siabanda invites the boys from the village to her house to receive a daily meal or other gifts in exchange for sex. Her best friends have advised her to do this, showing her new clothes and shoes every week. Meanwhile, the parents negotiate the dowry of 30 cattle with their 45-year-old cousin who wants to take a third wife. Siabanda is not educated in intimate relationships and very soon becomes pregnant by a 15-year-old boy. The cousin refuses to marry her and the parents disengage, having lost hope for economic advancement. The father of the child being too young and destitute does not intend to marry. The pregnant girl finds herself abandoned and must find ways to meet her daily needs. What do you think of this story? Is this happening in your community? How does the community perceive extramarital sex (before marriage / during marriage? What would you do if you were Siabanda? What would you do if you were Siabanda's parents?*
2. At what age do young men/women marry in your community? What changes have you observed in marriage practices over the past 10-15 years? (Cf. *Historical Calendar*) What inspired these changes? When do you think young men/women are ready to get married/be parents (physically and emotionally?)
3. How many children do members of your community usually have? Why?
4. What is the usual birth spacing in your community? Why?
5. *Narration*: *Zainab is 28 years old. She married her husband 12 years ago. Since then, she has given birth to a child almost every year. Out of 10 children, 3 died rather young. Zainab's husband wants to replace them so that they have enough people to work in the fields. Zainab does not want any more children, she has had enough of successive pregnancies. She is afraid to tell her husband that she doesn't want any more children because he says they are a gift from God. What do you think of this story? Can this happen in your community? Why do you think this is happening? What do people think about birth spacing? Is a woman involved in a decision about births? Why / why not? What would you do if you were Zainab?*
6. Who advises women, especially adolescent girls, during pregnancy?

Recommendations

7. How did you try to solve these problems individually/collectively at the community level?
8. How do you think they could be resolved? (SOLUTIONS)
9. What could be done on your side? (LOCAL CAPACITIES)
10. What do you need to get there? (NEEDS)
11. Which solution should have the highest priority? (PRIORIZATION)
12. What period of the year should the action be taken? (SEASONALITY)
13. Who should be targeted by this priority action?

INTERVIEW GUIDE: WOMEN AUTONOMY AND WORKLOAD

1. What does your daily routine look like? (Cf. *Daily activities*) How does your routine change during the year? (Cf. *Seasonal calendar*) What changes in daily routine have you observed between you and your parents/grandparents? (Cf. *Historical calendar*) What would you like to do differently than today? Why? What is stopping you from doing it?
2. How does your daily routine differ from that of men?
3. How do you see your workload? When is your workload heavier/do you feel busier or tired? (Cf. *Seasonal calendar*) What do you do when you feel like this?
4. What differences in daily routines have you observed between different households? What characterizes households with less workload?
5. What community groups are you a part of? What are the advantages and/or disadvantages of participating in these groups? How often do you attend community gatherings?
6. How often do you go out of your house/village? Who decides if you can leave? Where can you go without asking for anyone?
7. What activities can you make decisions about without consulting anyone? For which activities do you need to consult another member of your household? What activities can only a member of your household make decisions about? (*PROBE: schooling, marriage, household expenses, composition of meals, daily activities, workload, rest after childbirth, medical treatment in case of illness, family planning*). What do you think of this division of decision making? What would you like to change about this division of decision-making? In what areas would you like decisions to be made differently?
8. For decisions, where you need to consult another member of your household, to what extent can you participate in the decision-making? For decisions, when a member of your household is making decisions, to what extent can you contribute to the decision-making? How much do you feel listened to when decisions are made? What can you do when you disagree with a decision you have made? What happens when your opinion has not been considered, but it turns out that it would have been a good decision? How does this change decision making within the household?
9. Does your decision-making power change when your husbands migrate? Who makes the decisions in their absence?
10. How well can you access information to make informed decisions? What barriers to access do you encounter in accessing information?
11. What rights do women in this community have with regard to owning/inheriting land? Who usually decides what to plant?
12. What activities can women in this community do to generate income? Who controls the income generated in this way? What other activities do you think women in this community should be allowed to do to generate income? What changes in autonomy/decision-making power have you observed between you and your parents/grandparents? (Cf. *Historical calendar*)
13. What can you sell in the market without consulting another member of your household? What can you buy in the market without consulting another member of your household? What changes do you think might help you with regards to selling/buying in the market? Why?
14. What rights do women in this community have in lending or borrowing money? Who decides how the borrowed money is spent? Who is responsible for reimbursing the money? What

advantages/disadvantages does this arrangement bring you? How do you think this arrangement should change?

How would you describe your relationships with other members of your household? Which relationships bring you the most joy? Which relationships are you most concerned about? Why? How comfortable are you telling members of your household that you disagree/disagree?

Recommendations

15. How did you try to solve these problems individually/collectively at the community level?
16. How do you think they could be resolved? (SOLUTIONS)
17. What could be done on your side? (LOCAL CAPACITIES)
18. What do you need to get there? (NEEDS)
19. Which solution should have the highest priority? (PRIORIZATION)
20. What period of the year should the action be taken? (SEASONALITY)
21. Who should be targeted by this priority action?

INTERVIEW GUIDE: LIFE PERSPECTIVES (PARENTS)

1. What did you hope to achieve in your life? What inspired your dreams when you were younger? What did your parents/loved ones think about your dreams? Were you (completely/partially) able to achieve your dreams? Why? How do you feel about that? How does this influence your support for your children?
2. How did you describe the way your parents interacted with you and the way you interact with your children? What has changed in the meantime?
3. Were you used to discussing various topics with your parents? Do you usually do this with your children? What topics are often avoided?
4. If necessary, who do you seek advice/help from? Who has the greatest influence on your decisions? Who do you children seek advice/help from? What do you think of this choice?
5. Are there any disagreements between young people, their parents and/or their grandparents? What values do/do you not share with the younger generations? What do you blame your children for the most?
6. How are relationships between men and women? What do you think are the most common problems (*PROBE: physical, psychological, sexual violence)* between women and men? Why do they exist? (*PROBE: sources of income and their use/*quality of meals/workload/intimate relationships/infidelity/number of children/decision-making power). What is done in those cases?
7. What work/development possibilities do you have in your community? What do you think of these possibilities? What is missing? How do these possibilities influence the way you live in your families/community? What activities do you usually attend with other members of the community? What community groups are you a part of? What are the advantages and/or disadvantages of participating in these groups? Which institutions are the most valuable to you in your life? (*PROBE: family/diaspora/school/church/state/international aid*). How has their role changed over time?
8. How does the feeling of security / insecurity influence your way of living in the community?

Recommendations

9. How did you try to solve these problems individually/collectively at the community level?
10. How do you think they could be resolved? (SOLUTIONS)

11. What could be done on your side? (LOCAL CAPACITIES)
12. What do you need to get there? (NEEDS)
13. Which solution should have the highest priority? (PRIORIZATION)
14. What period of the year should the action be taken? (SEASONALITY)
15. Who should be targeted by this priority action?

INTERVIEW GUIDE: LIFE PERSPECTIVES (YOUTH)

1. What do you hope to achieve in your life? What inspired your dreams? What do your parents/loved ones think about your dreams? Will the current conditions allow you to achieve your dreams?
2. How did you describe the way your parents interact with you and the way they interact with their parents? What differences have you observed? Do you think you will run your own household the same way your parents did? Why/Why not? What are you going to do differently?
3. Are you used to discussing various topics with your parents? What topics are often avoided?
4. If necessary, who do you seek advice/help from? Who has the greatest influence on your decisions? What do your parents think about this choice?
5. Are there any disagreements between young people, their parents and/or their grandparents? What values do you/don't you share with them? What do they blame you most often?
6. What work/development possibilities do you have in your community? What do you think of these possibilities? What is missing? How do these possibilities influence the way you live in your families/community? What activities do you usually attend with other members of the community? What community groups are you a part of? What are the advantages and/or disadvantages of participating in these groups? Which institutions are the most valuable to you in your life? (*PROBE: family/diaspora/school/church/state/international aid*).
7. How are relationships between men and women? What do you think are the most common problems (*PROBE: physical, psychological, sexual violence)* between women and men? Why do they exist? (*PROBE: sources of income and their use/quality of meals/workload/intimate relationships/infidelity/number of children/decision-making power*). What is done in those cases?

Do you think you will have the same type of problems in your relationships?

8. How does the feeling of security / insecurity influence your way of living in the community? In what ways does it differ for girls vs. boys?

Recommendations

9. How did you try to solve these problems individually/collectively at the community level?
10. How do you think they could be resolved? (SOLUTIONS)
11. What could be done on your side? (LOCAL CAPACITIES)
12. What do you need to get there? (NEEDS)
13. Which solution should have the highest priority? (PRIORIZATION)
14. What period of the year should the action be taken? (SEASONALITY)
15. Who should be targeted by this priority action?

INTERVIEW GUIDE: SOURCES OF INCOME & RESILIENCE STRATEGIES

1. What are the main sources of income in your community? Do they vary throughout the year? (Cf. *Seasonal calendar*) Have they changed over the past 10-15 years? (Cf. *Historical calendar*) What caused the change?
2. What activities can women in this community do to generate income? Who controls the income generated in this way? What other activities do you think women in this community should be allowed to do to generate income?
3. What challenges do you face in agriculture? (*PROBE: access to water/land/soil degradation/ unavailability of seeds/tools/know-how/labour/cost of labour/plant diseases/access to the market for sale/price fluctuations during sowing or harvesting/fluctuations in market demand/quality requirements*) Do these challenges vary throughout the year? (Cf. *Seasonal calendar*) Have these challenges changed over the past 10-15 years? (Cf. *Historical calendar*) What caused the change?
4. What challenges do you encounter in the field of animal rearing? (*PROBE: access to water/grazing/vaccination/animal diseases/unavailability of know-how/access to markets for sale/fluctuating prices/fluctuating market demand/quality requirements*) These challenges vary during the year? (Cf. *Seasonal calendar*) Have they changed over the past 10-15 years? (Cf. *Historical calendar*) What caused the change?
5. What consequences do these challenges have on your household income? What coping strategies do you deploy to compensate for any losses? (Cf. *Coping strategies*).
6. Which households in your community are more vulnerable to food insecurity?
7. Do members of your community tend to migrate? If so, who is migrating? Or? When? For how long? Why? (Cf. *Seasonal calendar*) Have migration trends in your community changed over the past 10-15 years? (Cf. *Historical calendar*) What are the consequences of migration or the evolution of migratory flows on the members of a household who remain? (*PROBE: income, workload, decision-making, nutrition, health, child care practices*).

Recommendations

8. How did you try to solve these problems individually/collectively at the community level?
9. How do you think they could be resolved? (SOLUTIONS)
10. What could be done on your side? (LOCAL CAPACITIES)
11. What do you need to get there? (NEEDS)
12. Which solution should have the highest priority? (PRIORIZATION)
13. What period of the year should the action be taken? (SEASONALITY)
14. Who should be targeted by this priority action?

INTERVIEW GUIDE: MARKET ACCESS AND USE OF RESOURCES

1. How would you describe your market access? What access barriers do you face (*PROBE: distance, lack of transport, transport costs, insecurity*) How does your access to the market change during the seasons? (Cf. *Seasonal calendar*) How has it changed over the past 10-15 years? (Cf. *Historical calendar*).
2. What types of products are available in the market? During what period of the year are the products less available and/or unavailable? (Cf. *Seasonal calendar*) What products are not available at all despite the community need? What are you doing to alleviate this problem? Has product availability changed over the past 10-15 years? (Cf. *Historical calendar*)

3. How do product prices fluctuate over the year? (Cf. *Seasonal calendar*) How have they changed over the past 10-15 years? (Cf. *Historical calendar*)
4. What other services do you access the market for?
5. How do you use your household income? (Cf. *Household expenses*) What differences have you noticed in the spending practices between men and women?
6. How/How much/For what purpose do members of your community tend to save resources?
7. How do members of your community access credit? From whom/under what conditions? How much debt do the members of your community tend to accumulate?
8. What kind of expenses can women make decisions about without consulting anyone? What type of expenses do they need to consult you for? What kind of expenses are you alone in making decisions about? (*PROBE: schooling, marriage, household expenses, composition of meals, daily activities, workload, rest after childbirth, medical treatment in case of illness, family planning*). What do you think of this division of decision making? What should change about this division? Does the decision-making process change in the absence of the husband, e.g. migration)?
9. For decisions, where should women consult you, to what extent do you let them be involved in decision-making? For decisions that you mostly make on your own, to what extent do you allow women to express their opinion? To what extent do you listen to women in decision-making? What happens when your wife's opinion has not been considered, but it turns out that it would have been a good decision? How does this change decision making within the household?
10. What can women sell in the market without consulting you? What can they buy in the market without consulting you?
11. Do women receive a weekly allowance? If so, how much and for what?
12. What rights do women in this community have with regard to owning/inheriting land? What rights do women in this community have when it comes to lending or borrowing money? Who decides how the borrowed money is spent? Who is responsible for reimbursing the money? What advantages/disadvantages does this arrangement bring you?

Recommendations

13. How did you try to solve these problems individually/collectively at the community level?
14. How do you think they could be resolved? (SOLUTIONS)
15. What could be done on your side? (LOCAL CAPACITIES)
16. What do you need to get there? (NEEDS)
17. Which solution should have the highest priority? (PRIORIZATION)
18. What period of the year should the action be taken? (SEASONALITY)
19. Who should be targeted by this priority action?

INTERVIEW GUIDE: WATER, SANITATION AND HYGIENE

1. How would you describe the importance of water in the life of your community? How does this perception influence the use of water? How has your approach to water changed over the past 10-15 years? (Cf. *Historical calendar*) Why?
2. How would you describe the cleanliness/dirtiness? How does this perception influence sanitation/hygiene in your community? How has your approach to sanitation changed over the past 10-15 years? (Cf. *Historical calendar*) Why?*what*

3. How would you describe your access to water? What access barriers do you face (*PROBE: distance/availability/quality/price/workload/shortage/transport costs/waiting time*) How does your access to water change over the seasons? (Cf. *Seasonal calendar*) How has it changed over the past 10-15 years? (Cf. *Historical calendar*)
4. How do people in your community treat/store water? What challenges do they face in this regard?
5. Who is responsible for collecting water for the household? How much water do you collect in a day? Does it change throughout the year? (Cf. *Seasonal calendar*) Has this changed over the past 10-15 years? (Cf. *Historical calendar*) Why? What are the consequences of these changes?
6. What use of water is prioritised? (*PROBE: drinking/cooking/bathing/laundry/animal consumption/agriculture*)
7. How would you describe your access to sanitation facilities? What barriers to access do you face (*PROBE: availability, durability, acceptability, price, workload*) Has this changed over the past 10-15 years? (Cf. *Historical calendar*)

Recommendations

8. How did you try to solve these problems individually/collectively at the community level?
9. How do you think they could be resolved? (SOLUTIONS)
10. What could be done on your side? (LOCAL CAPACITIES)
11. What do you need to get there? (NEEDS)
12. Which solution should have the highest priority? (PRIORIZATION)
13. What period of the year should the action be taken? (SEASONALITY)
14. Who should be targeted by this priority action?

INTERVIEW GUIDE: HEALTH AND NUTRITION (DISTRICT REPRESENTATIVES / NGO STAFF)

1. How would you describe the trends in stunting in Bonthe district over the last 20 years? (*PROBE: improvement/decline)* Are these trends consistent with national/provincial trends?
2. What socio-political factors do you think have influenced stunting? (*PROBE: conflict / democratization / governance / decentralization / urbanization / factors relating to donors, etc.)*
3. What socio-economic factors do you think have influenced stunting? (PROBE: p*overty / labour migration/remittances / education)*
4. What cultural practices do you think have influenced nutrition situation in Bonthe district? Has this changed over the last 20 years?
5. Can you describe changes in the health system over the last 20 years? (*PROBE: availability/accessibility/volume and quality of provided services/financing/universal health coverage*) How do you think these have influenced nutrition and stunting of children?
6. What changes have you observed related to water, sanitation and hygiene? What do you think has contributed to these changes? (*PROBE: accessibility/availability of safe drinking water/toilets and sanitation facilities / household crowding / personal hygiene / food and environmental hygiene practices?)*
7. How has the availability of food changed over time in Bonthe district? What has caused these changes? (*PROBE: environmental changes / climate change / financial crisis / agricultural transition / types of crops produced / employment, etc.)*
8. How has dietary intake for mothers and children changed over the last 20 years? (PROBE: dietary *diversity, breastfeeding, complementary feeding, micronutrient supplementation)*
9. How have other factors, such as fertility rates or spacing between pregnancies, changed over time? How do you think this has influenced stunting?
10. What nutrition-specific interventions/policies do you think have worked well? What interventions have proved to be less effective? Who were they implemented by? Can you describe any results/changes achieved by these initiatives? What are the main challenges for implementing nutrition-specific programs in this area?
11. What nutrition-sensitive interventions/policies do you think have worked well? What interventions have proved to be less effective? Who were they implemented by? Can you describe any results/changes achieved by these initiatives? What are the main challenges for implementing nutrition-specific programs in this area?

INTERVIEW GUIDE: HEALTH AND NUTRITION (HEALTH STAFF)

1. What types of services do you offer? What fees do you charge? (*PROBE: antenatal/postnatal care, childbirth, vaccination*)
2. What do you think of your working conditions? (*PROBE: supervision, workload, availability of equipment, medication, location, salary*) What is the health centre's/clinic's biggest challenge that prevents or inhibits them in service delivery?
3. What is your daily routine? How does it change throughout the week/month? How does it change throughout the year?
4. How does the community perceive the services in this health facility? What services do they tend to use most often? Are there any services they don't use at all? Why? Which groups of people are less likely to use their services (e.g. religious groups)?
5. What barriers prevent the community from using the services of this health facility? Does this change throughout the year? (Cf. *Seasonal calendar*) Has this changed over the past 10-15 years? (Cf. *Historical calendar*)
6. What are the most common childhood illnesses in this community? (*PROBE: diarrhoea, fever, acute respiratory infections, malaria*) What are their main causes? During which months are they the most frequent? (Cf. *Seasonal calendar*) Has the prevalence of these diseases changed over the past 10-15 years? (Cf. *Historical calendar*) What is the preferred treatment option in this community for these childhood illnesses? Who in this community is most vulnerable to poor health?
7. What are the changes, if any, in health service delivery due to COVID-19 pandemic? (e.g. ANC, growth monitoring, immunisation, etc.)
8. What is the perception of undernutrition in the community? What are its main causes in this community? (Cf. *Hypothesis flashcards*) Does the community understand its causes differently? If yes, how? Why? Is malnutrition stigmatised in this community? If yes, how?
9. What type of child seems to be more vulnerable to this disease? (*PROBE: sex/age/household composition/birth size/birth spacing/head of household/mother's characteristics (age, education, workload, well-being)/economic means/breastfeeding/feeding practices/hygiene, etc.)*
10. Are there children in these categories who are not malnourished? If yes, why? What are their parents doing differently?
11. What are the main challenges parents face in keeping their children healthy?

INTERVIEW GUIDE: HEALTH & NUTRITION (COMMUNITY LEADERS)

1. What are the main challenges that this community is facing? What consequences do these challenges have on health? Why? What are the changes that community has been facing due to COVID-19 pandemic? (e.g. market access, livelihoods, access to healthcare, etc.)
2. What are the main challenges parents face in keeping their children healthy? What local beliefs or cultural/traditional or religious practices do you think are related to these challenges? Do they need to be strictly followed? Have they been followed in the same way over the past 10-15 years? If not, what has changed? (Cf. *Historical calendar*).
3. What differences in child nutrition have you observed over the past 10-15 years? Why do you think this has happened? *(PROBE: conflict (if applicable) / poverty / changes in quality of life / labour migration/remittances, changes in agriculture / urbanization / education / women's empowerment, etc.)*

4. What do you think of the children in these photos? (Cf. *Photos of malnourished children (marasmus / kwashiorkor/stunting*) What disease do they suffer from? What words do you use to describe such children in your community? Are some words more sensitive than others? What are the causes of this disease? What are the reasons why a child would become like this? (Cf. *Hypothesis flashcards*) What do you think of this disease? How is it similar or different from other childhood illnesses? Which type is more common in your community?
5. What type of child seems to be more vulnerable to this disease? (*PROBE: sex/age/household composition/birth size/birth spacing/head of household/mother's characteristics (age, education, workload, well-being)/economic means/breastfeeding/feeding practices/hygiene, etc.)*
6. How do you treat this disease (marasmus/kwashiokor) in your community? (Cf. *Therapeutic itinerary*) What is the most common treatment?
7. What nutrition-specific or nutrition-sensitive interventions have been implemented in your community over the last 10-15 years? Which ones do you think have worked well? Which ones have proved to be less effective? Who were they implemented by? Can you describe any results/changes achieved by these initiatives? What are the main challenges for implementing programs in this area?

INTERVIEW GUIDE: BARRIER ANALYSIS (DO-ERS)

Prioritised behaviours

a) Use of family planning
b) Delivery at the health facility/Postnatal care
c) Exclusive breastfeeding (0-6 months)
d) Infant and young child feeding (6-23 months)
e) Personal hygiene of the child

1. What illnesses can you / your child suffer from if you DO NOT PRACTICE THE BEHAVIOR?
2. What do you think of [ILLNESS mentioned by mother]? Is it dangerous?
3. When a person practices (THE BEHAVIOR), does this lead to the desired effect? (Ex. "When a person exclusively breastfeeds a child for the first six months of life, does this help prevent [the ILLNESS mentioned by the mother]?")
4. To what extent does (THE BEHAVIOR) help prevent (ILLNESS)?
5. Who (individuals or groups) do you think, object or disapprove if you practice (THE BEHAVIOR)?
6. Who (individual or group) do you think approves if you practice (THE BEHAVIOR)?
7. Which of these individuals or groups in the two questions above are most important to you?
8. How easy is it for you to practice (THE BEHAVIOR)?
9. How easy is it to remember to practice (THE BEHAVIOR) every time you need to do it?
10. Is it sometimes God's will that people / children get (ILLNESS)?
11. Why do some people get (ILLNESS) and others not?
12. Do people ever get (ILLNESS) from curses or other spiritual or supernatural causes?
13. What do you think are the benefits or good things that happen if you practice (THE BEHAVIOR)? What things do you like about practicing (BEHAVIOR)?

14. What do you think are the downsides or bad things that happen if you practice (THE BEHAVIOR)? What are the things that you dislike about practicing (BEHAVIOR)?

INTERVIEW GUIDE: BARRIER ANALYSIS (NON-DOERS)

Prioritised behaviours

a) Use of family planning
b) Delivery at the health facility/Postnatal care
c) Exclusive breastfeeding (0-6 months)
d) Infant and young child feeding (6-23 months)
e) Personal hygiene of the child

1. What illnesses can you / your child suffer from if you PRACTICE THE BEHAVIOR?
2. What do you think of [ILLNESS mentioned by mother]? Is it dangerous?
3. When a person does not practice (THE BEHAVIOR), does this lead to the desired effect? (Ex. "When a person does not exclusively breastfeed a child for the first six months of life, does that help prevent [the ILLNESS mentioned by the mother]?")
4. To what extent does (BEHAVIORAL NON-PRACTICE) help prevent (ILLNESS)?
5. Who (individuals or groups) do you think objects or disapproves of if you practice (THE BEHAVIOR)?
6. Who (individual or group) do you think approves if you don't practice (THE BEHAVIOR)?
7. Which of these individuals or groups in the two questions above are most important to you?
8. Would it be easy for you to practice (THE BEHAVIOR)?
9. What makes it difficult, if not impossible, to practice (THE BEHAVIOR)?
10. What could make (THE BEHAVIOR) easier to practice?
11. How easy would it be to remember to practice (THE BEHAVIOR) every time you had to?
12. Is it sometimes God's will that people / children get (ILLNESS)?
13. Why do some people get (ILLNESS) and others not?
14. Do people ever get (ILLNESS) from curses or other spiritual or supernatural causes?
15. What do you think are the benefits or good things that will happen if you practice (THE BEHAVIOR)? What are the things that will plead you practicing (THE BEHAVIOR)?
16. What do you think are the downsides or bad things that will happen if you practice (THE BEHAVIOR)? What are the things that you would not like about practicing (THE BEHAVIOR)?

SUMMARY OF FINDINGS, CATEGORISATION OF RISK FACTORS & FINAL RECOMMENDATIONS

The purpose of this exercise is to involve community members in the categorisation of risk factors with regards to their impact on the occurrence of malnutrition in their community. In other words, community members will be encouraged to rank identified risk factors from most problematic to less problematic in relation to their link with malnutrition. In addition, they will be encouraged to identify risk factors, which they believe are likely to change first, if properly addressed/supported.

Before the actual ranking exercise will be conducted, the study team will summarise their findings, which they collected during the first 5 days in the community with the use of pre-prepared flashcards. After the presentation of all identified risk factors, community members will be asked to validate the findings and the team's interpretation of community's main challenges in relation to malnutrition. If certain elements are deemed not representative of the community, the study team will modify the interpretation, as necessary.

Afterwards, the participants will be invited to rank identified risk factors from most problematic to least problematic in relation to their link with undernutrition. With the help of pebbles, they will be asked to give three pebbles to factors, which have a major impact on child undernutrition, two pebbles to factors, which have an important impact on child undernutrition and one pebble to factors, which have a minor impact on child undernutrition in their community. They will be visually aided by photos of undernourished children, which were previously used during focus group discussions, in order to keep the focus on this health issue rather than other main challenges that they face in their community.

All exchanges among participants with relation to this rating exercise and/or their justification of their rating will be duly noted. All participants will be encouraged to contribute and any disagreements will be rightfully addressed. The aim of this exercise will be to categorise risk factors into three groups, which all participants will agree with.

Once this stage is completed, the participants will be asked to pick few risk factors, which they think explain most cases of undernutrition in their community, and create a main pathway.

Alternatively, if a consensus on three categories of risks proves difficult, the study team will give three pebbles to each participant and will ask them to assign a pebble to each risk, which they consider the most important in relation to undernutrition in their community. Once all pebbles are counted, risk factors will be divided into three categories. The study team will ask participants to validate them and reach a consensus on 4-5 factors, which have a major impact on undernutrition in their community.

After the categorisation of risk factors, they study team will present solutions, which the community identified during focus group discussions to address these challenges. A validation, followed by a prioritisation of activities, will be sought.

APPENDIX

A set of visual aids (flashcards) are available as a separate file.