

Final report



NUTRITION CAUSAL ANALYSIS

October 2019-March 2020

Grand Bassa, Grand Cape Mount, Rural Montserrado, Rivercess, and Sinoe Counties



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¹ Full listing of team members in Annex F.

ABBREVIATIONS

AAH / ACF	Action Against Hunger / Action Contre la Faim
ANC	Antenatal Care
ARI	Acute Respiratory Infections
CFSNS	The Comprehensive Food Security and Nutrition Survey
CHA	Community Health Assistant
CI	Confidence Interval
CMAM	Community Management of Acute Malnutrition
DHS	Demographic and Health Survey
ECHO	European Civil Protection and Humanitarian Aid Operations
ENA	Emergency Nutrition Assessment
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FSL	Food Security and Livelihoods
GAM	Global Acute Malnutrition
gCHV	General Community Health Volunteer
GCM	Global Chronic Malnutrition
GoL	Government of Liberia
HAZ	Height for Age z-score
HH	Household
HHS	Household Hunger Scale
HDDS	Household Dietary Diversity Score
HIES	Household Income and Expenditure Survey
HQ	Headquarters
IDDS	Individual Dietary Diversity Score
IYCF	Infant and Young Child Feeding
Link NCA	Link Nutrition Causal Analysis
LMH	Last Mile Health
LNNMS	Liberia National Nutrition And Mortality Survey
LR	Livelihood Zone
MAHFP	Months of Adequate Household Food Provisioning
MAM	Moderate Acute Malnutrition
MCSP	Maternal Child Survival Program
MIS	Malaria Indicator Survey
MUAC	Mid-Upper Arm Circumference
NGO	Non-Governmental Organization
OTP	Outpatient Therapeutic Programme
PLW	Pregnant and Lactating Woman
PNC	Postnatal Care
PPS	Probability Proportionate to Size
rCSI	Reduced Coping Strategy Index
RFS	Risk Factor Survey
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SCI	Save The Children
SFP	Supplementary Feeding Programme
SSI	Semi-Structured Interview
SMART	Standardized Monitoring for Assessment in Relief & Transitions
TBA	Traditional Birth Attendant

TTM	Trained Traditional Midwife
UNICEF	United Nations' Children's Fund
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WaST	Concurrent Wasting and Stunting
WFP	World Food Programme
WHO	World Health Organization
WHZ	Weight for Height z-score

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EXECUTIVE SUMMARY

Bordering the Atlantic coast, Grand Cape Mount, Grand Bassa, Montserrado, Rivercess, and Sinoe Counties are among the five counties of Liberia with the highest burden of stunting in the country. Continued challenges in food security, water, hygiene and sanitation, as well as gender undermine child and maternal nutrition across the eight livelihood zones of these five counties. Rates of stunting remain chronically high, exceeding 30% in the five counties per the 2018 CFSNS. The Government of Liberia's national development plan for 2018 – 2023 therefore includes nutrition as a priority area, with the national target to reduce stunting to 22% by 2023. In an attempt to address complex root causes of stunting, GOL and implementing partners have been making efforts to scale up nutrition specific and nutrition sensitive interventions.

A part of this initiative to reduce rates of stunting, the Liberia WASH Consortium set out to conduct formative research to better understand the context-specific causes of stunting and determinants of related behaviours. Three out of five consortium members, i.e. Action Against Hunger, Concern Worldwide and Water Aid, engaged in the delivery of assessments, namely the Link NCA Nutrition Causal Analysis, Barrier Analysis and Cost of Diet Assessment, to build a solid evidence base for future interventions adapted to an in-depth understanding of the context and community priorities.

The Link NCA study is a critical part of this approach, allowing a better understanding of the underlying causes of stunting and the linkages between nutrition, food security and livelihoods, water, sanitation and hygiene, gender and other thematic areas. The key findings drawn from the analysis will inform the design of the second and third phases of the project, supported by awareness raising and advocacy efforts, in order to develop an integrated optimal response aimed at reducing rates of stunting in the study area.

KEY FINDINGS

The prevalence of global chronic malnutrition (GCM) was estimated at 33.8% [29.2-38.7%, 95% CI] in Region 1 (Grand Cape Mount), 34.1% [27.0-42.0%, 95% CI] in Region 2 (Grand Bassa and Rural Montserrado), and 36.4% [29.6-43.7%, 95% CI] in Region 3 (Rivercess and Sinoe). All three regions thus bear "very high" burdens of stunting according to the 2018 World Health Organization (WHO) thresholds.

The group identified as most vulnerable to chronic malnutrition across the study zone were male children living in mining/concession areas and/or agricultural livelihood zones. In Region 1, children of mothers of younger age were most vulnerable to stunting as their vulnerability to stunting significantly decreased as mother's age increased. In Region 2, children who were not the first born were more vulnerable to stunting while in Region 3 male children living in mining/concession areas and/or households where a head of household is engaged in agriculture had higher odds of being chronically malnourished.

Furthermore, 3.4% [1.9-6.2%, 95% CI] of children in Region 1, 4.1% [2.3-7.3%, 95% CI] in Region 2 and 4.0% [2.1-7.4%, 95% CI] in Region 3 were concurrently wasted and stunted (WaST). Across the study, this condition was most likely to affect children under 24 months.

The analyses undertaken during this Link NCA study allowed to identify 19 risk factors, believed to have an impact on the incidence of undernutrition in the study zone. Following a triangulation of data from diverse sources, three (3) risk factors were identified as having a major impact, eight (8) risk factors were classified as having an important impact and eight (8) risk factors were judged to have a minor impact on the incidence of undernutrition in the zone of study.

Among the major risk factors, two were identified in the sector of water, sanitation and hygiene, namely **low access to water** and **non-optimal sanitation practices**, while the last major risk factor, **low access to food**, was identified in the sector of food security and livelihoods.

The calculation of statistical associations between individual risk factors and nutritional status of children in surveyed households allowed to differentiate between the so-called “regional” causal mechanisms of stunting specifically designed for each set of respective counties and an overarching causal pathway based on all collected data. While the overarching causal pathway details generally applicable mechanisms across the study zone, regional pathways highlight the identified nuances between different counties and therefore allow for a more suitable adaptations for future interventions.

Causal pathway for Region 1 (Grand Cape Mount County)

The key risk factor significantly associated with stunting in Region 1 is a nutritional status of women, which means that children of mothers with a lower mid-upper arm circumference (MUAC) have higher chances of being stunted. According to the available data, it is possible to infer that a mother’s nutritional status is linked with her access to food as children of mothers with petty trade as an independent income were potentially less likely to be stunted. In addition, children of mothers belonging to at least one external support group were also potentially less likely to be stunted. This suggests that a combination of women’s income-generating activities in the form of petty trade and their membership in community-based organisations increases their access to food with a positive effect on their nutritional status and eventually their breastfeeding practices, thus ensuring a proper development of their child. Mothers with an increased appetite or consumption during pregnancy or lactation were more likely to report sufficient quantity of breastmilk to satisfy their child, thus refraining from premature weaning or early initiation to complementary feeding.

However, a dominant pathway to stunting in Region 1 more likely takes its roots in a limited access to markets, which translates into a limited access to soap and/or, more generally speaking, non-optimal environmental hygiene and sanitation. In other words, the presence of soap in a household is potentially a protective factor against chronic malnutrition while the presence of kitchen waste has potentially a reverse effect. The non-optimal environmental hygiene and sanitation then increase the likelihood of child being unclean, which increases his/her vulnerability to disease and to a growth retardation, as a consequence. The likelihood of a child not being clean in Region 1 increased in cases when inappropriate child-caregiver interactions were observed during the data collection.

Causal pathway for Region 2 (Grand Bassa and Rural Montserrado Counties)

Similarly to Region 1, a dominant pathway to stunting in Region 2 takes its roots in a limited access to markets. Children living in households within at least one hour from the nearest market were more likely to be stunted than children living in a closer proximity. Among other things, distance to market decreased the likelihood of a presence of soap in household while it also contributed to a likelihood of child being unclean. The likelihood of a child being unclean increased in agricultural livelihood zones (while it decreased for children living in peri-urban areas), in households living more than 20 minutes from the nearest water point and households practicing open defecation. In addition, children of mothers who did not complete their elementary education or higher and who had their first pregnancy before 18 years of age were more likely to be observed unclean as well as children, in cases of which inappropriate child-caregiver interactions were observed during the data collection.

The likelihood of child being unclean increases his/her vulnerability to disease and to a growth retardation, as a consequence. This seems to be backed up the available data on the incidence of key childhood diseases as a child suffering from diarrhoea was potentially more likely to be stunted if observed unclean while a child suffering from cough was significantly more likely to be stunted if observed unclean. Children suffering from cough were also significantly more likely to be stunted if living in a household with more than one child under 5 years of age. Children from these households were eventually more likely to be stunted if they were suffering from any of surveyed morbidities, i.e. fever or cough or diarrhoea.

This suggests a link with non-optimal birth-spacing (<24 months), potentially an early pregnancy, and women's decision-making powers. The available data suggests that a child born to a mother who had her first pregnancy before 18 years of age had higher odds of being stunted. In addition, low female autonomy leads to a low utilisation of health services, which does not reflect only on the use of contraceptive means but also on mother's health-seeking behaviour during the pregnancy. Mothers who desired to be pregnant were more likely to attend antenatal care, while children of mothers who completed at least four visits were significantly less likely to be stunted. In addition, children who were born in a health facility were potentially less likely to be stunted. It is possible to infer that the attendance of prenatal consultations plays an important role in mother's sensitisation on optimal care practices, planting a seed for proper child development once he/she is born. As such, children vaccinated against measles, dewormed and having received a Vitamin A supplementation were potentially less likely to be stunted.

The protection against pathogens is particularly important in non-optimal hygiene and sanitation environments, which are directly linked with child cleanliness, as discussed above. A child observed playing in dust or mud was significantly more likely to be stunted. The risk was comparably equally as high for children living in a household owning a livestock, thus exposed to a contamination through the proximity to animals and/or their faeces. This may also translate into a contamination of food as children living in households with poor hygiene practices where cooked food was stored for eating later in the day and/or the next day were potentially more likely to be stunted. The significant risk of chronic malnutrition was also confirmed for children living in household, where non-optimal water transportation and storage practices were observed during the data collection.

An interesting statistical association was detected among children wearing a washable diaper, especially children older than 18 months, who are significantly more likely to be stunted than children using a disposable diaper or a latrine.

Causal pathway for Region 3 (Rivercess and Sinoe Counties)

Similarly to Region 1 and 2, a dominant pathway to stunting in Region 3 takes its roots in a limited access to markets. Children living in households within at least one hour from the nearest market were more likely to be stunted than children living in a closer proximity. From among all surveyed areas, LR03 in Sinoe County came out as the livelihood zone with the lowest market access, while Rivercess County and Region 3 demonstrated the lowest market access at a county and regional level, respectively. Among other things, distance to market decreased the likelihood of a presence of soap in household and increased a likelihood of child being unclean. The likelihood of child being unclean also increased in agricultural livelihood zones (while it decreased for children living in peri-urban areas), in households practicing open defecation and where inappropriate child-caregiver interactions were observed during the data collection.

The likelihood of child being unclean increases his/her vulnerability to disease and to a growth retardation, as a consequence. This seems to be backed up the available data on the incidence of key childhood diseases as a child suffering from diarrhoea was potentially more likely to be stunted if living in a household with more than one child under 5 years of age. This suggests a link with non-optimal birth-spacing (<24 months) and women's heavy workload, which then reflects negatively on child care practices. The available data implies that a child cared for by a grandmother is more likely to be stunted while a child cared for by an aunt has significantly higher odds of being concurrently wasted and stunted.

Women's heavy workload is particularly applicable in case of women with insufficient support and/or limited access to income. Children of mothers perceiving a low external support were potentially more likely to be stunted while children of mothers benefiting from husband's allowance as a primary source of income were less susceptible to be chronically malnourished. Children living in female-headed households were potentially more vulnerable to stunting if a mother deployed coping strategies, e.g. reducing meal portions or reserving meals for children only, for 3- 7 days a week, thus highlighting a high level of food insecurity in the household. The deployment of coping strategies demonstrated a significant statistical association with a concurrent wasting and stunting, as children living in households with a medium or high rCSI score had higher odds of suffering from multiple nutritional deficiencies.

On a health-seeking side, from among children who were not born in a health facility, children living in a household more than 1 hour away from the nearest health facility were significantly more likely to be stunted. Longer distance to a health facility also seems to suggest a higher use of black baggers. The lack of measles vaccination among surveyed children increased their odds of being concurrently wasted and stunted.

Considering the role of non-optimal hygiene and sanitation environments on child cleanliness, children living in households using an unimproved water point were significantly more likely to

be stunted while children wearing a washable diaper older than 18 months of age were potentially more likely to be stunted.

Overarching causal pathway (all counties)

The analysis of pooled data from all three regions, representing five counties covered by this Link NCA study, allowed for a design of an **overarching causal pathway** detailing generally applicable causal mechanism based on the risk factors with a significant statistical association with stunting across the study zone.

Similarly to all three regions analysed separately, a dominant overarching pathway to stunting takes its roots in a limited access to markets. Children living in households within at least one hour from the nearest market were more likely to be stunted than children living in a closer proximity. Among other things, distance to market decreased the likelihood of a presence of soap in household and increased a likelihood of child being unclean. The likelihood of child being unclean also increased in agricultural livelihood zones (while it decreased for children living in peri-urban areas) and in households practicing open defecation. In addition, children of mothers who had their first pregnancy before 18 years of age were more likely to be observed unclean as well as children, in cases of which inappropriate child-caregiver interactions were observed during the data collection.

As child cleanliness can be heavily dependent on environmental hygiene and sanitation, a child observed playing in dust or mud was significantly more likely to be stunted while a child living in a household owning a livestock, thus exposed to a contamination through the proximity to animals and/or their faeces, was potentially more likely to be stunted. In addition, a child living in a household more than 20 minutes away from the closest water point, was significantly more likely to be stunted, especially if living in one of agricultural livelihoods zones (potentially via increased odds of diarrhoea, as explained below). An interesting statistical association was also detected among children wearing a washable diaper, particularly among children older than 18 months, living in agricultural livelihoods zones, who were significantly more likely to be stunted than children using a disposable diaper or a latrine. A potential risk was detected for children wearing a washable diaper if older than 18 months and living in coastal livelihoods zones.

The likelihood of child being unclean increases his/her vulnerability to disease and to a growth retardation, as a consequence. This seems to be backed up the available data on the incidence of key childhood diseases as a child suffering from diarrhoea was potentially more likely to be stunted. A child suffering from diarrhoea was significantly more likely to be stunted if living in one of agricultural livelihoods zones or observed unclean. Water source at more than 20 minute distance from a household increased odds of child suffering from diarrhoea while the presence of soap decreased them. A child suffering from cough was significantly more likely to be stunted if living in one of agricultural or coastal livelihoods zones, if living in a household with more than one child under 5 years of age and if observed unclean. A child suffering from any of surveyed morbidities, i.e. fever of cough or diarrhoea, was more likely to be stunted if living in one of agricultural livelihoods zones or observed unclean.

On a health-seeking side, a child living in a household more than 1 hour away from the nearest health facility was potentially more likely to be stunted. Similarly to Region 2, children born in a health facility and children, whose mothers attended more than 6 prenatal consultations during their pregnancy were potentially at a lesser risk of stunting. It is possible to infer that such mothers had a better access to health facilities while the attendance of prenatal consultations played an important role in mother's sensitisation on optimal care practices, planting a seed for proper child development once he/she was born.

Possibly linked with a health services' utilisation, a mother's use of contraceptive means and/or her capacity to birth-space surfaced as a significant or potential risk factor across all livelihoods zones. In mining/concession areas, an undesired pregnancy revealed a significant statistical association with stunting while a slightly statistically weaker association was observed in peri-urban areas too. Children in agricultural livelihoods zones, on the other hand, were potentially more likely to be stunted if born within 24 months' time from the birth of their older sibling.

Biologically, low birth-spacing can lead to a non-optimal nutritional status of women as their bodies cannot sufficiently recuperate from one pregnancy to another. This translates into a sub-normal development of a child during both a gestation and a lactation period. The nutritional status of women, assessed using a mid-upper arm circumference (MUAC), significantly links with the impaired growth, potentially via non-optimal breastfeeding practices caused by mother's perception of breastmilk insufficiency, triggering a premature weaning or early initiation of complementary feeding. According to the available data, mothers with an increased appetite or consumption during pregnancy or lactation were more likely to report sufficient quantity of breastmilk to satisfy their child and more likely to continue breastfeeding at 1 year.

The optimal nutritional status of women is naturally linked with their access to income or food, which may be particularly limited in food insecure households. Children in mining/concession areas, whose mothers benefited from a husband's allowance as a primary source of income, were less susceptible to be chronically malnourished. However, children of women who did not benefit from such support, especially children in female-headed households and children living in coastal livelihoods zone, were more likely to be stunted when a parent admitted to reserving meals for children only 3 to 7 days a week, thus implying the extreme vulnerability of the household. In addition, children in peri-urban areas living in households supporting another child in urban school, which translates into a preferential use of resources for education (at the expense of balanced meals), were also more likely to be stunted. In agricultural livelihoods zones, access to resources being intrinsically linked with the availability of external support, children of mothers who perceived low levels of such support and/or were not part of external support groups, were potentially at a greater risk of chronic malnutrition. It is interesting to note that a perception of external support decreased as women's decision-making powers declined.

KEY RECOMMENDATIONS

Based on these findings, the following activities, per region, are thus recommended to be considered for an incorporation into current/future interventions.

GLOBAL RECOMMENDATIONS

- Improve access to water through construction of new and/or maintenance of existing water points using existing structures and mechanisms to ensure their proper long-term utilization (e.g. water committees, town legislature, etc.);
- Improve water treatment management at water point and household levels, including the use of appropriate water treatment options and effective water transportation and storage practices to ensure water safety before use;
- Encourage the construction of family latrines using methodological approaches, which proved previously successful in the Liberian context, including trainings and sensitization activities adapted to context, typical income, lifestyle and concerns;
- Encourage the creation of baby-friendly play spaces, including mats and/or laying cement in areas where children play frequently, and their appropriate maintenance to decrease a potential contamination with the surroundings;
- Strengthen the sensitization of mothers as well as other family members (grandmothers, aunts, fathers and older siblings) on appropriate care practices, especially in households of young mothers in agricultural livelihood zones and mining/concession areas with more than 1h distance from the closest market;
- Launch a SBCC campaign on the appropriate use of washable diapers, highlighting the importance of their frequent cleaning and timely transition to other safe forms of defecation, especially for children older than 18 months;
- Improve access to markets by improving existing road network (among other by lobbying local authorities to ensure that road maintenance is done in line with signed concession agreements) and/or construction of new markets in closer proximity to the population, especially in areas with a general or seasonal access difficulties;
- Support diversification of income opportunities through livelihood zone appropriate revenue streams, including agricultural production schemes and/or community/ household gardens, adapting assistance modalities to target hardship during lean periods;
- Support the creation and/or capacity building of external support groups (*koo's*, VSLA, *susu* clubs, mothers' groups, community gardens) for both men and women, especially in agricultural livelihood zones, in order to strengthen existing social support mechanisms in communities and households, putting a particular emphasis on emotional support and stress relief. This may include an incentivization of loans to women, especially in female-headed households.
- Promote appropriate birth-spacing and family planning practices, especially among adolescents, by facilitating access to relevant health, education and/or youth services responsible for relevant information sharing, support and provision of suitable means of contraception to target groups. This may include nation-wide sensitization campaigns aiming to destigmatize the sexuality in parent-child conversations and/or adolescents desiring to use family planning methods.

REGION 1: GRAND CAPE MOUNT

- Strengthen the sensitization of households on appropriate waste management practices, especially the disposal of organic kitchen waste and the importance of soap for handwashing, bathing and dish/clothes washing;

- Promote optimal nutritional status of women via existing sensitization campaign via health facilities, community health worker networks or mothers' groups, highlighting the importance of balanced nutrition during pregnancy and/or lactation to ensure mother's perception of breastmilk sufficiency to maintain breastfeeding, as advised;

REGION 2: GRAND BASSA/ RURAL MONTSERRADO

- Improve access to health facilities by improving quality of provided services, especially via a continuous capacity building of health facility personnel and a constant availability of medicinal products as well as through innovative, low resource community approaches addressing geographical and financial barriers of access in order to ensure an increase in health facility utilization by pregnant and lactating women and children under 5 years of age, especially for antenatal care, assisted childbirth, vaccination, Vitamin A supplementation and deworming;

REGION 3: RIVERCESS/ SINOE

- Strengthen the sensitization of households on appropriate infant and young child feeding practices, especially in relation to the initiation, frequency and diversity of feeding. This may include a promotion of fruit snacks and a production of infant cereals² at scale for petty traders to decrease a potential higher workload of women;
- Research and design appropriate support strategies for households in mining/concession areas to assist them in child care

² Benny dust, plantain dust, rice dust, etc.

I. INTRODUCTION

Justification of the study

The Link NCA study for five counties in Liberia, namely Grand Cape Mount, Grand Bassa, Montserrado, Rivercess and Sinoe, is a part of a project funded by Irish Aid, designed through a consultative process with the Liberia WASH Consortium members as well as other key stakeholders. The specific objectives of the project are to formulate a strategy and Theory of Change (TOC) to address child stunting in a holistic, integrated and sustainable way and to conduct advocacy for the nutrition actions based on the experiences of the formative research. The aim of the project is to contribute to the improvement of nutritional security with replicable multi-sector interventions.

In order to design a high-impact, sustainable and replicable project design to reduce stunting; the programme was designed in three phases. The first phase, implemented in the period from September 2019 to May 2020, focused on formative research to better understand the context-specific causes of stunting and determinants of related behaviours. Three out of five consortium members, i.e. Action Against Hunger, Concern Worldwide and Water Aid, engaged in the delivery of assessments, namely the Link NCA Nutrition Causal Analysis, Barrier Analysis and Cost of Diet Assessment, to build a solid evidence base for future interventions adapted to an in-depth understanding of the context and community priorities.

The Link NCA study is a critical part of this approach, allowing a better understanding of the underlying causes of stunting and the linkages between nutrition, food security and livelihoods, water, sanitation and hygiene, gender and other thematic areas. The key findings drawn from the analysis will inform the design of the second and third phases of the project, supported by awareness raising and advocacy efforts, in order to develop an integrated optimal response aimed at reducing rates of stunting in the study area.

Zone of the study

The Link NCA study targeted five counties, with a special focus/stratification on major livelihoods zones within those five counties. Across the five counties, there are seven livelihood zones and one urban area. Special attention was given to different profile of vulnerability to undernutrition based on communities' livelihoods specialisation.



Figure 1: Map of the study area [in blue]

The five selected counties border the Atlantic and are among those with the highest burden of stunting nationally.

II. STUDY OBJECTIVES

Global objective

The main objective of this Link NCA study is to identify the major risk factors and causal pathways leading to undernutrition (stunting) in the study area.

Specific objectives

The Link NCA study aimed to answer the following study questions:

1. To identify and categorize risk factors responsible for stunting among the population in the study area and to estimate the prevalence of these risk factors;
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 for each major risk factor 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 multisector recommendations to address identified risk factors, targeting most vulnerable communities.

III. METHODOLOGY

A Link Nutrition Causal Analysis (Link NCA) is a method for analyzing the multi-causality of undernutrition, 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.³

The methodology has been precisely defined and tested in the field with a guidance available for every step of the method. It offers a unique opportunity for a great variety of key informants, from technical experts to community members, to express their opinions on the causes of undernutrition in the zone of study. The findings are constantly reviewed until validated by all stakeholders. The Link NCA places value on perceived causes as well as on evidence-based causes to display the complexity of perspectives. Undernutrition is examined globally, avoiding a vertical, sectoral approach, linking different verified sources of information to build consensus around the plausible causes of undernutrition in a given context.

³ For more information about the methodology, please refer to www.linknca.org.

A. KEY STAGES

Preparatory phase (October 2019)

The main objective of a preparatory phase was to define key parameters of the study, including its objectives, geographical coverage and feasibility. A preliminary secondary data and literature review was conducted in order to define the structure of the study. Considering new methodological advancements⁴ and a lack of availability certain key indicators for the zone of study, an option comprising all three Link NCA study components was selected. This phase also included preparation and planning stages necessary for any type of study, i.e. a development of Terms of Reference, resource mobilization as well as a recruitment of a Link NCA Analyst.

Identification of hypothesized risk factors and causal pathways (October 2019)

The key responsibility of a Link NCA Analyst at this stage was to gather an overall understanding of a local context and to identify a set of risk factors and their interactions, which could potentially trigger undernutrition among the target population in the zone of study. The identification of hypothesized risk factors and causal pathways was based on a systematic literature review (using the Link NCA Pathways to Undernutrition module and all grey literature available locally), supported by a series of exploratory interviews with key informants, such as representatives of relevant governmental institutions, non-governmental organizations and/or academia with an in depth knowledge or work experience in the zone of study. The identified hypothesized risk factors were presented, examined and validated for field testing during the Initial Technical Workshop, which took place in Monrovia on October 31st 2019.

Primary data collection: Qualitative inquiry (November- December 2019)

The Link NCA methodology relies on a triangulation of both qualitative and quantitative data. The qualitative data collection, led by the Link NCA Analyst, lasted four weeks, spanning from November 13th to December 11th 2019. It comprised of an in-depth inquiry on all risk factors identified and validated in preceding stages through semi-structured interviews and focus groups discussions as two principal data collection methods. The collected data was recorded in writing in the form of notes and later reproduced electronically. This stage also included a series of community consultations about past and/or ongoing interventions as well as a prioritization exercise with regards to future assistance.

Primary data collection: Quantitative Risk Factor survey (February - March 2020)

The quantitative data collection, which comprised of an Anthropometric data collection and a Risk Factor Survey conducted by the Link NCA Analyst and AAH M and E Officer, took place from February 8th to March 8th, 2020. It consisted of anthropometric measurements and 45 indicators, covering all risk factors identified and validated in preceding stages. The questionnaires were deployed on mobile devices and the collected data was uploaded and compiled in a KoboToolBox.⁵

Synthesis of results and building a technical consensus (March 2020)

⁴ E.g. Integration of statistical associations' calculations (prevalence of wasting/stunting in relation to identified risk factors) with an aim to enrich the data analysis/triangulation for a more precise definition of local causal pathways.

⁵ Free tool for data collection in harsh environments, www.kobotoolbox.org.

Upon the completion of a data collection stage, the Link NCA Analyst synthesized all collected data sets and conducted a series of analyses in order to categorize risk factors according to their relative impact on stunting in the zone of study and to describe dynamic relationships between various risk factors and their effects on undernutrition. As there is emerging evidence to suggest increased mortality risk in children with multiple anthropometric deficits, analyses were also conducted for children who are concurrently wasted and stunted [WaST]⁶. The categorization of risk factors took into account all sources of information collected in the course of study. The Final Technical Workshop, which was set to take place March 31st, 2020 in Monrovia, Liberia, was indefinitely postponed due to the CoVID-19 pandemic declared in March 2020. Consequently, an alternative, remote validation and review process was launched in April 2020 to allow stakeholders to discuss the findings and recommendations via online tools.

Communication of results and response planning (April 2020)

The results of the Link NCA were presented to the operational and decision-makers at the national level via a series of conference calls organized with the help of a virtual meeting platform. Three calls covering a variety of key stakeholders, including the Government of Liberia, members of the WASH Consortium and other partners took place on 17th, 23rd, and 24th April 2020. These were later complemented by bilateral and multilateral policy setting and project planning exercises aiming to improve nutrition security interventions in the study zone.

B. SAMPLING FOR QUANTITATIVE SURVEY

Sample size

The quantitative Risk Factor survey uses the SMART methodology to calculate sample size. To calculate sample size, the 5 counties were grouped into 3 regions, based on the 2016 Malaria Indicator Survey precedent:

1. **Region 1** (North-Western): Grand Cape Mount
2. **Region 2** (South Central): Rural Montserrado + Grand Bassa
3. **Region 3** (South Eastern A): Rivercess + Sinoe

⁶ Source: Myatt et al. 2018. Children who are both wasted and stunted are also underweight and have a high risk of death: a descriptive epidemiology of multiple anthropometric deficits using data from 51 countries. *Arch Public Health*. 2018; 76: 28.



Figure 2: Study area by region [Region 1- Green, Region 2- Blue, Region 3- Grey]

Sample size calculations were based on estimated stunting prevalence for each region, in line with the SMART Guidelines. The regional sample included representation from all livelihood zones in the five counties. The decision for a regional approach was informed by the risk factors and pathways studied in the qualitative stage. Furthermore,

1. County variances are less significant than livelihood zones in key risk factors for stunting;
2. This approach facilitated a larger sample size for the Link NCA quantitative analyses and triangulation at regional and pooled levels;
3. This approach allowed teams to spend more time in each cluster and household, meaning a larger number of risk factors could be studied.

The sample size for the Link NCA Anthropometric data collection was calculated using ENA for SMART software (2011 version). In Region 1, a precision of 7%, a design effect of 1.3 and an estimated global chronic malnutrition (GCM) prevalence of 34.4% was used giving a sample size of 250 children (including 5% contingency)⁷. In Region 2, a precision of 6%, a design effect of 1.3 and an estimated global chronic malnutrition (GCM) prevalence of 28.2% was used giving a sample size of 261 children (including 10% contingency).⁸ In Region 3, a precision of 7%, a design effect of 1.2 and an estimated global chronic malnutrition (GCM) prevalence of 32.7% was used giving a sample size of 225 children (including 5% contingency).⁹

Region	CM estimated ¹⁰	Precision	Design effect	Sample size-children	Average household size	% Population <5 years old	% Non-response	Sample size households	Number of clusters
Region I	34.4%	7%	1.3	250	4.7	17.9%	5%	348	30
Region II	28.2%	6%	1.3	261	4.0	17.5%	10%	368	31

⁷ Using prevalence from 2016 LNNMS, Design effect 2016 LNNMS, Precision based on SMART Guidelines, Non-response based on 2016 LNNMS.

⁸ Weighted prevalence from 2016 LNNMS (Montserrado and Grand Bassa), Design effect 2016 LNNMS, Precision based on SMART Guidelines, Non-response based on 2016 LNNMS & absentee rate in peri-urban areas

⁹ Weighted prevalence from 2016 LNNMS, Design effect 2016 LNNMS, Precision based on SMART Guidelines, Non-response based on 2016 LNNMS & absentee rate in peri-urban areas.

¹⁰ Prevalence from 2016 LNNMS.

Region III	32.7%	7%	1.2	225	4.1	17.0%	5%	378	31
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Table 1: Parameters of the quantitative study, by region

Sampling procedure

The selection of households was carried out according to a two-stage cluster sampling methodology. Clusters were defined as Enumeration Areas from the national sampling frame set by the last Population and Housing Census of Liberia (2008). This master list is an exhaustive list of all the enumeration areas within the fifteen counties of Liberia. In the first stage, a comprehensive list of Enumeration Areas in each of the three Regions was uploaded to ENA, excluding Urban Monrovia Enumeration Areas in Region 2. ENA software was used to select clusters using Probability Proportional to Size (PPS).

In the second stage, thirteen households within clusters were randomly selected using lists of households obtained in each Enumeration Area by the study team and a random number generator application on the tablets. For the study, household is defined as a group of related persons or not, eating meals from the same pot and recognizing a person's authority who is head of the household.

C. SAMPLING FOR QUALITATIVE SURVEY

The 2017 national livelihood zoning activity identified ten livelihood zones nationally based on economic and ecological differences. LR04 Coastal-plain cassava is the predominant livelihood zone in four of the five study counties, while LR08 is the primary livelihood zone activity in Rural Montserrado.

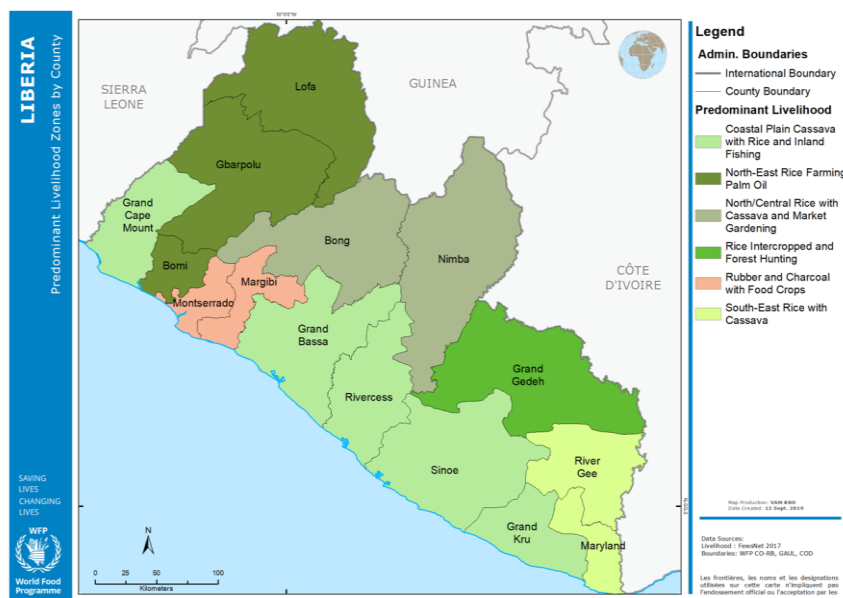


Figure 3: Predominant Livelihood Zones, Liberia¹¹

Stakeholders in the initial technical workshop suggested that the causal pathway for urban areas likely did not share the major risk factors identified for the rest of the study zone. Children in

¹¹ Source: WFP 2017; Predominant livelihood zones, Liberia.

urban Grand Bassa are often older and/or hosted by relatives for schooling. Thus, they suggested to focus qualitative sampling on rural and peri-urban areas.

The objective of the Link NCA's qualitative survey sampling framework was not to be statistically representative of the target population but rather to be qualitatively representative of different population segments living in the area. In order for the collected qualitative data to represent realities of a majority of households, a purposive sampling was used to select districts and towns within those districts. A particular attention was paid to the representativeness of livelihoods zones, distance to health facilities, and distance to the market.

Two towns were selected from each county for qualitative investigation. Selection was conducted in two stages: the first stage included secondary review of livelihood zone, health facility coverage, water point access, and population for each county by district. This listing was conducted in consultation with the County Health Team, other partners, and AAH County Nutrition Officers. Districts were purposively selected by the Link NCA Analyst based on varying health facility coverage, water access, livelihood zone, and location (i.e. no bordering districts). Consideration was given to the predominant livelihood zones in each county: LR04 in Grand Bassa, Grand Cape Mount, Rivercess, and Sinoe; LR08 in Rural Montserrado.¹²

After selecting districts, town listing was completed in consultation with the County Health Team, other partners, and ACF County Nutrition Officers. Town listing was exhaustive within the parameters of population- no less than 150 community members, including those living in linked villages (reporting to the same authority figure, i.e. town chief), so as not to exhaust community members in the six days of qualitative discussion. Any factors that distinguished the town from the rest of the district were asked to be highlighted- i.e. a town that engages in a livelihood zone different from the rest of the district, so that a more representative location in the district could be selected. Towns were then randomly selected within the district.

Study District	Town	Dominant Dialect	Livelihood zone	Access to health facility ¹³	Water point access
Grand Bassa County					
Buchanan	Duhwein Town	Bassa	LR04/LR09 Peri-urban; ¹⁴ Coastal Plain Cassava with Rice and Inland Fishing	2 hr 30 mins: Buchanan/ St. Paul	Handpump, Creek ¹⁵
District #2	Zangar's Town	Bassa	LR02 North Central Rice with Cassava and Market Gardens	3 hr 30 mins: Senyeh Town	Creek
Grand Cape Mount County					

¹² Source: GoL, Liberia Comprehensive Food Security and Nutrition Survey (CFSNS) Report 2018.

¹³ Walking, average.

¹⁴ Potter employment.

¹⁵ Dry season.

Golakonneh/ District 1	Weijue Town	Various	LR10 Mining/Concession and Farming Zone	2 hrs: Lofa Bridge	Well, handpump, creek ¹⁶
Tewor/ District 3	Taylor and Kru Beaches	Vai	LR05 Coastal Fishing and Cassava	3 hr 30 mins: Kunkor Health Center	Handpump, creek ¹⁷
Rural Montserrado					
Careysburg	Kingsville	Kpele	LR09/ LR08 Peri-urban/ Rubber and charcoal with food crops	Kingsville	Handpump, well, creek
Todee	Pleemu Town	Kpele	LR08 Rubber and charcoal with food crops	Pleemu Town	Handpump
Rivercess County					
Timbo	Kpah Town	Bassa	LR04 Coastal Plain Cassava with Rice and Inland fishing	2 hr 45 mins: Timbo Clinic	Creek, handpump ¹⁸
Doedain	Boegeezay	Bassa	LR02 North Central Rice with Cassava and Market Gardens	Boegeezay	Handpump
Sinoe County					
Butaw	Butaw	Various	LR10 Mining/Concession and Farming Zone	Butaw	Handpump, well, creek ¹⁵
Gblonee	Togbaville	Kru	LR04 Coastal Plain Cassava with Rice and Inland Fishing	Gblonee	Creek ¹⁹

Table 2: Qualitative sampling framework for the Link NCA qualitative survey, five selected counties in Liberia

On the town level, the following categories of participants were selected to participate in semi structured interviews and focus groups discussions:

- Community leaders (clan chiefs, town chiefs, town elders, religious leaders and other prominent community figures);
- Traditional healers or birth attendants;
- Health center personnel (doctors, nurses, health extension workers);
- School directors or teachers;
- Representatives of community-based organizations;
- Mothers and fathers of children under 5 years of age;
- Grandparents of children under 5 years of age
- Key government staff and staff of consortium partners

D. QUANTITATIVE DATA COLLECTION

Team composition and training

¹⁶ Large community, water source defined by proximity/ preference.

¹⁷ Creek during dry season.

¹⁸ Handpump during peak of rainy season only.

¹⁹ Malfunctioning handpump.

The quantitative data collection team was composed of six teams of three enumerators and a team supervisor. A seventh team, composed of the Link NCA Analyst and Action Against Hunger M and E Officer, provided roving support and supervision. A local guide was hired in each sampled cluster to facilitate team's work, including defining the Enumeration Area parameters and updating household listing, and to ensure community acceptance. Prior to the commencement of data collection, all team members received a thorough six-day training, which took place in Sinkor from February 10th to 17th, 2020. The training included, among others, modules on survey methodology, anthropometric measurements using the SMART methodology, Link NCA quantitative risk factors, and administration of household questionnaires using mobile devices. All team members participated in a standardization test for anthropometric measurements, per the SMART Methodology. Enumerators standardized across three measurements [MUAC, height, weight] were selected as measurers. A 1-day pilot test of random sampling procedures and all data collection tools took place February 17th, in Lakpazee Block D, for quality assurance purposes.

Data collection tools

The quantitative data was collected via an electronic questionnaire downloaded onto mobile



Photo 1: Interactive indicators, Risk Factor Survey

devices. The questionnaire covered all areas of interest linked with validated hypothesized risk factors. It was composed of sub-sections pertaining to a head of household, children under five years old, and mothers of children under five years old. One sub-section was dedicated to observations of caregiver care practices or household hygiene and sanitation practices. It was translated into Liberian English and administered in Liberian English or local dialect (primarily *Bassa*, *Kpele*, *Vai*, or *Kru*), depending on respondents' speaking abilities. The Risk Factor Survey piloted interactive indicators regarding social support and workload [**Cf:** GENDER].

In addition, for all children aged 6 – 59 months, anthropometric measurements, such as height/length, weight, mid-upper arm circumference (MUAC) and presence of edema, were recorded, as per the SMART methodology guidelines. Child height/length was measured using standard UNICEF height boards borrowed from the Liberian Ministry of Health. The weight was measured using SECA scales and recorded to the nearest 0.1kg. MUAC for children was measured using three coloured (red, yellow, green) standardized tapes, following the SMART Methodology guidelines. MUAC readings were recorded to the nearest 0.1 cm. Bilateral pitting edema was diagnosed by applying thumb pressure on the top of both feet. The child was recorded as oedematous only if bilateral pitting edema was confirmed by the team supervisor.

Main challenges

- 1. Administration in local dialect-** The questionnaire was translated to Liberian English during the team training and was downloaded onto the tablets in Liberian English only.

Efforts were made to ensure each team had one team member who spoke *Bassa*, *Vai*, *Kpele*, and *Kru*, respectively, as these were the primary dialects in the study zone. In the case a team did not have someone who spoke the local dialect, the community guide was utilized as an interpreter, if absolutely needed. However, this was generally needed only for elderly respondents and the impact on the data quality is deemed low.



Photo 2: Team member defines EA with community mobilizer

2. Inaccessibility- Several selected enumeration areas required canoe crossings; team members were not able to access one EA in District #1 Grand Bassa, as the canoe to cross was letting in water through the bottom. Future surveys must ensure each team member carry a life jacket.

3. Enumeration Areas- The first stage of the sampling framework utilized Enumeration Areas from the 2008 Population Census. The study team utilized maps provided by LISGIS. The names of localities/ features on some maps had changed, at which point the survey manager validated the area of interest with GPS coordinates and/or partner consultation. To mitigate these challenges, teams defined boundaries of the Enumeration Area alongside the team guide, segmenting proportional to size in Enumeration Areas with population over 150 households and/or large geographic span.

E. QUALITATIVE DATA COLLECTION

Team composition and training

The qualitative data collection was led by three teams: a Link NCA Analyst with the help of a two research assistants and two teams of a deputy analyst and a research assistant. Interpreters were recruited and trained at county level while a community mobiliser was recruited locally at town level. The main role of community mobilisers 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.

Prior to the commencement of data collection, team members received a detailed 3-day training, which took place in Monrovia from November 8th- 12th, 2019. The training included, among others, modules on survey methodology and tools as well as a detailed explanation of ethical considerations to be respected during the study. A series of practical tests was integrated into a learning process in order to test the team's level of comprehension of key concepts and practices and to ensure that high quality standard of the data collection will be met. A 1-day pilot in St. Paul District, Montserrado County preceded data collection.

Data collection tools

The qualitative survey team used semi-structured interviews and focus groups discussions as two principal data collection methods. However, in order to avoid an information bias due to a long history of interventions in the zone and a community dependence on external assistance, the qualitative survey team used a variety of participatory tools, aiming to reveal real determinants of undernutrition in the area. The selection of participatory tools included:

- 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
- I. Agree/disagree game
- J. Courage to change game
- K. Risk game

Semi-structured interviews and focus group discussions were guided by interview guides, covering key topics related to risk factors validated during the initial technical workshop. The content of the interview guides took into account available findings for Liberia and instead of repeating certain inquiries it aimed to deepen the understanding about individual risk factors and their interactions in the zone of study. For more information about qualitative survey methods and tools, please refer to Qualitative Survey Guide [Cf: QUALITATIVE GUIDE].

Data collection

The qualitative survey took place in selected towns from November 13th, 2019 to December 11th, 2019. The qualitative survey team spent approximately 6 consecutive days in each selected community. The length of semi-structured interviews (SSI's) or focus group discussions (FGD's) was limited to 1h or 1h15 min maximum. The focus group discussions took place during the time of the day which was most accommodating to the community's availability and their daily routine.

	Total no. FGDs	Total no. SSIs	Total no. participants	% of female participants	No. of observations	Community ranking exercises	No. of days
Montserrado: Kingsville #7, Careysburg District	14	6	146	60%	3	1	6
Montserrado: Pleemu Town, Todee District	14	4	160	61%	3	1	6
Rivercess: Boeegezay Town, Dodeain District	14	3	142	59%	2	1	6

Rivercess: Kpah Town, Timbo District	12	8	107	59%	3	1	6
Grand Bassa: Zangar's Town, District #2	12	8	107	56%	3	1	5
Grand Bassa: Duhwein Town, Buchanan District	12	8	100	66%	3	1	6
Sinoe: Togbaville Town, Gblonee Health District	13	4	145	63%	3	1	6
Sinoe: Butaw Town, Butaw District	13	5	146	62%	3	1	6
Grand Cape Mount: Weijue Town, Golakonneh District	14	4	128	61%	3	1	6
Grand Cape Mount: Taylor and Kru Beaches, District #3	13	3	143	55%	3	1	6
TOTAL	131	53	1324	60%	29	10	59 ²⁰

Table 3: Summary of community consultations during the Link NCA qualitative inquiry

The last day of a 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 to identified problems and their prioritization.

²⁰ Data collected concurrently by three teams.



Photo 3: Participatory household spending exercise, Montserrado County

Main challenges

- **Inability to reach northeast Sinoe County:** LR03, which represents a small section of north east Sinoe County, was originally included in the qualitative sampling framework. However, qualitative investigation took place at the tail end of a prolonged rainy season. After two attempts by the study team to reach the livelihood zone and in consultation with the County Health Team, the site was replaced by a town in Gblonee Health District in the LR04 livelihood zone, the predominant livelihood zone in the county.
- **Language barrier:** Considering the non-Liberian descent of the Link NCA Analyst, her communication with community members sometimes relied on translation from English to Liberian English. This was easily facilitated by the Research Assistants and/or an interpreter. As a result, some respective conversations were subjected to a double translation from English to Liberian English and a local dialect. Despite the additional steps required, its influence on the survey outputs are deemed limited.
- **Perception of stunting:** The majority of community members did not perceive stunting as a medical condition; thus, focusing causal pathways around stunting during community restitutions was challenging, as a critical sensitization component was missing. As it is not the role of researchers to also provide health education, the study team often struggled to focus conversations on chronic malnutrition and not general malnutrition. Despite best efforts, it is possible that community rankings reflect general undernutrition and not chronic malnutrition, specifically.
- **Saturation point of sampling frame-** The sampling framework consisted of two communities per county, whereas four would have been preferable. Given time constraints, more in-depth discussions, and time, in one community were prioritized over fewer days in more communities.

F. DATA MANAGEMENT AND ANALYSIS

The quantitative data was collected via an electronic questionnaire downloaded onto mobile devices. Paper anthropometry and mortality forms were maintained for verification before nightly upload of data onto an online platform KoboToolBox. The survey manager conducted regional review on the Sunday concluding data collection, before the next region, to review inconsistencies.²¹

After a final compilation, all the data was exported in the form of an Excel spreadsheet and analyzed with STATA software. The anthropometric data was analyzed using ENA for SMART software (2011 version).

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 grouped by themes for a more efficient analysis, making sure that a confidentiality of speakers is guaranteed. All views were then analyzed using qualitative content analysis methods.

G. ETHICAL CONSIDERATIONS

The following provisions were respected during the course of the Link NCA study:

- a. All relevant authorities, including the Ministry of Health and County Health Teams, were duly informed about the study by Action Against Hunger Country Office in Monrovia, as well as the Director of Nutrition for the Ministry of Health;
- b. The participants were selected equitably and their informed consent was sought to ensure that they participate in the study voluntarily;
- c. The participants of a qualitative survey were able to participate in more than one focus group discussion, if they chose to, but considering their heavy workload, especially in the brushing season in LR02 and LR04, community leaders were advised to spread the selection of participants across the whole town and associated village(s), if needed;
- d. 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 community entry, they received a detailed planning of research activities in their town 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, taking into account time constraints of the study;
- e. The anonymity of participants was ensured during all stages of the study (data collection, data analysis and data storage). Their names were neither collected nor shared;
- f. The qualitative data collection team organized 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 prioritize actions for the way forward;

²¹Data plausibility check by region, per ENA output: Region 1- 'Excellent' (8%), Region 2- 'Excellent' (7%), Region 3- 'Excellent' (9%)

- 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.

H. STUDY LIMITATIONS

- **Incomparable stunting prevalence data-** While the primary objective of the Link NCA quantitative sampling framework was for validation and triangulation of pathways, the study also generated stunting prevalence's at regional level. While useful for programming purposes, Regions 2 and 3 for the quantitative sampling framework exclude counties included in the MIS regions, and other surveys [DHS, LNMMS] have not calculated prevalence's at these regional level. Therefore, undernutrition prevalence generated for Regions 2 and 3 should not be compared to previous studies.
- **Saturation point of sampling frame-** Nuances in pathways to stunting by region were considered more significant than at smaller livelihood zone and/or county levels. As neither the qualitative nor quantitative sampling frames reached saturation at livelihood zone or county levels, associations and conclusions should not be interpolated to county or livelihood zone level.
- **Risk factor prevalence estimates:** Risk factor prevalence estimates featured in this report were calculated from a complete data set, where certain entries might have been doubled or tripled for mothers and/or households with more than one child under 5 years of age. For this reason, they cannot be deemed statistically representative and should not be used as a reference in project proposals and/or any other documentation requiring a sound quantitative evidence. They were integrated into a core text of this report for purely comparative purposes, despite their approximate value. While they tend to align with the findings of previous surveys and huge deviations are not expected, their statistical value cannot be guaranteed.
- **Correlations:** 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. P-value associations <0.1 have been included in the narrative as '**potential**' associations with the outcome of interest, stunting- with the intention of inspiring future research on the relationship between that risk factor and stunting. All '**significant**' associations have been considered as those with a p-value <0.05.

IV. FINDINGS

HYPOTHESIZED RISK FACTORS

The identification of hypothesized risk factors was based on a systematic literature review (using the Link NCA Pathways to Undernutrition module and all grey literature available locally), supported by a series of exploratory interviews with key informants, such as representatives of relevant governmental institutions, non-governmental organizations and/or academia with an in-depth knowledge or work experience in the zone of study. The identified hypothesized risk factors

were presented, examined and validated for field testing during the Initial Technical Workshop, which took place in Monrovia on October 31st 2019.²²

All 19 hypothesized risk factors were retained for field-testing. Technical Experts were afterwards invited to categorize risk factors according to their anticipated contribution to stunting in the zone of study on the scale from 1 (risk factor expected to contribute marginally to undernutrition) to 5 (risk factor expected to contribute substantially to undernutrition). The results of this exercise are presented in the table below.

A: Limited availability of quality health services	4.52
B: Limited access to health services/ traditional health providers	4.12
C: Low birth spacing/ unwanted pregnancies	4.03
D: Parental stress	3.31
E: Non-optimal breastfeeding	4.25
F: Non-optimal IYCF practices	4.48
G: Low access to food	4.28
H: Use of HH income non-beneficial to mothers/ children	3.66
I: Low diversity/ access/ availability of income sources	4.03
J: Malfunctioning market or supply system	3.24
K: Low coping capacities	2.95
L: Low access/ availability of water (quality and quantity)	4.25
M: Non-optimal water management	3.88
N: Poor sanitation practices	4.45
O: Poor hygiene practices	4.34
P: Low female autonomy/ decision-making	3.50
Q: Low social support for women	3.64
R: Early marriage and/or early pregnancies	4.03
S: Low nutritional status of women	4.14

Table 4: List of hypothesized risk factors validated for field-testing during Initial Technical Workshop, including Technical Experts Rating

A. HEALTH

Health care system

Fourteen years of civil war decimated Liberia's infrastructure, including the health care system. As the nation transitioned to peace in 2004, destruction and looting had left only 51 of the 293 public health facilities functional (17.4%).²³ In 2010, the Government of Liberia (GoL) reported 550 open

²² Participants included 31 technical experts covering a variety of sectors, such as health and nutrition, maternal health and care practices, mental health, agriculture, food security and livelihoods, water, hygiene and sanitation, and education.

²³ Source: National Transitional Government of Liberia. Joint needs assessment report. Monrovia: National Transitional Government of Liberia; 2004.

health facilities (378 public and 172 private).²⁴ Only 31 percent of private facilities met minimum facility accreditation criteria, compared to 80 percent of open government facilities.²⁴ The Ebola crisis of 2014 sent ripple effects through the national health system, including supply chain lapses and contagion-based fears from both providers and health seekers. While heavily supported by non-government organizations and foreign funding in the early 2000's (i.e. John Snow International, USAID funded Maternal and Child Health Integrated Program), only Last Mile Health and Action Against Hunger had direct and/or indirect targeted health center interventions at the time of qualitative data collection, in the study zone. Management of government facilities being decentralized, the County Health and Social Welfare Team is responsible for activities within their jurisdiction, but the allocation and transfer of funds is controlled at the national level.²⁴

There are three main levels of service delivery: primary, secondary, and tertiary.²⁴

- The **primary level** encompasses community and facility level care via the primary level's basic unit – the clinic, which offers the 'Essential Package of Health Services', including community health promotion;
- The **secondary level** includes health centers and county level hospitals, which offer 24 hour primary care services and a laboratory;
- The **tertiary level** includes specialized consultative care without a defined catchment area.²⁴ The largest tertiary care provider is John Fitzgerald Kennedy Medical Center (JFKMC) in Monrovia.

To control the flow of patients, patients are required to have a primary level referral from their catchment area before receiving treatment at a secondary level center. Ambulance services are typically maintained at secondary level. Caregivers are widely aware of referral processes, as seeking treatment initially from the incorrect provider presents an opportunity and/or financial cost.

"In case of emergency, we are not allowed to go to Cestos hospital²⁵ directly because we are in XX²⁶ health district, but we don't mind that because the distance to Cestos is far and then they take us in the ambulance from (the clinic)."

Focus group participant, Rivercess

Residents of urban and peri-urban areas can exercise some autonomy of choice when selecting formal health care (i.e. public or private provider), while residents of rural areas typically do not have a private care provider option and fall into the catchment area of one free government public health clinic or center. In peri-urban settings, the opportunity cost of stock outs or longer wait time in a government facility is weighed against the cost of treatment in a private facility.

"When my child was burned with hot water, I took her to (the private clinic),²⁶ the doctors there took good care of her, and she was treated well. I decided not to go to the government clinic because I was scared to wait."

Focus group participant, Grand Bassa (Peri-urban)

²⁴ Source: The Basic Package of Health Services Accreditation Final Results Report, MOHSW, 2010

²⁵ Secondary level care.

²⁶ Name withheld for anonymity.

Community-Based Health Providers

Primary health care delivery is formally brought to the community level, and thus made more readily accessible, by Trained Traditional Midwives (TTM's), general Community Health Volunteers (gCHV's), and Community Health Assistants (CHA's). General Community Health Volunteers work within 5km of health facilities' catchment communities, while CHA's work outside the 5km radius and are considered part of the health work force. The scopes of work for TTM's and gCHV's, which are community-based volunteer positions, include sensitization responsibilities as well as some service provision. The schedules and localities of both gCHV's and TTM's are managed by roster at the health clinic level. The scopes of work for these two positions were generally understood by community members; frequency and quality of services varied but was generally more favorable for Trained Traditional Midwives than gCHV's. If probed, community members knew the name of their gCHV but said their work was inconsistent due to their engagement in other livelihood activities. The TTM, if present in the community, was typically known by all community members as the woman who could be visited during pregnancy, even if all pregnant women did not exercise that option. The community-based volunteers strengthen referrals to the clinic, but their quality of work is hampered by lack of transportation for supervision and referrals. Volunteer activities thus complement, and often take backseat to, income generating activities, including agriculture. While some community-based volunteers, particularly TTM's, were previously subsidized by Health System Strengthening programs (i.e. NGO supported), many cited lack of incentives as a demotivating factor. Supervision is infrequent, but in the absence of incentives, training is a motivating factor for community based volunteers.

"The major challenges in my work as a midwife is that I have no support from the Government of Liberia. There is some relationship and understanding between me and the midwives at the hospital because they come here and check on me. The midwives checked on me in December of 2018. I am expecting them in the 2nd week of December [2019]."

Key Informant, Grand Bassa

Before the increased coverage of health clinics, TTM's and Traditional Birth Attendants (TBA's) were nearly exclusively responsible for pre-natal care and delivery. They charge for their services, leaving a contingent of experienced community-based birthers motivated to continue delivering at home, as opposed to the free government facilities.

"I can be compensated by the father of the child that has been delivered; I charge LRD 2,500 but they'll beg and pay LRD 1,500. Some midwives charge 2,000 for the boy and 1,500 for the girl child."

Trained Traditional Midwife, Grand Bassa

Health clinics have offset this by offering compensation and motivation schemes for the TTM. Because male caregivers are unlikely to accompany women to the clinic for delivery ('25% of the men can come with the females for the delivery and maybe 15% stay to escort the woman home'²⁷)-TTM's can escort the woman to the clinic for birth and return. Certified Midwives at some clinics create a competition for the highest number of referrals to the clinic for delivery per month.

²⁷ Certified Midwife, Rivercess

There is discordance between TTM's and young mothers' in terms of efficacy of home delivery. Despite the financial incentives and sensitization, TTM's remain confident that home deliveries are safe for mothers except under special circumstance. The TTM cadre, like the herbalist/ country work force, is aging- one key informant at County Health level estimated nearly all (95%) are 60+ years old.

Trained traditional midwife²⁸, Rivercess

I started in the late 1980's in Monrovia. I registered as a TTM, hospital recognizes me as a TTM, worked in the town for about 17 years, left Monrovia and brought the idea to XX²⁶ Town.

The TTM's role in community is to check pregnant women and refers sometimes, if critical. I can deliver for them. I wash my hands with water and wear gloves for the delivery. I check pregnant women at 6 months to check the position of the baby. I can use a stethoscope to examine pregnant women. I can refer to the hospital but I also can do delivery at my place. The message that I give to pregnant women is to not depend on me but also go to the hospital for check ups. I tell them to always eat good food (potato greens, red oil), not to eat dry cassava, not to drink liquor, not smoke or take snuff. Those foods are the foods that pregnant women should not eat.

Most of the women in the town can deliver at my place. There has been no problems since I started doing delivery in the town so people are free and happy to come to me.

I will refer a pregnant woman's delivery to the hospital when the child comes with one hand out, when the child crosses in the belly, when the woman is not able to deliver on her own. The child comes with one hand out when she sleeps on hard materials while pregnant, moving from place to place searching for cool places to sleep/ rest.

While CHA's bring formal health care delivery to the community level, the services they can provide is contingent on the resources they receive. In Rivercess and Grand Bassa, Community Health Assistants (CHA's) supported by Last Mile Health are stocked and equipped to treat basic illness among children under 5 years of age, prescribe and administer family planning, make referrals, and accompany pregnant women for delivery. In Sinoe County, CHA's expressed frustration that their value proposition in the community was limited to basic examinations, surveillance, and referrals, because they felt ill equipped with materials and drugs to do more. CHA's are well known in their catchment communities for the services and products they provide; if they are stocked with medicine, they are referred to as 'Small Doctor.' Their services are provided free of charge, and they receive supervision from GoL and NGO staff, if applicable.

"We are happy with the CHA because we reduce the distance to the clinic for treatment of the children. He is also the one giving family planning to us."

Focus group participant, Rivercess

Key Barriers to Healthcare

Geographic

The target catchment population for health clinics (primary care facilities) are 3,500 to 12,000 people, within a catchment area of 5 km (1 hour walk).²⁴ However, with the exception of

²⁸ This TTM was approximately 80 years old; she kept a log book of 200+ births since beginning her services as TTM

Montserrado,²⁹ 2011 data indicated that 39-49% of the population in the five study counties lives more than 5 km of a health facility. Many rural towns and villages are sparsely populated, such that geographic catchment areas can be large in scope and experience different barriers to seeking health care.

"This health facility has 54 catchment communities. The furthest is 3 hours away and the closest is 15 minutes away."

Health Facility Personnel, Rural Montserrado

This feedback from community members and key informants is supported by findings of the Risk Factor Survey, where mean minutes walked to the nearest health facility ranged from 72.5 minutes in Region 2 [65.3-79.6 minutes, 95% CI] to 88.7 minutes [78.0-99.5, 95% CI] in Region 3.³⁰ Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child who lives more than 1 hour from the health facility may be more likely to be stunted [p-val <0.1] and was significantly more likely to have diarrhea [Cf: Annex B].

In the event a motorbike can be found, refusal to transport very sick patients or women experiencing labor pains is common. While most mothers indicated a preference for delivering their child in a clinic, where the newborn could receive a modern exam, the Traditional Trained Midwife's (TTM) home was the preferred default, in the event that giving birth en route was a risk.

Blame for medical supply chain lapse was generally placed on the Central Government and road conditions, particularly in Sinoe, Rivercess, and parts of Grand Bassa counties, accessible only by roads frequently trafficked by logging companies. The heavy loads sink ruts into the dirt roads, which become impassable for vehicles carrying supplies, severely ill patients, and eventually even motorbikes in the peak of the rainy season.

"In fact all of this, the market and the drugs, would be fixed if it weren't for the logging companies on our roads."

Focus group participant, Rivercess

Financial

In the qualitative study sites, the longest reported walking distance to the clinic was 4-5 hours [Grand Cape Mount and Rivercess Counties], alternatively \$150- 400 LRD³¹ one-way on motorbike.³² In this scenario, one round trip cost alone represents an estimated 5.8-15.6% of monthly income for very poor households.³³ In low coverage districts, where large portions of the catchment population lives more than 5 km from the facility, such as District #2, Grand Bassa, geographical and financial barriers can reach extremes.

²⁹ Percentage includes Urban Monrovia.

³⁰ Region 1: 72.8 mins [60.0-85.7 mins, 95% CI]. Considering outlier communities, it is also important to consider the median: Region 1- 45 minutes, Region 2- 60 minutes, Region 3- 60 minutes.

³¹ \$0.76 - \$2.02 USD. One plate of food in a cookshop ranges from 200- 400 LRD, for reference.

³² Tail end of the rainy season.

³³ 2019 adjusted annual monthly income 61,416 LRD annual → 5,118 LRD monthly, 2019 CoD analyses.

"Our catchment areas are very hard to reach. Others have to cross rivers using ferries³⁴- getting here on a bike from that side can cost 1,500-2,000 LRD³⁵."

Key informant, Grand Bassa

While the Essential Package of Health Services are free of charge, in the event that a clinic is stocked out of medication, s/he will be referred to a pharmacy or divert to a black bagger. Women across the study zone associate the decision to carry a child to the clinic with permission to carry money for pharmaceuticals, so often is it that the clinic does not have medicine available. [Cf. GENDER].

Temporal

If the clinic is stocked with medicine, caregivers say they go to the clinic expecting to wait the entire day- in densely population health facility catchment areas, word of re-stocked medicine travels fast and typically is followed by a surge in health-seeking.

"When medicine comes, everyone can follow the vehicle up from the road and we won't go home until late at night, but for now people just come for birthing³⁶ (1 every other day)."

Health facility personnel, Montserrado

In more geographically dispersed catchment areas, low patient load in the triage area is typically the first clue that the clinic is stocked out of medicine. Paired with long distance walked, long wait time is one discouragement to attending the clinic, but typically perceived as worthwhile if medication is available.

Because of the long distance walked, and potentially long wait time, caregivers say they must be prepared to set aside their workload for the day to take a child to the clinic. This typically means missing one day of income generating activities, as well as ensuring care is provided for the remaining children and husband in the home for the day. In this case, if the woman does not have an adolescent female child, women usually arrange for household tasks to be offset by a sister/ sister-in-law, mother/ mother-in-law, or friend.

Socio-cultural

When clinics are not supplied with medicines due to financial or geographical constraints, caregivers say they are motivated to seek alternative options for their children- including traditional providers and/or black baggers.

"The traditional care provider play an important role in our lives because they go to the hospital and if there is no medicine and we don't have money for drugs, we can go to them for help."

Focus group participant, Grand Cape Mount

'Black baggers,' or unregulated persons who sell pharmaceuticals from black bags/ buckets in towns, sell medications based on clinic prescription, caregiver/ patient request, or their own assessment of symptoms. Medications typically pass through several suppliers before reaching the black bagger [i.e. Monrovia to Buchanan to personal purchase by the black bagger]. They are mixed in buckets or bags, stored for extensive periods of time in heat and/or direct sunlight, and

³⁴ Typically rafts made of logs.

³⁵ \$7.58- \$10.10 USD.

³⁶ Child deliveries.

sometimes removed from original packaging into plastic bags, making expiration dates impossible to reference or track. Though not associated with, or trained by, clinics, they are seen by community members as extension of formal medical care, as opposed to a traditional care provider, because they carry the same medicines. Black baggers are referred to at community level simply as doctors. Cost of treatment varies but is generally comparable to or slightly higher than the cost of the prescription at a physical pharmacy, but without the associated transportation or time costs.

Black bagger, Grand Bassa³⁷

Some black baggers also perform medical services (injections, suturing) on-site, though this varies by provider. Some black baggers mentioned that they offered vaccines, but caregivers denied going to them when their child was due on schedule for a shot. The study team, during qualitative inquiry, spoke with one black bagger who offered an array of services.

"I have a drug store in Buchanan at my residence. I get the medicines from Monrovia;³⁸ I bring the medicines to people in towns. My pharmacy opens at 6.30 am; I have all sorts of drugs- malaria, typhoid fever, infection. I have a busy schedule and only rest on Sunday's. I sell from markets to towns. I receive calls from different people to go to their rescues [sic].

I advise them to go to the hospital if something is major, but I can do some procedures for them here; these are all the services I can offer- stitches, IV and IM, circumcision for males at any age, vaccines that I take from the government and give to the people, prenatal care if the child is not resting well in the stomach, I can try to make it move right. If a woman is bleeding while she's pregnant, I refer her (to the hospital). I started my work in 1994. I want to go to training but the opportunity is not available. I have not received training before.

My motivation is that I love health. Our government down plays mobile clinics and our people die every day, so I decided to do this. People at the health centers call us as black baggers, it is not ok for me because I feel degraded by the term. I prefer to be called a 'practical nurse.'"

Traditional herbalists and "country doctors" continue to play an influential, but evolving, role as health care providers, with large variance between and within county and cultural contexts. Nearly every community identified a focal person(s) for traditional healing; this person's reputation was built both on his/her knowledge as well as their perceived spiritual powers. Some traditional herbalists are renowned at regional and/or national level for their knowledge and skills; others are scoffed at as charlatans or frail and elderly. Herbalists are often expensive, especially if they perceive a sickness to be spiritual in nature.

"Parents face hard time here, they don't have money to feed their family. People pay me for my services and it depends on the sickness. Sometimes I can charge L 3000- 4000³⁹ for malaria especially when you have gone to the clinic and get no improvement, because it can't just be about malaria then."

Key informant, Rivercess

Therefore, most initial traditional treatment is applied by caregivers within their homes. Traditional remedies are passed from generations within families and/or taught through traditional schooling

³⁷ This gentleman was interviewed while touring a town in the Buchanan catchment area, approximately 2 hour walk to the private health facility and 3-4 hour walk to the government health facility.

³⁸ Private pharmacy.

³⁹ Approximately \$15-20 USD.

for females. Traditional remedies can be quite localized; for example, one community in Grand Bassa had a supernatural tree only accessible to community members, the bark and leaves of which could be gathered and boiled for a range of conditions.

"There are two types of treatment in our community, either being treated by the doctor from the clinic or traditional doctor. The traditional doctors treat illnesses that cannot be treated by doctors in the clinic. Spiritual illnesses are treated by traditional doctors, while illnesses that can be discovered at the clinic are treated by doctors in the clinic."

Focus group participant, Rivercess

While dated literature suggests traditional healers in Liberia are distrustful of the healthcare system, this was not the dominant perspective observed by the study team,⁴⁰ except for conditions that were considered spiritual in nature because they persisted after formal health treatment- i.e. someone who has been witched by the 'African Sign'.⁴¹ In general, traditional healers acknowledged they played a lessening role in areas where clinics were available, and that the main value proposition they offered was in case of medical stock-out and/or illnesses spiritual in nature or exacerbated by witchcraft. Having said that, traditional healers also tend to believe more general illnesses are spiritual in nature or exacerbated by witchcraft, compared to other community members, thus viewing themselves as complementing services provided by formal clinics.

"I can foresee/ foretell as to whether I can treat a particular sickness or not. If I can treat the person then they will definitely get better. It can even be an ordinary fever, if I go to find the leaves for treatment and don't find it, I will let the person know that I can't treat that sickness and they should go to the clinic... I do feel valued by the clinicians and I would still feel valued if a clinic came here to our town because I know people will always come to me for my services."

Traditional healer, Rivercess

Traditional Healer, Grand Bassa⁴²

"I am an herbalist but I do it through the church; I can prophesy. I have a mirror that detects any problem a person faces. I was a zoe first⁴³ before becoming only an herbalist."

I was called by the Lord to do this work when I was young, I was not trained by anybody. If a sick person comes here, all I do is to pray and that person will get better. People come from many places, from as far as Monrovia, to see me. I offer plenty of services: land disputes, spiritual problems, any disease can be cured by me, if a person wants children I can solve that problem. I can cure measles on children. Some lactating women come to me when the titty water⁴⁴ is low. I make a special chalk and they rub it on the breast and it produces milk. Some women come here during pregnancy and stay until they give birth safely with me."

⁴⁰ Potential bias introduced by traditional healers willing to speak with the study team, though no identified traditional healer denied discussion with the team.

⁴¹ Source: Lori JR, Boyle JS. 2011. Cultural childbirth practices, beliefs, and traditions in post conflict Liberia. *Health Care Women Int.* June;32(6):454-73.

⁴² This traditional healer is a 3.5-5 hour walk from Zangar's Town, as far as or further than the clinic but mentioned by several women as a source of health care for children.

⁴³ High leadership position within Poro society.

⁴⁴ Breast milk.

I charge people that come to me for treatment, for cases of diarrhea I charge \$150 LRD.⁴⁵ I used to have more patients before as compared to now, this is due to the opening of the road and the presence of the hospital. If a person chooses to go to the hospital and they die it is up to them, because not all sickness can be cured by the hospital.

Currently, I am training one of my sons to take my place when I die, so when I receive a patient, I call him and tell him to watch what I am doing. Some people around give the wrong country medicine to another, so I advised them to stop."

The traditional health care sector is aging, with a shifting influence in parallel with the paradigm shift of traditional versus formal schooling (i.e. Sande/ Poro societies). Herbalists/country doctors interviewed by the study team were elderly; their younger years lived during periods of conflict when formal health services were disrupted for extended periods of time and only local remedies were available. While only one herbalist indicated that he was formally training a successor, indicating lower coverage of country doctors in the future, country medicine administered at home continues to be a tenant of Sande society learning and mentoring from mother to daughter.

Quality of care

Caregivers indicated that, besides the Ebola crisis of 2014, health clinics have been unable to offer services only in case of medicine stockouts [Cf: Health, Geographic barriers].

"The health workers are doing well, but the government through the Ministry of Health does not supply the facility with medications in the past 6-7 months. This condition has led us to attending traditional services again because we cannot sit here and let the children to suffer."

Focus group participant, Rural Montserrado

While health seekers were primarily concerned with the provision of drugs, challenging road conditions also impede supervision by the County and District Health Teams as well as delivery of essential medical supplies, such as gloves and IV hoses. Many clinics are in out-of-network areas; unless the clinic has a radio base, practitioners typically have to travel to a 'calling spot'⁴⁶ to receive or make calls, including for referrals of emergency cases.

Once caregivers reach the clinic, insufficient staffing can further delay treatment. Health clinics and facilities are staffed according to the catchment area and tier of service, with service providers falling into three general categories: nurses, midwives, and physician assistants.²⁴ There was a consistent discrepancy between number of staff members on the roster and those present at the clinic, from observation as well as community report. The primary demotivating factor for staff attendance was related to payroll. At the time of qualitative data collection, multi-purpose staff, such as the Registered Nurses and Officers in Charge, reported lapse of payment for up to 6-7 months, while other staff members previously on payroll in Grand Bassa with NGO or other subsidized programs had been dropped from payroll but retained on the roster.

"We have 23,020 individuals in our catchment population. There are 9 staff members, with 4 professionals- 2 Registered Nurses', 1 Certified Midwife, and 1 Officer in Charge. You can see here now that I am the only one here today. This is because staff are not taking pay for long time and that is why they are not here. MCSP was giving little incentives, but now they left so people come at times they see fit. You can't blame them for going

⁴⁵ \$0.76 USD.

⁴⁶ In-network area.

on their farm instead. But few staffs, one staffs, can't control this facility because sometimes when you're doing a delivery and another case comes, you add another."

Key informant, Grand Bassa

"Health workers, we are not paid according to profession, but what I'm receiving right now, that is what government feel to give me. I am not actually satisfy with my salary, but that is what government have to offer."

Key informant, Sinoe

Even if a health clinic is present, staffed, and medications are available, few have a potable water source on site or nearby, a functioning incinerator, and/or laboratories. Nearly none are located in electrified areas⁴⁷; solar panels, if present, were sometimes observed damaged by the study team.

"There is a micro-computer controller that is meant to help during delivery, but it has not been used since Save the Children provided it because there is no electricity."

Key informant, Rural Montserrado

Maintenance of weighing scales and height boards is a major challenge; a health clinic in Region 2, for example, indicated they did not have a functioning height board *'since the time of Ebola'*, so instead of measuring height and weight, *"we can just guess that they are not growing."*

The most recent estimates for coverage thus might overestimate functionality and/or infrastructure quality of existing clinics. Per qualitative inquiry, the 'nearest' health clinic and the 'nearest stocked and staffed health clinic' were often two different questions. According to the 2018 CFSNS survey, the percentage of communities without a functioning clinic ranged from over half (52.3%) in Sinoe, 79.2% in Grand Cape Mount, 82.5% in Rural Montserrado, 86.4% in Rivercess, and 92.5% in Grand Bassa.

Other quality of care barriers, such as staff attendance, mistreatment, and long waiting times were sometimes acknowledged by caregivers but dismissed as a factor in the decision to seek formal health care. Staff mistreatment or negligence was considered the occasional exception, not the norm. Outlier cases of mistreatment or negligence were well known in the catchment community, such as a registrar who spoke harshly to caregivers and only allowed intake during morning hours of 8 am to 11 am, but had been removed from the clinic one year prior to qualitative data collection.⁴⁸ Interestingly enough, these barriers were identified as potential barriers to health seeking during key informant interviews with health facility staff.

"Barriers for parents are that some medications are not available at the hospital- some parents understand, but some can really cry, and our own approach as nurses, sometimes we can be harsh and really discourage them- because they can be slow to understand or the work is heavy."

Health facility personnel, Grand Bassa

Men were unlikely to attend the clinic with the child, or attend clinics for their own health care, but generally believed the clinic was the best place for their child to be treated because the doctors there are trained. Language was dismissed as a barrier; if uncomfortable speaking Liberian

⁴⁷ 0.9% of households in rural areas are located on an electric grid, DHS 2013.

⁴⁸ County name withheld for anonymity.

English, women could speak their local dialect with the health facility staff or find a Liberian English translator to accompany them- often their sister or an adolescent child.

Regardless of coverage and infrastructural challenges, female caregivers in the study zone place high faith in the institution of formal medicine. Across the five counties, of the major barriers to health care, women described the primary discouragement to attend the health clinic as lack of medicine upon arrival and subsequent referral to a pharmacy, which they indicated as a frequent risk, particularly for infections and non-malarial fevers. Secondary was a non-satisfactory physical examination or a small prescription, indicating that the major disappointments in a health clinic visit are failure to meet the trained, tangible value proposition offered by a formally trained practitioner through pills, injection and/or an exam.

"We go to the government hospital first because it is the biggest and we receive proper check-up for our children, they touch them and weigh them, but when they are out of medicine they don't give us medicine, so we have to buy the medicine that they write from the drug store."

Focus group participant, Grand Bassa

In sum, while availability of health service centers remains to be improved, larger undercutting access and quality issues undermine health services currently in place.

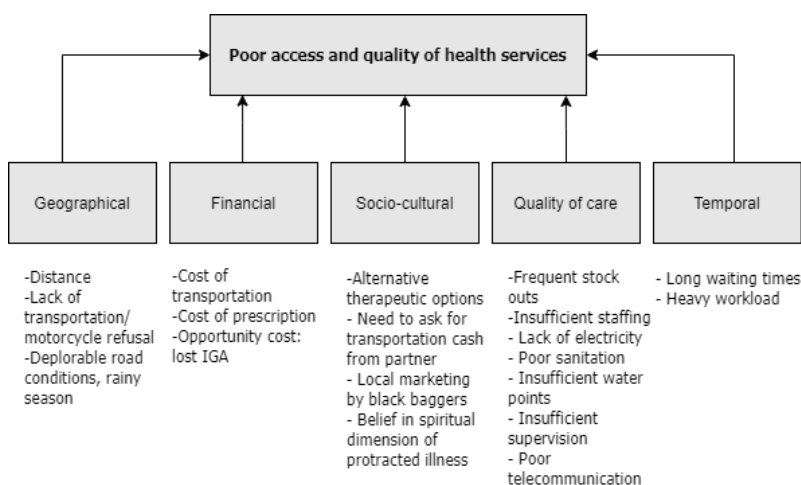


Figure 4: Summary of key barriers to health care in study zone

Child illnesses

"A baby who is healthy can be told by the way the child plays, he should be lively, moving around, healthy. And by the way the child eats, wanting to eat anytime, big appetite."

Focus group participant, Grand Bassa

Female caregivers in the study zone assessed health of the child by weight and activity level. A healthy child should have clean ("shiny") skin, play with his/her friends, and be generally self-contented. Having a healthy baby is a point of pride and acknowledgement in the community.

"Everyone is happy to hold the healthy baby. They will say, the baby is handsome/ beautiful, the child is healthy, thank you for caring for your child. If the baby does not fit⁴⁹ the healthy baby [criteria], everyone will neglect the baby; the baby is dirty, the baby's mother is careless."

Focus group participant, Grand Cape Mount

When asked if it was difficult to keep the child healthy, caregivers responded strongly based on their interpretation of the question as an assessment of the responsibility of the task, compared to the physical difficulty. Keeping a baby healthy is considered the primary responsibility of the female caregiver, but it is not easy work, primarily because of insufficient income to buy food/medicine for the child and an unclean environment.

When asked about the most important tasks to keep a child healthy, the first tenant mentioned by nearly every group was bathing the child frequently. Children are bathed 2-3 times per day, except in the dry season when water is scarce and/or the pump runs dry. They are then dressed in a new set of clothes, which are frequently dried on the ground unless heavy sensitization otherwise. Child play in the grassy house yard, where household animals such as chickens and dogs also wander. Children are lightly supervised while the mother and/or older siblings complete household chores.

The female caregiver is also primarily responsible to nurse a child during illness, but the decision for treatment depends on costs involved for transportation and/or a likely prescription. Where a free government clinic is available within walking distance, the female caregiver can make a unilateral decision to take the child for treatment. Visiting a private clinic, utilizing a motorcycle, and/or bringing money to purchase a prescription usually requires permission and cash from the male caregiver [**Cf:** Health, Financial Barriers].

"(When it comes to) Child health, you have to decide together, because it's you the man who spends (the money), but it's the woman who go sit with⁵⁰ the child."

Focus group participant, Grand Bassa

The most common illnesses prompting treatment include malaria, diarrhea, cold/ cough, skin disease, and eye disease. Correct identification of childhood illnesses in a qualitative inquiry, including etiology, loosely correlated with a distance to a health facility and/or a CHA, though most child illnesses and causes were correctly identified by female caregivers. Any illness could be considered spiritual in nature, secondary to witchcraft, if it was prolonged and did not respond to formal medication. A comprehensive list of local terminology for basic diseases, and treatment patterns, can be found in **Annex D: THERAPEUTIC ROUTES FOR RECURRENT DISEASES**.

Prevalence of fever in children under 5 was 43.3% in rural areas according to the 2016 Malaria Indicator Survey.⁵¹ In the Risk Factor Survey, which took place during the dry season,⁵² incidence over a 2-week recall period was similar- ranging from 36.6% [31.5-41.6%, 95% CI] in Region 1 to 49.7% [43.8-55.5%, 95% CI] in Region 3.⁵³ Subsequent analyses taking into account

⁴⁹ Meet the criteria for.

⁵⁰ Take care of, in the home and/or the clinic.

⁵¹ Data collected in September, tail end of the rainy season. Fever not reported in 2018 CFSNS.

⁵² Non-peak malarial month.

⁵³ Daily rain during data collection in Region 3; Region 2, prevalence: 37.7% [32.4-42.9%, 95% CI].

anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that fever was not a risk factor leading to stunting in the study area. [Cf: Annex B].

Only 11% of children had experienced diarrhea over the prior two weeks according to the 2018 CFSNS study,⁵⁴ which did not disaggregate diarrhea incidence by county or livelihood zone. Two years later, in the Risk Factor Survey, reported diarrhea incidence over the same recall period was higher, ranging from 26.0% in Region 1 [21.4-30.6, 95% CI] to 35.0% in Region 3 [29.4-40.5%, 95% CI].⁵⁵ Subsequent analyses taking into account anthropometric measurements of children revealed a significant statistical association between these indicators; in the entire study zone, a child with diarrhea was possibly more likely to be stunted [p-val <0.1], and significantly more likely to be stunted if s/he was also clean [Cf: Annex B]. Children with diarrhea were significantly more likely to be WaST [Cf: Annex B]. Across the study zone, distance to the water point over 20 minutes and distance to the health center over one hour significantly increased the likelihood of diarrhea, while presence of soap and agricultural livelihood zones decreased the likelihood of diarrhea [Cf: Annex B].

According to the 2018 CFSNS, the percentage of children who experienced cough in the past two weeks was higher than diarrhea, ranging from 19% in Rural Montserrado/ Rivercess to 21% in Sinoe. In the Risk Factor Survey, incidence over the same recall period was higher, ranging from 25.1% in Region 1 [20.5-29.6%, 95% CI] to 33.6% in Region 2 [28.5-38.7%, 95% CI].⁵⁶ In households with more than one children under 5 years old, children in Region 2 and the entire study zone who had experienced cough were significantly more likely to be stunted. A significant interaction was also identified between cough and child cleanliness in Region 2 and the entire study zone; children with cough who were also unclean were more likely to be stunted.

The percentage of children who had experienced one of the three morbidities (fever, diarrhea, and cough) ranged from 53.4% in Region 1 [47.5-59.3%, 95% CI] to 66.2% in Region 3 [28.1-40.1%, 95% CI].⁵⁷ Subsequent analyses taking into account anthropometric measurements of children revealed a significant statistical association between these indicators; in the entire study zone and Region 2, a child who had experience one morbidity was more likely to be stunted if s/he was also unclean [Cf: Annex B].⁵⁸

The Link NCA qualitative inquiry indicated particular seasonal illness variation across the coastal, agricultural, and Rubber/ Charcoal livelihood zones. Two livelihood zones in the study, LR09- Peri urban, and LR10- Mining and Concession, are defined by proximity to an urban area or economic activity, respectively. Seasonal variations that influence disease in these two zones mirrored the surrounding agricultural zones.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
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⁵⁴ CFSNS data was collected from March to May, during the transition from the dry season to rainy season.

⁵⁵ Region 1: 26.0% [21.4-30.6%]; Region II 33.7%[28.6-38.8%]; Region III: 35.0%[29.4-40.5%].

⁵⁶ Region 1: 25.1% [20.5-29.6% 95% CI]; 33.6% [28.5-38.7%]; 31.5% [26.1-36.9% 95% CI]

⁵⁷ Region 2: 57.1% [50.6-63.3%, 95% CI].

⁵⁸ Though stunting is the primary outcome of interest of the study, concurrence of fever and diarrhea was a significant risk factor for wasting in Region 1.

Climate												
Dry season	++	++	++							+	++	++
Rainy season LR05				+	++	++	+++	+++	+++	++	+	
Livelihood zone hazards												
Cool breeze, LR05						++	+++	+++	++	++		
Charcoal burning ⁵⁹ , LR08	+++	++	++	+						+	+	++
Health												
Diarrhea ⁶⁰	++	++	++					+++	+++	++	++	++
Acute respiratory infections (ARI)/ Common cold LR05, LR08	+++	++	+			+	++	++	++	++	++	++
Malaria	+	+	+	+	++	++	+++	+++	+++	+	+	+
Fever	+	+	+	+	++	++	++	++	++	+	+	+
Eye infection	++	++	++								+	+
Skin rashes/ Scabies	++	++	+++	++	+						++	++

Table 5: Seasonal calendar of main child illnesses in the study zone

Seasonal differences in childhood illnesses mainly follow the rainy and dry seasons, with slight variation between the livelihood zones. Diarrhea, cough, and skin irritants are generally more common in the dry season, while malaria/ other fevers spike in the rainy season.

"Keeping children healthy is more hectic in the rainy season than in the dry season, because during the rainy season we don't have enough time to find food for the family; even getting to the hospital is harder for us during the rainy season."

Focus group participant, Rivercess

Reported diarrheal spikes during the dry season were more significant in areas without a potable water source. Several communities with a water pump indicated that the pump dries during the dry season and they are forced to drink creek water, which they felt leads to the child experiencing diarrhea. Subsequent analyses did not reveal any statistical association between these indicators, which means that a child was not more or less likely to experience diarrhea depending on his water source. [Cf: Annex B]. However, it is outside of the scope of the Link NCA to perform water testing on 'protected' sources, such as the hand pump or protected well. It is possible that the association is confounded by water quality [Cf: WATER, SANITATION AND HYGIENE, Water access and availability].

Liberians in the study zone are pluralistic health seekers; pathways for general morbidities are often supplemented by various treatments. Home treatment can be applied in conjunction with or in the absence of formal medicine, to save money or speed along recovery. Failure to see

⁵⁹ Smoke in the air for prolonged periods.

improvements often prompts a caregiver to trigger other treatment options, especially those that are free or less expensive.

"The queen medicine⁶¹ can take time to work, so we can use the country medicine sometimes."

Focus group participant, Rural Montserrado

"For big stomach (bloated) baby, before the CHA we used to just pump the child direct with the tatee⁶², take the potato greens, pound them, put on fire, screen it, and pump the child, turn him upside down. Now the CHA can give the child worm medicine. If that doesn't work, we can take the child to the herbalist who gives medication to drink so that the child can vomit. The herbalist can also rub medication on the skin."

Focus group participant, Rivercess

Solely seeking traditional health remedies when formal options are available is perceived as less modern or scientific for general morbidities, especially by younger caretakers.

"It's not good to use country medicine because there's no measurement, no unit."

Focus group participant, Rural Montserrado

The primary method of treating fever was the pharmacy or black bagger in Regions 2 and 3 [Region 2- 59.2%, 50.7-67.2% 95% CI; Region 3- 34.5%; 27.7-42.1%, 95% CI], and the clinic in Region 1 [56.8%, 47.0-66.1%, 95% CI]. The primary method of treating diarrhea per the Risk Factor Survey was taking the child to the pharmacy or black bagger in all three regions- ranging from 34.0% in Region 3 [34.0, 25.5-43.7%, 95% CI] to 57.1% in Region 2 [48.4-65.5%, 95% CI]⁶³. The next most common health treatment sought was the clinic. The primary method of treatment for cough was the pharmacy or black bagger in all three Regions, ranging from 41.1% in Region 3 [31.4-51.5%, 95% CI] to 54.5% in Region 2 [44.8-63.8%, 95% CI].⁶⁴ Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a child first treated by a pharmacy or black bagger was not more or less likely to be stunted, nor was a child who was first treated at the clinic [**Cf:** Annex B].

Estimates from the 2018 CFSNS that 6.9% sought treatment for cough from traditional healers/herbalists are nearly certainly an underestimation, because these methods are often sought in tandem with or after formal care. Similarly, only 4.6% of caregivers in the Risk Factor Survey [2.9-6.4%, 95% CI] reported traditional treatment as the first remedy sought in the case of cough, fever, and/or diarrhea. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a child first treated by traditional medicine was not more or less likely to be stunted [**Cf:** Annex B].

Black baggers and pharmacies play an instrumental role in treatment of general morbidities.⁶⁵ In part due to convenience, and in larger part due to being stocked with medicine, they were the

⁶¹ Formal health care.

⁶² Homemade enema.

⁶³ Region 1: 41.8% [30.6-53.9%, 95% CI] pharmacy.

⁶⁴ Region 1: 46.6% [34.5-59.2%, 95% CI].

⁶⁵ Pharmacies are generally unregulated, offer similar health advice to black baggers, and have similar quality of care constraints- thus, coded with black baggers in Risk Factor Survey analyses.

most frequently sought treatment for all three major morbidities, with the exception of fever in Region 1. In Region 3, increasing distance to the health facility was significantly associated with use of a black bagger for general child morbidity.

Example therapeutic paths for three major diseases (diarrhea, cough, and fever) indicate treatment algorithms that factor cost, distance, efficacy, severity, and availability. In a locality in Grand Bassa far from the nearest clinic, for example, a mother indicated she first would boil leaves for her child, then carry the child to the clinic. If medicine was unavailable at the clinic, she would continue to provide traditional home treatment, only reverting to the pharmacy if her child did not improve.

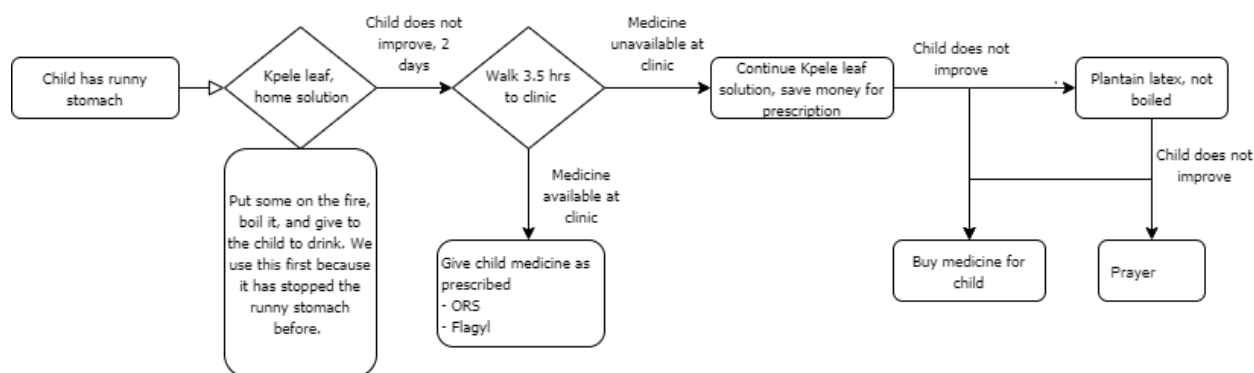


Figure 5: Example diarrhea treatment pattern [Grand Bassa]

Fever is often assumed to be malaria; an example treatment path indicated the child's symptoms would be relieved with a bath and Paracetamol; persistent fever would require a trip to the clinic.

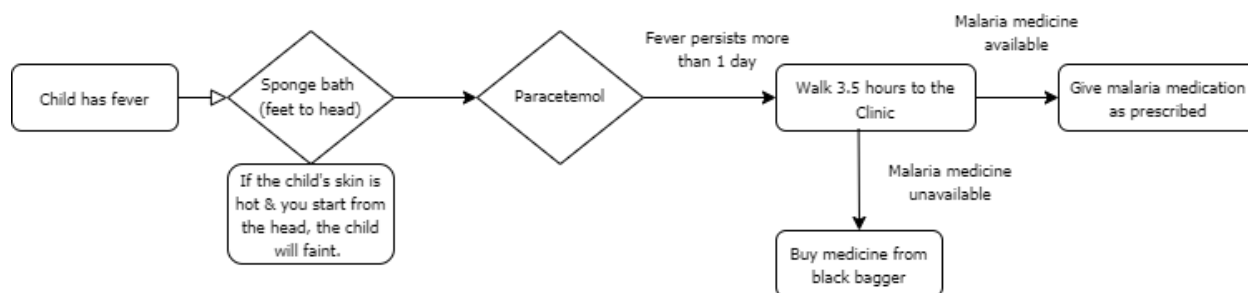


Figure 6: Example fever treatment pattern [Grand Bassa]

Cough is considered a symptom of other irritants or another illness; herbs could be used to assuage symptoms for up to 1 week, after which the child could be carried to the clinic.

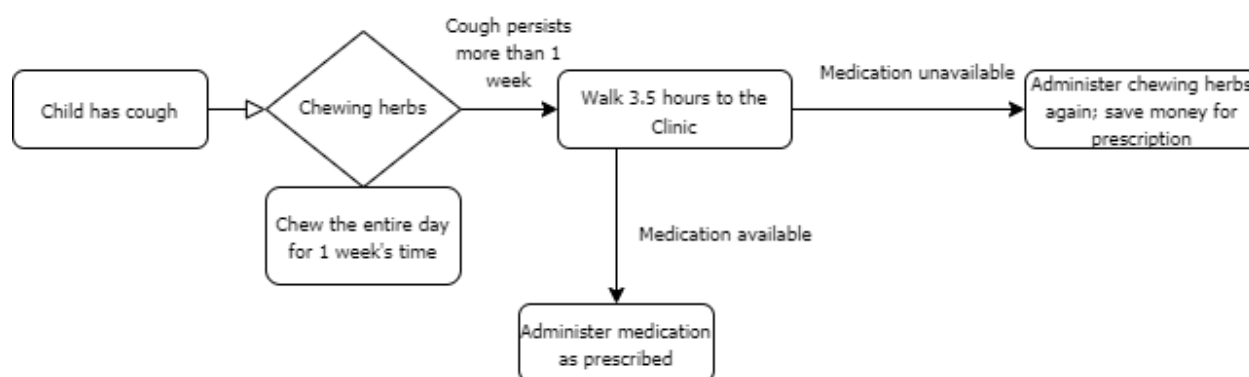


Figure 7: Example cough treatment pattern [Grand Bassa]

When discussing historical shifts in childhood disease, all counties referenced extension of the rainy season as exacerbating morbidities, especially malarial fever.

"During the rainy season our children suffer from malaria and fever, from April to November. Due to the climate change, the rain fall any time and this cause sickness for our children."

Focus group participant, Rural Montserrado

Other historical improvements/ deterioration in child health are highly localized, primarily related to the local water source and distance to a clinic. County-level deterioration was primarily related to deplorable road conditions during the rainy seasons and trafficking by logging companies.

Region	Location	Year	Observed change
1	Weijue Town, Grand Cape Mount	2017	Frequent stock-outs → insufficient drugs in the clinic
	Taylor and Kru Beaches, Grand Cape Mount	2019	Heavy flooding (higher than seasonally normal) → difficulty accessing clinic
2	Zangar's Town, Grand Bassa	2016	Logging company built road; improved access to Senyeh Clinic.
3	Kpah Town, Rivercess	Nov. 2018	Timbo Bridge spoiled; impeded access to Monrovia for referrals/ delivery of medication

Table 6: Historical report, health changes

Vaccination, Vitamin A, and deworming

According to the Liberian schedule of basic childhood vaccines, tuberculosis (BCG) should be given shortly after birth, while DPT/Pentavalent and polio should be given in three doses at age 3, 4, and 5 months, and the measles vaccine at or soon after reaching 9 months. Children should receive a yellow fever vaccine at age 9 months.⁶⁶ During 2014, vaccination campaigns were halted due to Ebola, resulting in a spike of measles cases.⁶⁷ Five years after the crisis, fears/suspensions of vaccination are identified in Rural Montserrado and Grand Bassa by some older community

⁶⁶Source: World Health Organization. 2015. 'Liberian schedule of basic childhood vaccines.' Received from: <https://www.who.int/features/2015/measles-vaccination-liberia/en/>

⁶⁷ Source: Wesseh, C. S., Najjemba, R., Edwards, J. K., Owiti, P., Tweya, H., & Bhat, P. (2017). Did the Ebola outbreak disrupt immunisation services? A case study from Liberia. *Public health action*, 7(Suppl 1), S82–S87.

members but were not a pervasive barrier. A more common barrier to returning for the vaccination schedule was an adverse reaction to the shot, such as rash or fever.⁶⁸

"There are people in this community that do not take their children for vaccination. Parents say that when their child take the vaccine, the skin can get so hot. I took my sister's child for vaccine and her skin got very hot and since then, I have not taken her for vaccine again."

Focus group participant, Grand Bassa

Vaccine acceptability is confirmed by the most recently available secondary data; however, there is a noted discrepancy between vaccination proof with a card and by recall. The 2018 CFSNS reported measles vaccination on caregiver recall, with rates of measles vaccination ranging from 91% in Grand Bassa to 94% in Rural Montserrado. In the same year, the country experienced a measles outbreak⁶⁹, reporting cases in all five of the study zone counties.⁷⁰ The Risk Factor Survey disaggregated measles vaccination by card and caregiver recall; the percentage of children 9-59 months vaccinated for measles by either confirmation source ranges from 66.8% in Region 2 [61.0-72.6%] to 88.8% in Region 1 [85.1-92.5%, 95% CI].⁷¹ When only a card is considered, however, percentage of children vaccinated is much lower, ranging from 28.5% in Region 2 [22.9-34.1%, 95% CI] to 67.8% in Region 1 [62.4-73.3%, 95% CI].⁷² Analyses of variance suggest significant differences in confirmed measles vaccination by Region and county, with significantly higher coverage in Region 1 (Grand Cape Mount) and significantly lowest coverage in Grand Bassa and Sinoe Counties.⁷³ Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between measles confirmation by mother recall; a child who reportedly was vaccinated for measles was less likely to be WaST [Cf: Annex B]. Children who were confirmed for measles vaccination by card and/or by caregiver recall were not more or less likely to be stunted.

Caregivers indicated their child received vaccines in their community, during campaigns, or from the clinic on the schedule outlined to them post childbirth in the facility. In the event of vaccine shortage, caregivers said they would just return to the clinic.

"Vaccines are available at the clinic; some are polio, tetanus vaccines. For children above one year they can come to us, but for children below one year, we have to go to the clinic. The vaccines can delay for maybe 2-3 weeks before we receive the vaccine."

Focus group participant, Rural Montserrado

⁶⁸ This mimics rhetoric around personal food taboo's, where a caregiver's taboo for a vaccination might affect them or their children but would not be imposed on or expected of a neighbor.

⁶⁹Source: UNICEF. 'Measles outbreaks continue unabated : Five countries accounted for nearly half of all measles cases in 2018.' 2019. Received from: <https://www.unicef.org/press-releases/measles-outbreaks-continue-unabated-five-countries-accounted-nearly-half-all-measles>

⁷⁰ Source: Nagbe, T., et al. 2019. Lessons learned from detecting and responding to recurrent measles outbreak in Liberia post Ebola-Epidemic 2016-2017. The Pan African medical journal, 33(Suppl 2), 7.

⁷¹ Region 3: 75.7%[70.0-81.4%, 95% CI]

⁷² Region 3: 28.8% [22.8-34.8%, 95% CI]. In the event that a printed Child Health Passport was not available at the child's birth or vaccination, some caregivers carried cardboard paper with vaccination and other health updates by the clinic/ vaccinators. This was considered by the study team as a confirmed card if signed by the health facility or vaccinator.

⁷³ 18.5% of surveyed children in Grand Bassa measles vaccination confirmed by card; 20.6% in Sinoe County

Children 6-59 months also receive Vitamin A supplementation during vaccination campaigns; caregivers could readily recognize the red and blue pills when shown the image during the Risk Factor Survey, though they did not necessarily know how/if the pill served a different purpose than a vaccination. According to the 2018 CFSNS, approximately, 3 out of every 4 children 6-59 months in all counties had ever received Vitamin A supplementation, with the highest coverage in Rural Montserrado, Region 2 [76%] followed by Sinoe, Region 3 [74%]. In the Risk Factor Survey, a similarly high percentage of children 6-59 months had received Vitamin A supplementation in the 6 months prior; ranging from 70.3% in Region 1 [65.1-75.5%, 95% CI] to 76.5% in Region 2 [71.4-81.5%, 95% CI].⁷⁴ Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that Vitamin A was not a risk factor leading to stunting in the study area [Cf: Annex B].⁷⁵

Micronutrient powders are periodically distributed, either with vaccination campaigns or at the clinic level, and instructed to be mixed with soft foods. The Risk Factor Survey found lower coverage of micronutrient powder distribution in the target population of children 6-24 months, ranging from 31.5% in Region 2 [21.6-41.3%, 95% CI] to 46.7% in Region 1 [36.3-57.1%, 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that micronutrient powder did not make children in the study area more or less likely to be stunted. [Cf: Annex B].

Deworming medications are typically included in immunization campaigns and prescribed by clinics; if unavailable, they are frequently purchased from pharmacies or black baggers. According to the 2018 CFSNS, approximately 4 out of every 5 children received deworming tablets, higher than only about half of children 6-59 months per 2013 DHS⁷⁶. Results from the 2020 Risk Factor Survey placed coverage somewhere in between for children 12-59 months, ranging from 60.0% in Region 3 [53.4-66.6%, 95% CI] to 66.0% in Region 2 [60.1-71.9%, 95% CI].⁷⁷ Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that deworming medication did not make children in the study area more or less likely to be stunted. [Cf: Annex B].

The percentage of children 12-59 months who had a confirmed measles vaccination, had received Vitamin A in the past 6 months, and had received deworming medication in the past 6 months, ranged from 13.6% in Region 3 [8.8-18.4%, 95% CI] to 36.9% in Region 1 [30.9-42.9%, 95% CI].⁷⁸ Subsequent analyses taking into account anthropometric measurements of children in the

⁷⁴ Region 3: 73.8%[68.2-79.5%, 95% CI]

⁷⁵ Though stunting is the primary outcome of interest of the study, it is interesting to note that children who had received Vitamin A were significantly less likely to be wasted.

⁷⁶ Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health and Social Welfare [Liberia], National AIDS Control Program [Liberia], and ICF International. 2014. Liberia Demographic and Health Survey 2013. Monrovia, Liberia: Liberia Institute of Statistics and GeoInformation Services (LISGIS) and ICF International.

⁷⁷ Region 1: 64.7%[59.0-70.4%, 95% CI]

⁷⁸ Region 2: 20.2% [14.9-25.4%, 95% CI]

household revealed an association between these indicators; a child who met all three criteria was potentially less likely to be stunted in Region 2 [p-val <0.1] [Cf: Annex B].

Birth spacing and family planning

"Before we believed if you take family planning you can't go to church because you are killing the baby, but this is a new age."

Focus group participant, Grand Cape Mount

Community exchanges on the topic of birth spacing are sometimes biased by the stigma attached to a woman who has children close together. However, at community level, female caregivers and health personnel were much more likely to focus on women who had children on a less than 2-year birth interval, often mentioning women who became pregnant while still caring for a toddler. Older women, particularly, believe the birth spacing gap has steeply narrowed, and the perceived danger of having children closely spaced was such that it was sometimes associated with death.

"If you get pregnant while breastfeeding, we will call you a big belly baby ma, it's not good. People can even take the baby from you and give it to the grandmother."

Focus group participant, Rivercess

"A woman who gets pregnant every 12 months wants to kill herself; she has to allow more time to pass, because they usually feel weak in the body. This can cause forever back pain."

Focus group participant, Grand Bassa

A noted attitude difference was observed in Grand Cape Mount, where most women in both localities felt satisfied with the birth spacing of one year, indicating if it happened this way, it was God's will.

"Birth spacing on average is one to one and a half. I don't feel good about it because it endangers the mothers and children. As a midwife, after doing my health talk, I focus on family planning, poor birth spacing leads to maternal death because the uterus gets weak anytime it is used."

Certified midwife, Rural Montserrado

In addition to the physical burden on the mother, a major reason for two years' birth spacing is that it is believed to spoil the mother's breastmilk for the nursed child. If a mother does get pregnant while lactating, she is often pressured to stop breastfeeding, to save the suckling child from 'suffering.'

"If the child gets titty⁷⁹ while you're pregnant, that child will get sick, it'll have a big stomach,⁸⁰ or be a tiny tiny leg man⁸¹."

Focus group participant, Rivercess

Secondary data does not support beliefs that the majority of mothers have poor birth spacing. Median birth interval in the study zone ranged from 32.5 months in Rivercess to 43.5 months in Montserrado, according to the 2013 DHS. Findings of the Risk Factor Survey corroborated a mean

⁷⁹ Breastfeeds.

⁸⁰ *Kuleeblo vle* (Bassa), meaning bloated or distended.

⁸¹ *Kpo kpa mlehn mlehn*, (Bassa).

birth interval over 2 years, with mean birth-spacing intervals for children under 5 years old ranging from 25.8 months in Region 1 [23.4-28.1, 95% CI] to 44.3 months in Region 3 [39.9-48.6, 95% CI].⁸²

Previous studies suggest poor birth spacing and frequent births are risk factors for chronic malnutrition in Liberia.⁷⁶ Secondary analyses in the 2013 DHS, for example, indicate stunting is most prevalent in children born less than two years after a previous birth [40%] and lowest among firstborns, children born 24–47 months after a previous birth, or beyond 47 months [28%, 33% and 23%, respectively].⁷⁶ Subsequent analyses taking into account anthropometric measurements of children in the household indicated a less clear link between these indicators. In Region 2, first-born children were significantly less likely to be stunted. In Region 3, children born less than 24 months after their next oldest sibling had potentially higher odds of being stunted [p-val <0.1].

Despite a desire to space births two years, and a stigma attached to low birth spacing, women did not feel in control of the time between births, saying that their male partners 'love sex too much' and/or wanted more children.

"We have one year birth spacing (in our community); sometimes it makes us very ashamed but we don't have anything to do, because the man give us hard time for sex. We feel (this birth spacing) is short and disgraceful among our friends. But our men don't give us chance."

Focus group participant, Rural Montserrado

Older women and men acknowledge suspicions toward family planning are shifting. This shift was credited to regular sensitization at the clinic and community level on the health benefits of birth spacing for both mother and child.

"I cannot advise young women on which contraceptive to use because they weren't around when I was young."

Focus group participant, Montserrado

While some women retain stigmas for contraceptives passed by older generations of women, the main barriers to contraceptive use are male preference and/or fear of a changed sexual experience.

"I have to ask my husband first before taking family planning; sometimes men can refuse because they want us to always be borning⁸³."

Focus group participant, Grand Bassa

"For family planning, we offer IUCD but most females don't accept. They mostly use Depo⁸⁴ most of the time. Condoms are not used by females in this area; both parties are not interested, they like the skin to skin."

Certified midwife, Rivercess

The 2016 MIS reported any contraceptive use by 29.9% of women in South Central Region (including Rural Montserrado, Grand Bassa) to 34.4% of women in South Eastern A (including Rivercess, Sinoe); findings from the Risk Factor Survey reflect the reportedly increased sensitization at clinic and community levels by the 2011 Essential Package of Health Services. Any form of contraceptive was used by 37.4% of women in Region 2 [31.2-43.6%, 95% CI] to 51.2% in

⁸² Months since the child's next oldest sibling was born. Region 2, 28.2[25.8-30.6, 95% CI].

⁸³ Bearing children.

⁸⁴ Depo-Provera, medroxyprogesterone acetate contraceptive injection, administered on 3 month basis.

Region 3 [44.4-57.9%, 95% CI].⁸⁵ Over 10% [10.4%] of women reported using the Lactation Amenorrhea Method to prevent pregnancy. In Grand Bassa, traditional ropes tied around the lower waist to prevent pregnancy were mentioned in qualitative inquiry; 1.6% [0.7-3.8%, 95% CI] of women mentioned this as their primary means of contraception in the Risk Factor Survey, though it is possible other women use traditional ropes to supplement other methods. Other traditional methods for family planning were usually employed after the woman had already become pregnant.

Modern contraceptive use ranged from 31.9% in Region 2 [26.0-37.9%, 95% CI] to 47.9% in Region 3 [41.2-54.6%, 95% CI].⁸⁶ The most common method across the study zone was Depo⁸⁴ injections on a three-month schedule [58.0% [50.8-65.0%, 95% CI], among contraceptives used, in study zone], followed by IUCD implants [14.2%, 9.8-19.8%, 95% CI]. Condoms were not frequently used from health facility report [0.6% [0-4.4%, 95% CI] from the Risk Factor Survey] and were laughed at by both female and male caregivers. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that contraceptive use by the child's mother did not make the child more or less likely to be stunted [Cf: Annex B].

Preference for the injection instead of IUCD was based on the duration of action- an IUCD lasts for years, while the injection is taken on a quarterly basis. Women feel that they have more freedom to reverse their family planning decision with the injection.

In the event of an unwanted pregnancy, abortion services were sought from an herbalist or country doctor, not the health facility. A young woman in the study's health facility catchment area tragically died during qualitative data collection after reportedly drinking an herbal tonic to remove a late first trimester pregnancy.

Prenatal consultations

The 2013 DHS registered a maternal mortality rate of 1,072 maternal deaths for every 100,000 births, one of the highest in the region and the world. The GoL thus prioritized pre-natal clinic attendance and safe delivery in a clinic setting. Maternal mortality prevention messages at clinic and community level have sunk in; women across the study zone vehemently endorsed the importance of prenatal consultations at the clinic. The 2016 MIS, though based on recall, indicated potential improvement in pre-natal care attendance. Over 90% of women [ranging 94.9% in South Central region⁸⁷ to 98.0% in the North Western region]⁸⁸ received antenatal care from a skilled provider for their most recent birth, over the five-year recall period. In rural settings, 73.7% of all women had the recommended four or more antenatal visits. Per the Risk Factor Survey, over 94% of children's mothers had attended the clinic for at least one antenatal care visit in all three regions.⁸⁹ A similar increase was reflected in percentage of mothers who met the recommended minimum four visits, ranging from 77.2% in Region 2 [70.6-83.8%, 95% CI] to 81.2% in Region 3

⁸⁵ Region 1: [43.0%, 37.1-48.9% 95% CI]

⁸⁶ Not significantly lower or higher in female headed households: 40.0%[32.4-47.6%], study zone

⁸⁷ Including Grand Bassa and Montserrado Counties, as well as Montserrado excluding Greater Monrovia.

⁸³ Including Grand Cape Mount County, Bomi County, and Gbarpolu counties.

⁸⁹ Region 1 : 94.9% [91.6-98.2%, 95% CI], Region 2 : 95.6% [92.4-98.8%, 95% CI], Region 3 : 98.2% [96.1-100%, 95% CI].

[75.2-87.2%, 95% CI]. In agricultural livelihood zones, recommended visit compliance was still higher than the 2016 findings- 76.2% [71.3-81.0%, 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators, in that children in Region 2 and the entire study zone whose mothers had attended four or more antenatal care visits were less likely to be stunted [Cf: Annex B].⁹⁰ Mothers whose previous pregnancy was desired were more likely to complete 4 or more ANC visits in Regions 1 and 2. Mothers who were more involved with decision making in Region 1 were more likely to complete 4 or more ANC visits.

Reasons for pre-natal care attendance at the clinic included wanting to know the size of the baby, wanting to know the health of the baby, and wanting to check on the health of the mother. The first indicator to go to the clinic was a missed period and/or nausea. While an unmarried adolescent girl is unlikely to attend a family planning consultation alone, a pregnant unmarried adolescent girl can attend prenatal care visits alone.

Because of the perceived severity and susceptibility of maternal mortality, distance to the facility was acknowledged as an inconvenience but not as much as a deterrent for antenatal care visits, compared to treatment of child illnesses. A pregnant woman is expected to attend the clinic for checkups despite her workload, and she often does. Over $\frac{3}{4}$ of children's mothers- 77.8% in Region 1 [72.9-82.8% CI], to 79.9% in Region 3 [74.8-85.0% CI], reported the recommend four antenatal care visits. Missing pre-natal visits was associated with being a 'careless' or 'useless' mother.

"A good mother always goes to the hospital when pregnant, takes treatment and vaccine regularly, takes exercise."

Focus group participant women, Rural Montserrado

Health care providers that play prominent roles in other therapeutic pathways, such as black baggers and traditional healers, are consulted less frequently for pregnancy. Female caregivers doubted their abilities to provide the necessary information and/or exams.

"Traditional healer won't develop the baby well for anyone, it's God and the food pregnant women eat, and medication intake from the clinic."

Focus group participant, Sinoe

An interesting figure in the pre-natal care pathway is the Trained Traditional Midwife (TTM). Incorporation of the TTM in the therapeutic pathway for advice during pregnancy is localized based on the TTM's reputation. Community members in peri-urban areas cited rumors that TTM's could be arrested for poor care or misadvice, though this was more in reference to botched deliveries.

"The hospital is preferable for pregnant women or girls to seek advice because if they go to the TTM in the community and anything happens like the child passes, and the TTM will be arrested, but the doctor at the hospital will not."

Focus group participant, Grand Bassa

⁹⁰ Question posed regarding the mother's last pregnancy, not necessarily the child assessed for stunting.

Perceived risk for certain behaviors during pregnancy are summarized below, by Region and County.

Behaviour	Region 1	Region 2		Region 3		Community justifications
	Grand Cape Mount	Grand Bassa	Rural Montserrado	Rivercess	Sinoe	
Non-attendance of antenatal care consultation	HIGH	HIGH	HIGH	HIGH	HIGH	General acknowledgement that non-attendance of antenatal care is risky. Noted historical shift in this attitude with the increased availability of health centers.
Childbirth at 14 years of age	HIGH	HIGH	HIGH	HIGH	HIGH	General acknowledgement that this presents risk to both mother & child, physically, financially, emotionally.
Childbirth at 40 years of age	LOW	LOW	LOW	MEDIUM	MEDIUM	Generally perceived as low, though Rivercess and Sinoe caregivers had mixed feelings about this, depending on how many children the woman had already had (higher risk if the mother has already born many children).
Childbirth at home	HIGH	MEDIUM	HIGH	HIGH	HIGH	While the risk of giving birth at home is nearly ubiquitously perceived as high, women sometimes felt helpless in their ability to control the reach the clinic in time. <i>"(Giving birth at home) is risky but it's what we have to do; big bellies⁹¹ be borning⁹² on the road if they try to make it to the clinic"</i> – Focus group participant, Grand Bassa
Poor birth-spacing (every 12 months)	MEDIUM	HIGH	HIGH	HIGH	HIGH	Risky for a mother's physical strength and energy available to her home.

⁹¹ Pregnant women.

⁹² Give birth.

Table 7: Perception of risk related to certain birth-spacing/ pregnancy factors

Behaviors affecting pregnancy- either the health of the women, or her fetus- are generally accepted as high risk, with the exception of pregnancy later in life (40 years plus). Women said they primarily received external support from their sisters, mothers, and occasionally partners to comply by positive behaviors affecting pregnancy.

Early pregnancies

"When I went to the clinic (pregnant at 14) they said, look at you, you small thing, you should be in school and you are already on your way to bear four or five children before (age of graduation)."

Focus group participant, Grand Bassa

Teenage pregnancy was considered so troublesome that the topic, regardless of setting (male caregivers, female caregivers, community elders, youth, health facility personnel), was greeted with visceral responses of exasperation, scorn, and/or frustration. Early pregnancy can result in stigmatization at the health facility and community levels. While a pregnant woman's right to attend school is not explicitly impeded or protected in policies, numerous sociocultural barriers remain. If a woman gets pregnant while still attending school, she will most likely decide to drop out. Pregnancy, and consequent motherhood, and furthering education are thus mutually exclusive. While some said this was the physical tax of pregnancy, others indicated that the pursuit of education was futile as the mother's focus after giving birth would be the child. These socio-cultural barriers are less common in the peri-urban Montserrado setting, where several young mothers mentioned support from their mothers and/or partner while they continued secondary and/or vocation school.

In 2013 DHS data collection, the percentage of teenage women who had begun childbearing ranged from 22.9% in Montserrado to 52.2% in Sinoe County. Seven years later, the Risk Factor Survey indicated an upward trend in teenage pregnancy. While the mean age of first pregnancy ranged from 17.4 in Region 1 to 17.6 years in Region 3,⁹³ the percentages of children whose mothers first became at or before the age of 18 ranged from 45.4% in Region 2 [37.5-53.5, 95% CI] to 60.0% in Region 3 [33.1-47.4%, 95% CI].⁹⁴ At national level, per the 2013 DHS, rural teenagers with less education and in lower wealth brackets tended to start childbearing sooner.⁷⁶ Across the study zone, 31.7% of mothers who first became pregnant after adolescence had a junior high education [25.7-38.5%, 95% CI], compared to 22.1% of mothers who first became pregnant as teenagers [17.8-27.1%, 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a statistical association between these indicators; in Region 2, a child whose mother first became pregnant as a teenager was more likely to be stunted [**Cf:** Annex B].

A consistent discrepancy was noted between the age community members believe a woman is ready to be a mother and when a woman tends to become a mother. 'Readiness' was interpreted as either the physical signs of puberty or the emotional and financial stability to raise a child. Women who indicated a girl is ready to be a mother when she shows physical signs of puberty

⁹³ Region 1: 17.4[17.0-17.7 CI], Region 2: 17.6[17.2-18.0 CI], Region 3: 17.5[17.1-18.0 CI].

⁹⁴ Region 1: 55.6% [48.0-63.0%, 95% CI].

said that this does not mean she *should* get pregnant at that time. According to community members, women tend to get pregnant when they are physically able to get pregnant but not emotionally and/or financially prepared to get pregnant.

"Girls are physically ready to be a mother when their body parents are well developed - breast, hair. Emotionally (she is ready) when she is confident, (they can) manage themselves, when she feels that she is a woman, she feels that she can make decision on her own, she does not listen to advice, when she feels the want of having her own home."

Focus group participant, Montserrado

Adults blamed shifting moral codes for adolescent pregnancy and resulting marriages. "Human rights"⁹⁵ were thought to have made children disobedient and irreverent of traditional values and their parents' advice. This independence is perceived by older adults, and even slightly older peers (20-25 years old), as "contagious."

"Girls at 15 years old can get their first pregnancy. The reasons for this is that some are stubborn; some can say, everyone wants to get their own fire hearth (family) because this is the interior."⁹⁶ Girls get peer pressure; they want to have children because their friend have child."

Certified midwife, Grand Bassa

"Our children now don't even want to share information with us. They hide everything from us, because they feel that they can do their own things. And also because of the human right issue which make them not to have respect to us."

Focus group participant, Grand Cape Mount

Many unmarried adolescent girls fall in a detrimental family planning services gap. Health service centers indicated adolescent girls were unlikely to attend the clinic for contraceptives alone, unless married. They are often not included in the target audience of general sensitization sessions, i.e. already pregnant women, lactating mothers, and other female caregivers of young children. Even male caregivers lament the dangers of adolescent pregnancy and early marriage, saying it's an issue that needs to be solved, but no one indicated whom should fill the family planning gap.

"Our girls need to take family planning because they make the boys not to be serious in school because of plenty borning (giving birth)."

Focus group participant, Sinoe

Female youth indicated they were generally uncomfortable discussing sex with their parents. In this case, then, if advice for family planning is sought, it is from a boyfriend, who is often an adolescent himself.

"Because parents always want what is best for their children, so they advise their girls to avoid man, so if a girl becomes pregnant, she is afraid because she has not listened to the good advices from her parents."

Focus group participant, Montserrado

⁹⁵ "Human rights" is a phrase used by community members to refers to various initiatives to reduce child beating and prolonged time in traditional schooling, as well as to reduce female genital mutilation.

⁹⁶ Rural area.

Case study: Young pregnant woman, Grand Bassa⁹⁷

"I have a big family of 12 brothers and sisters from the same mother but different father. I am the only step/foster child in the family. I lived with my parents when I was a child going to school, but stopped in the 5th grade due to my parents' separation. My father left my mother for another, so my mother also found a new man that could not support me to go to school (he was not setting aside money for my school fees). Finally, when I became pregnant, I quit. I wasn't getting attention at home, there was no support from my parents, and I was pressured by friends to get involved in man business."⁹⁸

When I was pregnant with my first, I received full support from my boyfriend. I ate twice daily during my pregnancy and visited the hospital every month during delivery. I continued my daily housework during the pregnancy. When I was pregnant with my first child, the hospital staff used to talk to me in nasty way, for example they used to tell me, "sit down there, you supposed to be beside your parents, then you go out and get pregnant, you small girl." This used to make me regret and feel like I did not make the right decision. But I have no choice but to go at the hospital, because I feel this is the only place than can help me to give birth safely. When I give birth, I rested for two weeks, and my boyfriend used to help me with the work in the home, also my mother in law and my mother.

I dream of going to school to become a doctor to help support my family. I believe that I can still fulfill my dream because I can stay young. I would need financial support to achieve my dream.

The advice I would give to young women is to not make the same mistake I made by getting pregnant. They should go to school and respect their parents. Children time (childhood) cannot pass so they should focus on their education and become someone in the future to help support their family."

Many women who become pregnant during adolescence often said their child presented a disruption and they dream of returning to school; according to subsequent analyses, women whose first pregnancy occurred as a teenager were significantly more likely to have undesired pregnancies [Cf: Annex B]. While teenagers fall in a family planning gap before pregnancy, women who became mothers while teenagers were potentially more likely to use modern contraceptives after birth [p-val <0.1] [Cf: Annex B].

Childbirth and postnatal care

Childbirth at a health facility is preferred, but reaching the clinic or health center is often too risky or impossible due to the sudden onset of labor pains and distance [Cf: HEALTH, Geographic barriers]. Deliveries in a health facility ranged from 39.0% Grand Cape Mount to 73.3% in Montserrado in the 2013 DHS disaggregated by county; 2016 MIS regional rates were much higher, ranging from 64.2% in the South Central Region to 81.8% in the South Eastern A region.⁹⁹ According to the Risk Factor Survey, percentage of children whose mothers had clinic deliveries ranged from 59.4% in Region 2 [53.3-65.4%] to 79.9% in Region 3 [74.8-85.0%].¹⁰⁰ If a woman

⁹⁷ The woman's first child is 6 years, second child is 2 years old, and she is 7 months pregnant. The respondent indicates she was 17 when she first became pregnant, but also says she is 20 years old with a 6-year-old child. During the interview, the woman's boyfriend left work to sit about 15 meters across from the male research assistant. The interview was conducted with consent by the young woman, her boyfriend, and the community mobilizer.

⁹⁸ Coupling/ sex.

⁹⁹ South Central region includes Grand Bassa and Rural Montserrado Counties, and South Eastern A region includes Rivercess and Sinoe Counties.

¹⁰⁰ Region 1: 78.5% [73.6-83.4%]. Analysis of variance suggests significant variation between regions (p-val 0.000).

does give birth at home, she is likely to consult the care of a TTM [17.0% of births in the TTM home [13.9-20.8%, 95% CI], compared to 9.2% in personal homes [7.0-11.9%, 95% CI], across the study zone]. Still, in the case that a decision can be made on birth location, women prefer to give birth in the clinic. Women in peri-urban areas close to equipped government hospitals endorsed preference for the sanitary environment of the government hospital.

"But for me, I don't go to the TTM at all, the hospital is the right place, because I don't trust the tool being used by the TTM, she uses it with other women, and she won't have the right medicine."

Focus group participant, Grand Bassa

In areas with a Community Health Assistant, a birth plan is made in consultation with the TTM and caregiver to decide when the mother will be accompanied by the midwife to the clinic. In areas where the clinic is far (more than a 2 hour walk), if the caregiver can afford the stay and/or has family or friends near the clinic, she will be escorted to sleep closer to the clinic during the 9th month of her pregnancy. For health districts that have TTM compensation schemes for accompanied deliveries, compensation is usually less than the full home delivery rate (average 1,000 LRD). Some health workers indicated resistance from TTM's, both from the lessening duties and compensation.

"The TTM was another challenge for me. We have the birth plan from 1 month old pregnant and we ask them for the amount that they will provide during their delivery. They will keep the money beginning at their first month till their delivery month. During the 9th month, they will be transported to XX Clinic²⁶ and remain there till she gives birth at the clinic. The money collected will be used for transportation, feeding. Someone has given birth here before (in the community) but was almost died from it."

CHA, Rivercess

Subsequent analyses taking into account anthropometric measurements of children in the household revealed a potential association between these indicators; in Region 2 and the entire study zone, children born in a health facility are potentially less likely to be stunted [p-val <0.1] [Cf: Annex B]. Childbirth in a health facility may serve as a proxy indicator for health facility access, with implications later in the child's life- in Regions 3 and the full study zone, children who were not born in a health facility and who lived more than one hour from the clinic were significantly more likely to be stunted than children born in a health facility and/or who lived closer to the nearest clinic.

Postnatal care

The amount of time a woman rests after delivery depends on the helpers she has at home, usually sisters, sisters-in-law, a mother, and/or older female children (eight to ten years and older). In a participatory game, female caregivers across the study zone strongly disagreed that they themselves had taken 6 weeks or more of rest after birth, saying two weeks was a more realistic target, but noting, *"it would be better if she could rest for 3 months."*¹⁰¹

In the Risk Factor Survey, the median days rested after delivery ranged from 14 in Region 2 to 30 in Region 3.¹⁰² For many women, especially those who give birth far from home and must walk

¹⁰¹ Focus group participant, Montserrado

¹⁰² Region 2, median days rested: 30

back, normal duties or a more heavily than recommended workload begins the very same day of delivery. This is especially true for young mothers who don't have older female children or nearby sisters. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that the number of days a woman rested after her last delivery did not make a child less or more likely to be stunted. [Cf: Annex B].¹⁰³ The Risk Factor Survey also indicated no relationship between a woman's total number of children and her days rested, reflecting reports that older male children might not offset tasks like older girls do.

"How much rest you take after birth depends on the helper you have in the home. Some have the daughter and mother to help, so they can rest for 6 weeks. I don't have anyone to help me, so I can rest a few days."

Focus group participant, Rivercess

Husbands can absorb some household tasks usually managed by the female "1-1" (meaning, infrequently), such as gathering firewood and beating rice, but their primary caregiving role during this period continues to be provision of food in the home. Women typically take at least 3 months before having sex with their husbands after birth. In addition to their own desire for intimacy, motivators for resuming sexual activity are also rooted in jealousy and a fear that a man might find a different partner.

"Everybody has their own homes and you will not want for your man to find another woman (after you deliver) so you will have to be strong and work just to avoid him eating from another woman."

Focus group participant, Grand Bassa

B. NUTRITION AND CARE PRACTICES

Household nutrition

"Rice is the food considered for our health. Rice is the food our grandparents were eating and we also eat. It is our staple food that we cannot live without."

Focus group participant, Grand Cape Mount

Liberians in the study zone oscillate between rice and cassava-based diets, depending on the time of the year. Cassava-based *fufu* and *dumboy* are often swallowed instead of chewed; thus, when discussing dietary patterns and preferences, it is common for Liberians in the study zone to talk about seasons of swallowing instead of chewing, with chewing being highly preferred to swallowing. Rice is heavily preferred; referencing a common attitude that "one has not eaten at all if one has not eaten rice". Brown rice produced at subsistence level in LR02 (dominant), LR04 (supplementary), and LR08 (minor) is called 'country rice.'

A participatory exercise on meal composition, integrated in a series of focus group discussions across livelihood zones, revealed that communities' eating habits during the dry season are characterized by a short switch from country rice to white (imported) rice, as post-harvest stores dry up. Ironically, as the household switches to white rice, this commodity too becomes less available or too expensive due to market accessibility challenges and poor road conditions. The

¹⁰³ Although the outcome of interest for the study was stunting, post-partum rest of at least 2 weeks was significantly protective of wasting.

household then switches to cassava (*fufu, dumboy*) in the rainy season. Thus, the base of imported rice is short-lived for the most vulnerable households, due to prohibitive costs. Wealthy households consume white rice, even if they produce their own country rice, which they can sell instead.

Dry season		
	Common meals ¹⁰⁴	Exceptions by LR/ Region
Breakfast	<ul style="list-style-type: none">Eddoes and red palm oil¹⁰⁵Dry cassava piece¹⁰⁶Dry (country) rice with Vita cube, red palm oil	Region 2 (LR09)- Doughnut ¹⁰⁷
Lunch	<ul style="list-style-type: none">Dumboy and soupFufu and palm butter¹⁰⁸Dried (boney) fish or chicken, rice	Region 2 (LR08, LR09)- Beans ¹⁰⁹ LR05- Sea fish
Dinner	<ul style="list-style-type: none">Country rice, pepe soup¹¹⁰ or palm butterBoney fish	Region 2 (LR08, LR09)- Pig meat All Regions (LR05)- Sea fish
Notes	If a household typically only eats two meals per day, the morning meal is often skipped in lieu of a larger mid-day meal- especially in livelihood zones with heavy morning workload.	
Rainy season		
	Common meals	Exceptions by LR/ Region
Breakfast	<ul style="list-style-type: none">Dry cassava pieceDry coconutDry (country) rice with Vita cube, red palm oil	Dry coconut less available in Region 2, LR08; perceived as an appetite suppressant and not a meal if/when eaten in other LR's.
Lunch	<ul style="list-style-type: none">Fufu, pepe soup, dried boney fishPalm butter, okra with rice	LR05- Sea fish
Dinner	<ul style="list-style-type: none">Fufu or dumboy, pepe soupPalm butter, okra with riceDry rice with palm oil	LR05- Sea fish
Notes	During the rainy season, the frequency of meals is more commonly reduced than the portion size- men especially indicate they prefer one very large meal per day, as opposed to two smaller meals in the day. It is more common for households to skip one or two meals (most often breakfast; then lunch and/or dinner)	
Desired meal		
	Common meals	Exceptions by LR/ Region
Breakfast	<ul style="list-style-type: none">Spaghetti, fried or boiled egg, mayonnaiseCream of wheat, fried or boiled eggs, grits¹¹¹Rice and egg, fried potato greensBread with Lipton Tea®, milk, and sugarAppleJuice	

¹⁰⁴ Repetition across regions and livelihood zones; exceptions noted.

¹⁰⁵ Preferred meal for children.

¹⁰⁶ Boiled or roasted cassava.

¹⁰⁷ Flour+ sugar fried in oil.

¹⁰⁸ Sauce based on the flesh of the palm nut, made with red palm oil, dried meat/ fish, palm butter leaf; bitter balls; and kitteley.

¹⁰⁹ Beans are infrequently available for two reported reasons: production challenges (problems with soil) and import challenges. [2019 CoD]

¹¹⁰ Clear broth soup with hot pepper and various other ingredients, including boney fish.

¹¹¹ Cream of wheat and grits packaged products, available in supermarkets and some shops in LR09.

Lunch	<ul style="list-style-type: none"> • Fried rice with sea fish, cabbage • Palm gravy (groundhog) and rice • Country chicken pepe soup with white rice • Cow meat soup with white rice • Bread, mayonnaise • Macaroni, ketchup, mayonnaise • Juice or Heineken® beer 	Dried sea fish is desirable in non-coastal LR's, but much more expensive/ difficult to find than boney fish or other inland fish.
Dinner	<ul style="list-style-type: none"> • Bread and Lipton Tea®, or coffee with sugar and milk • Cornflakes and milk • Avocado • Cornmeal • Rice with fried potato greens • Juice or Heineken® beer 	
Notes	Ubiquitous preference for eating 3 times per day when food/ money is abundant. No consistent differences in desired foods for children, women, men, with the exception of beer.	

Table 8: Results of participatory exercises on meal composition

'When food is plenty'¹¹², Liberians in the study zone prefer to eat three times per day- across regions, this is most often realized during the dry season, though with less disruption in LR09. If food is cooked for the family, it is typically eaten by all family members- though not necessarily at the same time. Exceptions include men in LR05 and LR10, and some rubber tappers in LR08, who cannot stop their daily activities for at least one meal (typically breakfast or lunch). In the lean period, families typically eat twice and sometimes once per day. If a family reduces meal frequency, the morning meal is most often skipped in lieu of a mid-day and/or evening meal, per family head preference.

It is important to note that meal frequency also increases the workload of the woman. As sauces and starch base (cassava/rice) do not preferably repeat in the day, women need to prepare fresh meals at different times of the day. While a woman often sets aside a portion of any leftover meal for later in the day or the next day [Cf: WATER, SANITATION AND HYGIENE, Household hygiene], daily preparation of food represents a significant portion of her daily workload.

Daily meal preparation

Cassava is time consuming and tedious to prepare. To make *fufu*, peeled cassava sits in a jug of water for three to four days, naturally fermenting. It then sits under weights to squeeze out the water, usually an additional two days. The mushy cassava is placed into a mortar and beaten; the thick remains are rolled into balls and sold. When ready for consumption, the *fufu* again sits in water and is boiled while stirred vigorously. An hour or so later, the *fufu* is shaped into balls and served with soup. *Dumboy* takes less time, as it is not fermented, but is similar in texture to *fufu*. *Garri*, or cassava flour, is sometimes mixed with sugar and eaten as a porridge. A fourth variant of cassava, 'GB', is differentiated from *dumboy* by remaining chunks of cassava. It was not frequently consumed in the study zone. Personal preference and familiarity determine type of cassava preparation (i.e. *dumboy* or *fufu*).

¹¹² Meaning, when the household is not food insecure and has access to the quantity and diversity of meals desired.



Photo 4: *Fermenting Cassava, Grand Bassa [Soaking, overlaid with palm leaves, packed for sale]*

Country rice is generally less exhausting to prepare than cassava; after beating in the mortar, it is boiled and consumed. White rice purchased on the market is ready to consume. Other starches consumed include eddoes and plantain, but these are served as a side to rice or cassava, unless consumed as a small breakfast.

The number of ingredients in the soup or gravy served with *fufu*, *dumboy*, or rice anecdotally correlates with the socioeconomic status of the family.¹¹³ '*Pepe soup*' includes, at minimum, Vita broth and *pepe* (very hot pepper) but can contain an assortment of other ingredients, including leafy greens (cassava, palm, potato), dried fish, bitterball, okra, or meat. Gravies such as palm butter and *palava*¹¹⁴ sauce are palm leaf and red palm oil based, but also contain chunks of bitterball, dried fish, and bushmeat, if the family can afford it. The least favorable meal, consumed by the very poorest families, is 'dry' rice, or rice topped with red palm oil but no soup or gravy.

The most commonly purchased meat is dried boney fish,¹¹⁵ otherwise, only wealthy households can afford bushmeat for purchase in the community, less so the market. Chickens are slaughtered for household consumption on an infrequent basis; eggs are available on a small scale in shops in affluent communities in LR09 [Region 2], LR10 [Regions 1 and 3], but they are rarely consumed- not because of a taboo, but mostly because of unfamiliarity, dislike, or ambivalence.

In Region 2 LR08 & LR09, proximity to Monrovia, as well as year-round IGA's, means certain products are available on the market that cannot be found in '*the interior*.' When asked about a '*dream meal*,' where money and market were no barrier, participants listed food based on their perceived ability '*to grow the body*.' These foods were also often those which could not be produced by homes, such as macaroni, mayonnaise, and tea. The desirability of these foods is also associated with their socioeconomic connotations and connection to a different, more urban lifestyle- especially in the agricultural livelihood zones, participants said they imagined these foods are what people eat in the '*Big Town*'- Monrovia. Barriers to eating these foods were primarily

¹¹³ Source: Concern Worldwide (2019). A cost of the diet (CoD) analysis in three Liberian livelihood zones. Liberia WASH Consortium. Concern Worldwide, Liberia. [2019 CoD]

¹¹⁴ Cassava/ potato leaf and palm oil based sauce

¹¹⁵ Small coastal fish, [2019 CoD]

access-based: either they are too expensive or just not available on the market. In addition to cereals and grains consumed by the wealthy, there was a general desire to supplement gravies and soups more densely with meats and veggies, thus mixing traditional and modern foods.

Snacks are unlikely to be considered a meal and are infrequently consumed, but mainly consist of fruits per seasonal availability, country bread (dried, pounded, sweetened rice, LR02 and LR04), and fried dough doughnuts or occasionally biscuits in LR09- though these present a cost to the family. Free/ wild foods vary, but are generally plentiful in agricultural livelihood zones- including breadnut, sweet potato, yam, eddoes, grapefruit, lime, orange plantain, plum, pumpkin, benny seeds, breadfruit, banana, coconut, golden plum, palm fruit, kittily, monkey nut, pawpaw in LR02 and LR04 (Regions 1, 2, and 3). Free/ wild foods are less common in LR08, Region 2, as much of the land is burnt for charcoal or tapped for rubber. However, breadnut, plantain, yam, and sweet potatoes contribute to household consumption. Access to free/ wild foods is typically less in LR09 (Region 2) and LR10 (Regions 1 and 3), as the family has less access to 'bush' to roam, or the soil has been converted to mining activities.

Despite availability, other than leafy greens, other free/ wild foods, such as breadnuts or coconut, are consumed only for satiety and are not considered mainstays of household nutrition.¹¹³ It is typically the responsibility of older children and/or the women to harvest free/ wild foods, except for larger, more labor intensive foods that might be sold, such as bush yam.

It is uncommon that a woman prepares a special meal for herself and/or her children; it is common, according to participants and by observation, for the mother and children to eat before the father comes home. This was a different perception than that of key informants, who indicated all family members must '*hold their stomachs*' until the father returns. While perhaps true from tradition or older generations, caregivers of children under 5 years of age cited the damage and stress of a child waiting many hours for the father to eat. Some fathers indicated they leave some of the meal in their bowl for their smallest children, as their mealtime may be an hour or more after the last time the children ate, but women did not indicate this as a major source of dietary intake for children.

Meal content is typically the same for all family members [**Cf:** Infant and young child feeding], but portion is allocated according to age and gender. The woman first plates the husband's food and sets it aside, plates the children's food separately, and then plates her own food. Plating the children's food depends on the age and gender range in the home. Male children who are older eat together, younger female children eat together, and the mother eats her portion alone or with the eldest, unmarried daughter who assists her with food preparation. Priority thus loosely follows this order:¹¹⁶

¹¹⁶ Some exceptions during pregnancy/ lactation; [**Cf:** Nutrition of pregnant and lactating women]

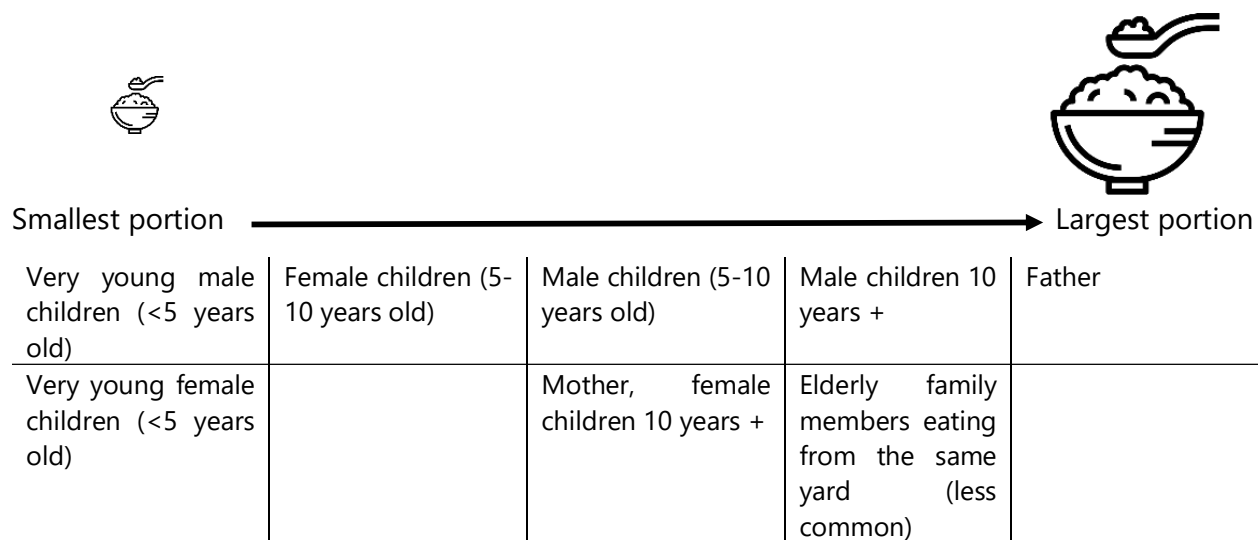


Figure 8: Household food allocation, as described in the qualitative inquiry, November-December 2019

Household food allocation, specifically preference for the father, was cited as a major source of dissatisfaction by youth. Less troubling than the portion size was the density of the soup or gravy, leaving the youth, children, and mother with much less favorable meal content. Youth blamed both their mother and father for this practice- the women for serving, and the man for expecting and consuming.

"Parents/ mother give us less meat and saving our father more meat/ food, this makes us to be vexed."
Focus group participant, Rivercess

An important deviance from normal household food allocation is withholding food from the husband or children because of displeasure. A woman can keep food from the man, plating him a smaller portion or less soup/ gravy, if she is displeased with the money he has given her for the meal, suspects him of infidelity, or is hurt by a decision he has made. Withholding food from children is also an important disciplinary strategy.

"If the man give you small money for that evening food, if I have means, I will add to the food but if not, I will give the food to the children. If it is habit to give small money for food, I would not give him any food."
Focus group participant, Grand Bassa

Because of market malfunction, small-scale livestock management, and reducing availability of bush meat, non-poultry meat is typically dried in the household or before selling in the market. Bush meat and fish are dried openly in the kitchen area with heavy doses of salt. Before drying, the bushmeat is skinned, scrubbed, and boiled. Sea fish in LR05 and freshwater fish in houses that engage in inland fishing are scrubbed, scaled, and dried. However, the meat can take several hours or up to a day to be transported back from the point of kill to the household. When the meat arrives at the household, it may rest for several additional hours before the woman is able to clean and boil it, due to her heavy workload.

The Link NCA findings corroborate those of the 2019 Cost of the Diet (CoD), which observed taboos are highly personal and variable within communities. The main categories of taboos are

those related to health concerns, myth- such as bad luck or *juju*¹¹⁷, family law or tradition, and religion.¹¹³ The most frequent taboo foods were meats infrequently available or consumed anyways- such as monkey, turtle, specific fishes, and dog. Reasons were either quite direct- i.e. *"my whole body swole up"*- or more convoluted (*"if I eat catfish, I will grow whiskers like the catfish,"* *"if I eat dog something bad will happen to me but I can't say what that is"*), without much of a middle ground, though all taboos were associated with an adverse physical or spiritual reaction. Except for family law or tradition, which were infrequently mentioned in focus group discussions,¹¹⁸ taboos were an individual choice and could change over the course of one's life.

"Both boys and girls eat all type/ kind of food while they are small, but when they grow up, they will decide as to the food they cannot eat."

Focus group participant, Grand Bassa

Nutrition of pregnant and lactating women

"Of course what a pregnant woman eats matters; the preparation starts in the womb."

Key Informant, Rural Montserrado

Good nutrition during pregnancy is seen as an important part of the development of the baby, but generally less achievable than antenatal care visit attendance, because of the daily implied costs and/or lifestyle changes. Women who did attend antenatal care visits indicated that they heard what foods to eat while pregnant but cited financial barriers. Foods listed as 'good' for the pregnant woman ranged from more starches,¹¹⁹ to vegetables,¹²⁰ and fruits.¹²¹

"The doctor tells us what food to eat but we don't have the money to buy that food; we just eat fufu."

Focus group participant, Grand Bassa

According to the Risk Factor Survey, 62.0% of currently pregnant and/or lactating women increased their intake during pregnancy [48.0-74.2%, 95% CI], while 32.4% of women did not have the appetite to [21.5-45.6%, 95% CI].¹²² This corroborates reports from both men and women, who indicated that many women actually *reduce* their intake during pregnancy, because of frequent nausea. If a woman is nauseous while pregnant, it is believed she should not force the food, because vomiting could harm herself and the baby. A woman who experiences nausea during pregnancy will completely avoid that food till childbirth and likely restrict her total intake as well. When probed, those trigger foods were highly individualized, almost like another form of taboo, but more likely to include major energy sources, such as rice, cassava, oil, and fish. The most common period of pregnancy when food would be restricted was the first trimester, though this, too, varied.

"When I get pregnant, I don't have appetite to eat but later I can have more appetite to eat. Rice and fresh fish can make me feel to vomit. At three months I can have more of an appetite and start eating any type of food."

Focus group participant, Rivercess

¹¹⁷ Witchcraft/ spiritual attack.

¹¹⁸ Possibly because they are highly personal.

¹¹⁹ Eddoes, plantains, bulgur wheat.

¹²⁰ Especially leafy greens.

¹²¹ Oranges, pineapple- but not good for lactation, due to 'sour in the stomach' in the breastfeeding child.

¹²² 5.6% indicated they had the appetite to eat more, but food/ resources were unavailable.

Two common stimulants used to abet nausea during pregnancy are potter¹²³ and kola nut.¹²⁴ These two items can be sucked or chewed as much as needed during the day, sometimes more often than meals. Whilst medical practitioners and health NGO staff incriminated both as detrimental in pregnancy, community members did not list ill effects of either of them. Many women said they craved potter during pregnancy, but they did not necessarily identify the craving as pica¹²⁵. According to the Risk Factor Survey, the percentage of children's mothers who ate potter on a daily or semi-daily basis during their last pregnancy ranged from 28.6% in Region 2 [7.5-49.6%, 95% CI] to 45.5% in Region 3 [22.9-68.1%].¹²⁶ Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a mother's consumption during pregnancy, including consumption of potter, did not mean a child was more or less likely to be stunting, according to the study. [Cf: Annex B].



Photo 7: Potter for sale, Grand Bassa

A woman's appetite generally increases during breastfeeding; according to the Risk Factor Survey, 89.5% of children's lactating mothers increased their intake during breastfeeding [85.3-92.6%, 95% CI], while only 3.4% did not have the appetite to [1.8-6.5%, 95% CI].¹²⁷ Men mentioned a woman's increased nutritional needs during breastfeeding more frequently than her increased nutritional needs during pregnancy. Per qualitative inquiry, breastfeeding women eat more than 3-5 times in the day if finances allow, sometimes reverting to foods like *garrie*¹²⁸ that could keep them full longer. Increased appetite and consumption during lactation was not significantly associated with stunting outcomes. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that children whose mothers reported increased appetite and consumption during lactation were not more or less likely to be stunted [Cf: Annex B].

In a community of Rivercess, where a very active CHA plays a health promotion role in the community, community members also espoused the increased water needs during pregnancy and lactation, but this was not mentioned in other communities. In this community, women even indicated they were peer pressured to drink a full glass of water every time they '*gave titty*'.¹²⁹

¹²³ Potter is a log of clay baked and marketed primarily to pregnant women. Its high mineral content is believed to cause appendicitis (KII's, NGO Staff and MoH- GoL).

¹²⁴ Kola, the seed of the Kola plant, has 2-4% caffeine content. Source: Burdock, G. A.; Carabin, I. G.; Crincoli, C. M. (2009). "Safety Assessment of Kola Nut Extract as a Food Ingredient". Food and Chemical Toxicology. 47 (8): 1725–32.

¹²⁵ Non-food cravings during pregnancy, related to iron-deficiency anemia and/or other micronutrient deficiencies.

¹²⁶ Question only posed to pregnant/ lactating women; Region 1- 42.9%[23.3-62.4%], Region 2 28.6%[7.5-49.6%], Region 3 45.5%[22.9-68.1%].

¹²⁷ 7.1% said they had the appetite to eat more, but the food was not available.

¹²⁸ Farina; cassava flour mixed with sugar.

¹²⁹ Breastfed.

Taboos play an important and interesting restriction on pregnant and lactating women's intake, though, like personal taboos, no major food groups were listed as taboo. Because a child and woman's nutritional needs are intertwined during pregnancy and lactation, in Grand Bassa and Rivercess, women are not allowed to consume the husband's taboo food (as well as her own) during this period. Other pregnancy-specific taboos, such as snails or deer, were infrequent, except in one locality in Grand Bassa- another example of highly localized traditional beliefs.¹³⁰ Egg was not a ubiquitous taboo food during pregnancy in the study zone, as it is reported in other parts of the country.

"Pregnant women can eat any good food; the barrier is mostly lack of money. For us here, we can eat egg when pregnant. But some come in one-one¹³¹ with beliefs like the child will come out spitting if the woman eats snail, or if I eat deer the child's ears will be long. It's not shared by everyone, those beliefs. It happens in the interior because they really believe these things that if they don't do it, something will happen to their child."

Certified midwife, Rivercess

When a woman is pregnant, she '*eats what her heart calls for*',¹³² but the burden of making special foods available for the pregnant or lactating woman mostly falls on the man, as families said the woman ideally reduces her income generating activities during this time. Provision of special foods for a pregnant and lactating woman is closely linked to a man's sense of this as his manly responsibility. In LR02 and LR04, men would '*go hustle in the bush for more bush meat*' for their wife, while in other livelihood zones, men said they were sometimes forced to purchase or borrow special foods for their wives. Women whose partners did not change their workload to provide more food during pregnancy and lactation were unlikely to have the time or energy to make extra foods available themselves, with the exception of affectionate sisters, in-laws, mothers or older female children, usually in the time directly post-partum.

Importance of maternal nutrition

Pregnant and lactating mothers are generally considered as a nutritionally vulnerable group. Maternal nutrition during pregnancy has a significant impact on fetal growth and birth weight. Due to the nursing process, mothers are subjected to nutritional stress, which may result in chronic energy deficiency – likely affecting their ability to provide appropriate care. Poor maternal nutritional status may be due to insufficient food intake, excessive energy expenditure or poor utilization of nutrients.

Inadequate dietary intake or exposure to infections during pregnancy can lead to infant under-nutrition. A child born with a low birth weight will have a high probability to become malnourished and thus maintain the vicious cycle of malnutrition presented here.

¹³⁰ *"There are certain things that pregnant women do not eat- white rice makes some vomit, honey can abort the pregnancy, porcupine gives the child cleft palate, cassava snake- the cassava snake does not move, if you eat it the child will just be rested in one place. Black bat gives difficulty with delivery, because it never touches the ground. Gbay bird hardly comes on the ground, so the fetus would have a hard time to come down during the delivery."* - Grand Bassa

¹³¹ Occasionally.

¹³² Focus group participant, Grand Bassa.

The findings of Risk Factor Survey, conducted during this Link NCA study, revealed that 2.0%¹³³ of caregivers had their middle upper arm circumference measured under 22cm,¹³⁴ meaning they could be classified as malnourished at the time of the data collection. An increase in the mother's MUAC was significantly associated in an increase in the child's Height-for-Age Z-score (HAZ) in Region 1 as well as the entire study zone (p-val. <0.05), meaning as a mother's MUAC increases, her child's height also increases, meaning the child is less likely to be stunted.¹³⁵

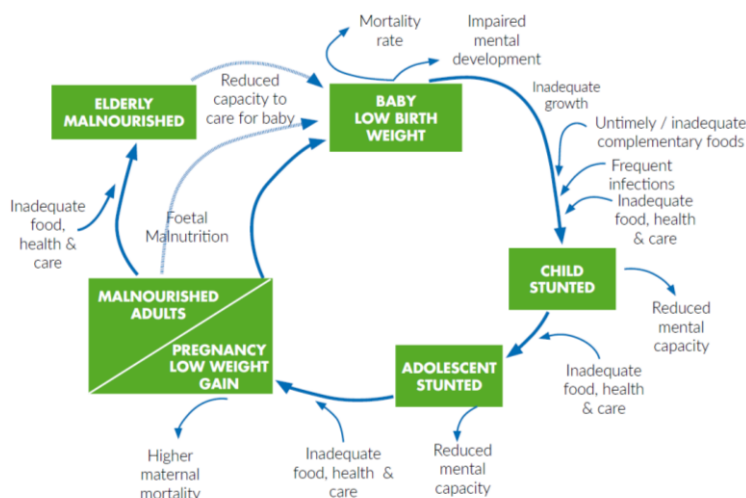


Figure 9: Cycle of under-nutrition¹³⁶

Breastfeeding practices

According to the last DHS Survey, nationally, a little more than half [55%] of children under 6 months are exclusively breastfed; the 2018 CFSNS reported a slightly lower percentage- 51%. Both were a celebrated increase over the 29% exclusive breastfeeding found in the 2007 DHS. A study conducted by Last Mile Health in Rivercess, late 2019 estimated only 34.1% [16.0-58.4%, 95% CI] of children were exclusively breastfed; the study catchment area included towns with active CHA's and clinics promoting exclusive breastfeeding.¹³⁷ While the Risk Factor Survey sample size was not powered to estimate prevalence of exclusive breastfeeding, 56.4% [46.9-65.8% CI] of children 0-6 months surveyed were exclusively breastfed, ranging from 46.3% in Region 2 [30.4-62.3%, 95% CI], 57.9% in Region 3 [41.4-74.3%, 95% CI], to 67.7% in Region 1 [50.3-85.2%, 95% CI].¹³⁸

Discussions during the Link NCA reflected protracted challenges in exclusive breastfeeding, despite targeted sensitization at health facility level, beginning with breastfeeding initiation. While

¹³³Full Study zone: 2.0% [0.9-3.0%], Region 1: 1.5% [<0.0%-2.9%], Region 2: 2.8%[0.1-4.8%], Region 3: 1.7%[<0.0%-3.4%].

¹³⁴ Link NCA recommended cut-off; Link NCA Indicator Guide.

¹³⁵ In Region 2, a child whose mother had a malnourished MUAC was more likely to be wasted.

¹³⁶ Source: BabyWASH, ACF, 2017. Adapted by the LSHTM (2013) from ACC/SCN (2000) Fourth Report on the World Nutrition Situation. Geneva: ACC/SCN in collaboration with the International Food Policy Research Institute (IFPRI)

¹³⁷ Source: Last Mile Health, 2019. Formative Assessment Report: Expanding Lifesaving Nutrition Interventions in Liberia's Most Remote Communities

¹³⁸ Region 1: 67.7% [50.3-85.2%], Region 2 : 46.3%[30.4-62.3%], Region 3 : 57.9%[41.4-74.3%]. Due to a relatively small sample size, this finding should be taken with precaution and not used in project proposals.

clinic staff say they encourage women to breastfeed upon delivery, initiation is delayed for mothers who give birth on their way to the facility or at home. TTM's indicated they would tell the woman to exclusively breastfeed but not necessarily when to start, because they believe rest post-delivery is paramount, and might be mutually exclusive to breastfeeding, if the mother is exhausted. If a woman gives birth at the TTM's home, she is often sent home first to rest, without breastfeeding. When asked about exclusive breastfeeding, several TTM's understood the concept as abstinence from food and juices, but not necessarily water. Perceptions that the breastmilk produced in the first days is insufficient are common. If this is the case, the woman needs to rest and eat to regain her strength, sometimes for 2-3 days, so the breast can produce sufficiently. Colostrum is not generally stigmatized and is typically given to the child.

Risk perceptions related to other breastfeeding practices are summarized below.

	Region 1	Region 2		Region 3		
Behavior	Grand Cape Mount	Grand Bassa	Rural Montserrado	Rivercess	Sinoe	Community justifications
Breastfeeding on demand	LOW	MEDIUM	LOW	LOW	LOW	In Grand Bassa, caregivers talked about breastfeeding every time the child cries as presenting a risk to the mother, as 'it causes us to rush everywhere we go,' but part of regular responsibilities.
Breastfeeding when a woman is pregnant	HIGH	HIGH	HIGH	MEDIUM	MEDIUM	This is believed to be medium to highly risky for the breastfeeding infant, as the mother's breastmilk can cause the child to have diarrhea or get stomach aches/discomfort ('sour in the stomach'), or even die. If a woman becomes pregnant, the child is often switched over to household food. The blame in this scenario is placed on the mother. ¹³⁹
Breastfeeding when a woman is hot or ill	LOW	HIGH	MEDIUM	LOW	HIGH	If a mother is breastfeeding an infant while sick, it is believed that her illness can pass to the

¹³⁹ "It was a bad decision in the first place to sleep with your man when the child is still getting titty water (breastfeeding). All systems are not the same and it is possible that the child can get sick while you're pregnant & still giving titty water, like runny stomach, big stomach, the child getting titty water becoming weak. We have seen it; it happens here." - Focus group participant, Grand Bassa

						child, including malaria and diarrhea. ¹⁴⁰
Giving water to the baby before 6 months of age	HIGH	HIGH	HIGH	MEDIUM	MEDIUM	Pervasive practice. Many women who hear that they should not give water at the clinic are dissuaded by their mothers or mothers-in-law.

Table 9: Perception of the risks associated with breastfeeding practices

Early introduction of water remains a widespread but non-universal practice- in the Risk Factor Survey, 39.3% of children 0-6 months had received clear water in the day prior [30.3-49.1%, 95% CI]. Before increased coverage of health facilities, older women indicated it was their parents or even the TTM who encouraged them to introduce water to the child to satisfy thirst.

Confidence in one's breastmilk sufficiency typically improves a few days post-delivery; in the Risk Factor Survey, 86.7% of children's mothers said that their breastmilk was sufficient during lactation [83.8-89.6%, 95% CI].¹⁴¹ If a mother does not have confidence in the quantity of breastmilk she is producing, she will supplement with water to satisfy the child's thirst. A woman's breast size is believed to directly correlate with her breastmilk production. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child whose mother perceived her breastmilk was sufficient was more likely to be WaST [**Cf:** Annex B]. Perceived breastmilk sufficiency was not a significant risk factor for stunting in the study. A woman who had increased appetite and consumption during lactation was significantly more likely to perceive her breastmilk was sufficient [**Cf:** Annex B].

To help give the child strength, rice can be burnt, mixed with water, squeezed, and the water given to the child. Sometimes, breastmilk is mixed with burnt soft rice as well to satiate the child (observed in Regions 1, 2, and 3, LR02 and LR04). A baby who cannot stop crying can bring the mother embarrassment or shame, leading her to introducing water to the child to quiet him or her.

While behavior change communication strategies have targeted early introduction of water, other important breaches in exclusive breastfeeding include a woman's illness and pregnancy. Another reason for early introduction of water is if a mother leaves for work or school, such as in LR09 (Region 2) and LR10 (Regions 1 and 3). While mothers in major livelihood zones talked about some modifications that could be made to bring the child while working, such as laying a tub in the field, mothers in concession/ mining work (LR10)/ school (LR09) were not permitted to bring the baby on site.

When asked about breastfeeding frequency, some mothers cited a number given to them by the doctor (i.e. 10- Montserrado), while most said this depended on the child's cues. The most

¹⁴⁰ "Breastfeeding when the woman is sick, the fever the mother has can pass to the child. The sickness within the woman will be transferred to the child, when the sickness is not severe you can breastfeed." - Focus group participant, Grand Bassa

¹⁴¹ This question was only posed to mothers of children under 36 months, to prevent recall bias. 86.7% [83.8-89.6%]. Significant Chi-Square correlation between increased appetite in pregnancy/ lactation and perceived breastmilk sufficiency.

common times listed for when a baby needs to be breastfed when s/he cries and when s/he wakes up.

As is true with child illnesses, advice from health facility personnel (or people believed to be doctors) is increasingly more heeded more than that of elderly women in the community. A mother's failure to uphold that advice is mostly related to perceived dissatisfaction of the baby or time away from the home.

Breastfeeding is viewed as a transaction between mother and child; mothers frequently cited the need to 'clean the titty' before giving to the child, because dirt and sweat could pass into the child's mouth. This was a major behavior change communication strategy during the 2014 Ebola crisis.¹⁴² Thus, a woman feels social pressure to clean herself of sweat and dirt before breastfeeding, though her workload can make this challenging.

Three-quarters [75%, 95% CI [60.1-89.9%, 95% CI] of children surveyed in the Risk Factor Survey were still breastfed after one year; this was not significantly associated with stunting. From qualitative inquiry, breastfeeding can continue for a long time, based again on the growth milestones of the child, including height and weight. Some mothers with children up to 54 months reported still breastfeeding their children, either because their child was not growing well, they didn't know their child's age, or believed their child still had a taste/ preference for breastmilk.

For mothers who adhere to exclusive breastfeeding, the complementary feeding window is also the period when country herbs can be given to the child, primarily for diarrhea, fever, and/or cough [**Cf:** Annex D: THERAPEUTIC ROUTES FOR RECURRENT DISEASES]. This is based on personal preference and severity of illness, but a typical age range when country herbs are appropriate to first give children was 12-24 months.

Infant and young child feeding

"Most young children eat the same fufu and clear pepe soup; they lack vitamins. Children need to drink milk and eat good food such as peanut butter so as to be healthy."

Key informant, Grand Bassa

In the study zone, sufficient nutrition during the complementary feeding window (6-24 months), including meal frequency, dietary diversity, and food safety, is well documented as lacking.^{12,76,137} Challenges perpetuating inadequate IYCF are much more nuanced than knowledge barriers, especially in the new generation of mothers who give birth in a health facility. The two most common inappropriate complementary feeding practices are binarily problematic: discontinued breastfeeding at six months (meaning, food with no complementary breastmilk) and extended exclusive breastfeeding past 6 months, delaying introduction of soft/semi-solid foods. According to the 2013 DHS, only 45% of children 6-8 months continued breastfeeding while eating soft/semi-solid food, while 40% of children the same age group only consume breastmilk and water.⁷⁶ Thus, many children who enter the complementary feeding window are deprived of the valuable

¹⁴² Source : Brandt, A., Serrano Oria, Ó., Kallon, M., & Bazzano, A. N. (2017). Infant Feeding Policy and Programming During the 2014-2015 Ebola Virus Disease Outbreak in Sierra Leone. *Global health, science and practice*, 5(3), 507–515. <https://doi.org/10.9745/GHSP-D-16-00387>

nutrients of breastmilk, while many others are deprived of the valuable nutrients of complementary foods.

Per qualitative inquiry, meal frequency for children is not typically different than that of the household. Even the youngest children in the complementary feeding window (6-18 months) were fed a median two meals per day in all three regions. The Risk Factor Survey indicated delayed introduction of complementary foods; more than one in five children [21.8%, full study zone] 6-18 months in all three regions, were fed zero meals in the twenty four hour recall period;¹⁴³ compared to 1.7% of children age 18-36 months fed zero meals.¹⁴⁴ Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child in the complementary feeding window who was breastfed only (thus, meal frequency of zero) was significantly more likely to be concurrently wasted and stunted [Cf: Annex B].¹⁴⁵ A significant association was not noted between complementary feeding frequency and stunting.

In qualitative inquiry, an exception was noted in LR04 Rivercess [Region 3], where rigorous promotion of fruits for children by the CHA encouraged women to offer mashed *pawpaw*¹⁴⁶ and/or banana as an intermediate snack, when available.

In the absence of rigorous Growth Monitoring Promotion and regular child check-ups [Cf: COMMUNITY PERCEPTIONS OF UNDERNUTRITION AND THERAPEUTIC ROUTES], women use other milestones to track a child's age, development, and readiness for food. Sitting and/or crawling is a common cue that the child should receive water, because of the additional activity. Food is first introduced when a child is standing or walking, and progressively softened less as the child stands and walks more confidently. Exceptions to this staged order are to appease the baby's dissatisfaction; either the child cries incessantly even after breastfed, or 'looks jealous' of the adult's food.¹⁴⁷

"We change the care of the child based on his/ her condition (sitting, crawling, standing, and walking) and by changing his / her food based on his/ her age or demand."

Focus group participant, Rural Montserrado

Generally, in the dry season and peak food availability, if the adults eat three times per day, the child also eats a full meal three times per day. As the lean season approaches, families said they prioritize food for the children.¹⁴⁸ While reducing children under 10 years old to two meals per day could be staved off for a while by reducing ingredients in the pepe soup and intake by older family members, most families said that in peak lean season, the youngest family members would

¹⁴³ Region 1: 21.4%[10.3-32.5%]; Region 2: 22.4%[11.4-33.5%]; Region 3: 21.5%[11.3-31.8%]; Full study zone: 21.8%[15.7-27.9%]

¹⁴⁴ Full study zone: [0.2%-3.1% 95% CI].

¹⁴⁵ In Region 3, these children were also significantly more likely to be wasted.

¹⁴⁶ Papaya.

¹⁴⁷ *"When I'm eating and the child is looking at me, I can feed them because I can feel sorry."* Focus group participant, Grand Bassa.

¹⁴⁸ The Risk Factor Survey, which took place outside of the lean season, indicated only 8.6% [6.8-10.3%] of households across the study zone had to diminish food for adults, so children could eat; Region 1 16.3%[12.4-20.2%], Region 2 3.0% [1.2-4.9%], Region 3 5.6% [2.9-8.2%].

also reduce to two meals per day. When asked if children reduce to one meal per day, as was indicated for some adult family members, most shook their heads that it was impossible for children to ‘hold their hunger’ for that long.

Dietary diversity in Liberia can be generally labelled as inadequate for children and households. As noted above, the diet of young children mirrors that of the other family members and is typically not more (or less) diverse.¹² The mean Infant Dietary Diversity Score, expanded to include children 6-36 months in the Risk Factor survey, ranged from 2.1 in Region 1 [1.9-2.7, 95% CI] to 2.7 in Region 3 [2.5-2.9, 95% CI],¹⁴⁹ falling short of the maximum score of 7 food groups, as well as the recommended minimum score of 4 food groups. Only 10.3% of children across the study zone met the recommended 4 food groups [7.6-13.1%, 95% CI].¹⁵⁰

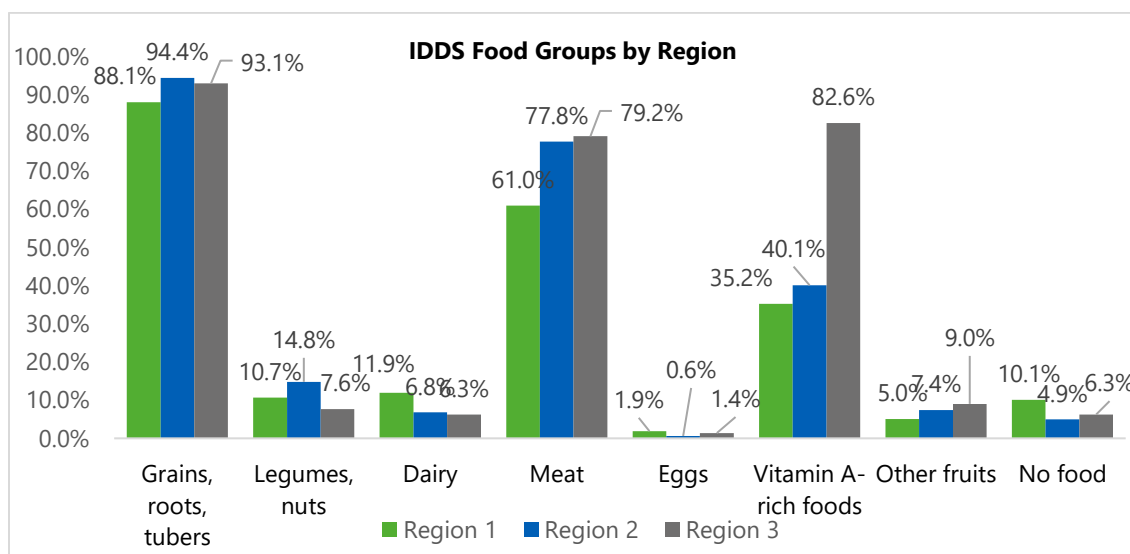


Figure 10: Percentage of children who consumed the 7 recommended food groups¹⁵¹

Figure 10 reflects a diet heavily dependent on grains, then Vitamin A rich foods, and meat. Just as is true for adults, rice is the preferred staple for young children, compared to cassava- *dumboy* and *garrie*, which are considered to cause distension and/or constipation. Children who eat ‘dry rice,’ without any gravy or soup, are judged and pitied. It is important to note that the most common source of Vitamin A was not a fruit or vegetable, but rather, unrefined palm oil, which is generously applied to all main meals. At minimum, a child’s rice should be topped with red palm oil, for palatability, and not necessarily the vitamin content.

Results of participatory exercises (based loosely on a child 12-18 months) indicate that child feeding is particularly challenging during the rainy season. The way children typically eat (dry and rainy season) is not desirable by their caregivers. If money and markets were not barriers,

¹⁴⁹ Region 1: 2.1[1.9-2.3 95% CI], Region 2: 2.4[2.2-2.5 95% CI], and Region 3: 2.7[2.5-2.9 95% CI].

¹⁵⁰ Full study zone: 10.3% [7.6-13.1], Region 1: 8.8% [4.4-13.3], Region 2: 11.8% [6.8-16.8], Region 3: 10.4% [5.4-15.5]. No significant variation between livelihood zones, according to ANOVA.

¹⁵¹ Minimum dietary diversity describes the proportion of children 6-23 months of age who receive foods from 4 or more out of 7 food groups in the previous day preceding the survey. The seven food groups include (1) grains, roots, and tubers; (2) legumes and nuts; (3) dairy products; (4) flesh foods; (5) eggs; (6) vitamin-A rich fruits and vegetables; (7) other fruits and vegetables. Importantly, category 6 includes palm oil and palm leaf.

caregivers indicate dietary diversity would also increase- but, desired meals reflect the same preference for modernization in line as the household [Cf: Household nutrition].

Dry season	
	Example meals
Breakfast	<ul style="list-style-type: none"> • Rice, palm butter • <i>Fufu</i> (watery) • Dry rice with palm oil • Banana or pawpaw
Lunch	<ul style="list-style-type: none"> • <i>Dumbo</i>y with pepe soup, palm butter (boney fish)
Dinner	<ul style="list-style-type: none"> • Rice with red palm oil or soup (boney fish and/or meat)
Rainy season	
Breakfast	<ul style="list-style-type: none"> • <i>Fufu</i>, Pepe Soup
Lunch	<ul style="list-style-type: none"> • <i>Fufu</i> with family soup
Dinner	<ul style="list-style-type: none"> • <i>Fufu</i> with family soup
Desired meal	
Breakfast	<ul style="list-style-type: none"> • Rice cereal with milk • Creamy wheat with milk and butter • Apples and grapefruits • Banana and pineapple
Lunch	<ul style="list-style-type: none"> • Cereal with peanut butter and milk • Cocoa oats • Rice with gravy, served with milk
Dinner	<ul style="list-style-type: none"> • Cereal with milk • Gari with milk • Bread with mayonnaise • Biscuits • Tea and milk

Table 10: *Ideal meals, complementary feeding*

Women believe marketed cereals or cream of wheat are more nutritious and appropriate for their children than typical family meals. If expensive items such as coffee and tea were available at household level, they would also be given to the young child, with sugar and milk.

Though children are not fed special foods often, women did give several recipes for special complementary foods. Considering accessibility issues with infant cereals purchased on the market, these substitutes from cassava, plantain, and/or rice are referred to as 'dust.' Dusts involve a long drying stage after pounding; thus, they are infrequently prepared during the rainy season. They are mixed with boney fish dust and benny seed. Major barriers to regular preparation of these cereal substitutes is time and urgency. 'Dusts' are not palatable to adults, so a preparation requires a second stage to the preparation of family meals. Furthermore, a dust would not be served with water only, and ingredients to mix in¹⁵² are expensive and sometimes different than what the adults would be consuming. Rice or plantain dust are not produced at large scale for purchase on the market so a mother who feeds her child rice or plantain dust must do so on small scale for her own child. As is true for the family, batch cooking is not common and most foods are

¹⁵² Benny seed, dry milk, boney fish, peanut butter.

prepared for consumption day, with evening or lunch meals sometimes being held over from the previous meals.

Density and texture of the meal might be altered for the children, particularly tougher forms of cassava. Rice can be slightly burnt or cooked longer for the child. *Fufu*, which is softer and fermented, was deemed more appropriate for children than stickier and tougher *dumboy*, which is too 'heavy' for children. *Garrie* might be prepared into a sweetened porridge, but this is typical only if it is an accepted breakfast for the father as well. Rice and cassava are allowed to cool before serving to children, because the heat is perceived as difficult to tolerate.

Understanding portions appropriate for a child's age also appears to be a challenge. According to secondary literature review and observation,¹⁵³ young children are often assisted by older siblings, 8-10 years old and above, who might not participate in active feeding like a mother would. Inadequate consumption might also be linked to several gastrointestinal symptoms in young children from cassava, strengthening preferences for rice. Anecdotally, health-center based key informants resonated with these sentiments, saying cassava produces gas, which diminishes appetite and make the child satiated quickly. Children in Nigeria and Kenya who consume cassava were at higher risk of low protein consumption than children who consumed less cassava.¹⁵⁴

Other care practices

"To give birth to the child is easy, but to give it a life is hard."

Key informant, Rural Montserrado

Focus group participants indicated the heaviest burden of childcare is that devoted to children 6-24 months. *'The work of a baby ma'*¹⁵⁵ is to devote her time fully to the baby's needs, as a child cannot care for him or herself at this time. Comparatively, the caretaking responsibility of the father is to ensure medication is available when needed, provide food in the home, and clothe the child.

When a child reaches the stage of *'no longer taking titty water'*¹⁵⁶, he/she increasingly fends for himself with assistance from older siblings and/or the grandmother. In larger families, girls age 10 and above play an assistant role, shadowing the mother in all her tasks and implementing other basic tasks, such as bathing the children and sweeping. Childcare responsibilities stop when adolescents *'start loving outside'*¹⁵⁷, usually sealed with pregnancy, financial support from a boyfriend, or traditional marriage.

In the 2013 DHS, above fifty percent of women and 30-35% of men agreed that parents are justified in hitting or beating their children if they go out without telling them, do not want to do housework, speak when grown-ups are talking, and/or do not study well at school. Only 2 percent

¹⁵³ Source : Yovsi, R.; Samba, K.; Bahr, B. et al. 2010. A Qualitative Study of Infant and Young Child Feeding Practices in Liberia. UNICEF.

¹⁵⁴ Source: Stephenson, K., Amthor, R., Mallowa, S., Nungo, R., Maziya-Dixon, B., Gichuki, S., Mbanaso, A., & Manary, M. (2010). Consuming cassava as a staple food places children 2-5 years old at risk for inadequate protein intake, an observational study in Kenya and Nigeria. *Nutrition journal*, 9, 9.

¹⁵⁵ Mother of an infant.

¹⁵⁶ Breastmilk.

¹⁵⁷ First and subsequent sexual encounters.

of women and 1 percent of men believed parents are justified in hitting or beating their children if they request clothes or toys. In the study zone, parents cited fear that they would be reported to Human Rights authorities¹⁵⁸ if they themselves disciplined their child but endorsed the practice as understandable if others did it.

"Right now, this is a modern time, and children have the right to take their parent to court when beat upon."

Focus group participant, Rural Montserrado

Caregivers say that while heavy beating could cause the child to become sick, a light beating is sometimes warranted if the child is not minding the parent's instructions. For example, in a scenario when a pregnant woman's son knocks over a can of water and then she beats him:

"The child behaved very badly because the mother is pregnant and has no one to help her fetch water. She has stress and the boy is adding her stress up. This story could easily happen here too. She should be careful about the way that she treats the child. She should not beat too harshly on the child because when the child gets sick, the problems will be more."

Focus group participant, Rural Montserrado

There is a tendency to justify current practices with comparison to previous practices. Especially regarding child discipline, caregivers said, while they might still beat their child occasionally, they never had the opportunity to discuss anything with their parents, for fear that they would be violently beaten. 'Peppering' the child's eyes, nose, genitals, or mouth with hot pepper, as well as food deprivation, were still enforced by caregivers and/or older sibling, but less often than in past generations. .

Failures to uphold the new childcare ideals introduced by health workers, such as exclusive breastfeeding, abstinence from country medicine, and appropriate complementary foods were at least an improvement from former generations, caregivers conceded.

"During our grandparents' days they used to force the child to eat by holding the child nose, but we don't do it now. Also we do not lay the baby near the fire, give the child herbs without measuring it, lay the baby down to feed him or her. This change in 2002 when health workers started telling us how to take care of our baby."

Focus group participant, Sinoe

Risk perceptions related to other childcare practices are detailed below.

	Region 1	Region 2		Region 3		
Behavior	Grand Cape Mount	Grand Bassa	Rural Montserrado	Rivercess	Sinoe	Community justifications
Leaving a baby with older siblings.	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	Depends on the age of the child- should be age 10-12. The sibling if less than 8 years old will not take good care of the baby; he will stick anything into the mouth of the baby.

¹⁵⁸ Refers to child abuse initiatives. [Cf: Opportunities for Youth.]

Leaving a baby with his grandmother.	MEDIUM	LOW	HIGH	MEDIUM	HIGH	Some espoused confidence in their mothers' ability to care for the child. Those who indicated this was medium or high risk were concerned that the grandmother could not breastfeed the baby and/or might spoil the child.
Slapping the baby.	HIGH	MEDIUM	HIGH	HIGH	HIGH	You should be attentive and let the child know if they need to be disciplined, but being too harsh on a baby would cause the child to be sick.
Baby playing in mud.	MEDIUM	HIGH	HIGH	HIGH	HIGH	Mud is cold and wet; it can cause the child to get cough or become sick. Some in GCM indicated this as medium risk, because it was impossible to keep their children from the mud, so they felt it was inevitable.
Baby in contact with animals.	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	Mixed perception of risk; as babies are frequently in contact with animals in the yard. Risk varies by type of animal- cats are especially risky, because they are mean to the child and dirty, as well as pigs.

Table 11: Perception of the risks associated with childcare practices

Keeping the child away from animals, and keeping the child clean, are important tenants of childcare- but they are difficult. Whom to leave the child with is typically decided based on the family composition. In the Risk Factor Survey, 48.3% of children were watched by their grandmother [43.8-52.7%, 95% CI], 18.7% of children by an aunt [15.3-22.7%, 95% CI], and 8.5% by an older sibling [6.4-11.2%, 95% CI]. Only 7.1% were primarily kept by the father, in the mother's absence [5.2-9.7%, 95% CI], and 14.6% of women said they must carry the child everywhere they go [11.8-17.8%, 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household revealed an association between these indicators; in Region 3, children who are primarily watched by their fathers were potentially less likely to be stunted, while in the same region, children watched by their grandmother were potentially more likely to be stunted [p-val <0.1] [Cf: Annex B]. Children watched by an auntie in Region 3 were significantly more likely to be WaST [Cf: Annex B].

In 2013, 22% of children nationally were fostered.¹⁵⁹ A fostered child is typically transferred out from living parent(s)' homes to other family members' for childcare, education, and/or work. In Rural Montserrado, Grand Bassa, and Sinoe, older children were likely to be fostered in Monrovia, Buchanan, and/or Greenville, to pursue education past secondary school. However, in the event of teenage pregnancy, a grandmother may effectively (financially) or totally foster the child from infancy.

The role of grandmothers

Grandmothers play an important role in childcare, including emotional and/or financial support for the mother, assistance with household chores, and watching the children while the mother is at work. The power of grandmothers' health and medical advice is slipping; their contradictory medical ideals are seen as less modern than advice given in the clinic. They can still exert significant pressure on a mother and are powerful decision-makers and counselors on topics of marital issues. In the absence of the mother, it is the grandmother who decides what, and when to feed the child. For teenage mothers who wish to continue education, grandmothers can take in the child during the day while the woman attends school.

For some, the role of grandmothers is to spoil the child, by giving them everything they need and refusing to discipline them. However, grandmothers can play an important polyvalent role, adopting responsibilities of the father and mother.

Life Story: Grandmother – Montserrado (LR08/LR09)¹⁶⁰

I grew up in a large family, my father had three wives, I had 18 sisters and 1 brother. During my days, education was not expensive as compared to today. My father always used to advise us on the following: focus on our education and take good care of ourself, avoid getting pregnant, discourage us that if we get pregnant we will die, life is not easy so we should avoid going around men. My father never went to school, but he loved education, he was not rich, he was a farmer, and he make sure through his farming activities he sent/ support us in school. My father never used to accept any excuse from us to be absent from school even if there was no instructional activities, we was [sic] encouraged by our father to form part of other activities on campus. My dream was to become a construction engineer, building houses. I used to admire my girlfriends riding big cars, that's why I was really wanting to become an engineer in construction building houses.

When I was thirteen years old, my uncle took me to live with him. While at my uncle place, I continue my education, but I stop in 9th grade due to illness (epilepsy) and could not go to school again. When I was living with my uncle, my workload increase, I was responsible for: cooking, washing, pressing, selling. All of these made me go to school late, I never had time to play, and all I have to do was to look after my uncle children. I worked from Monday to Sunday, morning to night. I also learn so many things from my uncle's wife that is helping me up to now, for example I learn how to: take care of children, make a garden, make business (sell dry fish, table market).

I was 25 years old before I had my first child, because my father used to be tough on us, that we should avoid all contact with men. There is a big difference in young girls today as compared to my days, for example, young girls don't love to go to school, they don't dress properly, there is so much teenage pregnancy. During my days, grandparents' role was to accept children and grandchildren during vacation. The only contact grandparents had with grandchildren was during the vacation when the children was not in school. Right now, grandparents have greater responsibility to look after grandchildren. I care for my grandchildren from 1 month

¹⁵⁹ Under the age of 18.

¹⁶⁰ This key informant sat with the study team after her daughter, an eighteen-year-old mother of a six-month-old baby, participated in a focus group discussion.

old up to when they become old enough to take care of themselves. I bathe them, feed them, play with them, and support their mother by sending them to school.

When my child made mistake by getting pregnant, I consider them by taking care of my grandchild and allowing her to go to school. I advise her not to make the same mistake by getting pregnant again. I forgive her and encourage her to keep on going to school and not drop due to the pregnancy. The role of grandparents now a days is to provide food for the grandchildren, take care of grandchildren, comfort grandchildren. Many grandparents refuse to look after grandchildren due to hard time, only few grandparents that love and care for the children accept to look after the grandchildren.

Someone needs to make the child feel cared for; let them know, I am the one that brought you into this world. From my current experience with my grandchildren, the workload is very hard, in caring for grandchildren. My advice to young girls out there is to go to school and learn before having children in order to reduce the burden and workload on the parents. To give birth to the child is easy but to give it a life is hard.

Up to now, I still admire girls that ride big cars, and girls that are in the building field (construction), but since I was not able to get in that field, I make business and garden

C. FOOD SECURITY AND LIVELIHOODS

The seven livelihood zones of the study area, while characterized by certain special features/ income opportunities, all rest on a base economy of cassava-dominated-with-supplemental-rice and rice-dominated-with-supplemental-cassava.¹⁶¹

Region	County	Major livelihoods zones *visited during qualitative inquiry	Dominant livelihood zone(s)
1	Grand Cape Mount	LR02, LR04 , LR05*, LR10*	LR04
2	Montserado	LR04, LR05, LR08* , LR09*	LR08
	Grand Bassa	LR02* , LR04 , LR05, LR09*	LR04/ LR02
3	Rivercess	LR02* , LR04* , LR05	LR04/ LR02
	Sinoe	LR03, ¹⁶² LR04* , LR05, LR10*	LR04/LR10

Table 12: Dominant livelihood zones in the study zone

While the major livelihood zones per region are explained in the subsequent sub-sections, the Coastal Fishing and Cassava livelihood zone (LR05) represents the strip along the Atlantic coast in all 5 of the study counties and it is characterized by fishing activities, with increasing resemblance to the peripheral Coastal Plain Cassava with Rice & Inland Fishing livelihood zone (LR04) 5 km inland.¹⁶¹ LR05 is characterized by fishing activities, by young/ strong men as well as their partners or female family members. Most fishing occurs in groups, with registration under a captain based on the fisher's strength and acceptance by the team captain [**Cf.** FOOD SECURITY AND LIVELIHOODS, Community-based organizations]. Payment is typically in fish; thus, income generation is at the household level- the man fishes, and sells freshly upon return, and/or the woman in the household dries the fish for selling. Most selling takes place locally; however, it is

¹⁶¹ Source: FEWSNET. 2017. Livelihood zoning activity in Liberia - Update

¹⁶²LR03, which represents a small section of north east Sinoe County, was originally included in the qualitative sampling framework. However, qualitative investigation took place at the tail end of a prolonged rainy season. After two attempts by the study team to reach the livelihood zone and in consultation with the County Health Team, the site was replaced by a town in Gblonee Health District in the LR04 livelihood zone, the predominant livelihood zone in the county.

common for urban purveyors to travel to the coast for purchase on a large scale. Further from the coast (5 km and above), livelihood activities in the LR05 periphery begin to mirror, and eventually transition to, LR04.

Artisanal/ makeshift mining (LR10 activity) is growing in north and central Region 1, which sits on a rice-with-cassava (LR02) economy [Cf: Income Generating Activities, Region 2].¹⁶³ Cross-referencing with the 2017 FEWSNET livelihood zoning exercise, many of the communities sampled

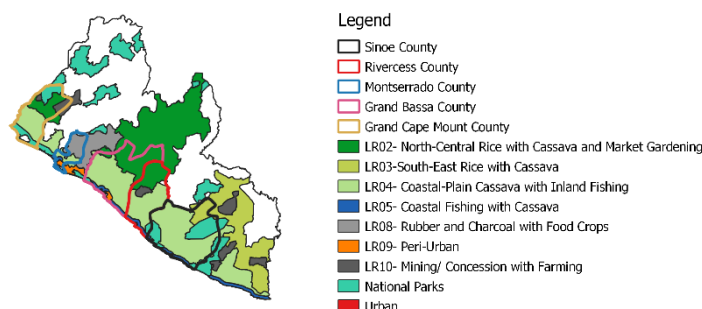


Figure 11: Livelihood zones [2017] and study counties

in the quantitative survey previously classified as agricultural have shifted to mining dominant.¹⁶¹ The primary motivator for an individual's or community's shift to mining activities is the perception of mining as lucrative. Secondary motivators include dissatisfaction with agriculture, which is tedious and sometimes dangerous. In LR10, Grand Cape Mount, for example, rampaging elephants killed a

farmer and continued to creep up on existing plots, forcing small holder farmers out of farming activities into more mining and concession activities. Makeshift mining is primarily conducted by men, many of whom migrate for these activities. Income flow from mining is inconsistent and unpredictable; unless a miner is originally from the host community, he would migrate to another mining site or back home, rather than settle into LR04 activities in the same area.

A noted income generating activity in LR10 was prostitution. While by no means a majority source of income, the study team learned that the transient, migrant nature of mining sites correlated with an increase in prostitution activities, markedly higher than in other livelihood zones. Women who engage in prostitution in mining areas are typically paid in gold or diamonds, as opposed to cash. They may be residents of the host community or migrants themselves. They are typically their own head of household. While some keep children under 5 years old with them in the community, others send remittances to the child, typically cared for in another community by an auntie or a grandmother.

Figure 12 displays livelihood zone distribution of the Risk Factor Survey, which represents percentage of children sampled who live in respective livelihood zones- it is not geographically representative.¹⁶⁴

¹⁶³ Golakonneh, Porkpa, and Tewor Districts.

¹⁶⁴ [Cf: Quantitative Methodology]. PPS random selection is based on population; not geography. Sparsely populated enumeration areas had lower probability of being selected by ENA software.

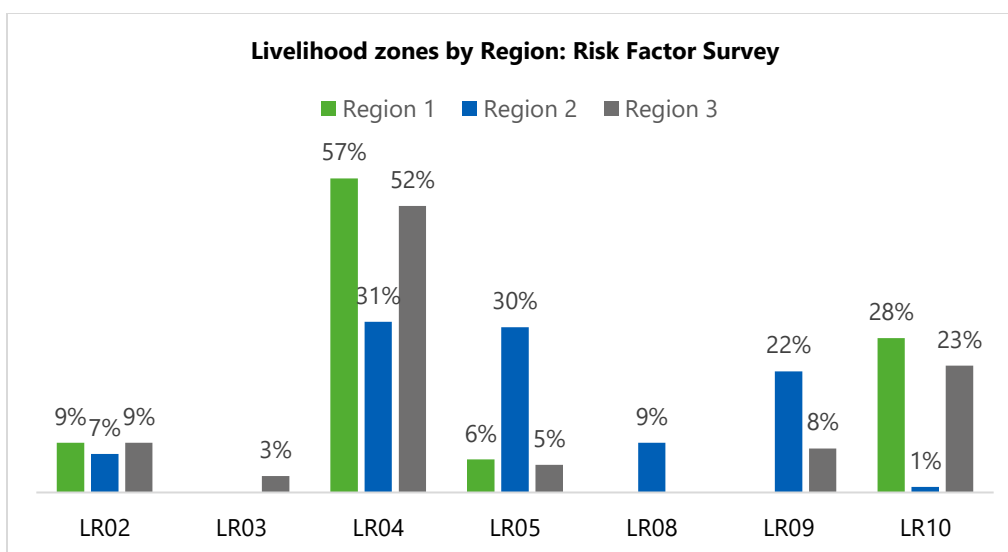


Figure 12: Percentage of children under 5 years old surveyed per livelihood zone

Income-generating activities

Region 1: Grand Cape Mount

The primary livelihood zones in Region 1, are Coastal Plain Cassava with Rice and Inland Fishing (LR04), Mining/ Concession with Farming (LR10), North-Central Rice with Cassava and Market Gardening (LR02),¹⁶⁵ and Coastal Fishing and Cassava (LR05).

LR04, the dominant livelihood zone of Grand Cape Mount as well as Grand Bassa of Region 2 and Rivercess and Sinoe counties of Region 3 is conducive to cassava production due to the low-lying coastal ecology.¹² While cassava production drives the income in LR04, vegetable farming also takes place and covers a variety of fresh produce, such as peppers, onions, bitterball/eggplant, cabbage and okra. Vegetable gardening takes place on a small scale. In two towns, women maintained elevated kitchen gardens with seeds distributed by an NGO. Other activities, such as hunting and inland fishing, can supplement household intake but are not generally large income generating sources.¹⁶⁶

"We can make the rice but it does not produce a lot. We set traps (hunt) only to eat the meat."

Focus group participant, Great Cape Mount, LR04

Producers in LR04 felt they were benefitting from regional and national consumption shifts to cassava, as rice became less available and more expensive in the rainy season. However, due to year-round market inflation, producers in this region noted increased cassava sales year-round. In response, residents in LR04 were prioritizing cassava production and focusing less on supplemental income-generating activities- such as bushmeat trapping and inland fishing.

In the Link NCA Risk Factor Survey, 56.1% [48.6-63.3%, 95% CI] of heads of households in Region 1 were primarily engaged in farming, followed by 15.9% [11.5-21.6%] engaged in mining.

¹⁶⁵ Increasing mining activities in LR02 communities¹⁶¹, during quantitative data collection.

¹⁶⁶ Exceptions, especially for hunting, can be based on skill- very skilled hunters may be able to find meat on a large enough scale to provide for their families yearround, though this is typically more challenging in the rainy season.

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that the head of household income source did not appear to be a risk factor leading to stunting in the study area. [Cf: Annex B].

Women's income generating activities generally supplement those of men, though are less defined by the livelihood zone. A slight variation was observed in mining areas, where women engaged in petty trade or business focus their activities on supplying minors with food, alcohol, and/or accommodation, as many minors migrate to the area and purchase meals on a daily basis.

In the Link NCA Risk Factor Survey, the predominant income source for women was petty trade or business [39.4%, 29.6-50.2% 95% CI], followed by farming [37.7%, 28.3-48.1% 95% CI] and allowance/support from a partner [20%, 12.9-29.7% 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child whose mother was engaged in petty trade was less likely to be stunted in Region 1 [Cf: Annex B].

Table 13 summarizes common income generating activities for men and women in Region 1, with exceptions noted by livelihood zone.

Women	Men
Agriculture: Cassava, rice (scratching, planting, harvest)	Agriculture: Cassava, rice (brushing, harvest)
Petty trade- Selling plantains, <i>garrie</i> , small vegetable gardens *Small shops- LR10	Inland fishing, trapping bushmeat
Artisanal mining- diamond, gold	Artisanal mining (diamond, gold)/ Concession mining
Fixing/ selling country bread (dry sweetened rice)	Charcoal burning
Drying/ selling dry fish	Fishing (trade- fresh fish)
Prostitution* *minority livelihood but reportedly higher than other livelihood zones	Cutting palm *youth
	Selling plantains
LR04/ LR02 dominant, LR05, LR10	

Table 13: Income Generating Activities (IGA), Region 1

Region 2: Grand Bassa and Rural Montserrado

The primary livelihood zones in Region 2 are Coastal Plain Cassava with Inland Fishing (LR04), Coastal Fishing and Cassava (LR05), Peri Urban: Petty Trade, Market Gardening, and Casual Employment (LR09), Rubber and Charcoal with Food Crops (in Rural Montserrado) (LR08), and North-Central Rice with Cassava and Market Gardening (LR02).¹⁶⁷ LR08 represents the geographic majority of Rural Montserrado and is characterized by rubber tapping¹⁶⁸ introduced in the 1920's by the Firestone plantation. Rubber tapping is a strenuous activity and unless contracted by

¹⁶⁷ The team visited one concession company (LAC Plantation), but the concession activity was rubber tapping.

¹⁶⁸ The process by which latex is collected from a rubber tree.

Firestone most rubber tappers depend on daily hire and/or their own plot of rubber trees to sell. Men, who are not fit enough to tap rubber, burn charcoal, which is an inconsistent source of income that also depends on a man's physical fitness to work.

LR02 represents a large geographic swatch of Northern Grand Bassa but is sparsely populated. Liberian rice ('country rice') is the primary income generating activity but it is not produced in large enough quantities to last a whole year. Therefore, households engage in income-generating activities based on seasonality and skill.

"We can make money from rice during the harvest time from October to December. When it comes to hunting, the animals are hard to find in March¹⁶⁹ and when the rain falls heavy. For every animal you find, you can sell it around 5,000-6,000 LRD."

Focus group participant, Grand Bassa, LR02

Cutting palm trees for palm oil is a more common supplementary source of income in LR02 than in LR04, but it is strenuous and mostly reserved for younger men. Palm wine is produced on a small-scale by some men for supplemental income.

In Region 2, the peri-urban livelihood zone (LR09) is defined by a proximity to Buchanan (Grand Bassa), Monrovia, and Kakata (Margibi). Despite some access to land, income generating activities in this zone are mostly defined by the needs of the city for residents along the main road and a blend of activities (agricultural and non-agricultural) for residents further away from the main road. Men and women along the main road might engage in petty trade, selling vegetables to the city, casual labor, or motorbike driving. Further in the interior, men and women's income generating activities mirror the surrounding catchment area (LR04 or LR08), primarily subsistence agriculture, charcoal production and/or some inland fishing.

The bulk of LR05 income generation takes place near Buchanan; thus, the livelihood activities mirror those of LR09.

In the Risk Factor Survey, 45.1% [37.7-52.7% 95% CI] of children's heads of households were primarily engaged in farming, followed by 13.4% [8.6-20.3% 95% CI] engaged in daily labor. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child whose head of households was engaged in business and/or petty trade was less likely to be stunted in Region 2 [Cf. Annex B].

Women's primary income generating activity was petty trade [44.2%, 36.4-52.3% 95% CI], whether or not they live in an agricultural livelihood zone. The secondary source of income for women in agricultural livelihood zones in LR02 was farming [31.0%, 23.2-40.1% 95% CI], followed by allowance from a partner [11.7%, 6.2-21.2% 95% CI]. In a non-agricultural livelihoods zones, the secondary source of income was a partner's allowance [33.9%, 23.4-46.4% 95% CI], followed by daily hire [5.2%, 2.2-12.1% 95% CI]. In LR08, a woman could be hired for daily hire to assist with preparing rubber for sale and/or assisting with charcoal burning. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical

¹⁶⁹ Peak dry season.

association between these indicators, which means that the women's income source is not a risk factor leading to stunting in Region 2 [Cf: Annex B].

Table 14 summarizes common income generating activities for men and women in Region 2, with exceptions noted by livelihood zone.

Women	Men
Agriculture: Cassava, rice (scratching, planting, harvest)	Agriculture: Cassava, rice (brushing, harvest), felling trees* *youth
Business- entertainment center, cook shops	Business- entertainment centers, small shops
Petty trade- Selling plantains, <i>garrie/ fufu</i> , small vegetable gardens *Small shops	Petty business- entertainment centers
Fixing/ selling country bread (dry sweetened rice)	Inland fishing, trapping bushmeat
Drying/ selling dry fish	Fishing (trade- fresh fish)
Daily labor	Monthly/ daily hire for rubber tapping
Cut pineapple	Cutting palm, palm wine *youth
	Selling plantains
	Burning charcoal
	Motorbike driving
LR04 dominant, LR02, LR05, LR08, LR09	

Table 14: IGA, Region 2

Region 3: Rivercess and Sinoe

The primary livelihood zones in Region 3 are Coastal Plain Cassava with Inland Fishing (LR04), Mining/ Concession with Farming (LR10), and North-Central Rice with Cassava and Market Gardening (LR02), with small populations engaged fully in peri-urban activities in Central Greenville (LR09), coastal fishing (LR05), and LR03, South-East Rice with Cassava, in the northern reaches of Sinoe County.¹⁶² While the agricultural livelihood zones of Region 3 share common income generating activities as Regions 1 and 2 [Cf: LR02 and LR04], LR10 in Region 3 is increasingly defined by larger scale gold and diamond prospecting/mining activities, organized both at an individual (artisanal) and a corporate level. However, both income streams from are sporadic, based on production.

In certain parts of Sinoe County, palm concession activities also provide employment opportunities for both men and women (e.g. circle weeding and picking seeds for women, and cutting palm trees for men).

In the Risk Factor Survey, 51.5% [44.6-58.3% 95% CI] of children's heads of households were primarily engaged in farming, followed by 10.9% [7.1-16.3% 95% CI] engaged in mining activities, and 10.0% [6.2-16.0% 95% CI] formally employed. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child whose head of household was engaged in business and/or petty trade was less likely to be stunted, while a child whose head of household was engaged in agriculture was more likely to be stunted [Cf: Annex B].

Women's primary income generating activity was petty trade [36.7%, 30.3-43.5% 95% CI], followed by agriculture [33.8%, 27.9-40.2% 95% CI]. However, in agricultural livelihood zones of Region 3, the inverse relationship exists: the primary income source for women is agriculture [39.7%, 31.9-48.2% 95% CI], followed by petty trade/ business [32.1%, 24.5-40.7% 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child whose mother depended on allowance from a partner was less likely to be stunted [**Cf:** Annex B]. While perhaps counterintuitive, only 16.7% [10.0-26.5% 95% CI] of women in Region 3 depend on allowance from their husbands. From qualitative inquiry, these were typically partners who were making sufficient income from mining or farming that the woman did not need to work.

Table 15 summarizes common income generating activities for men and women in Region 3, with exceptions noted by livelihood zone.

Women	Men
Agriculture: Cassava, rice (scratching, planting, harvest)	Agriculture: Cassava, rice (brushing, harvest), felling trees* *youth
Business- entertainment center, cook shops	Petty business- entertainment centers
Fixing/ selling country bread (dry sweetened rice)	Inland fishing, trapping bushmeat
Petty trade- Selling plantains, <i>garrie/ fufu</i> , small vegetable gardens *Small shops- LR09, LR10	Burning charcoal
Cut pineapple	Cutting palm, palm wine *youth
Daily labor	Selling plantains
Drying/ selling dry fish	Fishing (trade- fresh fish)
Casual labor- Concession activities (circle weeding, picking palm)	Concession labor- cutting palm
	Business- entertainment centers, small shops
	Motorbike driving
LR04 dominant, LR02, LR05, LR09 ¹⁷⁰ , LR10	

Table 15: IGA, Region 3

Aside from formal employment in LR09, few activities in the three study regions generate income year-round; the rainy season consistently disrupts most households' main sources of income, especially in agricultural zones [**Cf:** Resilience and coping strategies]. Table 16 illustrates seasonality of income opportunities, by livelihood zone.

Color coding	Agriculture LR : LR02, LR03, LR04		LR02 only		LR04 only		LR05	LR08	LR09	LR10	All	Multiple
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Climate												

¹⁷⁰ While Greenville was not characterized as LR09 in 2017 Zoning Exercise (FEWSNET), central / downtown Greenville is not primarily engaged in coastal fishing but rather centers around peri-urban/ formal employment opportunities.

Dry season	++	++	+++							+	++	++
Rainy season				+	++	++	+++	+++	+++	+	+	
Temperature	HIGH	HIGH	HIGH							LOW	LOW	
High sea waves/ storms						+	++	++	++			
Economic activities												
Farm labor	M++ W+	M++ W+	M++ W+	M+ W+	W+	W+	W+	W+	M+ W+	M+ W+	W+	W+ M++
Country bread										+	+	+
Whole cassava sales							+	+	+	+	+	+
Processed cassava sales	++	++	++									
Inland fishing	+++	+++	+++	+++	++						++	++
Palm oil sales	+											
Farm labor (supplementary)	+	+	+	+	+					+	+	+
Fishing labor	+++	+++	++	+						+	++	+++
Smoked/ dried fish sales	+++	+++	+++	+++	++	+				+	++	+++
Rubber tapping and sales	++	++	++	++	+	+					+	+
Small business/ petty trade	+++	+++	+++	++	+	+	+	+	++	+++	+++	+++
Formal employment	+	+	+	+	+	+	+	+	+	+	+	+
Concession labor	M+++ W+++	M+++ W+++	M+++ W+++	++	+	+	+	+	++	M+++ W+++	M+++ W+++	M+++ W+++
Gold/ diamond mining	++	++	++	++							++	++
Agricultural activities												
Rice (brushing/ planting / weeding / harvesting)	B	B	B	B/P	P	W	W	H	H	H		
Rice (brushing/ planting / weeding / harvesting)				W	P/W	W				H	H	B
Cassava (brushing / planting / weeding / harvesting)-LR02	B/ H	B/ H	B/ H	P/ H	P/ H	W/ H	W/ H	W/ H	W/ H	W/ H	H	H
Cassava (brushing / planting / weeding / harvesting)-LR04	B	B	B	W/H	W/H	W/H				H	B	B/H
Vegetables ¹⁷¹ (brushing/ planting/ weeding / harvesting)	H	H	H						B	B/P	P	P/H
Trapping meat	++	++	+	+					+	++	++	++
Availability of fruits-avocado, orange, pineapple	+	+	+							+	+	+

¹⁷¹ Pepper, onion, bitterball, eggplant

Hunger gap					+	+	++	+				
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Table 16: Income Generating Activities, by season

Land access

The land tenure system in Liberia is dominated by community, tribal and family land.¹⁷² Attitudes about land access were marked by-and-large by perceptions of economic opportunities: either new, rising opportunities, or stolen/ mis-allocated opportunities.

Region 1: Grand Cape Mount

In LR05 and LR10 Grand Cape Mount, where persons migrate for mining or fishing activities, land ownership is a blend of resident and host families, typically passed down from relatives, but access is getting more difficult *"as more people coming."* Both men and women have access to renting or owning land in the community. An increasing number of expatriates (Nigerian) are reportedly moving in, as mining opportunities increase- but they are typically not allowed to purchase, only to rent. As most mining activities are on an artisanal basis, there is a general optimism that future concession agreements would yield greatest income generation, and little concern about impact on individual's land access.

Region 2: Rural Montserrado and Grand Bassa

In Rural Montserrado, land is typically passed from generation to generation. Both men and women can own land, *"if you have the cash to buy the land."* It is more common that newcomers lease land for agriculture purposes. Before the lease, it is common that a farmer must pay \$2500 LRD to the owner of the land before using it for agricultural purposes, as well as a percentage of whatever the land produces. A typical range is 10-20% of that year's yield, with limits drawn above that.

There is general resentment toward older, large concession agreements, and optimism for employment opportunities in new concession agreements.

"Let land be provided to us, because our land has been sold (to Firestone)."

Focus group participant, Rural Montserrado

In Grand Bassa, land ownership was more tightly regulated by traditional law; land can be leased or sold from town person to lessee/ purchaser with supervision of the community elders. While these regulations did not previously exist, they have been made to accommodate for population growth. Traditional leaders at town level tend to decide if women can lease or own land.

"Land was free because of no education and people didn't have an idea about selling land and now, their brain is open¹⁷³. To get land, you have to be a citizen, you can purchase the land from the townspeople, no leasing of land, man can own land but not woman (from our decision)."

Key informant, Grand Bassa

¹⁷² Source: LISGIS. Household Income and Expenditure Survey 2016.

¹⁷³ They are enlightened, educated. Taking more opportunities to get cash.

The exception was peri urban LR09, where land access was generally accepted as low to accommodate for urban sprawl and prospected economic opportunities.

Elderly community members in long-standing mining and concession areas noted a shift in the need to regulate land sales, with the influx of new community members who desire work.

"Before/ during 1940-50 no body used to buy land here, people used to give land free base on how hard working a person was, but right now to own land you have to buy it or lease it from the owner."

Focus group participant, Rural Montserrado

However, a traditional authority in Grand Bassa, along the main road to newer concession areas, told a different story- one of hope that the forfeited land access would yield promised schools, clinics, and water points. In such situations, a conduit between citizens and the concession company is appointed by the citizens.

Traditional authority, Grand Bassa

A certain company that got concession are the ones fixing the road now¹⁷⁴. Some Chinese guys want to do gold business on St. John. By January they will go back. Their main reason to fix the road is for logging. They go up to the High High's¹⁷⁵ first and then later they come back to us. It is the High High who send them to us and we got the final decision. Well, we can't say no, but we tell them what we want them to do. Road is not for us alone. We ask for hand pump, clinic, and school. They start carrying the road to build the bridges for their work. We have power, if they feel they have road fix business without promises filled we will push back.

We the citizen, if we cut down even one tree on that land, we lose, but our own land is protected. After they're done with the land and leave, the land is for us again.

We and the company signed an agreement to make hand pumps. We drink creek water here, if they don't build the pumps we will take them to the High High. After the road is fixed, they will cut the log, then they will start building pumps. We have someone between the companies and the citizens, speaking for us.

Region 3: Rivercess and Sinoe

In Rivercess, land disputes and signs of creeping logging activities were cited as reasons for tighter land access restrictions. One locality exercised restrictions for ownership to citizens only; another mentioned increasing the lease costs two-fold.

"To get resident land without buying it, you must pay a token of 550 LRD to community people/local authority. Land is also acquired through inheritance from parents. For strangers, one can lease resident land without buying it also, but must pay a token of 1000 LRD to the local authority. There are changes in the cost of token for unpurchased resident land, such as ... citizen, from 150 LRD to 550 LRD, and stranger from 500 LRD to 1000 LRD."

Focus group participant, Rivercess, LR02

In Sinoe, land access was also regulated by traditional law, but seemingly less competitive than in Rivercess, as there was less interest in land for farm access. Land can be inherited from parents;

¹⁷⁴ Before 2016, this community was not accessible by road- a new road to Bong County was being built at the time of qualitative inquiry.

¹⁷⁵ National Government.

women were also typically allowed to own land if they could afford it and their family consented. While communities in qualitative inquiry said they do not tax land, a person's character is judged before being allowed to newly own land.

"If you are a stranger and you live with us, whenever you want land, we don't sell land to you but we give it to you without a fee to build on. After that, we will observe you for 4 years. In case we see no issues, we will ask you to take the land as a personal property."

Focus group participant, Sinoe, LR10

In sum, across the three regions of the entire study zone, land access is most regulated by local/traditional authorities (with the exception of peri-urban areas, and the majority of Rural Montserrat). While a person's ability to pay the fine dictates his/her access to land, his/her standing in the community (and often, gender) also influences ability to access land. The primary threats to land access are perceived to be concessions, not over exhaustion of farm land by poor agricultural practices.

Farming

"In the interior,⁹⁶ the only thing you can do to survive is to farm, and if I survive then I have achieved my dream."

Focus group participant, Grand Bassa

While each of the three regions is defined by a unique composition of livelihood zones, agriculture dominates each. Farming practices and challenges varied by region.

Region 1: Grand Cape Mount

In LR04, where farming activities are centered around the cassava and rice production, cassava is harvested annually and peri-annually, meaning it is either harvested a few months after planting or left planted for a year or more.¹² Field preparation includes brushing, conducted by men over the course of 3 months and involves heavy labor of felling trees and clearing the fields. This is followed by a month of planting, then three months of harvesting. Scratching (weeding) and harvesting responsibilities are shared with women. Cassava, rice, and vegetable fields are kept separately.

Unique shocks and hazards in LR04 are pest damage, flooding, and erratic rains. In this respect, during a qualitative inquiry challenges related to agriculture in LR04 included the pests, such as birds that eat the rice and maggots that infest bitterball, as well as the cost of tools. Cassava sticks were readily available and not cited as a challenge, though availability of vegetable seeds was.

Modern fertilizer is not typically used; however, one community with mixed LR04/LR09 activities near the border of Buchanan had a community farm that used commercialized fertilizer from the market. Individual farmers in the same town did not also use KPA 15-15¹⁷⁶ because they said they could not afford it.

Poor families in LR05 engage in farming if a family member does not engage in coastal fishing. The soil is sandy and fertile enough for cassava only. Rice and/or vegetables cannot be grown

¹⁷⁶ Homogeneous, multi-use fertilizer with a 1:1:1 ratio of NPK plus sulfur

here. Farmers in LR05 often use a fertilizer purchased from the market, as well as homemade fertilizer with ('laying of bush'), because of the sandy soil.

Families in LR10 lack time for agricultural activities, as mining is tiresome and the unpredictability of work (e.g. calls for daily labor) makes upkeep of plots challenging. In this case, hiring daily laborers needs can be considered but is only accessible by the wealthiest households who can afford to cover the daily pay. At the same time, mining activities are believed to suck the nutrient content out of the soil, which farmers said made it more difficult for high yield- thus further deterring miners from pursuing plots past their wives' market gardens.

Only 1.4% of farmers have access to an extension agent in Region 1, making education on improved practices possible for only a handful of farmers.¹⁷²

Region 2: Grand Bassa and Rural Montserrado

In LR04 of Grand Bassa, where farming activities are centered around the cassava and rice production, farming challenges mirror those of Region 1. In LR02, the production of rice is prioritized but primarily reserved for household consumption, which is usually higher than the yield. . Common vegetables grown in kitchen gardens include pepper, onion, bitter ball/eggplant, cucumber, okra, and palm cabbage.

The primary challenges farmers cited in LR02 were materials and water access. Tools, such as axes for felling trees and cutlasses for brushing, required for the heavy labour at various stages of rice farming, are expensive and not available in small markets. . While some areas in LR02 have access to rain-fed lowland swamps, desirable land within communities varies by access to a creek. Because land is typically passed between families or controlled by local authorities, it is uncommon for a farmer's allocated plot to change to a more desirable area, unless ample desirable land is available.

Fertilizer is typically not purchased in LR02 but leftover brush is sometimes laid on top of the soil. Despite perceived underproduction due to a decrease in soil quality, farmers said they could not afford fertilizers from the market. Farmers felt largely hopeless that they could do anything to reduce deteriorating soil, implying larger forces at work.

"Ten to fifteen years ago, things were normal but now things have changed and are more difficult. The food production before was abundant. Now, farms are not yielding good harvest like before. We believe it's the end time."

Focus group participant, Grand Bassa, LR02

When asked about the historical change, farmers added that apart from the soil quality, they could not trust the rain schedule like before, though they did not know why. To protect soil to the extent possible, fields in LR02 are rotated on an annual basis and then re-visited in the future. Mixed cropping is limited. Shocks and hazards in LR02 largely mimic those of LR04 [**Cf:** Farming, Region 1].

In LR08, to supplement income from rubber and/or charcoal sales, rice and cassava are grown to support household consumption. Smallholder farmers in this zone farm to stave off purchase in

the market. Small vegetable gardens can also be maintained, usually limited to bitterball, onion, and okra.

Farming in LR09 depends on a family's engagement in other activities as well as their access to land. Generally speaking, the agriculture livelihood zone and peri-urban 'lines' are blurred as farming activities increase with distance from the main road. Like in LR08, small holder farmers do so on a supplementary basis, maintaining a small rice or cassava 'hunger farm' and a vegetable garden to offset purchasing from the market.

Extension service coverage is also lacking, despite per-urban hubs: only 0.5% of farmers in Grand Bassa and 2.1% in Montserrado had access to an extension service in 2016.¹⁷²

Region 3: Rivercess and Sinoe

Echoing key challenges discussed for Regions 1 and 2, miners in Region 3 are further deterred from farming because they are predominantly migrants and accessing land for a farm plot is challenging. When discussing the dreams and visions of migrants in LR10, particularly those drawn to larger scale operations, young miners did not aspire to be farmers as they did not imagine themselves rooted in one locality for long stretches of time.

Per secondary data review, farmers in LR03 are particularly vulnerable to erratic rainfall.¹² Extreme isolation from markets discourages production on a large scale; plots in this livelihood zone are typically smaller than in other livelihood zones.¹⁷²

Access to extension services per the 2016 HIES ranged from 0.5% in Rivercess to 2.3% in Sinoe.¹⁷²

Major barriers to agriculture production, based on key informant interviews and secondary review, were discussed in qualitative inquiry. A summary of major agriculture challenges in the three regions, by livelihood zone, is represented below.

	LR02: North/Central Rice with Cassava and Market Gardening	LR04: Coastal Plain Cassava with Rice and Inland Fishing	LR05: Coastal Fishing and Cassava	LR08: Rubber and Charcoal with Food Crops	LR09: Peri-Urban: Petty Trade, Market Gardening, and Casual Employment	LR10: Mining/ Concession and Farming Zone
Region 1						
Region 2						
Region 3						
Inputs						
Land access					X	X
Lack of fertilizer/ poor soil quality			X	X		X
Water access	X					
Seeds	X	X			X	X
Labor						
Individual approach (no koo)			X	X	X	X
Training/ 'know how'		X		X		X
Hazards						

Pests (birds, groundhogs, maggots)	X	X	X	X	X	X
Plant disease		X	X	X	X	X
Flooding			X			
Costs						
Cost of daily laborers				X	X	X
Lack of tools (cutlass, axe)	X	X	X	X	X	X
Lack of market for selling						X *Sinoe

Table 17: Barriers mentioned regarding agriculture

Animal rearing

"Keeping animals will reduce my income because I will have to spend more money to care for them."

Focus group participant, Grand Cape Mount

The livelihood zones of interest are not characterized by significant investments in livestock. Chickens are raised at the household level to supplement intake in pepper soup; they are seldom kept for egg laying. Surplus chickens are sometimes sold in the market at the beginning of the rainy season, to delay the transition from preferred rice to less preferred cassava. This decision is only available to wealthier households and would be made by the man. Selling chickens was not listed as a significant source of income for households in any of the livelihood zones. Chickens are perceived as easier to keep and less of a theft risk than other larger livestock.

"Chicken is the only animal kept here but it's for eating, not eggs. The means of getting animals is not easy. For example, a goat is sold for USD 175 there in Buchanan, and when you raise your animal, criminals will steal it."

Focus group participant, Grand Bassa, LR04/09

Goats are maintained by fewer households and were only observed in LR02 and LR04. In peri urban Grand Bassa, there was a misperception that goats were maintained further from the city, but this was not the finding of the study team; in the Risk Factor Survey, only Region 3 surpassed an average of one goat per household.

Average pig ownership did not reach 1 per household in either Region 2 or Region 3; zero surveyed households in Region 1 owned pigs.¹⁷⁷ Pigs were generally believed to be dirty and/or too expensive. Self-efficacy in how to maintain pigs' health was low even in areas with previous interventions.

"(NGO) gave our community 6 pairs of pigs to manage for the promotion and development of the community or for the mean of empower us also, but the community farmer capacities were not build on how to manage them in terms of feeding, vaccination, and control of animal diseases. In 2017, all of the pigs died. This was caused by lack of knowledge and poor monitoring practices."

Key Informant, Rural Montserrado

Communities in the entire study zone were not making major investments in livestock due to multiple deterrents to maintaining it. Firstly, for poor families, the cost of keeping the animal

¹⁷⁷ Possibly related to religious beliefs; high percentage of Muslim households.

healthy is prolonged and high. In addition, goats and larger livestock are believed to be an invitation for easy theft. Low incentives to keep animals were reflected in the 2018 CFSNS, which found an average of eight to nine chickens in the five counties of interest and an average of two goats in only Sinoe, Region 3. Findings of the Risk Factor Survey reflected a similarly low livestock ownership, with an average range of owned chickens from 8.7 in Region 2 to 10.4 in Region 3.¹⁷⁸

	Region 1	Region 2	Region 3
Sheep/ goats	0.5[0.3-0.6]	0.1[0.0-0.2]	1.6[1.0-2.2]
Ducks	0.5[0.-0.6]	0.9[0.5-1.4]	1.5[1.0-1.9]
Chickens	8.8[7.4-10.1]	8.7[7.6-9.8]	10.4[9.0-11.7]
Pigs	N/A ¹⁷⁹	0.0[0.0-0.1]	0.4[0.0-0.8]

Table 18: Mean livestock ownership: Risk Factor Survey, 95% CI

Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators in Region 2, such that ownership of livestock presented a significant risk factor to stunting [Cf: Annex B]. However, this is likely confounded by the role of livestock in unhygienic households [Cf: WATER, SANITATION AND HYGIENE, Household hygiene].

Self-efficacy in maintaining the animals' health was generally low, outside of areas with livestock interventions. As the war depleted livestock, the current generation of farmers did not say animals were part of their upbringing or that they learned livestock management practices in traditional schooling. Farmers did not identify government extension officers as a source to help them address animal disease and husbandry issues. While local breeds are reasonably well adapted to local conditions, their health is also stunted by poor nutritious feed.¹⁸⁰ Aside from a handful of deviant farmers raising livestock on a larger scale, chickens and goats roam and are not given special feed.

"Livestock are not fenced, as a result others steal them; livestock destroy other people garden around town; sometimes they get sick and die by themselves; no animals treatment/ medication to treat animals when they are sick; no means of feeding the animals, because there no food to feed them; Livestock destroy the creek where the nearby community fetch water; the lack of market to sell livestock. These challenges affect our income, because when they die it reduces the amount of cash that comes into the house. It leads to losses to the family."

Focus group participant Sinoe, LR10

Decisions to maintain livestock were often influenced by positive deviants in the community who had successfully maintained and profited from the livestock, which was challenging in more market constrained areas. At the same time, Peri-Urban households seldom had sufficient land to keep livestock other than a few chickens.

¹⁷⁸ Analyses of variance indicate significant difference in Livestock Score across the 3 regions. Livestock scoring: Livestock score=(chickens*.01)+(sheep*.1)+(ducks*.1)+(pig*.2)+ (cows*.5).

¹⁷⁹ Zero homes owned pigs in Region 1.

¹⁸⁰ Source: GOL, FAO, International Fund for Agricultural Development, and World Bank. 2007. Comprehensive Assessment of the Agriculture Sector in Liberia, Volume 1: Synthesis Report.

While in LR02 and LR04, major barriers for maintaining livestock were the cost of obtaining animals, households in LR05, LR08, LR09, and LR10 were more likely to cite other barriers, such as insufficient time (LR10), high risk of criminal activity, and lack of training. In LR02, Grand Bassa, near the border of the Bong County, dogs were identified as an important animal reared by the household, but for hunting purposes (*"Dogs help for hunting; they kill groundhog and deer"*). Training dogs was part of traditional schooling for males.

General barriers mentioned for household's engagement in livestock management are listed below.

	LR02: North/Central Rice with Cassava and Market Gardening	LR04: Coastal Plain Cassava with Rice and Inland Fishing	LR05: Coastal Fishing and Cassava	LR08: Rubber and Charcoal with Food Crops	LR09: Peri-Urban: Petty Trade, Market Gardening, and Casual Employment	LR10: Mining/Concession and Farming Zone
Region 1						
Region 2						
Region 3						
Cost of purchasing the animal	X	X	X	X	X	X
Market access for sale			X	X		
Vaccination			X		X	X
Water access	X					
Criminal activity	X			X	X	X
Lack of training		X			X	X
Lack of time						X
Land access				X		X
Negative impact on community hygiene and/or child health		X	X	X		X

Table 19: Barriers mentioned regarding choice to maintain livestock

Household expenditure

Food is the pre-dominant expense across the Link NCA study's livelihood zones. According to the 2018 CFSNS, 53% of the population in Grand Cape Mount, Region 1; 48% of the population in Rural Montserrado and 54% of the population in Grand Bassa, Region 2; and 53% of the population in Rivercess and 44% of the population in Sinoe, Region 3 spend over 65% of their expenditures on food. While food is a concerningly elevated expense nationally, variations in other household expenses were noted in the qualitative investigation as well as from the secondary review.

In addition to food, school also presents a significant cost, as families who can afford to send their children to Buchanan or Monrovia for schooling, do so and thus incur a significant cost [Cf: GENDER, Opportunities for youth]. Usual expenses include the full-board and enrollment fees, unless children attend free government facilities and the children are housed with relatives or

friends. There is a tendency to believe that school fees displace food costs as the primary expense, perhaps because there are alternative free (but less satisfactory) food options available locally.

"The biggest expense we have is school fees, then buying food, then clothes. The reason that we spend the most money on school is that education is very important. And next, food because humans need to eat 3 times per day."

Key informant, Grand Bassa

Clothes, particularly slippers for children and *lappa*¹⁸¹ for women, represented another significant cost for households.

As far as the health costs are concerned, the majority of expenses in this domain usually covered the treatment of acute conditions, rather than prolonged, planned, preventative costs. During the participatory exercise it became evident that the estimates for health expenses are more reflective of the household's number of children, pregnant women (prioritized for medical expenditures), and proximity to a government clinic with medicine, which would negate health costs.

In LR05, fisherman make contributions to boat maintenance, registration, and nets. Daily hires represent a high cost in LR09, as households recruit help to maximize what they can sell in the market. For example, in Buchanan District, a community engaged in potter processing had to balance high sales with the needed labor costs.

"Sometimes you have to pay people to bring the potter bags to the town and also beat it if you're a woman and you need help, and these people sometimes take their own time to do it."

Focus group participant, Grand Bassa.

In LR05, men indicate that they drink alcohol and smoke cigarettes to stay warm on the canoes. As they spend prolonged periods of time on water without meals, alcohol and cigarettes help them to feel satiated. In LR10, on the other hand, alcohol and cigarettes are openly embraced as part of the culture and rewards of income.

Results of a participatory household spending exercise indicate trends in spending by livelihood zone, though food was ranked as the primary expense in all exercises.

	LR02: North/Central Rice with Cassava and Market Gardening ¹⁸²	LR04: Coastal Plain Cassava with Rice and Inland Fishing	LR05: Coastal Fishing and Cassava ¹⁸³	LR08: Rubber and Charcoal with Food Crops	LR09: Peri-Urban: Petty Trade, Market Gardening, and Casual Employment	LR10: Mining/Concession and Farming Zone
Region 1						
Region 2						
Region 3						
School	6	6	3	8	8	1
Livelihood expenses ¹⁸⁴	4	4	6	7	5	1
Health	4	4	3	3	1	1

¹⁸¹ Cloth.

¹⁸² Average.

¹⁸³ Only represents LR05, Grand Cape Mount County.

¹⁸⁴ Agriculture, fishing tools.

Food	11	8	8	9	9	8
HH Item	4	4	3	3	5	5
Rent	0	1	2	2	2	4
Alcohol/ cigarettes	3	3	6	2	2	6
Debts/ credit	3	2	8	4	4	6
Transportation	7	3	6	8	7	7
Daily hires	0	6	0	4	5	0
Clothes	7	6	0	4	5	7
Polyamorous expenses ¹⁸⁵		4- Sinoe County	6			4

Table 20: Household expenses¹⁸⁶

While “polyamorous expenses”, i.e. expenses relating to maintaining multiple wives and/or girlfriends, which include but are not limited to expenses for food, gifts and/or other care¹⁸⁷, were discussed via participatory exercises across all livelihood zones, it should not be assumed that they are a significant household expense only in Sinoe and Grand Cape Mount Counties (Region 3 and 1). In certain areas, this was a particularly sensitive topic, largely avoided by participants in group settings.

Throughout the year, men across the livelihood zones believed that women spend money more frivolously than men.

“For me¹⁸⁸, men spend money more than women; because they will want to fix their nails, plait their hair, and pay for their new fashion wares.¹⁸⁹”

Focus group participant, Sinoe

As is true for income generating activities [**Cf:** Income generating activities], household expenses generally follow the rainy and dry seasons (seasonal calendar by livelihood zone below), with a tendency to increase in the Christmas season, as families are expected to celebrate the holidays and women are typically given a small allowance for purchasing items for the women.

Color coding	Agriculture LR : LR02, LR03, LR04	LR02 only	LR04 only	LR05	LR08	LR09/LR10	All					
Climate												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Dry season	++	++	+++							+	++	++

¹⁸⁵ ‘Girlfriends, woman business.’

¹⁸⁶ Number in each cell represents a proportion of the income dedicated to each category of expenses, where a total equals to 50. Cells highlighted in orange designate top 3 household expenses; dark orange represents the largest expense to the family. While certain differences between households are natural, community members in each location agreed that their expenditure resembles a model portrayed in the table.

¹⁸⁷ Hygienic items for the home; clothes.

¹⁸⁸ In my opinion.

¹⁸⁹ Clothing.

Rainy season				+	++	++	+++	+++	+++	+	+	
Temperature	HIGH	HIGH	HIGH						LOW	LOW		
High sea waves/ storms						+	++	++	++			
Hunger gap					+	+	++	+				
Food expenditures												
Rice (subsistence/ purchase)	S/ P	S/P	S/P	P	P	P	P	S	S	S	S/P	S/P
Rice (subsistence/ purchase)	S	S	S	S	P	P	P	P	P	S	S	S
Rice (subsistence/ purchase)	S	S	S	S	S/P	S/P	S/P	P	P	S	S	S
Rice (subsistence/ purchase)	P	P	P	P	P	P	P	P	P	P/S	S/P	S/P
Rice (subsistence/ purchase) – LR09/ LR10	P	P	P	P	P	P	P	P	P	P	P	P
Cassava (subsistence/ purchase) – LR02	S	S	S	S	S	S	S	S	S	S	S	S
Cassava (subsistence/ purchase) – LR04	S	S	S	S	S	S	S	S	S	S	S	S
Cassava (subsistence/ purchase)- LR05	S	S	S	S	S/P	S/P	S/P	P	P	S	S	S
Cassava (subsistence/ purchase)- LR08	S	S	S	S	S/P	S/P	S/P	P	P	S	S	S
Cassava (subsistence/ purchase) – LR09/ LR10	P	P	P	P	P	P	P	P	P	P	P	P
Vegetables (subsistence/ purchase)- LR02	S/P	S/P	S	S	P	P	S/P	S/P	S/P	S/P	S/P	S/P
Vegetables (subsistence/ purchase)- LR04	S	S	P	P	P	P	S	S	S	S	S	S
Vegetables (subsistence/ purchase)- LR05	S	S	S	S/P	P	P	P	P	P	S/P	S/P	S
Vegetables (subsistence/ purchase) lowland- LR08	S	S	S	S/P	P	P	P	P	P	S/P	S/P	S
Vegetables (subsistence/ purchase)- LR09/ LR10	S	S	S	P	P	P	S	S	S	P	P	S
Peak expenditures												
School fees	++									++		
Health expenditures				+	+	+	+	+	+			
Holiday expenses	+											+

Table 21: Seasonal calendar, household expenses

Market access and price fluctuations

"We the Liberians go to other countries for our eating."

Focus group participant, Montserrado, LR09

Liberians in the study zone rely on the market for much of their dietary intake; thus, roads and purchasing power are lifelines to food security. Nationally, 60% of rice consumed is imported.¹⁹⁰ In urban and peri-urban settings, meat is also imported, though imported meats rarely reach far from Monrovia or Buchanan, as cold storage is a challenge.

Poor road conditions further limit opportunities for rural citizens, primarily in market integration with urban areas. Within rural road networks, poor infrastructure limits access to markets, especially during rainy season. Bridge crossings are frequent, due to the country's web of inland creeks and rivers. In the absence of a bridge, canoes and/or rafts ferry people and/or motorbikes back and forth, for a fee.



Photo 5: Risk Factor Survey team river crossing, Grand Bassa

Market access for two sites in Regions 2 and 3 of the qualitative study (Grand Bassa and Rivercess) had been severely compromised by bridge collapse during the rainy season (local bridge, Grand Bassa, and Timbo bridge, Rivercess). As a consequence, in Rivercess, where smallholder farms were completely cut off from the Yarkpa Town market and demand drastically dropped in Little Liberia, an estimated 75% of gari for sale (100,000 LRD) was spoiled.¹⁹¹

In addition to inconsistent maintenance by the national government, heavy trafficking by mining and logging companies exacerbate poor road conditions for parts of all three regions. Citizens were generally discontent with companies' return on promises to maintain roads.

"Road condition is worse now as compared to 15 years because of no good maintenance, bigger trucks (logging) are spoiling the roads and the government is not doing anything."

Focus group participant men, Rivercess, LR04

However, in areas of Grand Bassa where logging companies newly introduced roads for their activities, citizens credited the road for improved market and clinic access, comparing it to walking several hours in the bush before reaching the main road before.

¹⁹⁰ Source: National Investment Commission, Government of Liberia. Available from : http://investliberia.gov.lr/new/page_info.php?&7d5f44532cbfc489b8db9e12e44eb820=NDg5

¹⁹¹ Key Informant, Grand Bassa

While peri-urban households in Regions 2 and Region 3 (Greenville) have physical access to daily market items, they perceived themselves as more susceptible to inflation- perhaps because they were more likely to buy and sell a variety of goods on a larger scale.

The median distance (time) to the market ranged from 30 minutes in Region 2 to 97.5 minutes in Region 3, although the median time in the agricultural livelihood zones of Region 2 rose to 45 minutes. In central and northern Sinoe County of Region 3, distance to the market reaches extremes as the mean distance walked to the market reached 122.1 minutes [93.3-150.9 95% CI]; while some communities reported relying on Greenville market, which could require up to 8 hours of transit. Two communities sampled for the Risk Factor Survey described their market access as 4 hours of walking to the nearest town and subsequent 3 hours on motorcycle to reach Greenville. In this case, only wealthier households can afford to commission charter motorcycles to Greenville to do their shopping, which translates into 11,000 LRD round trip, plus the cost of goods.¹⁹² The window for this option closes during the rainy season, which typically lasts at least three months.

Subsequent analyses taking into account anthropometric measurements of children in the household revealed significant statistical associations between these indicators; children who live more than one hour from the market were more likely to be stunted in Regions 2, 3, and the pooled study zone.¹⁹³ Children whose households have market access at least 10 months in the year were less likely to be stunted in Region 3. However, distance to the market, as well as months of market access, were not a significant risk factor to stunting in Region 1.

In addition to difficult road conditions to access markets, national inflation rates exacerbate an already poor purchasing power from insufficient income and thus represent a significant financial barrier to access the commodities. According to 2018 CFSNS, inflation rates jumped from 8.8% in 2016 to 12.4% in 2017 to 23.6% in 2018. The Liberian dollar, stood at 1 USD to 152.56 LRD in July 2018 and 1 USD to 191.49 LRD in January 2020¹⁹⁴, representing a 25.5% increase. In late 2019, a shortage in Liberian currency meant that USD, which is a common mode of payment in LR09 formal employment, could be turned down for exchange.

"Day before yesterday, someone took her US money to change but the trader refused to trade her money because the US rate has drastically dropped."

Focus group participant, Montserrado, LR08/09

While the inflation affects all items on the market, the reference item for monitoring price fluctuations is commonly rice. In addition to being expensive, the availability of rice, as well as other food staples, drops during the rainy season.¹¹³

"The USD rate has dropped and this causes the prices of things to increase. From November to March, there is no country rice so we have to get the imported rice from the market. We buy rice at 50 LRD now but it is sold

¹⁹² Jaedepo District, \$55 USD.

¹⁹³ OR Region 2: 2.00[1.19-3.35], OR Region: 2.11[1.18-3.80; Full study zone 1.70[1.26-2.29].

¹⁹⁴ 18 January 2020, Web search.

at 60 LRD (per cup) during the rainy season. One year ago, we purchased imported rice at 30 LRD or 35 LRD, five years ago it was only 25 LRD."

Focus group participant, Montserrado, LR08/09

Price fluctuations are reported as a major source of stress for families in the study zone. In the 2018 CFSNS, inflation and consequential price spikes were the major shock experienced by households across all livelihood zones. Family members indicated they were unable to keep up with the fluctuations in goods, which could spike unpredictably and less often drop. In LR09, Grand Bassa, where many residents engaged in the potter industry, sellers indicated that, while the price they could sell potter to vendors had not increased, the price that vendors sold on the market *had* increased. Residents in this town did not directly sell themselves because they lacked the means to transport goods to Monrovia and/or other markets utilised by the vendors.

"Prices have increased in the market because the US rate is so high. You can't buy anything here for less than LRD5. Prices change daily. What you bought yesterday for LRD 3050 might as well cost you 3150 today. From 2018 to now, the US rate has been going only up. The value of things is still the same but the USD now costs LRD850."

Focus group participant, Montserrado, LR08/09

The most commonly purchased foods in the market include salt, vita, seasonings, and dried fish for pepper soup. Rice and cassava are also major purchases, per subsistence/production schedules [Cf: Farming]. Nutritious foods to improve dietary diversity are not main frequently purchased; the 2019 Cost of the Diet Assessment provided more in-depth information about availability and cost of these items on the market.

Summary: Cost of the Diet, 2019¹⁹⁵

Testimonies collected during the qualitative inquiry as well as the secondary data review regarding the high percentage of income spent on food, corroborate the findings of the 2019 Cost of the Diet (CoD) assessment, which assessed respective costs across three livelihood zones in the Link NCA study zone for:

1. Energy-Only (EO) Diet: A lowest cost diet that meets only the average energy specifications of the members of the household;
2. Nutritious diet (NUT): The lowest cost diet that meets specifications for energy, protein, fat and micronutrients, but does not consider typical dietary habits;
3. Food habits nutritious diet (FHAB): A lowest cost diet that meets specifications for energy, protein, fat, micronutrients and accounts for typical dietary habits.

While the energy-only diet presents nearly half of costs in poor households, and up to 77.6% of costs in very poor households in LR08, nutritious diet and food habits nutritious diet were unattainable for very poor households and most poor households.

	LR02: North/Central Rice with Cassava and Market Gardening ¹⁹⁵	LR04: Coastal Plain Cassava with Rice and Inland Fishing	LR08: Rubber and Charcoal with Food Crops
Region 1			

¹⁹⁵ Average.

Region 2			
Region 3			
Average daily cost, LRD			
EO Diet	113.38	114.49	130.55
NUT Diet	311.06	180.04	214.69
FHAB	325.96	330.18	368.43
Percentage of income			
EO			
Poor households	45.8%	49.0%	52.8%
Very poor households	67.4%	72.1%	77.6%
NUT			
Poor households	125.7%	73.7%	86.8%
Very poor households	184.9%	108.4%	127.6%
FHAB			
Poor households	134.6%	137.3%	148.9%
Very poor households	190.9%	167.3%	219%

Table 22: 2019 CoD (Rainy season) in Link NCA Regions of Study

The annual costs are reflective of the relative distance from urban centres – with markets in LR08 (Margibi and Montserrado) being the most expensive and closest to the capital city, Monrovia, and markets in LR02 being the most rural and difficult to access.

The cost of the diet increases 1.7, 1.6, 1.4 times more during the rainy season than the dry season in LR02, LR04 and LR08 livelihood zones, respectively. LR02 is the most food insecure zone with half of visited markets offering less than 40 items for purchase. This zone was also the most difficult to access. For full study results:

Concern Worldwide (2019). A cost of the diet analysis in three Liberian livelihood zones. Liberia WASH Consortium. Concern Worldwide, Liberia.

A summary of the markets visited in the Link NCA study zone, as well as time/associated costs, follows below.

	Region 1	Region 2				Region 3			
	Taylor and Kru Beaches (LR05)	Kingsville (LR08/09)	Pleemu (LR08)	Duhwein Town (LR04/09)	Zangar Town (LR02)	Kpah Town (LR04)	Boegeezay (LR02)	Togbaville (LR04)	Butaw (LR10)
Market surveyed in qualitative inquiry	Bo-Waterside	Kingsville	Pleemu Market	Buchanan	Senyeh Town	Little Liberia	Boegeezay Market	Greenville	Butaw
Additional markets listed	-	Redlight, Kakata	Kakata	Harsford, St. John's	None	Yarkpa Town, #4 market	Boloweyea	Butaw	Greenville
Distance to the most common market (walking)	4 hr 30 minutes	-	-	2 hr 30 mins	3 hr	2 hours	-	4 hrs motorbike	-
Price of transit to the market	200 LRD	-	-	150-200 LRD	Infrequent motorbikes	100 LRD	-	Not specified	-/ 1000 LRD
Market day(s)	Not specified	Tuesday	Monday	Daily	Friday	Friday's	Thursday's	Daily	Daily
Accessible during the rainy season?	Difficult	Demand reduces for sold goods	Yes	Yes, longer walk (3 hr- 3 hr 30 mins;	Yes; longer walk	Yes; reduced demand, sometimes also sell in	Yes; reduced demand for goods	Difficult	Difficult

			cannot take shortcut)		Yarkpa Town			
Median distance [time, minutes]	60	30 (45, agricultural)			97.5 (123.2, agricultural)			

Table 23: Summary of market access, Link NCA Regions

Resilience and coping strategies

"If you reduce the number of times you eat in the day, then you cut down the credit, drinking, and you hustle harder."¹⁹⁶

Focus group participant, Grand Bassa

Community members in the three regions described the rainy season as a challenging time to maintain the health and well-being of their families. According to the 2018 CFSNS, only 24% of families in Grand Cape Mount, Region 1; 29% in Grand Bassa and 33% in Rural Montserrado, Region 2, and 23% in Rivercess, 31% in Sinoe were food secure. According to the Risk Factor Survey, adequate months of household food provisioning (MAHFP) ranged from 10.1 months in Region 3 [9.9-10.3, 95% CI] to 10.4 months in Region 2 [10.2-10.5, 95% CI]. Due to challenging market access [**Cf:** Market access and price fluctuations] and reduced farming activities [**Cf:** Farming], the most challenging months coincide with the rainy season (April to August, peaking in June/July), i.e. several months after the Risk Factor Survey. The same could be applicable in January as many households reported difficulty providing food for their families during that time – likely related to higher spending during the holiday season in December [**Cf:** Household expenses]. During the holiday season, if a family does not have money to pay for the holiday season activities, they will 'suffer embarrassment' or credit to ensure their family can enjoy something special.

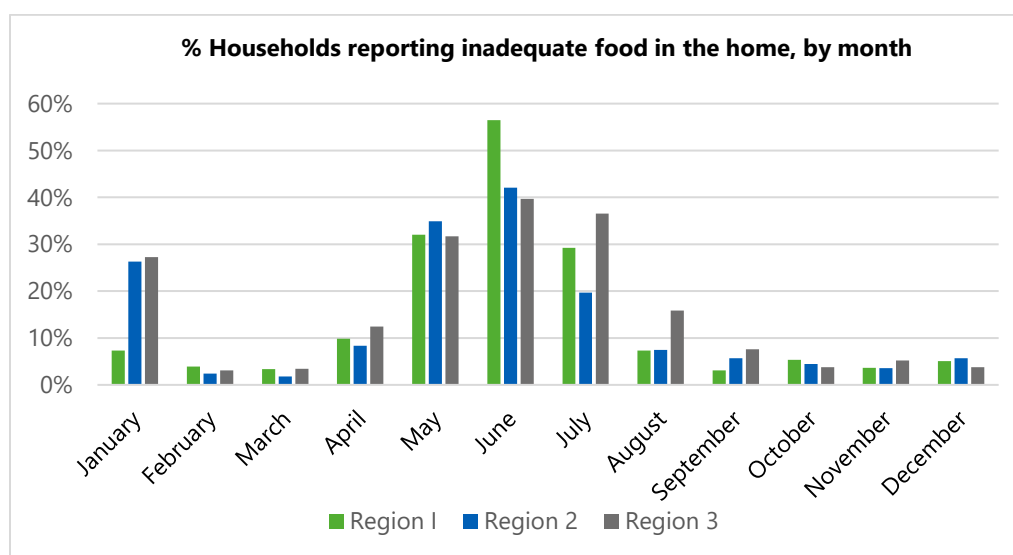


Figure 13: Months of inadequate food home provisioning, Risk Factor Survey

¹⁹⁶ Work harder.

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that MAHFP is not a risk factor leading to stunting in the study area. [Cf: Annex B].

In addition to standard, composite analyses, the available rCSI data were also studied qualitatively and quantitatively at the level of its key components (questions of research). Conversations around coping during qualitative inquiry were framed loosely around the Reduced Coping Strategies Index during the months when food is not sufficient in the home. Across the study zone, as the lean season approaches, families cope by:

1. Slightly reducing portion size (and/or ingredients in the soup/gravy) and reducing transportation costs, i.e. walking instead of taking a motorbike;
2. Reducing the number of meals consumed in the day from 3 to 2;
3. Switching from more preferred rice to less preferred cassava.

Once these strategies no longer suffice to cope with the pressure, the household proceeds to access credit from a friend, relative, community elder, or savings organization [Cf. Community based groups]. Crediting is typically done on an interest base, with 10-20% return. Credit is given on an honor basis, meaning one must be in good standing with traditional authorities to receive it. The terms of credit agreement are discussed when the first loan is taken and the presence of a third party is required.. Outside of women's savings clubs, the creditor is typically male. If the loan payment is in crops and the farm fails, focus group participants during the qualitative inquiry said you would pray for a creditor to defer the loan, since he is likely in the same compromising situation. Men in LR05 are frequently engaged in crediting schemes, as the entry cost for fishermen, including canoes, nets, fees and hooks, is quite high. In these areas, credit is typically given by wealthier fishermen and/or available crediting/savings schemes.

If crediting does not suffice and further coping strategies need to be deployed, adults restrict their food consumption in favor of their children. A woman typically reduces her intake more than a man, because she already eats less and *"women can stand hunger more than men,"* though this can vary by household.¹⁹⁷

Additional coping strategies were typically employed only once money had already been credited and the consumption of adults reduced. Sale of household items and/or land is not usually very operational due to the lack of purchasers – and the lack of marketable items themselves. Especially in LR02, LR04, and LR08, coping strategies are applied at a similar time of year across the community, which means that one family is not significantly better off and able to buy marketed items or land. In LR02 and LR04, as meals become difficult to purchase, men said they can overexert themselves at night by hunting for bush meat or engage in inland fishing in addition to their agricultural activities during a day.

In case more adjustments are necessary, the household proceeds with reducing non-food expenditures on health and school fees. Another strategy is to send a child to stay with another family, if it also presented educational opportunities. Families admitted that an adolescent girl would be encouraged to marry for dowry payment [Cf: GENDER, Marriage and extramarital

¹⁹⁷ Focus group participant, Grand Bassa

relations], if she was ready. When discussing these hypothetical situations (marriage, sending a child away), focus group participants said this 'happens plenty'¹⁹⁸ but would not be an option for their own families. When probed to discuss all possible coping strategies, families said that prostitution is not an employed coping strategy, because of the close-knit nature of communities (thus, secondary gossip), morals, values, and lack of purchasing power by male residents.

During the Risk Factor Survey, which took place at the tail-end of the dry season, children living in households, which were engaging in medium coping strategies¹⁹⁹ ranged from 11.2% in Region 3 [7.5-14.9%, 95% CI] to 30.9% in Region 1 [26.0-35.7% 95% CI].²⁰⁰ The majority of children lived in households engaged in low coping strategies, ranging from 68.3% in Region 1 [60.7-75.0%, 95% CI], to 85.2% in Region 2 [78.7-90.0%, 95% CI], and 88.8% in Region 3 [83.1-92.7%, 95% CI].

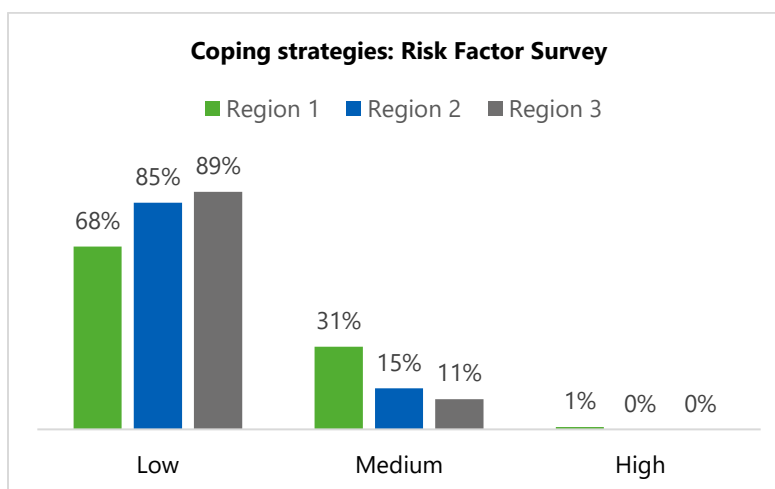


Figure 14: Coping Strategies Classifications, Risk Factor Survey²⁰¹

The most commonly deployed coping strategy during the quantitative data collection period in Regions 2 and 3 was a consumption of less preferred or expensive foods, i.e. cassava instead of rice. In Region 1, this coping strategy followed limiting portion size at mealtimes. Considering the survey timing, it is important to note that the Reduced Coping Strategies Index could have been significantly different if the date were collected during the latter period.

¹⁹⁸ Is likely, happens often

¹⁹⁹ Reduced Coping Strategies Index

²⁰⁰ Region 2: 14.5%[10.7-18.3%, 95% CI]

²⁰¹ Low, medium, high

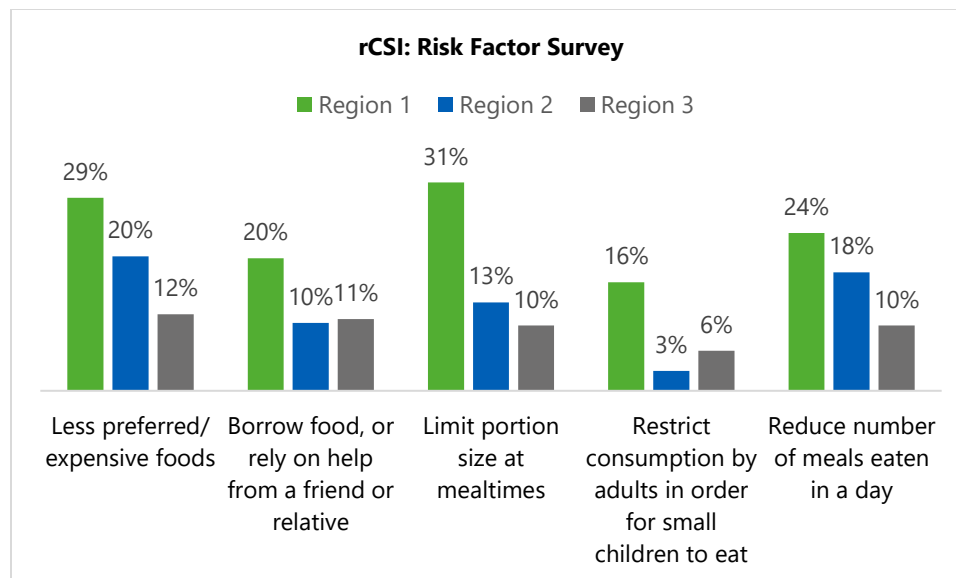


Figure 15: Percentage of children's households engaged in coping strategies, Risk Factor Survey²⁰²

Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators. In Region 3, child in a household with medium or high rCSI was significantly more likely to be concurrently wasted and stunted (WaST). In the same region, consumption of less expensive foods and reducing meal portions were associated with stunting, meaning a child whose household engaged in those strategies might be more likely to be stunted [p-val<0.1]. Restricting consumption by adults to prioritize small children's food intake was associated with stunting in Region 3 [p-val <0.1], and significantly associated with stunting in the entire study zone, meaning that children whose households engaged in those strategies might be more likely to be stunted in Region 3, and were more likely to be stunted in the entire study zone [Regions 1, 2, and 3, combined]. Other coping strategies were not significantly associated with stunting.

It is important to note that in certain communities, resilience strategies are guided and/or supported by existing structures. In LR02 and LR04, households protect themselves against shocks by engaging in *koo* groups to ensure higher yields in agriculture [Cf. Community Based Organizations]. In LR05, fishermen cope with their high risk/high reward industry by participating in fishing teams. If yield is low, fishermen supplement their team's fishing activities with additional ventures on small canoes with one (or no) other fisherman- meaning more time on the ocean, with higher risk.

As there are no *koo* structures in Region's 2 LR08 zone, a rubber tapper's insufficient income can be supplemented by engaging in smallholder farming. Residents also engage in inland fishing in times of family stress, but bushmeat hunting is less frequent. Due to a low agricultural production and monoculture practice, residents in LR08 indicated that they cope by preserving food production using traditional methods (e. g. by drying cassava, corn, okra, or rice) but struggled to find enough space to do so.

²⁰² Chart does not reflect severity; i.e. number of days per week

In certain agricultural areas, on the periphery of mining or peri-urban zones across all 3 regions, individual households make decision to shift income generating activities for more prosperous opportunities. This opportunity can also be sought at town level- which was the case of a town in Grand Bassa of Region 2, interviewed by the qualitative study team.

Community-based livelihood shift: Grand Bassa- LR04/LR09²⁰³

The first priority was agriculture but has been dominated now by potter making as opportunity increased. Most of the income from potter making goes to support children in Monrovia. Most all of us have children in Monrovia. We have a school that stops in 6th grade and if your child graduates from 6th grade, parents send those children to Monrovia to continue their education. I myself (Key Informant, Town Elder) can spend 15% of my income on my children's school fees.

(Young) children usually work on potter business production after school hours, but currently most young children are producing the potter due to no money to pay school fees, they are out of school making potter in order to obtain money to pay their fees.

We get together for agricultural activities once a week now, right now we have a farm that is larger than 4 hectare, 35 men and 30 women are in this group. We want to help the community through this process to be able to build school and we will ask the government to send teachers to help us when we can pay for the building.

If the potter demand reduces, children will drop from school because it is our main source of income. We are just dependent on God that the demand continues high.

Community-based organizations

Formal and informal crediting schemes are common across the study zone as citizens struggle to navigate market instability and price fluctuations. In a *susu*, a small group of people give a set amount to a 'pot' on a regular basis (i.e. weekly, daily, monthly) while the full sum is given to one of the group members in a merry-go-round style. The *susu* club sets its own rules and regulations but is typically managed by community members, as opposed to traditional authorities. In LR09 and LR10, *susu* clubs are sometimes managed by a street vendor/*susu* booth. Members of the *susu* club can take credit but must pay interest based on the amount they credit. A decision to credit a member of the *susu* club depends on a group vote. Non-members of *susu* clubs are sometimes accepted to credit, under condition that a designated member of the club pays the debt if the debtor cannot, an interest is added to the amount credited, and the interest gained is re-distributed to the group or kept by the leader. Other creditors tend to be 'big men in the town,' who can create their own interest demands, thus making *susu* clubs the preferred line of credit.

Susu clubs are sometimes gender-specific. General membership depends on stability to make continued contributions and 'overall good standing,' which is loosely tied to the principles of an ideal man/ ideal woman [Cf. Annex G, Ideal Gender].

²⁰³ XX (name withheld for anonymity) town is a 25 minute drive from Buchanan, 10 minutes off of the main road. While previously exclusively engaged in LR04 activities, residents in XX town have tapped into a specialty potter industry and are increasingly Peri-Urban. Residents in XX town said they were primarily driven by the opportunity to send their older children to school-6th grade and above. The community members maintain a group farm which they attend once per week, as their own farms have decreased in size.

In addition to *susu* clubs, village savings and loan associations (VSLA) exist at town level. Village savings schemes vary more than *susu* clubs in their target population, priorities, and requirements. VSLA members register, then buy shares: typically, in units of 20 LRD or 50 LRD. The interest rate for the savings club are lower than in *susu* clubs, but they can be more exclusive, i.e. limited to specific community members or women only. Ideals of 'overall good standing' are the same for VSLA's and *susu* clubs.

VSLA's can set group priorities for loans; i.e. school fees, agricultural investments, or support for single mothers/widows. One village savings club in LR08/LR09 zone of Rural Montserrado originated with NGO support and continued with the same local leadership, but most others begin on a smaller scale from community initiative. In this scenario, as the locality is a large township, the VSLA organizers also trained other VSL managers to start groups, reaching 30 groups total in the community.

"We have a village savings loan club here started by (NGO in 2005. The support was withdrawn several years ago. Some people can save for 9 months and others save for 12 months. This association is a real help to single mothers, because we have so many in this community. We have 30 VSL groups in the township around 30 members each. It also has a social fund that is used to help a member in greatest need. People can save as low as 50 LRD, 100 LRD, and 125 LRD depending on the financial status."

Focus group participant, Montserrado, LR09

Failure to make payment on a *susu* or VSLA is punished based on the savings club's terms of agreement. Depending on the severity of the debt, interest can be added, property seized, a debtor taken to a traditional court, and/or punished by a Poro society devil²⁰⁴ sent on the family.

Social support was formally facilitated in two towns of Rivercess through mothers' groups supported by an NGO. Mothers' groups are limited to 25 members and meet on a monthly basis to discuss issues related to child health, hygiene, and nutrition. They can also manage their own VSLA.

"Now, since the mothers' group was established, more women are keeping the home clean, washing their areas, keeping the garden, the produce of which the household can consume, and washing their hands, which helps to prevent sickness. We have a clean community because every woman is keeping their place clean."

Focus group participant, Rivercess

In LR10, which attracts a diverse set of economic migrants, ethnic associations are formed to represent community members and present their issues collectively to the concession company. They also act in conflict resolution, manage savings, and issue credit.

"We have community groups here: Bassa association, Grebo association, Kpelle association. All those associations also carry on saving in their various association. We also have village saving groups who lend members with cash for business or other affairs, but when one is not a member you will have to pay an interest for loan."

Focus group participant, Sinoe

Fishing teams in LR05 and *koo* agriculture teams in LR02/LR04 are two additional community-based structures, the function of which is centered around increasing the productivity.

²⁰⁴ Spiritual authority.

Agricultural *koo*'s are typically initiated by traditional leadership. There can be multiple *koo*'s in one town, depending on the size of the town. *Koo*'s are structured by gender: men brush,²⁰⁵ women scratch.²⁰⁶ All members work on one member's farm for the day, clearing the area as a group. During the men's brushing *koo*, wives cook as a group and bring lunch at noon time. During the women's *koo*, one or two women stay behind to cook for the group. *Koo*'s have a president and fine tardiness/non-attendance. A schedule with hours and place of work is managed by the president and secretary. *Koo* membership requires and increases one's social and financial capital. To be a member of a *koo*, one must 'be in good standing' and fully available to support the *koo*'s activities. For men's *koo*, one should also be physically strong and able to provide palm wine or other liquor on the day work is done on your farm.

Households in LR04 also often engage in *koo* farming, with similar gender roles to LR02. Men brush the fields from December to January, women plant from February to March. Both harvest the cassava and typically sell from April – June.

Koo's don't work unless enough household in the community are engaged in agriculture: Farmers in LR08 were unlikely to participate in *koo* groups because their time is spent tapping rubber or burning charcoal. Farmers in LR05 typically do not participate in *koo* groups because they are involved in other, fishing-focused activities. Since *koo*'s are typically coordinated by traditional authorities, farmers in LR09 said there wasn't enough 'know-how' or motivation to coordinate a *koo*. Furthermore, farmers in LR09 need more flexibility than *koo*'s typically afford, so that they could also engage in urban-centered activities.

Koo Farming: 'Unity,' productivity, 'love'

"The process of koo is all about understanding and love for each other in this town".

Key informant, Grand Bassa

Smallholder farmers in LR08 and some parts of LR09 reminisce on the opportunities that team farming afforded them, saying that working together with unity was impossible given their split time allocation.

"There was a time we can move together, sharing the load from one field to the next, but now there's no unity."

Focus group participant, Rural Montserrado, LR08/LR09

But community members of LR02 and LR04 say the *koo* is about much more than productivity. *Koo*'s facilitate social cohesion. The membership endorses that one is an ideal man or woman, worthy of trust from *koo* teammates. For men, *koo* time is an important time to drink together and 'lecture'²⁰⁷. While women do not typically drink together on their *koo*, they do help each other prepare meals to bring on the men's farm.

In LR05, 'good' fishing canoes, which can reach the deep sea, are typically purchased and managed by wealthy captains. Fishing occurs in teams, with registration at the discretion of the team captain. Fishing team members are admitted on the basis of their strength, fishing skills, and their

²⁰⁵ Refers to land clearing.

²⁰⁶ Refers to weeding.

²⁰⁷ Hold long discussions, usually with palm wine or liquor.

willingness to take risks- often doubling shifts in the morning and night or braving treacherous sea conditions. The captain manages registration with local and national authorities. Fishing teams only admit men, and their schedule is managed by a secretary.

"Each team has a captain, who has a canoe and a net. Fishing teams register as a group. The captain is the head. Secretary writes and keeps financial records for every sale. Every sale is around 200,000 LRD, but a lot of it goes to paying workers, maintain canoe, and paying taxes to fishery registration."

Key informant, Grand Cape Mount

All community-based organisations are important means of social and financial capital. A participation in one or more groups ranged from 46.9% of households in Region 1 [40.9-52.8%, 95% CI] to 62.5% in Region 3 [56.-68.7%, 95% CI²⁰⁸]. Subsequent analyses taking into account anthropometric measurements of children in the household revealed an association between these indicators; in Region 1 and the entire study zone, a child whose mother participated in at least one or more external support club/ group were potentially less likely to be stunted [Cf: Annex B].

The most common club reported in the Risk Factor Survey was a VSLA or *susu*; ranging from 39.4% in Region 1 [33.6-45.2% 95% CI], to 39.0% in Region 2 [33.0-45.0%], to 42.5% in Region 3 [36.2-48.8%, 95% CI]. Participation in a savings club was not significantly associated with stunting outcomes, which means that participation in a savings club was not a risk factor or protective factor in the study area [Cf: Annex B].

D. WATER, SANITATION AND HYGIENE

Water access and availability

Fresh water courses through mainland Liberia in a vast network of inland streams and rivers facilitate physical access of Liberians in the study zone to one or multiple sources of water. However, many are still water insecure as access to protected water points is much less ubiquitous. Improved water sources expected to be safe are piped water, hand pumps/protected wells, and protected springs. Other sources, such as exposed wells, creeks, ponds, lakes, or dams are considered 'unprotected'.²⁰⁹ Only 64.1% of improved national water points are estimated to be fully functional, ranging from 52.9% in Rivercess (Region 3) to 72.7% in Sinoe (also Region 3).²¹⁰ The percentage of the population with basic water service,²¹¹ under the same estimates, ranges from 12.5% in Grand Cape Mount (Region 1), to 84.7% in Montserrado (Region 2).²¹² However, it is important to note that there is a high variability within districts and counties. In Jaedepo and Sanquin No. 3 Districts in Sinoe County (Region 3), for example, only 0.2% of the population has basic water service compared to 70.8% in Commonwealth B District of Grand Bassa (Region 2).

²⁰⁸ Region 2, 55.8%[46.7-61.8%, 95% CI]

²⁰⁹ Link NCA Indicator Guide.

²¹⁰ 2017 Water Atlas; Region 1, Grand Cape Mount: 53.2%, Region 2: Montserrado, 71.1%, Grand Bassa: 65.9%

²¹¹ Basic service defined as people having access to a functioning and improved water point within 1 km, 2017 Water Access

²¹² Region 2, Grand Bassa 25.2% ; Region 3 : Rivercess 13.1%, Sinoe 25.1%

According to the 2018 CFSNS, 34% households in Sinoe and 48% households in Rivercess counties (Region 3) and 42% households in Grand Bassa County (Region 2) rely on creek water for their primary source of drinking water. According to the Risk Factor Survey, the most common protected source of water in a household was a hand pump, ranging from 48.5% of total children's households in Region 2 [43.3-53.7%, 95% CI] to 78.8% in Region 1 [72.72-82.7%, 95% CI].²¹³ The next most common source of water for households was unprotected; the percentage of households that relied on the creek for water reached 42.6% in Region 3 [37.8-47.4%, 95% CI].²¹⁴ Rainwater, which requires no distance walked, is frequently collected with buckets outside of the household, but is a supplementary source of water for washing clothes and cooking.²¹⁵

Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child whose household's main source of water was an improved water point was less likely to be stunted in Region 3 [Cf: Annex B]. It is interesting to note that this was also the region with the highest percentage of households (over two in five) who rely on creek water for their primary water source.

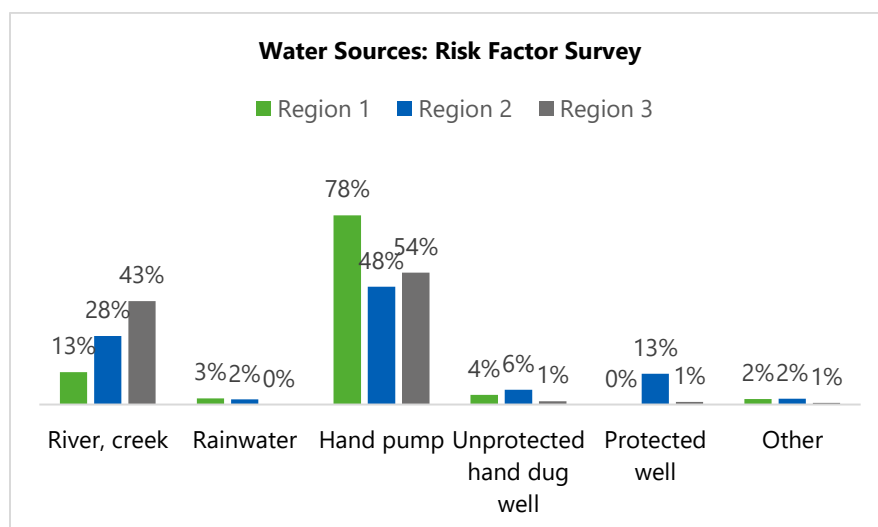


Figure 16: Water Sources, Risk Factor Survey

In towns with multiple water points, the decision-making tree guiding which water point to use factors in availability, distance, quality, and preference. A typical algorithm is presented below:

²¹³ Region 3: 54.3%[49.6-59.0%, 95% CI]

²¹⁴ Region 1 : 13.3% [9.6-18.1%, 95% CI], Region 2 : 28.2% [24.7-32.0%, 95% CI]

²¹⁵ Risk Factor Survey took place in the dry season; percentage of households that rely primarily or solely on rain water increases in peak rainy season months.

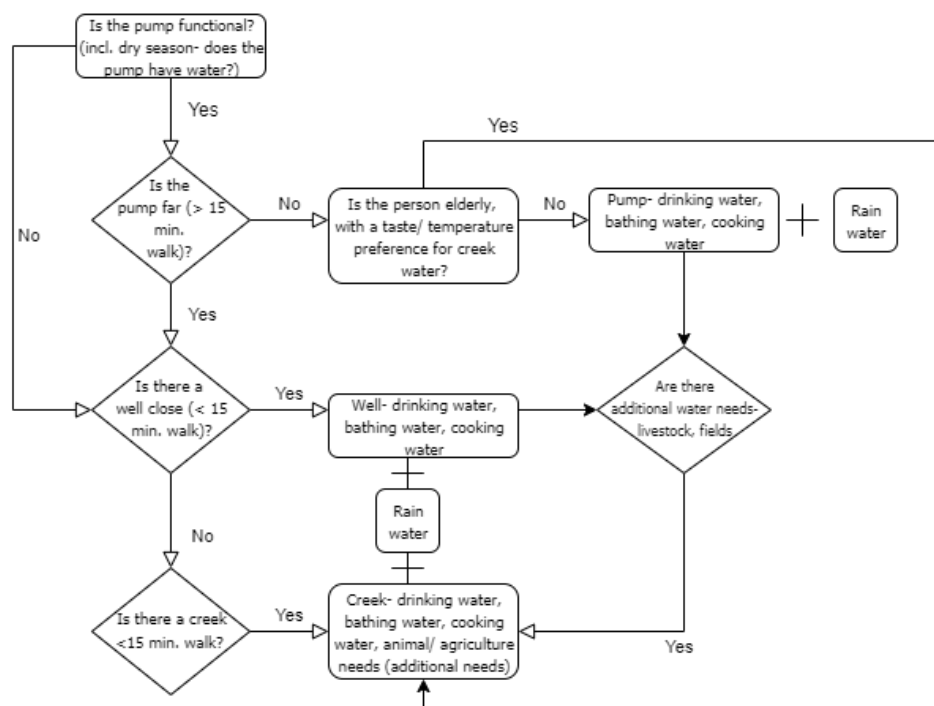


Figure 17: Typical water decision-making tree in localities with multiple water points, as described by focus group participants during the qualitative inquiry, Rivercess [Region 3], November-December 2019

The selection of a water source is primarily conditioned by its proximity. During the qualitative inquiry, focus group participants cited 1 hours as the longest distance walked to the water point. More frequently, though, they confirmed the presence of at least one water source within a 15-to-20 minute radius. During the Risk Factor Survey, distance to the used waterpoint (therefore, not necessarily an improved source) ranged from an average of 5 minutes in Region 1 [4.2-5.8 mins, 95% CI] to 8.3 minutes in Region 3 [6.7-9.9, 95% CI].²¹⁶ When factoring in waiting time at the water point,²¹⁷ average fetching time (one-way) increased to 13.3 minutes in Region 1 [11.1-15.5, 95% CI] to 14.9 minutes in Region 3 [12.4-17.4, 95% CI].

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that time to the water point was not a risk factor leading to stunting in the study area. [Cf: Annex B]. However, children who live more than 20 minutes from the water point were significantly more likely to have experienced diarrhea in the two-week recall period.

After proximity, the community members typically prioritized quality of a water point, preferring a hand pump first, then a well and a creek in the third place, usually reserved for cooking and bathing only, with the exception of elderly households, which would use it for drinking as well. Hand pumps are perceived safer than wells as they are not open to contamination by the air and/or animals. Regular maintenance, including chlorination, is the responsibility of traditional

²¹⁶ Region 2: [5.4, 4.6-6.2] 95% CI.

²¹⁷Source: Liberia Ministry of Public Works. 2017. Liberia Water Point Survey. Basic water service defined as 30 minutes round trip to the improved water source.

leaders and/or water committees. Regardless of leaders' maintenance regularity [Cf: Household water management], this is a large source of confidence behind hand pumps as preferred water sources. In addition, there is a common association between the depth of the water source and its viability and safety, meaning that a more shallowly dug well is more likely to run murky in the dry season. As many hand pumps were mechanically drilled, they are believed to be dug deep enough and therefore safer to use. If a hand pump runs dry, it is most often blamed as a depth issue. The dry season primarily presents challenges for pumps and wells, which tend to go dry in January- March. Across the study zone, pumps tend to dry a month or more before the wells.

Open wells are often hand dug by the community so some community members questioned if they had been "dug deep enough" like a hand pump would be. In communities with multiple sources of water, a hand pump would be prioritized for drinking water while other water sources would be used for household and routine tasks. Some households in LR09 livelihood zone of Montserrado [Region 2] indicated they could use a well for cooking and a hand pump for drinking, though this option is available during the same months when rainwater is sufficient and can therefore supplement the household water needs. Water for agricultural purposes is nearly always gathered from the creek.

A variation in the use of a preferred water source is of seasonal nature, occurring mainly in the dry season when a water source can run dry, thus forcing families to seek water from less preferred sources.

"When a hand pump gets dry, we wait for 15-20 minutes to fill one bucket. Sometimes the water is muddy. When this happens, we start to get creek water for household use, such as drinking, washing, or we walk long distances to find water. This is when sickness increases."

Focus group participant, Grand Cape Mount

Households headed by the elderly typically prefer creek water for their primary water source, both for its cool temperature and a comparatively lighter workload of drawing water from a creek instead of a pump. Typically, in a nuclear family, a mother and/or older children are responsible for fetching water, more likely to be an improved water source, while a child under 5 years of age in a grandparent's care might primarily drink creek water, even if his/her nuclear family did not.

Caregivers of children under 5 years old indicated various quality concerns with unprotected water sources; directly linking creek water to diarrhea (running stomach), skin rashes, and even malaria [Cf: Health].²¹⁸ In the dry season, however, they felt nothing was to be done in the scenario that their only option was creek water. A seasonal exception is the peak of the rainy season, as rainwater and heavy flowing creek water are trusted (but not as trusted as hand pumps) by some non-elderly headed households, as well.

Along the coast, saltwater is not collected for household use, but baths can be taken in the ocean to offset the quantity of water that would need to be collected.

²¹⁸ Subsequent analyses taking into account morbidities of children in the household did not reveal any statistical association between diarrhea and a protected water source, which means that water sources classified as protected were not significant risk factors to stunting in the study area.

Case Study: Opportunity cost vs. risk, fetching water

The qualitative team tested preferences and opportunity costs of water collection in one community.

XX town²¹⁹ has a creek and a pump for 32 households in the town. An additional 15 households reside in affiliated villages. Most town members live at the bottom of the hill, near the creek (<5 minutes). The creek is managed by 2 points: 1 for drinking, the other for washing. Every household in the town was given a water treatment bucket by (NGO 1) in 2018. Members of the associated villages do not have water treatment buckets. The pump is at the top of the hill by a school; lines before school can reach up to a 30-minute wait, when the pump produces water.

The pump frequently produces murky water towards the beginning of the dry season; it only reliably produces clean drinking water in the months of August to October. The community members reached out to (NGO 2) about the issue; they were told the community has heavy sheet rock and is unsuitable for drilling.

Community members indicated a new water pump as a recommended solution to their health issues. When presented several scenario's when the pump was constructed in a closer, but rocky, area or a far, but less rocky, area, community members indicated they would prefer to use the creek if the pump was more reliable but further. This was true even for community members in the associated villages who did not have a water treatment bucket.

Scenario	Predicted use	Community justification
< 5 minutes (bottom of the hill)	Highly likely	Close & preferable to the creek
10 minutes (top of the hill, same location)	Likely	Same use as now; continued unpredictability in the dry season
15 minutes (less rocky area, water most of the year)	Likely	Same use as now, plus use during the dry season.
25-30 minutes (least rocky, water year-round)	Unlikely	Too far, given the option of creek water < 5 minutes away

During the dry season, communities restrict the quantity of water that households can draw during one trip- typically one bucket per draw, reducing total water consumption to about half of what is typically drawn, though this widely varies based on household composition. Water is stored in smaller batches during this period, and rationed by household members for use. Many communities said the climate change triggered them to enforce this rule, as the water ran completely dry in years prior.

"We collect 15 buckets of water; during the dry season, we collect 8 buckets instead of 15. It has changed since 2017 due to the climate change."

Focus group participant, Montserrado

The quantity of water gathered (often two jerry cans in the morning, two jerry cans in the evening, average household estimation) also depends on the woman's workload with other activities, as she is primarily responsible for fetching water. When water is scarce, families indicated they would

²¹⁹ Name withheld for anonymity

bathe less often, wash clothes less frequently, but continue to prioritize drinking and cooking water.

Certain towns enforce restrictions on the use of water points, including creeks and pumps, all year-round. Fines are the primary fear tactic for compliance to town-level water management policies. A fine of 250-500 LRD²²⁰ presents a blow to the family's already insufficient income, especially in the lean season. These fines are typically decided by the community leadership and enforced by vigilante reporters.

Town policies for various water sources are summarized below.

Water source	Town policies
Creek	1. <i>Designated bathing/ washing areas</i> : Fines for bathing (300 LRD) or washing (250 LRD) in non-designated areas – Rivercess, Punishment by the Poro Society devil, fines of 200 LRD to 400 LRD – Grand Bassa
Hand pump	1. <i>Daily schedule</i> : Hand pump closed during day time hours, re-opened mornings and evenings– Montserrado 2. <i>Routine chlorination</i> : Community contributions to chlorinate the hand pump every 3 months– Grand Bassa 3. <i>Dry season restriction</i> : 1 gallon or bucket per draw– Rivercess 4. <i>Year-round restriction</i> : Every household entitled to draw 4 gallons from the pump– Montserrado 5. <i>Sanitation</i> : Shoes must be removed before entering the hand pump area. – Sinoe; women tidying their hairs, taking off slippers, cleaning around the pump when the area is dirty. – Grand Cape Mount; user must carry a broom to tidy the pump before drawing water– Grand Cape Mount 6. <i>Coordinated clean-up</i> : Weekly and quarterly community cleanings of the pump area – Rivercess
Well	1. <i>Routine chlorination</i> : Community contributions to chlorinate the well every 3 months – Grand Bassa

Table 24: Town policies for water use, as described in qualitative inquiry, November- December 2019

Risk perceptions related to water quality are summarized below, by county and region.

Behavior	Region 1	Region 2		Region 3		Community justifications
	Grand Cape Mount	Grand Bassa	Rural Montserrado	Rivercess	Sinoe	
Drinking water from the protected water point– hand pump and/or protected well	LOW ²²¹	LOW	LOW	LOW	LOW	Water from hand pumps and wells is good and safe to drink from, except for times when there is no water available in them.
Drinking water from the creek.	MEDIUM	MEDIUM	HIGH	MEDIUM	HIGH	Variety of responses from participants, based on perceived susceptibility and trust in the water source. It

²²⁰ \$1.25- \$2.50 USD

²²¹ Based on one town only; other town N/A, no protected water point

						were mostly the elderly who identified drinking water from the creek as a low risk because water is life ²²² and the water from the creek is good and cold. Community members considering the creek water a medium risk explained that the water from the creek was not meant for drinking but when there was no water in town, they have no choice but to drink it. A perception of a high risk was justified by the presence of germs, which can cause illness.
Drinking rainwater	MEDIUM	MEDIUM	LOW	LOW	HIGH	Drinking rainwater is risky depending on the container that you have (and less so the roof catchment).

Table 25: Perception of the risks associated with water quality

Household water management

"Me and my family [sic] can really suffer for water because we don't have a place to keep it."

Focus group participant, Sinoe

As nearly all Liberians in the study zone rely on fetching water outside of their household, drinking water is carried to and stored in the household in buckets and/or plastic gallons. The buckets are typically not cleaned as it is believed that the water carried in a bucket washes it. The plastic gallons used to store water cost about 200 LRD²²³ while they are also important tools for certain income generating activities, such as palm oil and palm wine production.

Households typically store water in covered gallons, with a narrow mouth, but it is brought out of the house into large tubs for prolonged use. These tubs are placed next to the kitchen, or just outside of family home, with a cup for easy access for small children and/or cooking and cleaning. The household does not consider water in tubs as 'stored' water; they are large, uncovered, and sit outside typically the entire day. In some households, tubs may be a preferred water storage option because they are believed to 'catch the breeze', which then cools the stored water and makes it more pleasant than the water stored in a plastic gallon.

The Risk Factor Survey assessed household water transportation and management using a composite index with 0 indicating the lowest risk and 7 indicating the highest risk of contamination. The findings demonstrate a mean score ranging from 2.8 in Region 1 to 3.3 in Region 2, indicating most households fell into the 'mild risk' of water transportation and

²²² Water is required for every living thing; one cannot do anything without water.

²²³ February 2020, informal market assessment.

management.²²⁴ Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; as household water transportation and management scale risk increased, a child's HAZ decreased—meaning they were more likely to be stunted [Cf: Annex B].

Point of use water treatment (POUWT) is low. Per the 2013 DHS, few rural Liberians (7.0%) added bleach or chlorine after gathering water, while only 0.2% boiled water before drinking, thus making the contamination after collection highly likely. In the Risk Factor Survey, percentage of households that treated water before drinking ranged from 6.9% in Region 3 [4.0-9.9%, 95% CI] to 12.4% in Region 2 [8.8-16.0%, 95% CI].²²⁵ However, when safe methods are considered as separate from unsafe methods, the percentage of water treatment is quite lower: less than 1% [0.5%, 0-1.0%, 95% CI] of households boil their water, which is only safe if done for recommended duration.²²⁶ Just over 6% [6.3%, 4.8-7.8%, 95% CI] in the pooled study zone chlorinate water at home, which is efficient only if the water is not turbid.²²⁶ Comparatively, 7.0% of rural households²²⁷ utilized this method in 2013, according to the DHS data.

A sliver of households apply treatment methods that are not recommended as safe, including 1.3% of households in the entire study zone that strain through a cloth [0.6-2.1%, 95% CI]; 3.2% of households had basic filtration devices [2.1-4.3%, 95% CI], but it was outside of the scope of the survey to assess their quality and condition. For households that utilized unprotected water points, point of use treatment was not significantly associated with stunting.

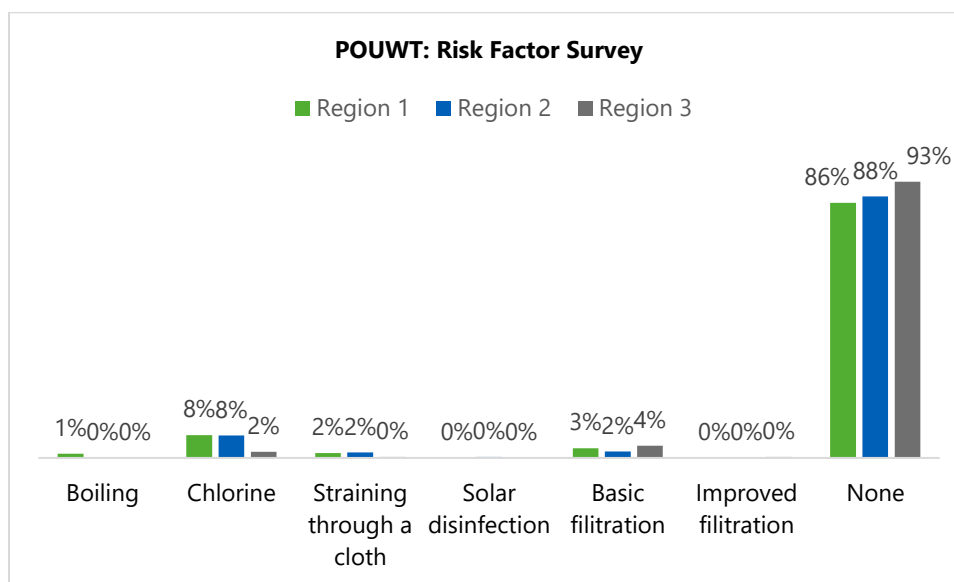


Figure 18: Point of use water treatment, households utilizing unprotected water sources, Risk Factor Survey

During a qualitative inquiry, water treatment chemicals was not identified as a priority expense. In fact, when the money was progressively added to the household budget during the household

²²⁴ Household Water Transportation and Management Checklist, Link NCA Indicator Guide.

²²⁵ Region 1: 11.1% [7.8-14.4%, 95% CI]

²²⁶ Link NCA Indicator Guide.

²²⁷ Nationwide.

expenses' participatory exercise, community members did not indicate a preference for water treatment supplies as an important expense, instead prioritizing additional school fees or savings.

Faith in the regularity of pump and well treatment schedules, managed by committees or local authorities, varied by community; households generally deflected that because they had contributed money to community chlorination schemes, they should not have to further pay or take time to treat water in their homes. While one town water committee chlorinated water on a set schedule determined with the community, and reported back under the *palava* hut,²²⁸ it is often done on an honors basis. Community chlorination schemes do not exist in towns that rely on unprotected water sources. A minority opinion resisted POUWT because they felt it affects the taste of the "cold and sweet" creek water to hot and/or bitter [**Cf:** Water access and availability].

Sanitation

"Defecation is done in the bush. You will have to go to the bush and while walking, you will step on someone's pupu."²²⁹

Focus group participant, Montserrado

The GOL has endorsed the community-led total sanitation (CLTS) model with a heavy emphasis on "triggering" community disgust toward open defecation. The highest percentage of households without improved sanitation live in Grand Bassa and Rivercess counties of Regions 2 and 3, respectively.¹² However, outside of recent NGO-interventions, it was uncommon to see a used latrine in the community. A major barrier cited was the anticipated cost of latrine construction, which community members estimated at \$175-400 USD.

Unlike in case of water points, which benefit from the community-level management, there are fewer systems in place for the management of sanitation facilities, including their cleaning or maintenance. For example, in one peri-urban location in Grand Bassa, two public latrines had not been cleaned for several years and were forbidden for the use by children and distrusted by adults. Responsibility by community members was deferred to traditional authorities, while traditional authorities said they did not have the 'know-how.'

However, one town in Rivercess demonstrated a different reality. Following an ODF demonstration on the importance of latrines, including the walk of shame and defecation mobility, the town now has newly built latrines for each of its 33 households.

"Every house in the town has a latrine. They were built in 2019. (NGO) came and discussed their plans with the community to build latrines, but they were built by the community dwellers. (NGO) did not give any materials except encouragement. Everyone was happy to have a toilet and welcome the idea. The reason that made us happy was because during the rainy season the children defecate all along the creek making our stomach to run."

Focus group participant, Rivercess

As community members were able to choose a type of latrine to build -from simple pits with an iron sheet and wood privacy shade to concrete latrines with drying racks, tile floor, and paper

²²⁸ Community gathering place.

²²⁹ Feces.

waste bucket, prices for actual construction ranged from \$25- \$60 USD.²³⁰ It is important to note that the town law now preconizes a private latrine for each house and open defecation is punishable by fine. Villages associated with the town received the same instruction but are not subject to the same fines. When asked what motivated the town to enforce the latrine construction, even up to the village level, they said they understood this as a requirement of the intervention. During the initial sensitization meeting, town authorities said it was presented as a requirement, not an option, for the subsequent supervision and monitoring visits.

In the absence of private latrines, open defecation is commonly practiced by older children and adults. Communities typically designate a bush area that should be used for defecation, separated from houses and the water source. Defecation mobility, or the realization that feces reach water or food and ultimately end up being consumed, is the main motivator of fecal management. The thought of flies traveling from feces to food was particularly perturbing. While the designated bush area was separated to prevent flies gathering in living areas, it was not so far that a person could risk getting lost or injured in the forest. The primary barrier to using a non-forested area for defecation was the communal shame that this could mobilize flies in the community and/or contaminate the water. Because community safety is typically tightly regulated by traditional authorities, with moderate to severe repercussions in place, community members said they did not fear assault as much as they feared snakes. An important exception was in LR10 (Regions 1 and 3), where migration is common and *'it is impossible to know your neighbor'*²³¹. In communities bordering concession areas, use of land is regulated to the extent of defecation.

"Risks in going to the bush: some get involved in car accident (crossing the road), always the snake bites, and if you are unlucky and the Firestone security catches you, they will make you to pick your feces with your bare hands."

Focus group participant, Rural Montserrado

Linked with the latrine use is safe disposal of child stools, which per qualitative inquiry and quantitative testing is considered low. The very few children who did directly use a private latrine were near the 36 month cut-off for this segment of the questionnaire.²³²

²³⁰ Community member report; Amount used for a latrine- 2 bags of cement, 20 US, 4 sheets of zinc, 1400 LD

²³¹ Focus group participant, LR10

²³² Defecation presented to children <36 months to test evidence from qualitative inquiry on the unsanitary conditions of diapers. As children >36 months are more mobile, posing to caregivers of older children also limits the precision of the response.

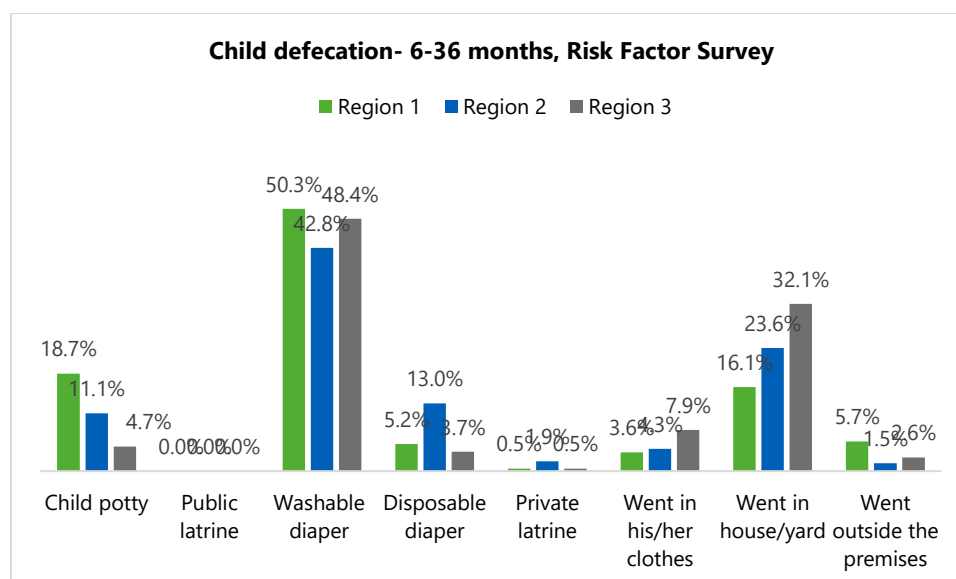


Figure 19: Child defecation, Risk Factor Survey

Use of public latrines by children was nil. In the rare occasion one was available, it was deemed too unclean for children. Because children were feared to be at risk of falling into the latrine, communities with private latrines maintained a bucket ("child potty") instead, and from which child feces then immediately thrown in the latrine. It was uncommon to see child potties in towns without private latrines. Their use ranged from 4.7% in Region 3 [1.7-7.8%] to 18.7% in Region 1 [13.1-24.2%, 95% CI].²³³

According to the Risk Factor Survey, the most common place of defecation was a washable diaper, ranging from 42.8% in Region 2 [36.4-49.5%, 95% CI] to 50.3% in Region 1 [43.2-57.3%, 95% CI].²³⁴ Washable diapers are handmade, composited of layers of cloth and plastic, meaning a strip of cloth is laid against the child's body, and then the baby is wrapped in plastic, sealed with more cloth or plastic at the top. An important role of the mother is to check and change the baby every time s/he defecates. By observation, a child is often left in his diaper for several hours at a time, and the diaper is cleaned during the time of other clothes' cleaning- once two twice a day. Mothers said this was a tedious task due to their already high workload. While they understood its importance, they said it was challenging to set aside more time for this activity apart from the regular times when a child is changed into clean clothes.

Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; in Region 2, a child who defecated in a washable diaper, as opposed to a latrine or disposable diaper, was more likely to be stunted [Cf: Annex B]. Children over the age of 18 months, who were still kept in washable diapers, were also more likely to be stunted in Region 2 as well as the entire study zone.²³⁵

²³³ Region 2: 11.1% [6.8-15.4%]

²³⁴ Region 3: 48.4% [41.3-55.6%, 95% CI]

²³⁵ Children who were kept in washable diapers were more likely to be wasted in Regions 1 and 2.

If a child does not utilize a child potty or washable diaper, s/he defecates openly. According to the Risk Factor Survey, many more children defecated in the house or yard, as opposed to the bush (outside of the premises). In towns without private latrines, an indicated safe method of disposal was to bury the child's feces, though compliance was largely related to fines at town level for feces being observed outside of the house. The bush was not considered safe for children to wander, so the designated area for child defecation is always near the house. In towns that do not enforce child fecal management fines, it is much more common to see a child defecate freely in the play area near the house, and the mother sometimes scoop up with leaves then dispose.

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that open defecation did not appear to make a child more or less likely to be stunted in the study area. [Cf: Annex B].

When the study team asked community members if they would prioritize water or sanitation interventions, households selected a water intervention, saying 'water is life' and the bush is always there for defecation. Water pumps would be used daily, multiple times per day, and would reduce frequency of illness while toilets might reduce illness and keep the community cleaner, but they wouldn't be used as frequently by all community members

Hygiene

Cleanliness is an important tenant of an 'ideal' man, woman, and baby. Men and women bathe twice daily, once in the morning and in the evening, when there is enough water. A man or woman might reduce to once per day in the peak of the dry season, but the baby's bathing frequency should not reduce. As an infant approaches the age of being a toddler, his or her frequency of bathing can reduce, but a typical child less than 5 years old is washed twice or three times per day.

"I wash my baby at least 3 times per day, morning and evening and sometimes in between. My daughter-in-law bathes my namesake 4 times because she is small."

Focus group participant, Rural Montserrado

Water is filled from large tubs that sit outside during the day time [Cf: Water access and management] to a smaller tub or bucket; the child is rigorously washed, and swaddled if unable to walk or dressed if of walking age.

Handwashing is believed to be the responsibility of adults and not necessarily small children. The most frequently identified key handwashing times was before eating, followed by after defecation. Washing hands before cooking was perceived as less important, because the food is cooked so the heat will kill the germs. However, men sometimes groaned that they would like their wives to wash their hands before cooking, but they never did so. Men often associated this with ignorance or improper upbringing.

"Most women cannot wash their hands before cooking because it is not a part of their upbringing, they are not used to it."

Focus group participant, Grand Bassa

In part or full because of the associated shame, women said that they themselves washed their hands before cooking, but their peers might not because of the heavy workload and lack of money from their partner to buy soap.

Duration or vigor were not mentioned for proper hand washing; a person has washed his or her hands if they are rinsed with water or, in highly sensitized areas, rinsed with water and soap. Ash was a viable substitute mentioned only in two communities of Rivercess (Region 2), which had the active presence of a CHA who was known to regularly remind them.

It is widely accepted that soap is an important tenant of proper bathing and washing. It is maintained down to the sliver in small baskets carried to the bathing point. Iron soap²³⁶ is the least expensive form of soap on the market, but it is harsh on skin and not preferred for bathing.

"The iron soap we used to buy for 5 LRD is now sold for a price that we cannot afford all the time. (Palm) Oil is sold at a high price."

Focus group participant, Rural Montserrado

In the Risk Factor Survey, a presence of hand/bathing soap was confirmed in 63.7% of child's homes in Region 3 [58.1-69.2%, 95% CI] to 84.6% in Region 2 [80.3-89.0%, 95% CI].²³⁷ Confirmed presence of laundry soap was lower, ranging from 42.4% in Region 3 [36.6-48.1%, 95% CI] to 53.1% in Region 2 [47.3-58.9%, 95% CI].²³⁸

Subsequent analyses taking into account anthropometric measurements of children in the household revealed an association between these indicators; a child whose household had either, or both, handwashing or laundry soap was potentially less likely to be stunted in Region 1 [p-val <0.1] [Cf: Annex B]. In the entire study zone, a child whose household had either, or both, handwashing or laundry soap was significantly less likely to experience diarrhea. Presence of soap significantly negatively correlated with distance to the market, meaning soap was less likely to be found in households further from the market.

Environmental Enteropathy: Child play area

Environmental Enteropathy Disease (EED) is an enteric disease caused by a continued exposure to faecal microorganisms due to poor environmental conditions at the household level- such as animal and human faeces as well as pollution and contamination from water, soil, air and food. It is considered as an entry point for chronic undernutrition because this condition would reduce the system's capacity to absorb nutrients.²³⁹

The Link NCA studied the child's play environment and household environmental condition. Despite frequent bathing, caregivers conceded that keeping the child clean is next to impossible, as the play area is a shared household yard, which is nearly always dirty. Mats are infrequently prioritized for the child. In LR02 of Region 2, for example, children frequently wandered from one open kitchen to the next, precariously close to fires and monitored by mothers pounding mortar or older siblings. Hunting dogs and chickens often roamed the same areas, meaning a child was frequently in contact with animal feces. Child body cleanliness was assessed on a five-point scale per the Link NCA Indicator manual, with a score of zero

²³⁶ Homemade, palm oil based soap.

²³⁷ Region 1: 67.1% [61.6-72.7%, 95% CI]

²³⁸ Region 1: 52.5% [46.8-58.2%, 95% CI]

²³⁹ Source : ACF. 2017. BabyWASH and the first 1,000 days.

indicating high cleanliness and a score of five indicating low cleanliness.²⁴⁰ The mean score ranged from 2.3 in Region 2 [2.1-2.5, 95% CI] to 2.6 in Region 3 [2.4-2.8, 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means a child's uncleanness did not make him/her more likely to be stunted [Cf: Annex B].

Certain indices, however, significantly associated with uncleanness in children. Children who last defecated openly, and not in a latrine or disposable diaper, were more likely to be unclean. Children in agricultural livelihood zones were also more likely to be unclean, compared to children in peri-urban livelihood zones who were less likely to be unclean. Children who lived more than one hour from the market, as well as children who lived more than one hour from the health facility, were more likely to be unclean.

Unhygienic houses and compounds are also source of exposition to environmental contamination. Household hygiene was assessed on a five-point scale per the Link NCA Indicator manual, with a score of zero indicating high cleanliness and a score of six indicating low cleanliness:²⁴¹ The mean score ranged from 2.8 in Region 1 [2.6-3.0, 95% CI] to 3.7 in Region 3 [3.5-4.0, 95% CI]. Increasing uncleanness on this scale did not significantly correlate with a child's height for age.

Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these observation of a child playing in the mud; a child who was observed playing in the dust or mud was significantly more likely to be stunted in Region 2, and, in the entire study zone, potentially more likely to be stunted [Cf: Annex B].

In a CLTS town in Rivercess, mothers' group members said the most surprising behavior change after safe drinking water was the laundry. Typically, clothes are laid out on the soil or in the area with small thorny bushy to dry.. After an effective behavior change communication, which relayed ideas of pests and caterpillars crawling on the clothes and onto (or into) the skin, communities members started to pin the laundry up to avoid this undesirable contamination. The practice was even transformed into a law in this particular location.

Food preservation is another hygienic concern at household level [Cf: NUTRITION AND CARE PRACTICES, Household nutrition]. Leftover rice, soup, and/or cassava are typically kept aside in a covered pot and then reheated for all family members, including young children. According to the Risk Factor Survey, food preservation is dominant practice, ranging from 82.4% of households in Region 2 [78.3-86.5%, 95% CI] to 85.8% in Region 3 [81.7-89.8%, 95% CI].²⁴² Subsequent analyses taking into account anthropometric measurements of children in the household revealed an association between these indicators in Region 2; a child whose household preserved food and was classified as very poorly hygienic²⁴³ was more likely to be stunted [Cf: Annex B].

As is true for water management, town policies play a role in enforcing sanitation/ hygiene standards in few towns with current or previous CLTS interventions. Notably, no policies were mentioned for handwashing and/or food hygiene.

²⁴⁰ Child body cleanliness observation, Link NCA Indicator Guide.

²⁴¹ Condition of the kitchen / food conservation and environmental condition of the house checklist, Link NCA Indicator Guide.

²⁴² Region 1: 83.0% [79.1-86.9%, 95% CI]

²⁴³ Score of 4 or more on the HH hygiene checklist.

Sanitation/ hygiene issue	Town policies
Open defecation- adults	1. Mandatory latrine construction - Rivercess 2. CLTS - Sinoe, punishable by 200 LRD fine
Open defecation- children	1. Safe disposal fines - If a child defecates and it is not removed, the parent of the child will be fined the amount of 250 LRD- Rivercess
Uncontained animals	1. Containment fines - If livestock eats anyone's crops, it will be taken to the Commissioner's officer and fined 500 LRD. If unable to pay after few days, they will eat your goat. - Rivercess
Household	1. Hygienic item requirements - dish rack and laundry pins, Rivercess 2. Routine community clean ups - weeding and maintenance of hand pumps, Grand Bassa, Rivercess
Food preservation	None
Handwashing	None

Table 26: Sanitation/ hygiene laws, as described in the qualitative inquiry, November- December 2019

Perceptions of risks related to certain hygiene and sanitation practices are summarized below.

Behavior	Region 1	Region 2		Region 3		Community justifications
	Grand Cape Mount	Grand Bassa	Rural Montserrado	Rivercess	Sinoe	
Letting flies sit on a plate of food.	MEDIUM	HIGH	MEDIUM	HIGH	HIGH	Perception of a medium to high risk as flies can spread bacteria from faeces to food
Eating without washing hands.	MEDIUM	HIGH	HIGH	HIGH	HIGH	Widespread knowledge that hands should be washed before eating.
Cooking without washing hands.	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	Considered less risky than eating without washing hands as the heat can kill germs in the food.
Defecating without washing hands after.	MEDIUM	HIGH	MEDIUM	HIGH	HIGH	'Feces from your hands can stay with you onto the food' if you do not wash your hands, so not washing your hands is very risky- but some households indicated they did not have soap to wash hands after defecating every day, so the risk was manageable.
Defecating around the house.	MEDIUM	MEDIUM	HIGH	HIGH	HIGH	Medium risk voters indicated that, while the practice was not ideal, it happens frequently without any major consequences and thus a risk cannot be high.
Cleaning a latrine.	MEDIUM	LOW	LOW	LOW	LOW	Most participants indicated that cleaning a latrine presented a low risk, because they themselves had never done it before – due to the lack of latrines and/or know-how. An important exception in Grand Bassa (Region 2)/ Grand Cape

						Mount (Region 1) were individuals who had experience cleaning a latrine before and indicated this high risk (unpleasant and unclean), but the group vote settled with a medium ranking instead, as majority felt it was low risk.
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Table 27: Perception of the risks associated with certain sanitation/hygiene practices

A consistent discrepancy was noted with perceived risk and practice of cleaning a latrine. Most communities that ranked this as a low risk activity did not have experience cleaning a latrine and deferred this responsibility to community leaders if a public latrine was made available.

E. GENDER

Traditional values

"Tradition makes laws in our community, tradition trains people how to become a good wife or husband, tradition makes peace in the community."

Focus group participant, Sinoe

Traditional knowledge systems play a major role in defining gendered expectations, especially in rural areas. In addition to teaching young people local customs and livelihood skills, cultural traditions set rules and regulations enforced by town chiefs and/or elders. A town can set its own traditions based on shared taboos or restrictions for outsiders, i.e. certain areas, which cannot be visited by persons not born in the town. In group settings, the word 'tradition' was often also interpreted euphemistically as partially in reference to *Sande* and *Poro* societies.²⁴⁴ Bush school trainings for these societies teach sex education, hygiene, livelihood skills, and housekeeping skills.

Feelings about the role, and value, of traditions (and societies) are highly personal. Across settings and within communities, individuals debated the use and role of traditional values in their own and their children's lives. Some identified tradition as an important tenant of unity, while others blame the schooling as a missed opportunity to advance one's education and therefore society's progress.

"My dream was to be educated but then my parents put me in the Sande bush. I can no longer realize my dream, even from nursery school, I wasn't allowed to go."

Focus group participant, Grand Bassa

Those who endorse the importance of societies tend to also believe in their spiritual powers, citing them as important sources of confidence, protection, and peace-keeping in the community.

The 2013 DHS estimated that 85.8% of rural women had heard of the Sande society, and 64.8% of those women were members.²⁴⁵ The privacy and secrecy of societies is so important that participation is almost certainly under reflected. Both in non-traditional and traditional areas, the

²⁴⁴ Sande is a secret female society; Poro is its male equivalent.

²⁴⁵ Only women who said they had heard of the society were asked if they were members. Poro Society membership not reflected in DHS.

loosening grip of traditions was acknowledged and sometimes associated with youth's shifting (and slipping, according to elders) morality.

"Tradition play important role in our life because it show us how to take care of our home and man. But now the child are not making good use of the training. Our days we were practicing all that they trained us to do in tradition, but now the children are not doing it."

Focus group participant, Sinoe

Youth themselves felt that, while traditional values of respect and marriage still largely defined their identities [Cf: Annex G, Ideal man/ woman], the role of societies was shifting, largely because they would prefer to invest their time in formal education, if given the choice. To compensate, bush school trainings were reportedly rescheduled to take place around the formal school vacation calendar- compared to older generations of men and women, who reported spending years away from their families. The decision for a child to enter a bush school training is typically considered by parents and finalized by a male, though under significant community pressure in tight-knit traditional communities.

Per qualitative inquiry, the number of traditional families in a community was influenced by several factors. If a traditional authority sets a strong precedent for community traditions, community members tend to follow them. In some towns, even if an individual does not personally value traditional beliefs, he/she is still expected and pressured to send the child to bush school training. Parents who themselves had been formally educated, or had not spent time in bush school trainings themselves, did not tend to want this for their children, either. Many LR09 residents, as well as key informants, associated traditional compliance with ignorance, considering traditional education mutually exclusive with formal education. In LR10, where families migrate for work, children of migrant community members might stay at the home location to participate in traditional training or cede society participation entirely.

Gender norms: 'Ideal woman'

Attributes of an ideal woman are those which 'contribute to a fruitful and happy marriage,' or make the (romantic) relationship and family to be happy/successful.' Unlike men, a woman's worth is largely defined by her ability to keep up with the daily activities centered around her home, as well as her respect of others- and less so by her ability to fill income generating livelihood roles. Women described the most tedious work in the home as tasks to keep children and the home clean but part of their accepted burden.

"We monitor the children and our family every day. It is hard, but it is our normal routine. It is not satisfactory for us, but we just have to do it."

Focus group participant, Grand Bassa

An ideal woman should focus on her family; both their communicated needs and her emotional intelligence to interpret unsaid needs- she should 'understand his signs in public' and be 'shivering to work' for him and care for his stomach.

In qualitative inquiry, most perceptions of an 'ideal woman' centered around her dependability, responsibility, and respect [Cf: Qualities of an Ideal Woman, Annex G]. An ideal woman should be hospitable and caring; she should not show that she is upset. While focus group participants of

older age did not seem to accord importance to education, the youth had a tendency to indicate that an 'ideal woman' should also be educated. In Montserrado that meant achieving secondary or college education. Many attributes of an ideal woman, such as health of her child, hospitality, and timely preparation of meals, depend on her husband's financial provision- i.e. money to feed the family on time, a house to welcome visitors with accommodation, money for soap, medicine, and clothes to keep the child healthy and clean.

While some men (especially youth) value a woman's economic contributions and utilitarianism, most did not list them as a requirement for an ideal woman. Young women, on the other hand, often listed financial independence, or complementarianism, as an ideology to strive for. Supplemental income from a woman is then diverted to savings, additional school fees, or investments.

While women did not mention their own fertility as a quality of an ideal woman, men and youth did. An important ideology of femininity is the ability to have, and care for, children. Women considered motherhood an important role but were less concerned with a number of children they would give birth to. . An ideal woman should also be able to satisfy her husband in bed, never refusing his advances while she can initiate sex herself if in good understanding with the husband.

Women said they learned the qualities of 'ideal women' from the lived examples of their mothers and grandmothers. In traditional communities, society trainings played an important role in teaching women the respectful demeanor as well as their roles as wives and mothers. However, most women said inundation with these ideals began from young childhood, as they watched their mothers and grandmothers in the home.

Woman who fail to meet the 'ideal' paradigm include those who keep multiple sexual partners, gossip, and dress inappropriately (skirt above the knee). The latter comment was espoused in youth settings, even by female participants who themselves wore skirts above the knee. Consequences for a woman who failed to meet expected norms include derogatory name calling, targeting a woman's intelligence and/or sexuality- i.e. *hopajoe*²⁴⁶ woman, prostitute, foolish woman, useless woman [Cf: Qualities of an Ideal Woman, Annex G].

Gender norms: 'Ideal man'

Masculinity is defined by a man's control of and provision for the household. After dowry is paid, a woman, and eventually children, are the man's financial responsibility. An ideal man should be able to provide for the family's financial needs. A 'ideal man' should also financially provide for his girlfriend(s) and their children; while an 'ideal man' should not keep girlfriends according to men, women, and youth.

While women and youth expressed that an 'ideal man' should be monogamous, the practice was said to be pervasive across all livelihood zones and counties [Cf: Qualities of an Ideal Man, Annex G]. The more frequently mentioned characteristics of an ideal man can exist in the paradigm of polygamy. Men and youth frequently mentioned a man's sexual prowess as an important

²⁴⁶ Promiscuous.

characteristics, though it is important to note that this was separate from fertility, which was not explicitly mentioned as a feature of an ideal man.

As head of the home, a man is supposed to facilitate peace and learning in his family. In addition to the provision of school fees, a 'good man' lectures his family before bed, sharing learnings and reflections, sometimes prayers or lessons from the Bible. If the family owns a radio or mobile phone, this time can also revolve around listening to political news.

An ideal man should fit within his livelihood zone's gendered activities- i.e. successful fisherman in LR05, productive farmer in LR02/04, capable and employed rubber tapper in LR08, contracted concession worker or lucrative miner in LR10. A man's hunting record was an important point of pride and renown in LR02 and northern parts of LR04. According to youth and men, a man should be well-educated (secondary school) or 'in the pursuit of knowledge'- open to learning from his elders and a frequent 'lecturer' to his family and friends. Interestingly enough, women did not mention formal educational achievement as a requirement for men.

Men said they learned qualities of an 'ideal man' from positive role models in their lives or their communities.

"My father always loved to support his family, so I believed that this is what a real man should act like."

Focus group participant, Rural Montserrado

In traditional communities, Poro society trainings and the influence of traditional leaders play important roles in teaching men their roles inside and outside his home. In qualitative inquiry, it was very common for young men to name (unprobed) one or several men in the community whom they would aspire to be, based on their ideal qualities.

Men who fail to meet ideal paradigms are 'foolish,' 'useless,' 'wicked,' or 'unserious.' Derogatory terms related to a man's promiscuity were more commonly used by youth and women.

Women's daily workload

"We do more work than men because when the men burn the field, they can leave it with us because we can plant the farm, cut rice, parboil it, pound it. And when it comes to the cassava, we dig it, pound it, fix dumboy and the fufu. The men only cut the trees and burn the farm and the rest is left with us to do."

Focus group participant, Rivercess

Women spend their days juggling childcare, cleaning, cooking, and seasonal income generating activities. Partnered women defined their primary work as maintaining the home, supplemented by a spike in income generating activities per their tradition, livelihood zone, and/or familial need, usually during the dry season. Widows and single mothers assume both caretaker and head of household roles.

"Women activities in our township is hard; women goes to Firestone bush to slash, while some engage themselves in gardening vegetables as a means of support. The widows and single mothers are more likely to go to Firestone to slash."²⁴⁷

Focus group participant, Rural Montserrado

²⁴⁷ Cut trees for burning charcoal.

A typical woman's day starts "*before the sun*" by sweeping the yard, starting a fire, fetching water, and washing her face. Then she cooks the family's breakfast while ensuring her children are washed and clothed. She serves her husband and children breakfast first (if the children attend school) and then eats the remains after they go to work or school.

After she sends everyone off, a woman starts household chores and/or seasonal income generating activities.

During planting and scratching times, in LR02, LR04, and households in other livelihood zones that also primarily engage in agriculture, women go to the farm from 8 am to 5 pm or 6 pm. If a woman farms as part of a *koo*, she is delivered lunch by one of her teammates; if not, she depends on her husband to deliver food or skips meals. Post-harvest, a woman pounds the cassava and/or rice with large pestle and mortar in shifts. In the brushing time, when her husband is on the farm, she is responsible to help deliver meals to men on the farm. Because pounding the mortar is exhausting, she supplements her down time with other household tasks such as stirring food on the fire, fetching water, gathering firewood, and childcare. If she is engaged in petty trade, she will attend the market on market day and/or set up her small shop near her home. Once a woman stops her income generating activities, she will serve dinner, wash her children, and put them to bed.

In LR05, women balance their household responsibilities and petty trade with receiving fish at the beach for selling. Due to the unpredictability of the fishermen's schedules, women estimate the time that canoes return and then wait to purchase, often bringing their children with them, as they can wait several hours, or leaving the child with someone else. The first shift to receive fish can be as early as 5.00 am. Receiving fish can be quite competitive, meaning a woman can arrive on the beach hours before she expects delivery to ensure she receives fish for the day and that they are dried quickly. Women in this livelihood zone dry and smoke fish into the late night hours. During the heavy rain season, when fishing activities decline, women in this livelihood zone spend their days engaged in petty trade, routine household activities, and/or vegetable gardening.

In LR10, women's activities typically center around petty trade in the day time, supplemented by their household and childcare duties. Women engaged in petty trade in LR10 work late in the night, as they serve to profit from selling snack foods to hungry miners. Thus, she often finds someone to watch her child during the evening hours, or sets up her shop right outside of her home. In concession areas of Region 3, LR10, women are employed on a needs basis during peak activity times; typically, during circle weeding in palm concession areas. The company sets the schedule for work; women say they are not afforded childcare or breastfeeding breaks, so they depend on friends, a mother, or in-laws to lead routine household chores in the mornings and afternoons. Hours typically start early and end early evening, such that a woman has to rely on female relatives, older children, or her partner to take care of children, so that she does not lose her formal employment.

In addition to agricultural activities, women in Region 2, LR08 occasionally spend their days engaged in burning charcoal, only on a needs basis. The general day-to-day structure is similar to the agriculture zones, except for an additional hygiene burden, as the woman needs to bathe more frequently to rid the smoke from the home. In LR09, petty trading complements other

household and childcare tasks. If a woman is formally employed, she may engage female relatives to offset her daytime childcare and household responsibilities.

Across regions and livelihood zones, on Sunday's, women take a day to 'rest,' where daily activities in the early morning and evenings remain the same, but mid-morning and afternoons are spent in church, preparing a large Sunday meal for the family, and 'lecturing'²⁴⁸ her friends and family.

Women indicated they feel most busy/ tired when balancing their routine household duties with a seasonal increase in income generating activities. The most strenuous tasks are physically tedious, such as weeding cassava/ rice and circle weeding palm.

"Scratching (weeding) rice is the toughest. We strain our backs while bending to scratch. We are helped by our husband, who fells the trees and burns the farm, scratches."

Focus group participant, Grand Bassa, LR02

Women's Workload: Daily bundle

"Our responsibility is very hard, heavy workload is the cause women get older sooner than men in our community."

Focus group participant, Rivercess

Perceptions of maternal workload were studied qualitatively and quantitatively. Qualitatively, women often described the '*plenty plenty things to do in the day, and all the thinking business with it*'²⁴⁹ as part of their responsibilities of being a good woman. Therefore, conversations in group discussion about the burden of daily workload often deflected to a woman's sense of inevitable responsibility- i.e. the workload, between children, husband, and home, is often too much, but what is there to do about it, as it's part of my responsibility as a mother and wife. This was often described as a '*bundle*'- meaning all the literal and figurative things a woman carries with her on a daily basis.

Peak workload for women is seasonal, based largely on their livelihood activities. Workload in LR09 and LR10 did not follow seasonal trends, as income generating activities in those livelihood zones primarily followed the patterns of surrounding agriculture activities and/or were based around petty trade.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Peak work load- women												
LR02		+++	+++	+++	+++	+++	+++	+++				
LR04		+++	+++	+++	+++	+++	+++					
LR05	+++	+++	+++								+++	+++
LR08	+++	+++	+++								+++	+++

Table 28: Peak women workload, as described in qualitative inquiry, November- December 2019

²⁴⁸ Leading discussions with.

²⁴⁹ High workload, stress.

In the Risk Factor Survey (February and March data collection), female caregivers were asked to rank how their workload makes them feel- physically and emotionally.

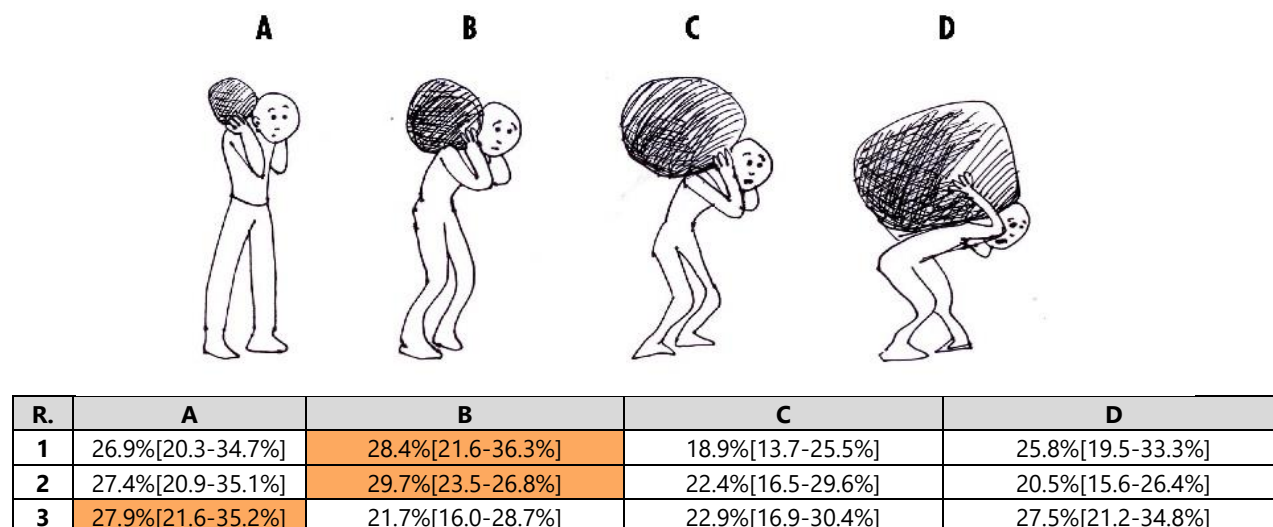


Figure 20: Workload Perception,²⁵⁰ Risk Factor Survey

Across regions, perceived workload varied but was nearly evenly distributed from lightest to heaviest.

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a women's self-identified workload does not appear to be a risk factor leading to stunting in the study area [Cf: Annex B].²⁵¹ The total number of children a woman negatively correlated with a woman's workload, meaning that the more children a woman had, the more likely she was to identify with a heavier workload.

Community members say a breastfeeding or pregnant woman should reduce her workload- particularly pounding rice/cassava, fetching water, and weeding/harvesting rice and cassava. Her ability to reduce work as she 'should', however, depended on the support available to her, mostly through sisters, female in-laws, or older children from the age of seven years old and up. According to the Risk Factor Survey, children whose mothers had the heaviest workload had significantly less likely to be still breastfed at 12 months.

Women can mitigate the pain associated with their workload by taking pain relievers, a cool shower, and taking physical rest.

"The hardest works we do are scratching the rice and fetching waters. After doing these works, I buy tablets [Paracetamol] and take them or if I don't have tablets, I can go to bed."

Focus group participant, Rivercess

²⁵⁰ Source: Action Contre la Faim France. December 2018. Page 141 sur 162. Suffering scale: impact on daily life. Image drawn by Armelle Sacher.

²⁵¹ In Region 1, heavy workload was significantly associated with wasting, such that a child whose mother had the heaviest work load was more likely to be wasted.

Men's daily workload

"When I wake up I pray, and go in the bush to hustle."

Focus group participant, Grand Bassa, LR04

Men's days center on income generating activities to support their obligations as head of the household, i.e. to ensure money for food and medical expenses is available. Direct childcare, such as bathing, feeding, and playing with the child, does not majorly factor into the man's daily workload. Men's daily activities are seasonal, with the heaviest workload falling in the dry season and activities lessening during the rainy season.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Peak work load-men												
LR02	+++	+++	+++	++								+++
LR04	+++	+++	+++	++							+++	+++
LR05	+++	+++	+++	++	+				+	++	+++	+++
LR08	+++	+++	+++	++	+				+	++	+++	+++

Table 29: Peak men's workload, as described in qualitative inquiry, November- December 2019

In agricultural livelihood zones LR02 and LR04, male daily activities mostly ascribe to the gendered, seasonal, traditional livelihood role, with little variation. Breakfast is typically forewent for a snack on the way as a man typically tends to reach his farm or starts *koo* activities in the early morning hours to beat the heat. Women typically serve lunch to *koo* groups at mid-day, or the man comes home, and then resumes work.

In LR10, despite alternative tasks, men's schedules are markedly similar to those of agricultural livelihood zones- leave in the mid-morning, return late evening. Men in concession areas of Region 3 may be formally employed by concession companies. Though contracted, this work typically involves long hours and is subject to seasonal availability. Opinions on the workload of formal concession work occupied flipped sides of the same coin- men who had formal employment be grieved the heavy workload and unfair benefits, while those on the periphery idealized the workload and said they would accept any benefit.

Fishermen in LR05 factor a supply, demand, and financial need algorithm into their daily activities. As such, they have a tendency assume one or two shifts on the sea within the same day. Morning shifts typically start at 4 or 5 am, and evening shifts can run overnight, though both are dependent on the tide. A two-shift day affords the man less than five hours of rest in between but can bring in enough cash to reduce pressure for work later in the week or month. This workload is usually managed by the canoe's captain or self-managed by men who operate their own canoe.

While on morning shift, a man might return for mid-day lunch, and then re-launch for evening shift fishing. Men who occupy the overnight shift will sleep during the day and depart in the early evening hours, leaving their partners to manage the home until their return. In LR05 of Region 2 employment opportunities for men blend into those of LR09. Fewer men devote their full energy to fishing, and those who do are often migrants without children at home.

Men in LR08 and LR09 describe more variety in the day-to-day, as steadier, formal employment opportunities are competitive, but traditional livelihood activities (farming/burning coal) were more tiresome, less lucrative, and therefore less desirable.

When asked if the workload was manageable, men across the study zone answered based on their understanding of the question as their responsibility or if it was physically exhausting.

"The workload is heavy, but we cannot do anything for now. As a result of my work load I am not happy because I cannot provide for all of my children equally."

Focus group participant, Grand Bassa

Men generally believe their work load is more challenging than women's, partially because of the physical strength needed and the physical difficulty. Physical exhaustion was highlighted mostly in dangerous livelihood activities, including felling trees and fishing during high seas.

"The workload is more hard than women's because during felling of tree, the trees sometimes fall on the man and he lost his life."

Focus group participant, Grand Bassa

Though the majority opinion, it was not ubiquitously shared- exceptions being men who perceived the daily chores of keeping the child healthy and the home clean as tedious and challenging.

When asked what men did to manage exhaustion, most shrugged that there were no options, and that the only time of rest was Sunday. To reduce stress, some farmers indicated they would take a cold bath in the running creek and get some sleep. Wealthier farmers could take on daily laborers to help share the load; others could engage the help of older children (10 years and up). Livelihood 'teams,' such as the *koo* structure for agriculture and a fishing group, could also reduce the workload a man feels on a given day.

In LR10 (mining and concession zone), difficulty paying for the child's treatment reflected oscillations in the income and/or migration of a male caregiver. While work is generally in higher demand during the dry season, migration for work was specific to the mining and concession industry in the zone. Male caregivers did not follow a standard migratory pattern for mining and/or concession work, but when they were not available to give cash or did not have cash to give, female caregivers indicated it was more challenging to buy things to keep the child healthy and/or pay for treatment.

Sunday is a day of rest, with men checking on the daily activities that require daily maintenance (palm wine tapping, checking traps), but primarily spending the day resting with their families, attending religious activities, discussing with friends, and eating 'good food.'

Coupling, marriage, and extramarital affairs

"Everybody wants their own fire hearth. When a young woman has breasts on her chest they think they are winning on their own now."

Focus group participant, Rivercess

Courtship typically begins informally, when both boys and girls are around the same age, typically when the girl exhibits initial signs of puberty, defined by mutual interest and spending time together. While some older women blamed family planning access for early coupling, coupling

transitioned to marriage early most often because of pregnancy, i.e. a young couple was not taking family planning and the woman became pregnant, thus the couple deciding to start a household together. Other reasons for early coupling and/or marriage were dissatisfaction with the care received at home, peer pressure, interest in sex, and/or a desire to start one's own family.

"Girls get peer pressure from their friends, telling them that I have my own boyfriend now and nothing is happening to me so if you do the same nothing will happen with you. Most want the money but some want the child, they see the peer of the same age having children and they want the same. Some are motivated by drugs and alcohol into boyfriend business."

Focus group participant, Grand Bassa

As noted with pregnancy [Cf: Health, early pregnancy], there was a consistent discrepancy between age of actual marriage and age of preparedness. Marriage is an economic proposition, the value of which youth allegedly undercut by pursuing '*man-woman business*'²⁵² at too young of an age. This often backfired on the parents, who hoped for marriage to be economically beneficial to their child and eventually themselves, but often had to absorb the new family's financial and food needs.

"Boys should get married at 20 years, because when you have a partner, you have to provide for that partner. You will be refused a job when you're 15-17 years; no one will give a job at that age. Girls should get married at 18; women will need things when they reach at that age, so they need partners because of materials."

Focus group participant, Rural Montserrado

Elderly community members believe the age of marriage has decreased from 25 or 30 to 13-15, though secondary data to dispute or support this is not available.²⁵³ While before, women were held in the Sande bush until they were emotionally and physically ready for marriage, young women now could exercise free will, which they were doing at '*too early an age*' [Cf: Early marriage and pregnancy]. While only a proxy measure of marriage, in the Risk Factor Survey, the percentage of mothers who first became pregnant at 14 or earlier ranged from 10.8% in Region 2 [6.9-16.5%, 95% CI] to 16.1% in Region 1 [10.6-23.6%, 95% CI].²⁵⁴

Dowry payment was typically the same across the study zone: \$48 USD and kola nut, plus food and drink for both families to celebrate. For families in economic crisis, the potential for an adolescent girl to be married off for dowry and continued salary or food support was acknowledged as a real option; "*some can go and hustle to bring money to their parents*"²⁵⁵. These were less often realized in a formal marriage arranged by the parents and more often so in pressure applied by parents to support the family in one means or another. Another source of pressure for marriage might stem from shame or embarrassment of a girl's father if he learns that his young daughter was sexually active.

When asked about polygyny and extramarital affairs, women and men across the study zone indicate it '*happens plenty*.' In addition to her child's education and health, a major source of stress for women was their ability to keep their partner from '*loving outside*,' or taking on girlfriends or

²⁵² Sex.

²⁵³ Sources: DHS 2013, DHS 2007.

²⁵⁴ Region 3: 11.3% [7.0-17.7%, 95% CI].

²⁵⁵ Focus group participant, Montserrado.

additional wives without their consent. This was particularly stressful during pregnancy and the six months post-partum, when a woman is not supposed to have sex to keep the breastfeeding child from becoming malnourished. The threat of a man cheating while breastfeeding was so immense that several women admitted to stopping exclusive breastfeeding early, to satisfy their partners' demands. Other sources of dissatisfaction between partners include a man's displeasure with the food available, often secondary to insufficient funds made available to a woman to prepare said food [**Cf:** NUTRITION AND CARE PRACTICES, Household nutrition]. Women often withhold food or sabotage the meal by preparing a weak gravy or burnt rice when displeased with a man or suspecting him of cheating.' Thus, a household can enter a vicious cycle of the man spending time, and eating with, a different lover, making less funds available to the woman to prepare meals that might lure him back, exacerbating frustration from both parties.

The decision to take another wife, and the total number of wives to take, is non-linear with the dispensable income available to the household. The decision to take another wife was more often associated with sexual dissatisfaction and/or unsatisfactory care in the home, meaning bad food, an untidy house, or generally unpleasant interactions. In the case an additional wife is taken, a clear power paradigm among the wives emerges: if the first wife remains in good standing with the husband, she is considered the superior to the younger. Her workload reduces as she is the female authority in the home and she can delegate the home tasks. If the first wife does not remain in good standing, household resources are diverted to the new wife/ wives, leaving the older wife and her children without support, which needs to be compensated by income-generating activities. Women cited the real threat of resources being withheld as reason to comply with a husband's decision to take on another partner.

In the study area, rates of polygyny per 2013 DHS ranged from 8.7% in Rivercess and 18.5% in Grand Cape Mount.²⁵⁶ These may have been underreported based on the understanding of the word 'wife,' as many polyamorous relationships discussed during the Link NCA study were with girlfriends/boyfriends, not husbands or wives. Generally speaking, in the Risk Factor Survey men reported fewer multiple partners, ranging from 3.6% in Montserrado to 10.6% in Rivercess. The percentage of children who lived in polygynous households, by either female or male report,²⁵⁶ per the Risk Factor Survey, ranged from 10.6% in Region 2 [7.2-14.1%, 95% CI] to 21.1% in Region 1 [16.7-25.6%, 95% CI]. Multiple co-wives were reported only in Region 1, in 4.6% of children's households [2.1-7.2%, 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that polygyny did not seem to be a risk factor for stunting in the study population [**Cf:** Annex B].²⁵⁷

Traditionally, and per secondary literature review, Liberian men are believed to be 'jealous' and authoritarian. A man is often taught, or learns from peers, to show jealousy as a sign that he loves

²⁵⁶ Question was posed to both the head of household and the female caregiver; indicated as yes if either or both said yes.

²⁵⁷ Analyses of variance indicate significant variance by Region; highest rates of polygyny in Region 1.

his partner.²⁵⁸ Man's jealousy and restriction on women's decision-making was highlighted as a major source of disagreement by key informants including midwives and health facility personnel.

Male members of the study team were sometimes eyed with suspicion by male partners; town rules during the teams' community entry often specified that visiting males must ask town leadership first before pursuing any romantic relationship, to assuage jealous suspicions of male residents. During one key informant interview with a seven month pregnant woman, a boyfriend (who had been present during the informed consent by the team in the presence of the local community mobilizer) was so jealous of the male study team member that he chose to leave his activities (digging potter clay) and supervise the interview from a distance. [Cf: Case Study, Young Pregnant Woman, Grand Bassa].

Among women, an age-based rift is emerging regarding acceptance of a man's jealousy. When the scenario of 'Young Pregnant Woman, Grand Bassa' was posed as a case study in focus group discussions, older women generally indicated jealousy was an expression of love.

"If I was XX, I would just tell her to forget about school and focus on her children, it's too late for her now. XX's boyfriend is jealous because he loves her. XX should forget about school and be a businesswoman²⁵⁹ to support her children so that they can achieve the dreams she once had."

Focus group participant, Grand Bassa

Younger women conceded that, while XX's chances of achieving her dream were reduced, *"her boyfriend is jealous because he decided to be jealous, jealous man makes the woman to suffer."* Recommendations for XX were based on the social support network XX had, but it was generally accepted that there was little to do to stop a jealous man being suspicious of his partner. Both men and women could be suspected of having extramarital affairs; a woman found to be cheating was sure to be divorced, while a man found to have a girlfriend would either take that woman as his wife or keep supporting her financially if she became pregnant.

If a man suspected his partner of spending her time with other men or keeping boyfriends, he could *'disgrace his wife in the night in a wrong manner²⁶⁰'*, meaning physically beating her. Women believed that physical abuse increased when a man started spending time with other girlfriends, to release tension, but that it was impossible for them to know. Another major source of conflict or confusion between partners was economic distress or mistrust about use of funds. For example, *"when a man is working for US \$100.00 but does not give all the salary during the other months,"* this could cause a dispute between partners.²⁶¹

Human rights campaigns' which targeted reduction of physical abuse were referenced as effective by parents for children and less effective for women. In the case of escalating tensions, several means of de-escalation were mentioned by households: consulting a trusted elder (mother, father, mother-in-law, and grandmother), a town chief, or a conversation between the husband and wife.

²⁵⁸ Source : Martínez Pérez, G., Tarr-Attia, C.K., Breeze-Barry, B. *et al.* 'Researchers have love for life': opportunities and barriers to engage pregnant women in malaria research in post-Ebola Liberia. *Malar J* **17**, 132 (2018).

²⁵⁹ Petty trade.

²⁶⁰ Focus group participant men, Grand Bassa.

²⁶¹ Montserrado, Focus group participant women.

Few women indicated they themselves were physically abused by a partner, though when asked about the practice at community level, women, youth, and men were quick to say it happens and 'happens plenty.' If a woman had a good relationship with her husband's parents, she would go to them for advice if her husband beat her, because *'they know him best.'*

While parents feared that youth would call the police on them if they were accused of physical abuse, women were less likely to call the police to settle disputes with their partners.

"Settling confusion²⁶² between men and women they can call older people to settle the problem, if the woman calls police and the man is to be in jail, she will run back to the station to free her man because her heart can be burning for her husband."

Focus group participant, Grand Bassa

Divorce is rare and managed by traditional leaders and/or the courts. Reasons to 'quit a marriage' were highly personal, ranging from no reason to frequent and insufferable beatings, taking on another wife without consent, and failure to bear children. Women with their own income source could eventually quit the marriage, especially if they did not trust their partner with money. Even if a woman's 'deal-breaker' behavior was present in a marriage, she indicated she was unlikely to stay in the marriage without financial means to support herself.

"We need more livelihood activities for women, forget about the men, if we could just take care of themselves. Like in Careysburg, we can see some development opportunities, but not for us here."

Focus group participant, Rural Montserrado

Decision-making power

"The man is the hustler for the money so he is the one to decide in the home, but if the woman has some money, she can make the decision too."

Focus group participant, Grand Bassa, LR04

The way decisions are made in the home varies widely within and between study areas. Generally, a 'traditional' man makes most decisions in the home, while a 'modern' man consults with his wife or knows that she makes some decisions alone. Thus, decision-making trends noted across the study zone should be interpreted with caution, as distribution of traditional and non-traditional homes is much more nuanced than county and livelihood zone- and decision-making between traditional homes varies, as well.

The Link NCA team tested shared or designated responsibilities for several key decisions, qualitatively and quantitatively. Key findings are summarized below:

Domain	Bearer of decision					Community justification + additional information
	Region 1	Region 2		Region 3		
	Grand Cape Mount	Grand Bassa	Rural Montserrado	Rivercess	Sinoe	
Marriage	Man or woman	Woman or parents	Man or Woman	Man	Parents	There is no set decider for marriage, though community members indicated trends by county. While parents

²⁶² Disputes.

						historically made the decision for their child to marry, this is changing. It is possible that there is discordance between 'marriage' and 'coupling' - while either teenager can choose to couple without parental knowledge or consent, traditional marriage tends to follow traditional law, with participants in Rivercess indicating it is the man's decision and those in Sinoe indicating the parents still decide.
Household expenses	Woman	Man	Man	Man	Woman	Decision for household expenses varied across the study zone, though this likely reflects proximity to the market (i.e. who is attending market day and purchasing for the household).
Family planning	Man	Man	Man	Man	Man	Men make the decision about family planning and the number of children to have in the family, "because the load is on them" (Montserrado). Woman who take a unilateral decision for family planning usually take Depo, because of the subtlety of the injection site.
Schooling for children	Man and woman conjointly	Man and woman conjointly	Woman	Man and woman conjointly	Man and woman conjointly	Both parents decide for the child to go to school- though this varies depending on associated costs. In towns with a free government school, the parents decide conjointly and there are few to no associated fees. Either parent can initiate the decision to send a child away for schooling in an urban center, though the male is the decision maker for funding. "For girls, my plan is for her to be educated and she has reached maturity and if she disagree with the plan, then I leave it. The father and mother decide for the child to get to school. It is the woman's responsibility to persuade the child to go to school."- Male

						Focus group participant, Montserrado.
Treatment of child illness	Man and woman conjointly	Man and woman conjointly	Man and woman conjointly	Man and woman conjointly	Man	Decisions for the child's health treatment follow a similar pattern to schooling; the woman initiates conversations about the decision if there are costs involved and she does not have her own budget for the care. The man decides with the woman if money will be spent on the child's treatment.
Household nutrition-content	Man	Man	Man	Woman	Woman	A man can call for which soup he prefers, while in Rivercess and Sinoe the woman was more likely to make the decision based on her understanding of the husband's preferences.
Household nutrition-quantity	Woman	Woman	Woman	Woman	Woman	The woman decides the portion needed for mealtime and cooks accordingly.
Daily activities	Man and woman conjointly	Man and woman conjointly	Man and woman conjointly	Man and woman conjointly	Man and woman conjointly	Men and women can discuss their daily activities together or make the decision for their own activities.
Additional wife	Man	Man	-	Man	Man	The man makes the decision to take another wife. Though some older women (Grand Bassa, Rivercess) mentioned recruiting another wife, anticipating that their husband would take one anyways, based on help needed in the household or their friendship with the woman, this was less common than the man bringing another woman into the home uncounseled.

Table 30: Overview of decision-making powers within a household, as described in qualitative inquiry, November-December 2019

Household money

Few women are involved in, or in control of, decisions on the family's finances- ranging from 15.3%[11.0-19.6%, 95% CI] in Region 1 to 25.5%[20.0-31.1%, 95% CI] in Region 3.²⁶³ Suspicion and mistrust influence this, on both sides: many men believe women will spend money frivolously, and many women believe men spend money on extramarital and other illicit affairs.

"Women and men do spend differently because, as for the women when it comes to wearing any new clothes they see they want to buy it/ have it, for this reason they spend more than men."

Focus group participant, Rivercess

"Men spend by supporting their habits (cigarettes/ alcohol and supporting girlfriends), because the men are in control of the money."

Focus group participant women, Grand Cape Mount

Women believe a woman's earnings should be hers to spend. While men said the same, women across the study zone complained that men kept their cash for family expenses but often used the money to keep up with other girlfriends. In several of the study sites [Region 2, Rural Montserrado; Region 3, Rivercess] there were women's only savings (*susu*) clubs that women participated in with their husband's consent. Men do not give women money as an allowance but say money from her own small market garden is hers to spend or save. The only regular allowance is given at Christmas time, for the woman to buy gifts for the family and also treat herself to something small.

A woman's ability to participate in her own income generating activities and make decisions is significantly influenced by her partner's jealousy. A jealous man is unlikely to permit his wife to participate in a livelihood that is outside of his supervision. Some women indicated exasperation with this limitation.

"We would like to change from only being boring machines and wives to decision makers to positively impact our community and the life of our children."

Focus group participant, Montserrado

Households that take joint decisions on family expenses say this is particularly relevant during difficult times, when typical spending needs to reduce. While it is believed to be the man's responsibility to initiate this conversation, women said they often led men to the topic, during intimate times, when they noticed money for food and other needs was insufficient. Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a child whose mother is involved in the decision for household spending is seemingly not more or less likely to be stunted [Cf: Annex B].

Family planning

The decision for the total number of children in the family is typically made by the male, as is the decision to utilize modern contraceptives. Women who are abandoned by partners temporarily or permanently say they take family planning without partner involvement, usually when they

²⁶³ Region 2 : 21.2% [16.2-26.2%, 95% CI]

started having to take on additional income generating activities to support the family. The percentage of children's mothers who made or jointly made the decision to take contraceptives ranged from 40.7% in Region 1 [34.9-46.6%, 95% CI] to 52.2% in Region 3 [45.6-58.8%, 95% CI].²⁶⁴ A unilateral decision to take family planning could spark domestic dispute and/or abuse, rectified by removing the device or stopping the series of injections. Some CHA's indicated they would not provide family planning until confirming the male partner is aware and has confirmed, to prevent retaliation and/or jealousy.

"When she took the implant without consent, he bruised the area purple so that we knew exactly where to take it out from."

Key informant, Rivercess

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a child whose mother is involved in the decision for family planning is seemingly not more or less likely to be stunted [Cf: Annex B].

Clinic

A decision to attend the clinic often implies additional costs [Cf: HEALTH, Barriers to Health Care]. Percentages by Region ranged from 26.9% in Region 1 [21.6-32.2%, 95% CI] to 45.3% in Region 2 [39.2-51.5%, 95% CI].²⁶⁵ Averaged over the study zone, 38.0% of children's mothers indicated they make or are involved in the decision to carry a child to the clinic, while only 20.5% of children's mothers indicated the same for family finances. Only 15.2% of children's mothers indicated they are involved with both decisions. Thus, generally, the opportunity cost of paying for a prescription/transportation, and having to seek permission, is weighed against the severity and duration of the illness.

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a child whose mother is involved in the decision to take the child to the clinic is seemingly not more or less likely to be stunted [Cf: Annex B].

School

As is true for the clinic, the decision for the child to attend school often depends on if there are additional costs. While local government schools are free, a decision to send the child to a larger urban area for schooling has financial implications, and is often decided by the man. Percentage of women involved in a decision to send the child to school was lower than those who decided to take the child to the clinic, ranging from 16.4% in Region 1 [12.0-20.8%, 95% CI] to 29.6% in Region 3 [23.8-35.4%, 95% CI].²⁶⁶

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a

²⁶⁴ Region 1: 40.7% [34.9-46.6% CI], Region 2: 48.8% [42.6-55.0% CI], Region 3 : 52.2%[45.6-58.8%]

²⁶⁵ Region 3: 42.9%[36.5-49.2%, 95% CI]

²⁶⁶ Region 2: 26.3%[20.9-31.6%, 95% CI]

child whose mother is involved in the decision for the child's enrollment in school is seemingly not more or less likely to be stunted [Cf: Annex B].

Interesting, the decision to send one's child to traditional schooling often lies in the hands of the town authorities, and/or the husband.

"The Sande Bush wasted my time, if I was to decide for myself I would not send my child there but it's our town tradition so I'm forced."

Focus group participant, Grand Bassa

If it is the town's tradition for children to be sent to the bush for school, it is very challenging for a woman to push back on the decision (if she wanted to), without very strong support from her partner.

Household nutrition

'Calling of the soup'²⁶⁷ is an interesting form of control in some households. When discussing meal preferences and food allocation, many women framed typical meals around their husband's preferences. While some men can literally call the soup for later in the day when they leave, women in the study zone were more in control of this decision than others, ranging from 41.2% in Region 1 [35.4-47.1%, 95% CI] to 52.1% in Region 3 [45.7-58.5%, 95% CI].

Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that a child whose mother is involved in the household nutrition is seemingly not more or less likely to be stunted [Cf: Annex B].

Percentage of children whose mothers made three or more decisions ranged from 17.6% in Region 1 [13.0-22.1%, 95% CI] to 32.9% in Region 3 [26.7-39.1%, 95% CI].²⁶⁸ The percentage of mothers who were involved in no household decisions ranged from 19.2% in Region 2 [14.3-24.1%, 95% CI] to 35.5% in Region 1 [29.8-41.2%, 95% CI].²⁶⁹ Subsequent analyses taking into account anthropometric measurements of children in the household did not reveal any statistical association between these indicators, which means that the number of decisions a mother was involved in by self-report did not make the child more or less likely to be stunted [Cf: Annex B].

Figure **21** summarizes distribution of maternal decision-making, by decision. Analyses of variance indicate significant variation between Regions, with mothers in Region 1 involved in the fewest decisions.

²⁶⁷ Deciding the meal for the day.

²⁶⁸ Region 2: 30.4%, [24.7-36.1%] 95% CI

²⁶⁹ Region 3: 22.1%[16.6-27.6%, 95% CI]

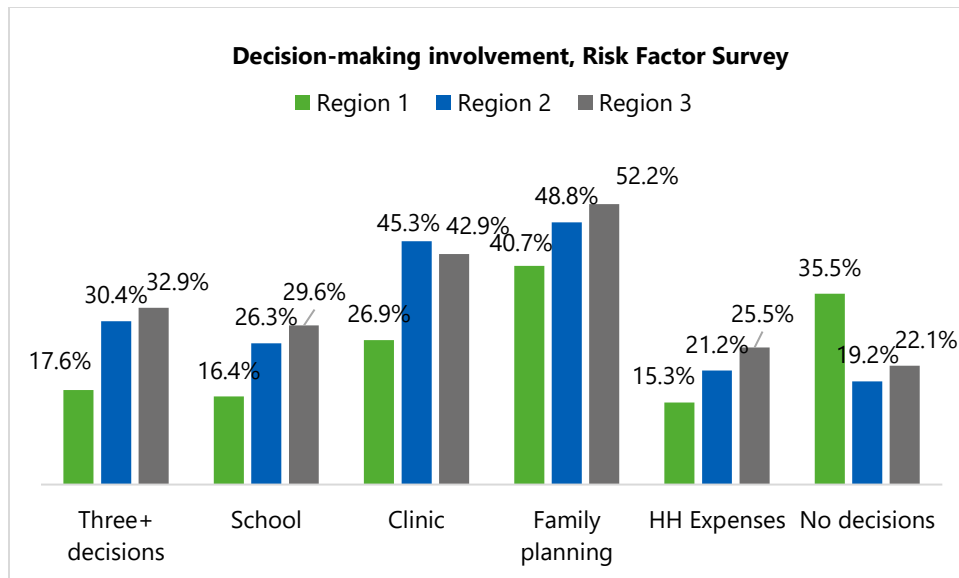


Figure 21: Decision-making involvement, Risk Factor Survey

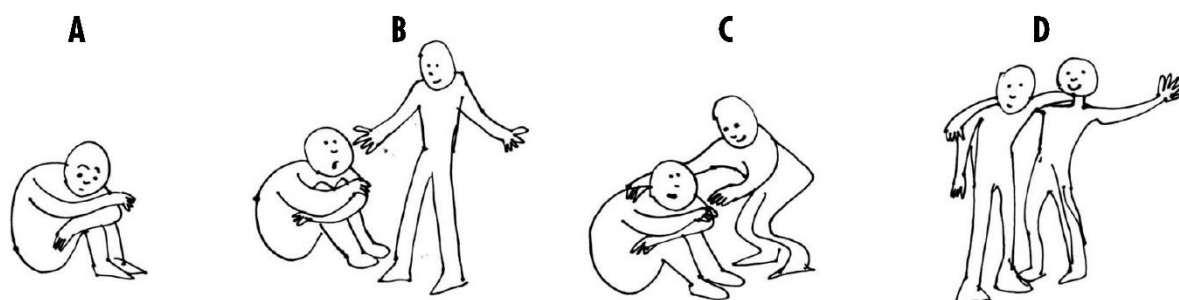
Parental stress and abuse

Stress, or '*too much thinking business*,' was recognized as a pervasive and insurmountable challenge for parents across the study zone. Economic distress is the primary stressor for parents, followed by low access to quality education and high school fees. Price fluctuations and devaluation of currency make it impossible for parents to save or invest in what they have been taught are most important for their children- formal education and medical care. Adolescents' perceived promiscuity and disrespect present an additional stressor to parents, as adolescent girls seek financial support from romantic partners to supplement the little provided by parents, and adolescent boys pursue autonomy from their parents through their own income generating activities.

Extreme stress sometimes presents in the phenomenon of 'open mole.' In infants and children, *open mole* refers to fontanelle or softened skull. However, in adults, *open mole* is a syndrome documented in secondary literature consistent with symptoms of depression and anxiety, not necessarily identifiable by a physical softening of the skull. Symptoms include paranoia, sadness, headache, body pain, and seclusion.²⁷⁰

A woman's social support network plays a major role in offsetting her workload, either by helping with childcare or assuming chores. In times of insurmountable stress, many women indicated that they had someone in their life to listen to and comfort them, but not necessarily to alleviate them from their situation.

²⁷⁰ Source: Abramowitz, S. A. Trauma and humanitarian translation in Liberia: the tale of open mole. Culture, Medicine, and Psychiatry. 34(2): 353-379. 2010.



R. ²⁷¹	A	B	C	D
1	18.9%[13.5-25.8%]	16.4%[11.3-23.1%]	33.5% [26.8-40.9%]	31.3%[25.1-38.2%]
2	22.4%[16.5-29.7%]	12.7%[8.7-18.3%]	44.4%[37.4-51.6%]	20.5%[14.9-27.4%]
3	25.0%[18.8-32.5%]	13.8%[9.0-20.4%]	42.5%[35.5-49.8%]	18.8%[13.3-25.8%]

Figure 22: External support, Risk Factor Survey

A concerning number of women, however, felt that in times of stress, they had no one to speak to or be comforted by- ranging from 18.9% in Region 1 to 25.0% in Region 3. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a statistically significant association between these indicators; in Region 2, a child whose mother had the lowest perceived external support [A] was possibly more likely to be stunted [p-val <0.1]. In the same region, a child whose mother had the lowest external support was more likely to be WaST [Cf: Annex B]. A composite scoring of workload and external support was not significantly associated with stunting, meaning children whose mothers had the heaviest workload and felt the lowest social support, per this index, were not more likely to be stunted.

Opportunities for youth

"It's a new world we will live in now; children don't want to be under parent control."

Focus group participant, Grand Bassa

Shifting moral codes in education and youth autonomy present a conundrum for parents and youth. Many parents did not get the opportunity to attend school themselves because of the war, low schooling coverage, or long stays in traditional education systems, thus now prioritizing the opportunity for their children.

"I was 16 year old before I enter A/B/C, because of the war. No one to come to where the school is and no money around."

Focus group participant, Rural Montserrado

Dreams for youth are often tied to formal education as an entryway to a better, more financially secure, less tiresome life. Families pride education for youth that is delivered in 'proper' English as opposed to local dialects. A child who attends schooling in Buchanan or Monrovia is civilized, well prepared for the outside world, and seen as more likely to support the family sooner.

"If you spend more money on education, if your child learns, it will benefit you in the future."

Focus group participant, Rural Montserrado

²⁷¹ Region

In the study zone, the percentage of children's mothers who did not have the opportunity to attend formal school ranged from 33.3% in Region 3 [26.3-41.2%, 95% CI] to 36.4% in Region 2 [29.9-43.5%, 95% CI]. Subsequent analyses taking into account anthropometric measurements of children in the household revealed a potential association between these indicators, in that a child whose mother had stopped in junior high level or above was potentially less likely to be stunted [p-val <0.1] [Cf: Annex B].

Education is both an investment and an expense for a striking number of households. According to the Risk Factor Survey, the percentage of children under 5 years old who live in households financially supporting older children attending an urban school ranged from 45.5% in Region 2 [40.1-50.9%, 95% CI] to 60.6% in Region 3 [54.9-66.2%, 95% CI].²⁷² Subsequent analyses taking into account anthropometric measurements of children in the household revealed a significant statistical association between these indicators; a child whose household was supporting an older child in an urban school was less likely to be stunted [Cf: Annex B]. This perhaps suggests that households that can support urban school tuition fees also have money to provide food and other needs in the home.

When asked what factors were considered when choosing which child(ren) to send, parents indicated a choice was made when the child was in 5th grade, as 6th grade is typically the last grade in community schools. Gender '*used to be a factor,*' but now that income opportunities for women are increasing, the decision was more-so related to timing. Some key informants disagreed with this assessment, indicating boys are often still prioritized for sending to school.

In peri-urban settings, youth who did have the opportunity to attend formal education referenced temptations to earn supplemental cash and couple early.

"My dream was to get big and help my parents, but I didn't finish because I dropped from school. I lacked cash, I was misled by my friends, early cohabitation (with a boyfriend) to sustain self. I started living with my friends and left my parents, started laying basket and selling catfish along the road, dropped from school, and started having children."

Focus group participant, LR09

While parents dream for their children to achieve a formal education, even if it requires relocation, they also grieve shifting moral codes, especially pertaining to respect and obedience. Many parents felt 'human rights', or campaigns against physical abuse, actually decreased parental authority to keep children from engaging in behaviors that threatened their ability to stay in school or be in healthy partnerships. Parents said they feared to physically discipline their child, at risk of being carried to the police station.

"During our days, we were always doing things our parents wanted us to do and for this the interactions was very good but for our children, they are not listening to us and are doing things we ask them to do. They are very disrespectful to us. Whenever we try to discipline them, they will talk about human rights. These things happen because of modernization and the presence of human rights/ child rights."

Focus group participant, Grand Cape Mount

²⁷² Region 1: 54.2%[49.0-59.4%, 95% CI]

Youth themselves said they could report their parents if beaten, but this was only because they were exercising freedoms that should be theirs. This was particularly true pertaining romantic relationships.

"The reason for confusion between parents and their children- unfair treatment of children by the parent. My parents advise me to have one boyfriend, and I refuse because I said that one tree cannot make a forest, and that make my parents vexed."

Focus group participant, Rivercess

Hefty school fees and insufficient employment opportunities after graduation were referenced by youth in peri-urban areas as reasons to start a family early. Furthermore, youth discussed the care and financial provision they received (or hoped to receive) from a boyfriend or girlfriend as that which was missing from their own homes. Key informants remembered times when the material things of marriage and partnership weren't as alluring.

"Let me tell you, in 1972, we used to just go sing and drink the whole night and just rest like that. Before, we didn't care about clothes and who's buying what. Now, the young people are like they don't want to spend 1 hour anywhere for nothing (without financial benefit). Everybody want to live like they're in the city. Their thinking (some) is good- 60% of them doing that thinking, 40% stay behind."

Clan Chief, Grand Bassa

If funds were not available to send a child to Buchanan, Monrovia, or Greenville for school by 6th grade, youth were nihilistic about the opportunities left to them. While some youth still aspire to the traditional martial ideals, few aspired to the traditional livelihood roles, referencing their parents' financial distress and heavy workload.

"In the interior, the only thing you can do to survive is to plant, and if I survive then I have achieved my dream. If you plant and survive then in the future maybe you can hope to do something else."

Focus group participant, Grand Bassa

A youth who is unable to achieve his/her dream of formal education, due to lack of funds or early coupling, resorts back to the primary livelihood role in the community. While some endorsed general satisfaction with this pivot, if/when it was made, this course was typically seen as non-reversible and is replaced by filling ideals of a man or woman within their town, as is illustrated by the story of a young fisherman in LR05 below.

Young Fisherman- Grand Cape Mount, LR05
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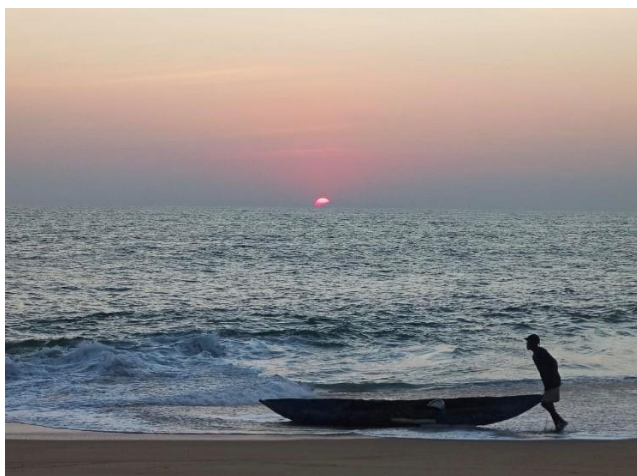


Photo 6: Young fisherman pushes his canoe after being interviewed

I am 18 years of age. I am a citizen of this beach community²⁷³. I went to school and stopped in the 4th grade. I stopped going to school because my mother and father died during the Ebola Crisis in Liberia. I am now living by fishing because I have no supporter/sponsor. I was 15 years old when my parents died and no one was there to help me. I live here with my girlfriend who is 15 years of age, and the both of us have one son who is 8 months old.

I met my girlfriend at the age of 14, she went to school also but dropped out of school because she had no supports (school fee). She dries and sells the fish/ fishes I get from the sea to support our home. After sale, my girlfriend sometimes get 10-20 thousand LRD.

I had a dream of becoming a medical doctor when I was living with my parents, this dream changed when they died and I now consider myself a fisherman. I can no longer be a medical doctor because I have to care for myself and my family through fishing.

The life I am living now was not the life that I wanted to live but I just have to because of the area I find myself and the condition I am in.

Going to school now will not help me because I am used to fishing and I have interest of being a great fisherman in my community. I leave my family by 7 pm to start my fishing activities and return at 2 am. I only sleep for 5 hours (2 am to 6 am) and start another journey at 8 am and return by 2 pm and wait for the night.

I am not happy with my current condition (such a time, such a condition) but I have to make myself happy in doing it because that is our key source of income for more members of our community.

Thus, parents and youth themselves discussed modernization as a double-edged sword-presenting opportunities to finish secondary school and onward on one side, while opening an opportunity for early emancipation from parents on the other.

F. UNDER-NUTRITION

ANTHROPOMETRIC DATA COLLECTION RESULTS

²⁷³ Name withheld to protect anonymity.

The anthropometric data collection findings revealed a prevalence of global chronic malnutrition (GCM) on the basis of height-for-age z-score at 33.8% [29.2-38.7%, 95% CI] in Region 1, 34.1% [27.0-42.0%, 95% CI] in Region 2, and 36.4% [29.6-43.7%, 95% CI] in Region 3. Prevalence of global acute malnutrition (GAM) on the basis of weight-for-height z-score is estimated at 5.4% [2.8-10.2%, 95% CI] in Region 1, 7.1% [4.6-10.9%, 95% CI] in Region 2, and 8.7% [5.5-13.5, 95% CI] in Region 3. The prevalence of severe acute malnutrition (SAM), according to the same criterion, was estimated at 1.4% [0.5-3.7%, 95% CI] in Region 1, 2.6% [1.2-5.8%, 95% CI] in Region 2, and 3.1% [1.4-6.4%, 95% CI] in Region 3.

References	Indicators	Region 1		Region 2		Region 3	
WHZ	Global Acute Malnutrition W/H <-2 z-score and/or edema	Z-scores and/or edema (N =294)	5.4 % (2.8 - 10.2 95% CI)	Z-scores and/or edema (N =267)	7.1 % (4.6 - 10.9 95% CI)	Z-scores and/or edema (N =229)	8.7% (5.5-13.5 95% CI)
	Severe Acute Malnutrition W/H <-3 z-score and/or edema		1.4 % (0.5 - 3.7 95% CI)		2.6 % (1.2 - 5.8 95% CI)		3.1 % (1.4 - 6.4 95% CI)
Edema	Bilateral pitting edema	Age= 0-59 months (N =322)	0.0 %	Age= 0-59 months (N =310)	0.03% (0.0-2.3 95% CI)	Age= 0-59 months (N =269)	0.4% (0.0-2.6 95% CI)
HAZ	Global Chronic Malnutrition H/A <-2 z-score	Z-scores (N =293)	33.8 % (29.2 - 38.7 95% CI)	Z-scores (N =270)	34.1 % (27.0 - 42.0 95% CI)	Z-scores (N =231)	36.4 % (29.6 - 43.7 95% CI)
	Severe Chronic Malnutrition H/A <-3z		12.6 % (8.6 - 18.2 95% CI)		11.9 % (7.6 - 18.1 95% CI)		16.0 % (10.5 - 23.7 95% CI)
WaST	Wasting & Stunting H/A <-2 z-score and W/H <-2 z-score	Composite (N= 293)	3.4% (1.9-6.2 95% CI)	Composite (N= 267)	4.1% (2.3-7.3 95% CI)	Composite (N= 231)	4.0% (2.1-7.4 95% CI)
WAZ	Global Underweight W/A <-2z	Z-scores (N =294)	17.7 % (12.4 - 24.6 95% CI)	Z-scores (N =267)	21.0 % (14.9 - 28.7 95% CI)	Z-scores (N = 231)	18.2 % (13.8 - 23.6 95% CI)
	Severe Underweight W/A <-3z		3.4 % (1.8 - 6.5 95% CI)		7.1 % (3.6 - 13.5 95% CI)		7.4 % (4.2 - 12.6 95% CI)
MUAC	Global Acute Malnutrition (MUAC <125mm) and/or edema	Age = 6-59 months (N =295)	2.7 % (1.2 - 6.0 95% CI)	Age = 6-59 months (N =271)	5.2 % (2.6 - 9.9 95% CI)	Age = 6-59 months (N =232)	4.3 % (2.3 - 8.0 95% CI)

Table 31: Summary of anthropometric results, Risk Factor Survey²⁷⁴

In addition to risks posed by respective classifications of undernutrition, secondary literature suggests increased mortality in children with multiple anthropometric deficits.⁶ The prevalence of children who were both wasted and stunted ranged from 3.4% [1.9-6.2%, 95% CI] in Region 1 to 4.1% [2.3-7.3%, 95% CI] in Region 2.

²⁷⁴ WHO 2006 exclusion flags applied. Non-response/ absentee rate: Region 1- 6.1%, Region 2- 7.3%, Region 3- 6.1%.

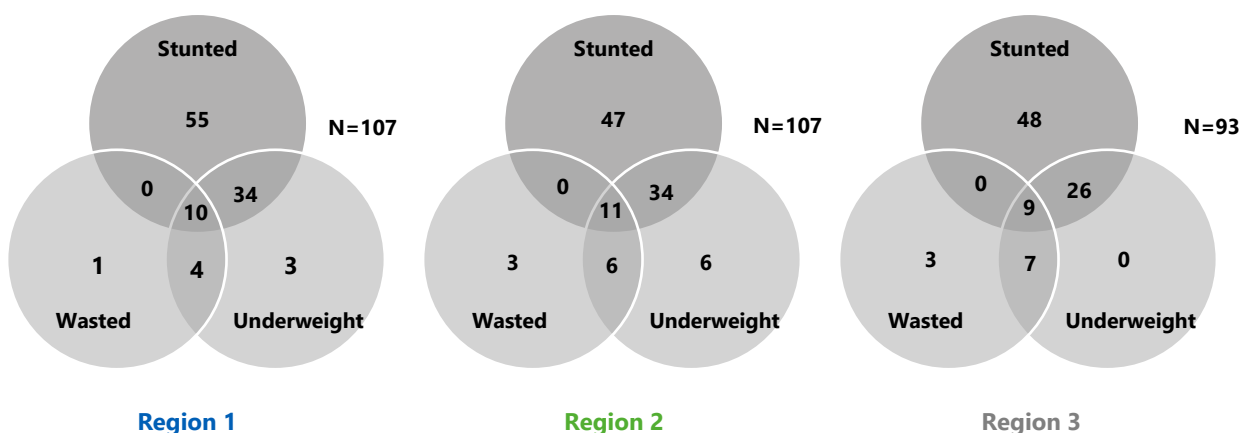


Table 32: Number of cases by anthropometric deficiency, Risk Factor Survey²⁷⁵

All children who were wasted and stunted were also underweight. In Region 3, all underweight children were also wasted, stunted, or both.

Subsequent analyses of age and gender revealed a significant relationship between age and WaST in Regions 1, 2, and 3; meaning that a child who is less than 24 months old was more likely to be wasted and stunted [Cf: Annex B].

Due to the unavailability of reliable, disaggregated nutrition data, it was not possible to study the historical trends of stunting in the study zone with precision. However, based on available nutrition surveys, Figure 23 below outlines an approximate evolution of chronic undernutrition in the last seven years, i.e. from 2013 to 2020. It is very important to note that 2013 and 2016 data for Region 2 could not be disaggregated to exclude Urban Monrovia; thus, the sharp increase in stunting from 2016 to 2018 should be interpreted with extreme caution. While the findings of the Risk Factor Survey indicate a marginal improvement in the mentioned period, the upper end of the 95% confidence intervals of prevalence for Region 2 and 3 still place prevalence above the 'critical' WHO threshold of 40%. Historically, chronic undernutrition prevalence is higher than the 'acceptable' WHO threshold of 20%.

²⁷⁵ N represents total children wasted, stunted, and/or underweight.

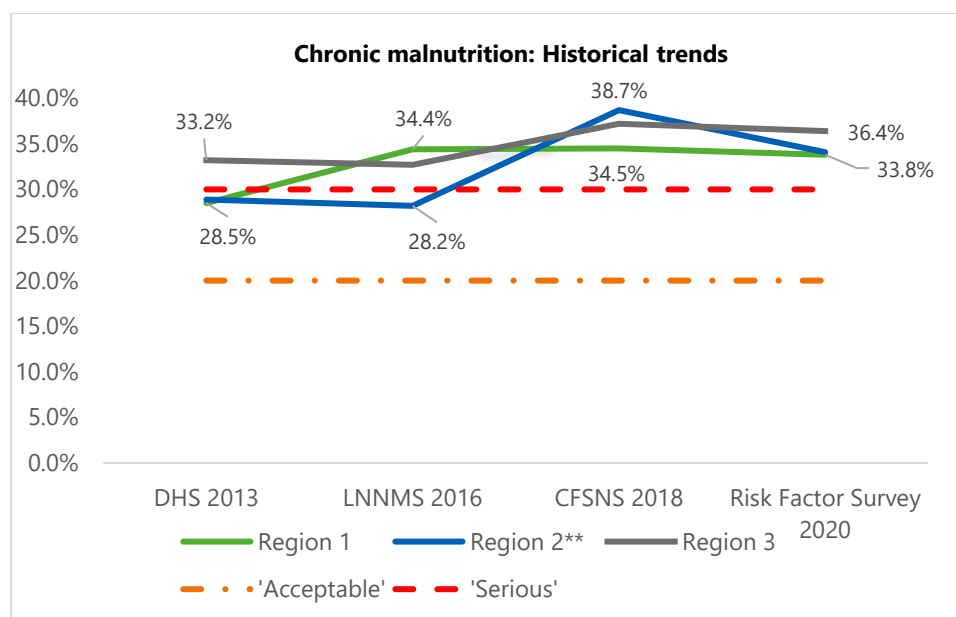


Figure 23: Historical Trends of Stunting²⁷⁶

G. COMMUNITY PERCEPTIONS OF UNDERNUTRITION AND THERAPEUTIC ROUTES

Community perception of undernutrition

"The community will look at that family that has a dry (malnourished) child as a cursed family. That girl (the mother) is dirty and doesn't know how to take care of her child, that family is witch craft, that family is cursed."

Focus group participant, Montserrado

Members of visited communities tended to fixate on wasting when presented with photos and drawings of different forms of undernutrition. Most community members did not indicate wasting in their own community but associated it with their lived experiences in civil war. If a community did have a malnourished (wasted) child, this child was readily identified as *'dry'*- the Liberian English phrase for wasting used ubiquitously across the study zone, though interpretations in local dialects were interchangeably used. A child is *'dry'* as opposed to naturally thin if s/he is *'boney boney,'* meaning his/her ribs protrude and his/her legs are *'too skinny to carry him.'* Other nicknames for wasting tease at a child's physical appearance, including dry and scaly like a *'chameleon'* or *'Mister Bone Chairman.'*

When asked what causes a child to be *dry*, responses directly or indirectly blame mother's negligence. A child is at risk of becoming dry if he *'does not get food on time,'* is not washed frequently enough, and/or has frequent diarrhea. Fathers were seldom directly blamed. Unlike general morbidities, a dry child is more likely to have been a victim of witchcraft. Dryness is perceived as a chronic condition, and it is challenging to overcome the conditions that made a child to be dry.

²⁷⁶ Regions 2 and 3 used weighted prevalence based on sample size calculations & prevalence at county level, from DHS 2013, LNNMs 2016, and CFSNS 2018. As the sampling frame was at county, and not regional level, these historic comparisons should be interpreted with caution.

If a mother had previously a miscarriage, she is believed to be more likely to have a dry child in future. Miscarried children are thought to be jealous of their younger siblings and could curse them. Identification of the 'correct' name- either the stillborn child's real name, or the name that the stillborn child wants for his/her sibling, requires the assistance of a country doctor.

"If a dry child wants to be called by the stillborn child's own name, but the parents have refused to give them that name, the child will keep getting dry till the country doctor or pastor gives them the correct name."

Focus group participant, Rivercess

If a child was dry because he was a witch, he was blamed and also feared.

"The child is in the dark or demonic world eating others people, he is big and healthy in the dark but he looks sickly outside."

Focus group participant, Grand Cape Mount

For some community members, dryness was a synergistically spiritual and physical condition.

"Worms suck the food from the feet of the child because they slept on a cold place and not in a good place"

Focus group participant, Grand Bassa

At the view of a child with kwashiorkor, focus group participants again associated the image with extended periods of civil war and conflict. Community members knew this condition as '*searching for the wet and the dry*,' a description for the bilateral pitting edema test. During the qualitative inquiry, communities said they had not seen children with that condition in at least a decade. The parents of a few children diagnosed with bilateral pitting edema in the Risk Factor Survey indicated they had already received pressure from community members to attend the clinic but had delayed due to heavy workload or financial barriers.²⁷⁷

"God is not stupid, he just made some people who can born²⁷⁸ tight (stunted) children and some people who can born tall people."

Focus group participant, Rivercess

At the view of a stunted child next to a healthy child, community members tended to identify the stunted child as younger. When guided by the study team to consider that the shorter child was actually slightly older than the taller child, community members were quick to recognize this child as one who is '*tight*' in the body- meaning a child who cannot grow into his or her full height for his age. Tightness is differentiated from shortness if the child progressively falls further behind his peer's growth.

"If the child is 6 years old and looks like three years, then that's how we know that the child is tight not short."

Focus group participant, Grand Bassa

As children age, it is easier to differentiate shortness from tightness, so community members say they can tell easily if a child is *tight*, but that they don't know when the condition starts.

Community etiology of stunting roughly fell into three categories: hereditary, environmental, and spiritual. The dominant belief is that a '*tight*' child is short because his/her parents are short. When asked to differentiate what made a child tight, instead of short, community members said it was

²⁷⁷ Transportation, not cost of treatment [treatment is free at public clinics].

²⁷⁸ Give birth to.

the combination of having two short parents that made the child stunted, or the parents were *tight* themselves.

"If the father is huge (tall) and the mother is tight, the first child might be huge and the next child can be tight."

Focus group participant, Grand Bassa

A child could become stunted if he was not well taken care of in the home- this referred to both nutrition and household hygiene. A few community members identified pregnancy and lactation as influential times that a child could or could not become stunted, but this was typically in sensitized areas that espoused the general health benefits of breastmilk. As was true for any other protracted undesirable situation (health, economic, etc.), a 'very very tight' child could have been vexed by witchcraft. However, the more common spiritual belief was associated with genetics- that God willed the child to be stunted, because he gave the child to short or stunted parents.

"Some people are tight & some people grow fast because that's how God created them- God takes some people from tall fat land and God takes other people from tight land."

Focus group participant, Rivercess

Terms used to describe undernutrition, in Liberian English and local dialects are summarized below.

Stunting	
<i>Tight</i> <i>kpaine, kpakpou, orgban/orgbanee, link konyo, diakpah</i>	Short for age
<i>Short butt AK-47</i>	Short for age
<i>Teddy</i> <i>Kpaine</i>	Teddy bear
<i>NGO – "Never grow old"</i>	Unable to grow to potential
<i>Small in the body</i>	Short for age
<i>Kpontuklay</i>	Can't grow
<i>Forever young</i>	Looks younger than he should
<i>Cornerstone</i>	Never changing, never growing up ²⁷⁹
<i>Little man</i> <i>kele-kou</i>	Small for age, with a face like an old man
<i>Small man in the iron jacket</i>	Very tight in the body** Increased severity
<i>Short baby</i>	Short for age as an infant
<i>Lazy child</i>	The baby is too weak to grow
<i>Evil child</i>	The child is from the devil
<i>Iron rock</i>	A child who looks older than his age, but stooped like an elderly person
<i>Kuduo</i>	Stunted (Direct name)
Marasmus	
<i>Dry</i> <i>yousawsaw, kaplemey, linkpai, na-klan</i>	Dry skin, no fat in the body, child who is very sickly
<i>Witch child</i>	Child is a witch; the child is flying at night
<i>Chameleon</i>	Appearance like a lizard
<i>Boney boney</i> <i>Bapleh</i>	Appearance like the dry boney fish that are frequently consumed

²⁷⁹ The child is the oldest of all the children in the community but he/she is very short and small in size.

<i>Pure body child</i>	The child is short of blood and water, his or her appearance look different.
<i>Malnourished</i>	The child is very dry, weak, pure, dirty, dry and small in size.
<i>Win child</i>	Poor birth spacing ²⁸⁰
<i>Dirty child</i>	The child is not cared for by his or her parent nor caregivers.
<i>Coupou</i>	The child who did not come to live on earth, to spoil the resources of their parent
<i>Weakly weaky</i>	Child who is sicker than other children
<i>Mr. Bone or Bone Chairman</i>	The child ribs and others bones of his/her body can be seen and counted.
<i>Hands small small</i>	A child whose arms are too small for them
<i>Skinny-winnie</i>	The child legs and arms are very dry and his stomach is big.
Kwashiorkor	
<i>Big belly</i> <i>Quleebo vleen, Kawene, Gan-gar Ball</i>	"He look like someone who have eating one bag of rice," stomach is always shining like lightbulb, plump like a ball
<i>Youbon Didadyu</i>	Soldier Child
<i>Moonface</i>	The child's face look shiny and the color of his hair has changed
<i>Dry monkey sick</i>	Spiritual sickness
<i>Feet swollen up</i>	Bilateral pitting edema

Table 33: List of local terms used to describe different forms of undernutrition, local dialects color-coded as follows:

Bassa, Kpele, Kru, Vai

A child who is 'dry' was identified as needing urgent treatment in the health facility. Community members did not necessarily differentiate which health facility could provide care for their child in this condition, believing that all clinics could provide them with the necessary treatment. RUTF, or 'Peanut Butter,' is widely recognized (and envied) but it was not available on the market, by report and observation. Because acute malnutrition is relatively rare, malnourished children on RUTF were well known in the community, often called by name by focus group participants when the topic of malnutrition was introduced. RUTF was perceived as a desirable food for children only; it was not commonly re-distributed in families to adults. After receiving RUTF from the clinic, a dry child would typically also be taken to the country doctor or church for prayer, to catalyze the therapeutic regimen at the clinic.

Therapeutic paths for stunting are much simpler than for marasmus, as they are essentially non-existent. A suggested treatment plan for stunting by one community member was for the child to eventually marry a tall person, to break the cycle of stunting for his/her children.

Community members agreed that wasting, if it happened, is more prevalent during a hunger gap in the months of May to August [Cf. Seasonal calendar]. However, this was typically based on general morbidity spikes during those months. Even in the rainy season, community members did

²⁸⁰ The child was 'won' by the parents by having sex too soon after the last baby

²⁸¹ It is important to note that this list of terms used to describe the different forms of undernutrition contains descriptions of causes as well as symptoms, both used by focus group participants to describe children with acute malnutrition. and / or chronic malnutrition.

not perceive high rates of wasting in children. Aside from cessation of the civil war in 2003, community members said they could not recall deterioration or improvement in wasting. No historical or seasonal trends were identified for stunting.

The overwhelming consensus was that boys were more vulnerable to stunting than girls. Community members said they could visualize this difference; they saw more tight boys than girls. Boys are said to be greedy when breastfeeding. If they were not satisfied from infancy, they were believed to be frustrated and unable to grow. Others believed that boys were more stubborn and therefore more disciplined, or carrying heavier loads, which could make them to be stunted—especially if a boy was disciplined or had a heavy workload from a young age. While girls, and women, are said to grow on a daily basis, because they are involved in household chores and not “heavy labor,” men and boys are said to only grow on Sundays. This was interpreted quite literally as physical growth only one day per week, for males, making boys more susceptible to stunting than girls.

“Women grow faster than men; women have flesh²⁸² and men have hard body²⁸³. Every day girls grow but boys only grow on Sundays.”

Focus group participant, Rivercess

Height discrepancy was less noticeable in adults; though adults, too, could be stunted, community members said it was impossible to know when the condition started.

Growth monitoring

Growth monitoring for children under 5 years of age is offered at the clinic level and/or by CHA's in the community. Caregivers indicated this was an important motivator to attend the clinic, as the doctor or nurse physically touching their child and then writing down the measurement is reassuring. However, many clinics did not have functioning weight scales or height boards. At the county level, key informants indicated financial barriers to re-stocking these supplies in clinics. Stocking medicine needed to be prioritized over tools that were seen as non-essential.

Female caregivers in only two of nine communities in qualitative inquiry (both in Region 1) indicated they receive feedback on their child's growth. Cards with the child's height and weight are maintained at clinic level, so caregivers in the seven localities for qualitative inquiry said they had never been told a number for their child's height, weight, or MUAC. In quantitative inquiry, if a mother carries a Child Health Passport, it is typically filled with the child's birth information and vaccination updates. The growth plot pages remain blank. CHA's in the community typically carry MUAC tapes, to screen children at the community level. Only one CHA in qualitative inquiry had a height board and weighing scale on-site; both were supplied by a partnering NGO.

Health facility personnel indicated they typically give feedback on a child's weight and MUAC, if the child is malnourished. However, many health facility personnel themselves did not identify stunting as a nutritional deficit. Key informants including Officers in Charge and County Health Team member believed many clinics did not provide feedback on a child's height because they did not know how to—i.e. they did not know how to classify a child as stunted, or if they did, what

²⁸² More fat.

²⁸³ Muscles.

advice to give the mother. Thus, a suggested barrier to growth monitoring is health personnel confidence in the next steps a mother should, or could, take.

H. COMMUNITY PERCEPTIONS OF CAUSAL MECHANISMS OF UNDERNUTRITION

The qualitative inquiry of this Link NCA included over 180 independent exchanges with more than 1,300 participants. Their detailed and complementary testimonies helped to define one causal pathway of stunting per region, as well for the entire study zone. It is important to note that many communities did not perceive stunting as a public health nutrition issue; thus, many community perceptions of causal mechanisms of undernutrition are based on perceptions of more general growth faltering and development in children, recurrent illnesses, and/or wasting.

GENERAL PERCEPTIONS

The faltering economy is described by communities as the key trigger of unsatisfactory development and poor health in children. Subsistence agriculture, a dissatisfying long-term income-generating activity for many families, feels like the only option as supplier demand does not support production of crops at larger scales. In the event that a family could physically access a larger consumer base, they typically lack the equipment and/or labor network to break even. Community members in rural areas felt literally cut off from viable economic opportunities by poor roads and erratic rainfall. Self-efficacy, tools, and historical knowledge limit crop diversity. Farmers who do try to diversify their fields typically feel discouraged by the recurrent seed costs and/or underproduction.

Families in the study zone felt they suffered from an erratic and dissatisfying market system. Daily markets were either far, insufficiently stocked, too expensive, or all of the above. Aside from staple crops [cassava and/or rice], and relatively non-nutritive bitterball, okra, etc., families depend on market purchases for the majority of their non-carbohydrate purchases. Even if a family does have purchasing power for more nutritious foods, their options are typically limited to boney fish and tubers, as poor road networks limit the movement of foods between producing areas. While the nutritive content is typically the same for the entire family, portion size and meal density are inadequate for women and children, as the family typically eats as many times as, and less quantity than, the head of the household. Women expressed an inability to feed the child the '*good foods*' they would like to, while doubting the quality of their breastmilk if they themselves were not well-nourished.

The current generation of parents, many of whom spent their childhood and adolescence in years of extended lapses of formal education, increasingly see opportunities for their children in migration. School is seen as a valuable investment- so valuable that the family often cedes the comfort of children living nearby and sends them to the nearest urban area for the best education possible. The little cushion of income that a family sits on, then, is diverted to supporting the child's room and board while in school. Families with no safety net typically pull the child from school, if they could afford to send him/her in the first place.

Many parents describe this decision as the ultimate sacrifice for their children, representing a large emotional and financial burden. At the same time, parents feel respect is slipping, as traditional education systems which typically enforce this posture toward elders is replaced by the

adolescent's sense of autonomy. Regardless of the child's educational achievement or enrollment, 'human rights' campaigns are seen to fuel children's discontent with the financial situation in the home and poor quality of life. Thus, adolescents feel emboldened to pursue relationships on their own, starting families sooner, and foraying into autonomy without the maturity or financial base to manage a home or a child of their own. Adolescent girls describe coupling early as a result of increased decision-making; many initiate the relationship themselves, or eagerly reciprocate interest, because they see marriage as a path to financial autonomy. Comparing reality to expectations, many adolescents ceded that marriage and parenthood was not what they had expected, as the decision typically narrowed income generating opportunities to those activities available in the locality. Young women who described dissatisfaction with their role in decision-making said the shift occurred after the relationship was initiated, and was not the reason they began the relationship to start with. If a woman does not wish to become pregnant, she often describes decreased decision-making ability to take family planning as this is often her husband's decision and he may have entered the union with an intention to have a large family. Thus, a woman must respect her husband's decision or seek family planning in secret, which is typically only possible if the health clinic is nearby, but not so close that gossip would spread.

Female caretakers described the heavy sense of responsibility to manage a home and a child as the defining characteristics of their identity as a mother. Debating whether or not this responsibility was overwhelming was typically deemed futile, a waste of time for deliberation, as the outcome of that debate would not change the way things had always been. The best opportunity for a woman to alleviate dissatisfying circumstances for her family was typically petty trade- to support formal education for her child/ren, not herself, as well as possibly save for an eventual business store front. Women described an increasing posture shift to men's acceptance for their income generating activities, though few were in charge of the cash themselves. Formal and informal support groups, such as savings clubs, agricultural groups, friends, sisters, and mothers, help offset the burden of a woman's child care responsibilities.

While many women see small steps toward their own financial contributions in the home, few saw historical improvement in larger infrastructure that would directly improve their child's health. Keeping the child clean was described as tedious and burdensome, yet failure to maintain standards is typically met with stigma and/or illness. Water access and availability, unless directly addressed by an NGO partner, stood largely unchanged, and women saw no hope for their own ability to improve access to water, which would make keeping the child clean easier. The same water source was typically used for their and their child's drinking water, meaning little to no improvements in diarrhea and rashes. The price of soap, subject to inflation, remained a discouraging expense.

Women endorse high faith in the offerings of formal medicine, and frequently broken trust in the event of pharmaceutical stock-outs. Few sensitization messages were offensive; most were unattainable because of the lack of finances or support in the home to implement them. A connecting risk factor is heavy workload of women, which is fueled by their numerous household duties and which eventually reflects negatively on their capacity to practice practices in line with sensitization messages on the subject.

REGION 1: Grand Cape Mount

In addition to the details described for a general pathway above, families reliant on coastal fishing in LR05 of Region 1 described a high risk, high reward economy. To be successful, a fisherman and his family must shew other income generating activities, especially farming, and focus nearly solely on fishing. In this case, the family is even more at the mercy of the market for dietary diversity and caloric needs. Furthermore, the unpredictability of the work, and profit, make consistent child care challenging. Many children are thus cared for by their grandmothers or a friend in the day, making him/her more vulnerable to inappropriate infant and young child feeding practices and generally poorer care.

Families in mining areas struggle with the same trade-off of decreased food available from the home for increased income through other channels. Mothers in mining areas of Region 1 said they struggled especially with their partner's tendency to migrate to new mining sites, leaving them alone to care for the child in the meantime. Concerns about decision making particularly expended to include the decision to formally accept another wife. In the event of a polygamous marriage, a woman said she had no choice but to accept her husband's decision, or suffer from an even more extreme funneling of resources out of retaliation than she would already experience with the additional persons in the home.

REGION 2: Rural Montserrado and Grand Bassa

In addition to the details described for a general pathway, families in peri-urban LR09 cited extreme susceptibility to the market fluctuations as well as intense pressure to participate in the formal economy and send all or most children to school. Despite geographic accessibility to formal health care, residents in LR09 found themselves discouraged by the poor availability of medications in the clinic. In LR08 communities of Rural Montserrado, caregivers found themselves straddling the demands of producing charcoal and/or rubber at scale for purchase with the belief that these professions were unhygienic for children. Thus, female caregivers typically did their best to stay at home and maintain small 'hunger plots' of rice, cassava, and/or a few vegetables, to offset the family's dependence on purchasing from the market

REGION 3: Rivercess and Sinoe

In addition to the details described for a general pathway, families in Region 3 felt they suffered extreme consequences of poor road conditions. Even those in Greenville described the consequences of the rainy season, as the road past Buchanan became treacherous and discouraged traffic into and out of their region. Consequently, families cited extreme stress in the dry season months to establish enough of a safety net to float the rainy months. One coping strategy was migration for mining and concession activities. In concession areas of Region 3, caretakers who were formally employed described dependence on friends and family members to offset child care responsibilities. Even communities bordering concession development described dissatisfaction in development opportunities for their quality of life, including water access and formal education.

I. SUMMARY OF RESULTS AND CATEGORIZATION OF RISK FACTORS

In order to understand how participating communities perceive the severity of risk factors to undernutrition, a prioritization exercise was conducted at the end of the qualitative data collection period in each of ten localities. All risk factors identified by community members over the course of the study were presented back to them with the use of flashcards, portraying each discussed risk factor. After a recapitulation of survey findings by the qualitative data collection team, participants were invited to validate the interpretation of results and suggest modifications, if necessary. Subsequently, they were requested to divide risk factors into three categories (major, important, minor), depending on their impact on child undernutrition. The results of this exercise are presented in the table below with additional columns added for a pooled categorisation by region and a global categorisation for the entire study zone. Risk factors perceived as having a major impact on undernutrition are highlighted in red, important factors are marked in orange while risk factors with minor impact are coloured green. White cells marked "N/A" signify that a respective community did not identify that risk factor as a cause of undernutrition in their milieu.

	Risk factors	L1	L2	R1	L3	L4	L5	L6	R2	L7	L8	L9	L10	R3	Overall
A	Limited availability of quality health services	+	+	+	+++	+++	+++	+++	+++	+	+	+++	N/A	+	++
B	Limited access to health services/ use of traditional health providers	+++	+++	+++	+	+	+++	++	++	N/A	+	+++	+	+	++
C	Low birth spacing/ unwanted pregnancies	+	+	+	+++	+	+	+	+	+++	+++	+	+++	+++	++
D	Parental stress	+	+	+	+	+++	++	+	++	+	+	+++	++	++	++
E	Non-optimal breastfeeding practices	+	+	+	+	++	+	+	+	+++	+++	+	+++	+++	++
F	Non-optimal IYCF practices	+	+	+	+	+	++	+	+	++	+	+	+++	++	+
G	Low access to food	+++	+++	+++	+++	+++	+++	+++	+++	+	++	++	+++	++	+++
H	Use of HH income non-beneficial to mothers/ children	+	+	+	+	+	+	N/A	+	++	+	+	++	++	+
I	Low diversity/ access/ availability of income sources	++	+++	+++	+	+++	++	++	++	++	+	+++	+	++	++
J	Malfunctioning market or supply system	+++	++	+++	+	+++	+	+	+	+++	+++	+++	+	+++	+++
K	Low coping capacities	+	+	+	+	+	+	+	+	+	+	+	+	+	+
L	Low access/ availability of water (quality & quantity)	+++	+++	+++	+	++	+++	+++	+++	+++	+++	++	N/A	+++	+++
M	Non-optimal water management	+	+	+	+	+	+	+	+	+	++	+	+	+	+
N	Poor sanitation practices	+++	+++	+++	+++	+	+	++++	++	+++	+++	+	+++	+++	+++
O	Poor hygiene practices	+	+	+	+++	+	+	+	+	+	+	+	+	+	+
P	Low female autonomy/ decision-making	+	++	+	++	+	+	+	+	+	++	+	+	+	+
Q	Low social support for women	+	+++	++	+	+	+	+++	+	+	++	+	+	+	+
R	Early marriage and/or early pregnancies	++	++	++	++	++	+++	+	++	+	+	++	++	++	++

S	Low nutritional status of women	++	+	+	++	+	+	++	++	N/A	+	+	+	+	+
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Table 34: Synthesis of the results of the exercise of the categorization of community risk factors

Legend:

Region 1		Region 2		Region 3	
L1	Weijue Town, Golakonneh District, Grand Cape Mount	L3	Pleemu Town, Todee District, Rural Montserrado	L7	Togbaville Town, Gblonee Health District, Sinoe
L2	Taylor & Kru Beaches, XX District, Grand Cape Mount	L4	Kingsville, Careysburg District, Rural Montserrado	L8	Butaw Town, Butaw District, Sinoe
		L5	Duhwein Town, Buchanan District, Grand Bassa	L9	Kpah Town, Timbo, Rivercess
		L6	Zangar Town, District #2, Grand Bassa	L10	Boegeezay Town, Doedain District, Rivercess

After the completion of both quantitative and qualitative data collection, Link NCA Analyst triangulated all available data sets, compared correlations for each risk factor and determined the strength of its association with undernutrition. The ratings for each hypothesized risk factor are summarized in the table below.

	Risk factor	Strength of the association of the risk factor with under-nutrition in the scientific literature	Prevalence of risk factor according to secondary data (literature review)	Statistical associations from the quantitative survey				Classification of the risk factor according to the results of the qualitative study				Classification of the risk factor by the communities				Interpretation / Impact of the risk factor			
				R1	R2	R3	Pooled data	R1	R2	R3	Overall	R1	R2	R3	Overall	R1	R2	R3	Overall
A	Limited availability of quality health services	++	+	N/A	N/A	N/A	N/A	+	++	++	++	+	+++	+	++	M-	M-	M-	M-
B	Limited access to health services/ use of traditional health providers	++	++	-	-	+++	+	+++	+++	++	++	+++	++	+	++	I	I	I	I
C	Low birth spacing/	++	++	-	-	++	+++	+	++	+++	++	+	+	+++	++	M-	M-	I	I

	unwanted pregnancies																		
D	Parental stress	++	++	N/A	N/A	N/A	N/A	++	++	++	++	+	++	++	++	M-	M-	M-	M-
E	Non-optimal breastfeeding practices	+++	+++	-	-	-	+	++	+++	+++	+++	+	+	+++	++	M-	M-	I	I
F	Non-optimal IYCF practices	+++	+++	-	-	-	-	++	++	++	++	+	+	++	+	M-	M-	I	M-
G	Low access to food	++	++	-	-	++	+++	+++	+++	+++	+++	+++	+++	++	+++	I	I	M+	M+
H	Use of HH income non-beneficial to mothers/ children	++	+	N/A	N/A	N/A	N/A	++	+	++	++	+	+	++	+	M-	M-	I	M-
I	Low diversity/ access/ availability of income sources	++	++	+	+	+++	++	+++	+++	+++	+++	+++	++	++	++	I	I	M+	I
J	Malfunctioning market or supply system	+	+++	-	+++	+++	+++	+++	++	+++	+++	+++	+	+++	+++	I	I	I	I
K	Low coping capacities	+++	++	-	-	++	-	++	+++	++	++	+	+	+	+	M-	M-	I	M-
L	Low access/ availability of water (quality & quantity)	+++	++	-	-	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	I	I	M+	M+
M	Non-optimal water management	+++	++	-	+++	-	-	+	+	++	+	+	+	+	+	M-	I	M-	M-
N	Poor sanitation practices	++	+++	+	++	-	+++	+++	+++	+++	+++	+++	++	+++	+++	I	I	I	M+
O	Poor hygiene practices	++	+++	+	+++	+	+++	++	++	++	++	+	+	+	+	I	I	I	I
P	Low female autonomy/ decision-making	+	++	-	-	-	-	+	++	+	+	+	+	+	+	M-	M-	M-	M-

Q	Low social support for women	+	+	+	-	+	++	++	++	++	++	++	+	+	+	M-	M-	M-	I
R	Early marriage and/or early pregnancies	+	++	-	+++	-	-	++	+++	+++	+++	++	++	++	++	M-	I	M-	M-
S	Low nutritional status of women	+++	++	+++	+	-	++	++	++	++	++	+	++	+	+	I	M-	M-	I

Table 35: Summary of categorization of risk factors

The weight of each risk factor was determined in line with the rating grid presented below.

Category	Criteria
Major risk factor	No conflicting information AND Strength of association with literature review classified as [++] or [+++] AND Majority of [++] or [+++] for all other sources of information
Important risk factor	A minor amount of contradictory information exists AND Strength of association from literature review is classified as [++] or [+++] AND Majority of [++] or [+++] for all other sources of information
Minor risk factor	A moderate level of contradictory information is permitted AND Strength of association from literature review is classified as [+] or [++] AND Majority of [+] for all other sources of information
Risk factor rejected	Non-contradictory information AND Majority of [-] or [+] for all other sources of information

Table 36: Rating grid for the categorization of risk factors

At the same time, Link NCA Analyst revisited causal pathways of undernutrition, as developed with communities during the qualitative inquiry, and developed four simplified outlines, likely to explain a majority of cases of stunting in Grand Bassa, Grand Cape Mount, Rural Montserrado, Rivercess, and Sinoe Counties. Most importantly, this exercise allowed to highlight differences between causal mechanisms across regions, which will enable the adaptation of response strategies to respective counties and/or livelihood zones.

Figure 24 below depicts a **causal mechanism for Region 1**, represented by Grand Cape Mount County, highlighting the risk factors with a significant statistical association with stunting and/or a concurrent wasting and stunting. The most vulnerable group to chronic malnutrition were children of mothers of younger age as their vulnerability to stunting significantly decreased as mother's age increased. Children under 24 months of age appear to be most vulnerable to a concurrent wasting and stunting.

The key risk factor significantly associated with stunting in Region 1 is a nutritional status of women, which means that children of mothers with a lower mid-upper arm circumference (MUAC) have higher chances of being stunted. While, the rest of available data did not demonstrate significant statistical relationships with stunting in the area, it is possible to infer that a mother's nutritional status is linked with her access to food as children of mothers with petty trade as an independent income were potentially less likely to be stunted. In addition, children of mothers belonging to at least one external support group were also potentially less likely to be stunted. This suggests that a combination of women's income-generating activities in the form of petty trade and their membership in community-based organisations increases their access to food with a positive effect on their nutritional status and eventually their breastfeeding practices, thus ensuring a proper development of their child. Mothers with an increased appetite or consumption

during pregnancy or lactation were more likely to report sufficient quantity of breastmilk to satisfy their child, thus refraining from premature weaning or early initiation to complementary feeding.

However, a dominant pathway to stunting in Region 1 more likely takes its roots in a limited access to markets, which translates into a limited access to soap and/or, more generally speaking, non-optimal environmental hygiene and sanitation. In other words, the presence of soap in a household is potentially a protective factor against chronic malnutrition while the presence of kitchen waste has potentially a reverse effect. The non-optimal environmental hygiene and sanitation then increase the likelihood of child being unclean, which increases his/her vulnerability to disease and to a growth retardation, as a consequence. The likelihood of a child not being clean in Region 1 increased in cases when inappropriate child-caregiver interactions were observed during the data collection.

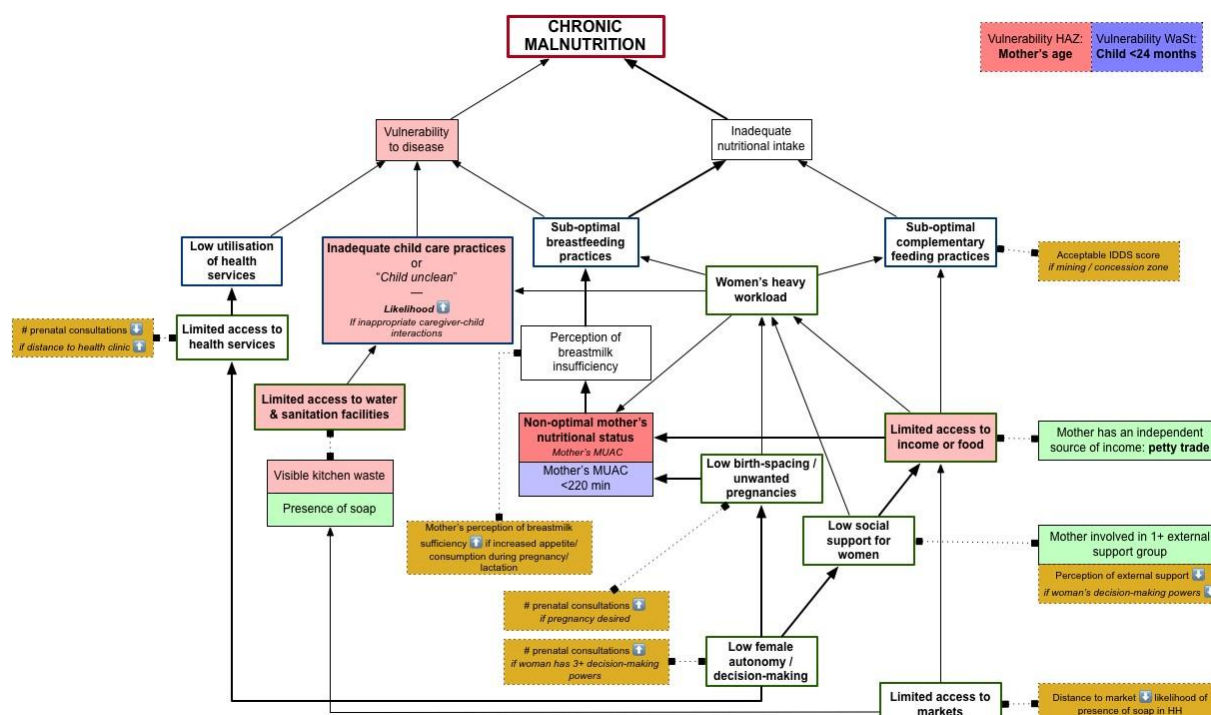


Figure 24: Simplified causal pathway for Region 1 (Grand Cape Mount County)²⁸⁴

Figure 25 below depicts a **causal mechanism for Region 2**, represented by Grand Bassa and Montserrado Counties, highlighting the risk factors with a significant statistical association with stunting and/or a concurrent wasting and stunting. The most vulnerable group to chronic malnutrition were children who were not first born. Children of heads of households involved in business or petty trade appear to be less vulnerable to stunting than children of heads of households involved in other income-generating activities. Children under 24 months of age living

²⁸⁴ Dark red cells represent risk factors presenting a significant statistical association with chronic malnutrition while dark purple cells represent risk factors presenting a significant statistical association with a concurrent wasting and stunting ($p < 0.05$) (See Appendix B). Cells highlighted in light red and light purple signify risk factors with a potential link to chronic malnutrition and a concurrent wasting and stunting, respectively ($p < 0.1$). Cells in dark/light green represent protective factors with a significant and/or potential statistical association with chronic malnutrition.

in agricultural livelihood zones while having a mother under 19 years of age appear to be most vulnerable to a concurrent wasting and stunting.

Similarly to Region 1, a dominant pathway to stunting in Region 2 takes its roots in a limited access to markets. Children living in households within at least one hour from the nearest market were more likely to be stunted than children living in a closer proximity. Among other things, distance to market decreased the likelihood of a presence of soap in household while it also contributed to a likelihood of child being unclean. The likelihood of a child being unclean increased in agricultural livelihood zones (while it decreased for children living in peri-urban areas), in households living more than 20 minutes from the nearest water point and households practicing open defecation. In addition, children of mothers who did not complete their elementary education or higher and who had their first pregnancy before 18 years of age were more likely to be observed unclean as well as children, in cases of which inappropriate child-caregiver interactions were observed during the data collection.

The likelihood of child being unclean increases his/her vulnerability to disease and to a growth retardation, as a consequence. This seems to be backed up the available data on the incidence of key childhood diseases as a child suffering from diarrhoea was potentially more likely to be stunted if observed unclean while a child suffering from cough was significantly more likely to be stunted if observed unclean. Children suffering from cough were also significantly more likely to be stunted if living in a household with more than one child under 5 years of age. Children from these households were eventually more likely to be stunted if they were suffering from any of surveyed morbidities, i.e. fever or cough or diarrhoea.

This suggests a link with non-optimal birth-spacing (<24 months), potentially an early pregnancy, and women's decision-making powers. The available data suggests that a child born to a mother who had her first pregnancy before 18 years of age had higher odds of being stunted. In addition, low female autonomy leads to a low utilisation of health services, which does not reflect only on the use of contraceptive means but also on mother's health-seeking behaviour during the pregnancy. Mothers who desired to be pregnant were more likely to attend antenatal care, while children of mothers who completed at least four visits were significantly less likely to be stunted. In addition, children who were born in a health facility were potentially less likely to be stunted. It is possible to infer that the attendance of prenatal consultations plays an important role in mother's sensitisation on optimal care practices, planting a seed for proper child development once he/she is born. As such, children vaccinated against measles, dewormed and having received a Vitamin A supplementation were potentially less likely to be stunted.

The protection against pathogens is particularly important in non-optimal hygiene and sanitation environments, which are directly linked with child cleanliness, as discussed above. A child observed playing in dust or mud was significantly more likely to be stunted. The risk was comparably equally as high for children living in a household owning a livestock, thus exposed to a contamination through the proximity to animals and/or their faeces. This may also translate into a contamination of food as children living in households with poor hygiene practices where cooked food was stored for eating later in the day and/or the next day were potentially more likely to be stunted. The significant risk of chronic malnutrition was also confirmed for children living in household,

where non-optimal water transportation and storage practices were observed during the data collection.

An interesting statistical association was detected among children wearing a washable diaper, especially children older than 18 months, who are significantly more likely to be stunted than children using a disposable diaper or a latrine.

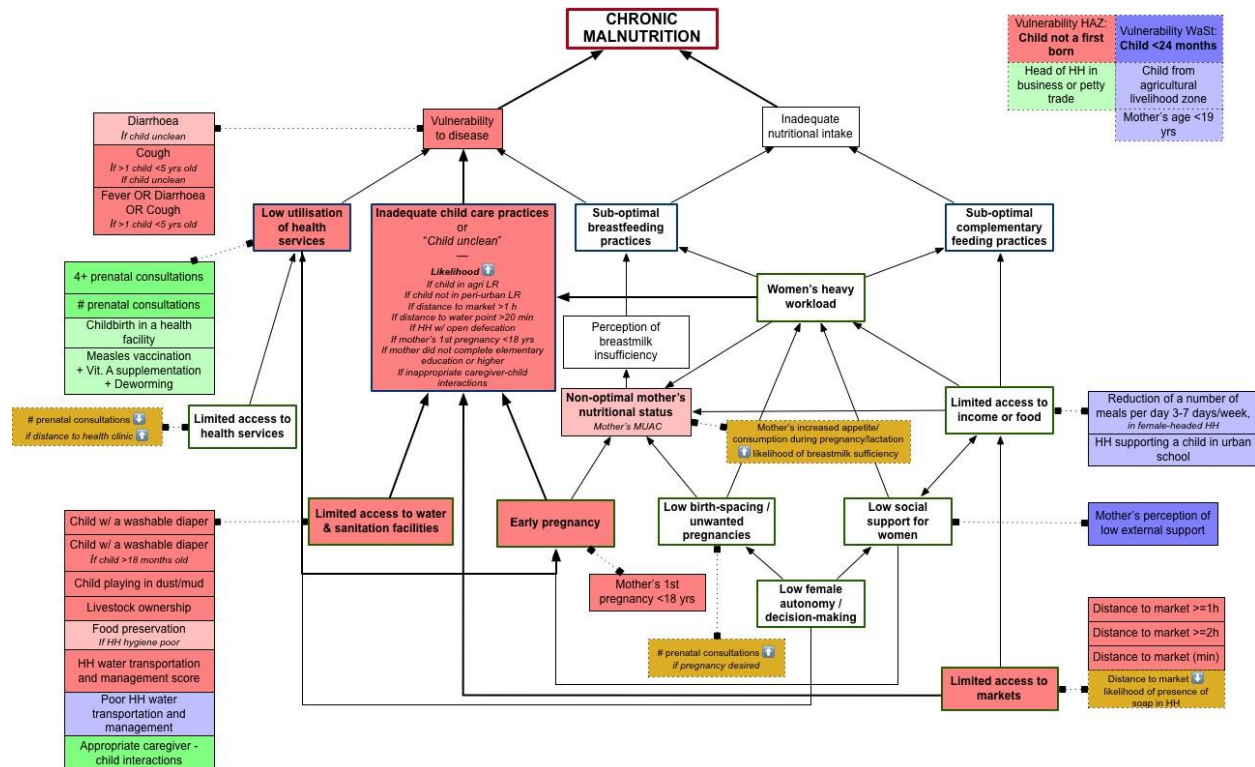


Figure 25: Simplified causal pathway for Region 2 (Grand Bassa and Montserrado Counties) ²⁸⁵

Figure 26 below depicts a **causal mechanism for Region 3**, represented by Sinoe and Rivercess Counties, highlighting the risk factors with a significant statistical association with stunting and/or a concurrent wasting and stunting. The most vulnerable group to chronic malnutrition were male children living in mining/concession areas and/or households where a head of household is engaged in agriculture. Children under 24 months of age, living in households where heads of households were involved in business or petty trade appear to be less vulnerable to stunting. The same applies to children, whose mother completed education at a junior high or higher level. Male children under 24 months of age living in mining/concession areas appear to be most vulnerable to a concurrent wasting and stunting. This condition also seems to be triggered by a recent death in the family, potentially implying financial and emotional burden caused by this event.

²⁸⁵ Dark red cells represent risk factors presenting a significant statistical association with chronic malnutrition while dark purple cells represent risk factors presenting a significant statistical association with a concurrent wasting and stunting ($p < 0.05$) (See Appendix B). Cells highlighted in light red and light purple signify risk factors with a potential link to chronic malnutrition and a concurrent wasting and stunting, respectively ($p < 0.1$). Cells in dark/light green represent protective factors with a significant and/or potential statistical association with chronic malnutrition.

The likelihood of child being unclean increases his/her vulnerability to disease and to a growth retardation, as a consequence. This seems to be backed up the available data on the incidence of key childhood diseases as a child suffering from diarrhoea was potentially more likely to be stunted if living in a household with more than one child under 5 years of age. This suggests a link with non-optimal birth-spacing (<24 months) and women's heavy workload, which then reflects negatively on child care practices. The available data implies that a child cared for by a grandmother is more likely to be stunted while a child cared for by an aunt has significantly higher odds of being concurrently wasted and stunted.



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Women's heavy workload is particularly applicable in case of women with insufficient support and/or limited access to income. Children of mothers perceiving a low external support were potentially more likely to be stunted while children of mothers benefiting from husband's allowance as a primary source of income were less susceptible to be chronically malnourished. Children living in female-headed households were potentially more vulnerable to stunting if a mother deployed coping strategies, e.g. reducing meal portions or reserving meals for children only, for 3- 7 days a week, thus highlighting a high level of food insecurity in the household. The deployment of coping strategies demonstrated a significant statistical association with a concurrent wasting and stunting, as children living in households with a medium or high rCSI score had higher odds of suffering from multiple nutritional deficiencies.

On a health-seeking side, from among children who were not born in a health facility, children living in a household more than 1 hour away from the nearest health facility were significantly more likely to be stunted. Longer distance to a health facility also seems to suggest a higher use of black baggers. The lack of measles vaccination among surveyed children increased their odds of being concurrently wasted and stunted.

Considering the role of non-optimal hygiene and sanitation environments on child cleanliness, children living in households using an unimproved water point were significantly more likely to be stunted while children wearing a washable diaper older than 18 months of age were potentially more likely to be stunted.

The analysis of pooled data from all three regions, representing five counties covered by this Link NCA study, allowed for a design of an **overarching causal pathway** (Figure 27 below) detailing generally applicable causal mechanism based on the risk factors with a significant statistical association with stunting across the study zone. The most vulnerable group to chronic malnutrition were male children living in mining/concession areas and/or agricultural livelihood zones. Their vulnerability to stunting increases as a mother's age decreases. Children under 24 months of age living in households where heads of households are involved in business or petty trade and mothers completed education at junior high and higher level appear to be less vulnerable to stunting.

Similarly to all three regions analysed separately, a dominant overarching pathway to stunting takes its roots in a limited access to markets. Children living in households within at least one hour from the nearest market were more likely to be stunted than children living in a closer proximity. Among other things, distance to market decreased the likelihood of a presence of soap in household and increased a likelihood of child being unclean. The likelihood of child being unclean also increased in agricultural livelihood zones (while it decreased for children living in peri-urban areas) and in households practicing open defecation. In addition, children of mothers who had their first pregnancy before 18 years of age were more likely to be observed unclean as well as children, in cases of which inappropriate child-caregiver interactions were observed during the data collection.

stunting ($p < 0.05$) (See Appendix B). Cells highlighted in light red and light purple signify risk factors with a potential link to chronic malnutrition and a concurrent wasting and stunting, respectively ($p < 0.1$) Cells in dark/light green represent protective factors with a significant and/or potential statistical association with chronic malnutrition.

As child cleanliness can be heavily dependent on environmental hygiene and sanitation, a child observed playing in dust or mud was significantly more likely to be stunted while a child living in a household owning a livestock, thus exposed to a contamination through the proximity to animals and/or their faeces, was potentially more likely to be stunted. In addition, a child living in a household more than 20 minutes away from the closest water point, was significantly more likely to be stunted, especially if living in one of agricultural livelihoods zones (potentially via increased odds of diarrhoea, as explained below). An interesting statistical association was also detected among children wearing a washable diaper, particularly among children older than 18 months, living in agricultural livelihoods zones, who were significantly more likely to be stunted than children using a disposable diaper or a latrine. A potential risk was detected for children wearing a washable diaper if older than 18 months and living in coastal livelihoods zones.

The likelihood of child being unclean increases his/her vulnerability to disease and to a growth retardation, as a consequence. This seems to be backed up the available data on the incidence of key childhood diseases as a child suffering from diarrhoea was potentially more likely to be stunted. A child suffering from diarrhoea was significantly more likely to be stunted if living in one of agricultural livelihoods zones or observed unclean. Water source at more than 20 minute distance from a household increased odds of child suffering from diarrhoea while the presence of soap decreased them. A child suffering from cough was significantly more likely to be stunted if living in one of agricultural or coastal livelihoods zones, if living in a household with more than one child under 5 years of age and if observed unclean. A child suffering from any of surveyed morbidities, i.e. fever of cough or diarrhoea, was more likely to be stunted if living in one of agricultural livelihoods zones or observed unclean.

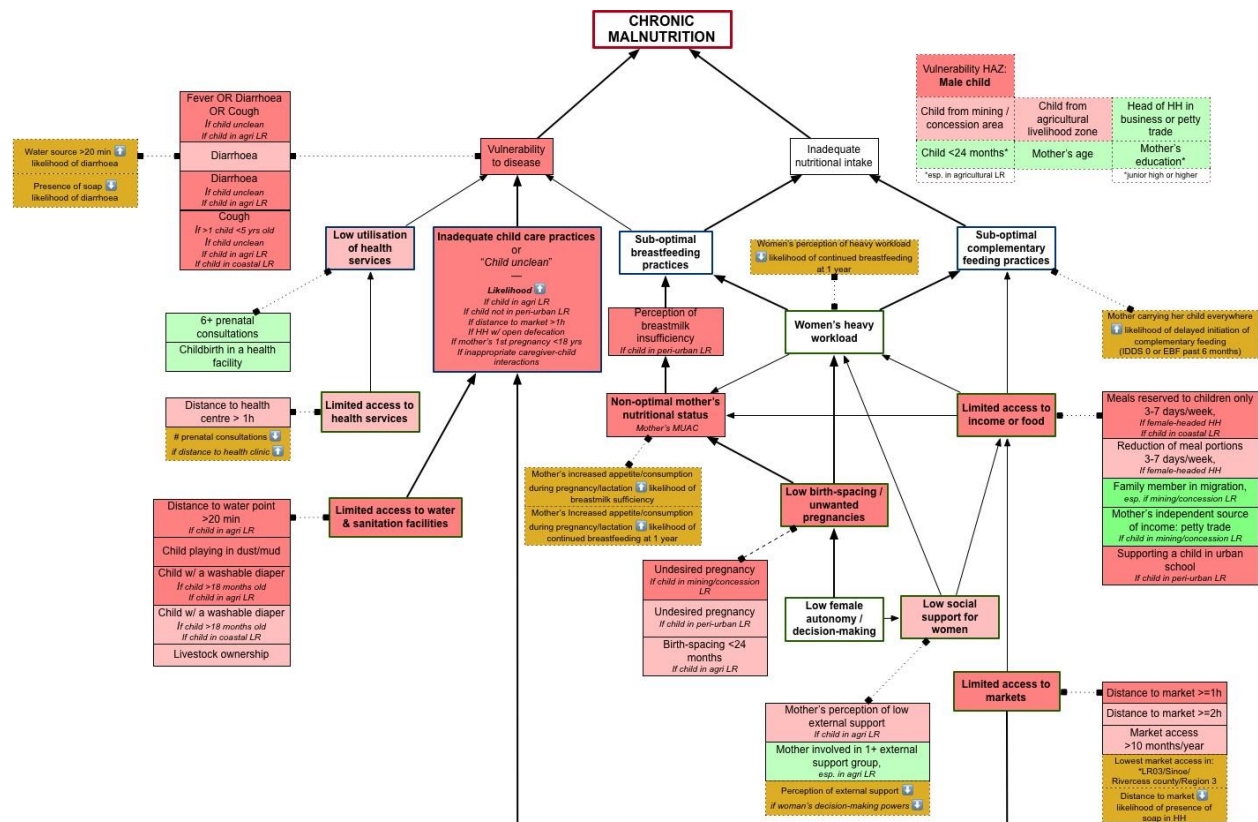


Figure 27: Simplified causal pathway for the entire study area (based on pooled data)²⁸⁷

On a health-seeking side, a child living in a household more than 1 hour away from the nearest health facility was potentially more likely to be stunted. Similarly to Region 2, children born in a health facility and children, whose mothers attended more than 6 prenatal consultations during their pregnancy were potentially at a lesser risk of stunting. It is possible to infer that such mothers had a better access to health facilities while the attendance of prenatal consultations played an important role in mother's sensitisation on optimal care practices, planting a seed for proper child development once he/she was born.

Possibly linked with a health services' utilisation, a mother's use of contraceptive means and/or her capacity to birth-space surfaced as a significant or potential risk factor across all livelihoods zones. In mining/concession areas, an undesired pregnancy revealed a significant statistical association with stunting while a slightly statistically weaker association was observed in peri-urban areas too. Children in agricultural livelihoods zones, on the other hand, were potentially more likely to be stunted if born within 24 months' time from the birth of their older sibling.

Biologically, low birth-spacing can lead to a non-optimal nutritional status of women as their bodies cannot sufficiently recuperate from one pregnancy to another. This translates into a sub-normal development of a child during both a gestation and a lactation period. The nutritional status of women, assessed using a mid-upper arm circumference (MUAC), significantly links with the impaired growth, potentially via non-optimal breastfeeding practices caused by mother's perception of breastmilk insufficiency, triggering a premature weaning or early initiation of complementary feeding. According to the available data, mothers with an increased appetite or consumption during pregnancy or lactation were more likely to report sufficient quantity of breastmilk to satisfy their child and more likely to continue breastfeeding at 1 year.

The optimal nutritional status of women is naturally linked with their access to income or food, which may be particularly limited in food insecure households. Children in mining/concession areas, whose mothers benefited from a husband's allowance as a primary source of income, were less susceptible to be chronically malnourished. However, children of women who did not benefit from such support, especially children in female-headed households and children living in coastal livelihoods zone, were more likely to be stunted when a parent admitted to reserving meals for children only 3 to 7 days a week, thus implying the extreme vulnerability of the household. In addition, children in peri-urban areas living in households supporting another child in urban school, which translates into a preferential use of resources for education (at the expense of balanced meals), were also more likely to be stunted. In agricultural livelihoods zones, access to resources being intrinsically linked with the availability of external support, children of mothers who perceived low levels of such support and/or were not part of external support groups, were

²⁸⁷ Dark red cells represent risk factors presenting a significant statistical association with chronic malnutrition while dark purple cells represent risk factors presenting a significant statistical association with a concurrent wasting and stunting ($p < 0.05$) (See Appendix B). Cells highlighted in light red and light purple signify risk factors with a potential link to chronic malnutrition and a concurrent wasting and stunting, respectively ($p < 0.1$). Cells in dark/light green represent protective factors with a significant and/or potential statistical association with chronic malnutrition.

potentially at a greater risk of chronic malnutrition. It is interesting to note that a perception of external support decreased as women's decision-making powers declined.

V. CONCLUSION AND RECOMMENDATIONS

The analyses undertaken during this Link NCA study allowed to identify 19 risk factors, believed to have an impact on the incidence of undernutrition in the study zone. Following a triangulation of data from diverse sources, three (3) risk factors were identified as having a major impact, eight (8) risk factors were classified as having an important impact and eight (8) risk factors were judged to have a minor impact on the incidence of undernutrition in the zone of study.

Among the major risk factors, two were identified in the sector of water, sanitation and hygiene, namely **low access to water** and **non-optimal sanitation practices**, while the last major risk factor, **low access to food**, was identified in the sector of food security and livelihoods.

The calculation of statistical associations between individual risk factors and nutritional status of children in surveyed households allowed to differentiate between the so-called "regional" causal mechanisms of stunting specifically designed for each set of respective counties and an overarching causal pathway based on all collected data. While the overarching causal pathway details generally applicable mechanisms across the study zone, regional pathways highlight the identified nuances between different counties and therefore allow for a more suitable adaptations for future interventions.

Based on these findings, the following activities, per region, are thus recommended to be considered for an incorporation into current/future interventions.

GLOBAL RECOMMENDATIONS

- Improve access to water through construction of new and/or maintenance of existing water points using existing structures and mechanisms to ensure their proper long-term utilization (e.g. water committees, town legislature, etc.);
- Improve water treatment management at water point and household levels, including the use of appropriate water treatment options and effective water transportation and storage practices to ensure water safety before use;
- Encourage the construction of family latrines using methodological approaches, which proved previously successful in the Liberian context, including trainings and sensitization activities adapted to context, typical income, lifestyle and concerns;
- Encourage the creation of baby-friendly play spaces, including mats and/or laying cement in areas where children play frequently, and their appropriate maintenance to decrease a potential contamination with the surroundings;
- Strengthen the sensitization of mothers as well as other family members (grandmothers, aunts, fathers and older siblings) on appropriate care practices, especially in households of young mothers in agricultural livelihood zones and mining/concession areas with more than 1h distance from the closest market;
- Launch a SBCC campaign on the appropriate use of washable diapers, highlighting the importance of their frequent cleaning and timely transition to other safe forms of defecation, especially for children older than 18 months;

- Improve access to markets by improving existing road network (among other by lobbying local authorities to ensure that road maintenance is done in line with signed concession agreements) and/or construction of new markets in closer proximity to the population, especially in areas with a general or seasonal access difficulties;
- Support diversification of income opportunities through livelihood zone appropriate revenue streams, including agricultural production schemes, adapting assistance modalities to target hardship during lean periods;
- Support the creation and/or capacity building of external support groups (*koo's*, VSLA, *susu* clubs, mothers' groups) for both men and women, especially in agricultural livelihood zones, in order to strengthen existing social support mechanisms, putting a particular emphasis on emotional support and stress relief. This may include an incentivization of loans to women, especially in female-headed households.
- Promote appropriate birth-spacing and family planning practices, especially among adolescents, by facilitating access to relevant health, education and/or youth services responsible for relevant information sharing, support and provision of suitable means of contraception to target groups. This may include nation-wide sensitization campaigns aiming to destigmatize the sexuality in parent-child conversations and/or adolescents desiring to use family planning methods.

REGION 1: GRAND CAPE MOUNT

- Strengthen the sensitization of households on appropriate waste management practices, especially the disposal of organic kitchen waste and the importance of soap for handwashing, bathing and dish/clothes washing;
- Promote optimal nutritional status of women via existing sensitization campaign via health facilities, community health worker networks or mothers' groups, highlighting the importance of balanced nutrition during pregnancy and/or lactation to ensure mother's perception of breastmilk sufficiency to maintain breastfeeding, as advised;

REGION 2: GRAND BASSA/ RURAL MONTSERRADO

- Improve access to health facilities by improving quality of provided services, especially via a continuous capacity building of health facility personnel and a constant availability of medicinal products as well as through innovative, low resource community approaches addressing geographical and financial barriers of access in order to ensure an increase in health facility utilization by pregnant and lactating women and children under 5 years of age, especially for antenatal care, assisted childbirth, vaccination, Vitamin A supplementation and deworming;

REGION 3: RIVERCESS/ SINOE

- Strengthen the sensitization of households on appropriate infant and young child feeding practices, especially in relation to the initiation, frequency and diversity of feeding. This may

include a promotion of fruit snacks and a production of infant cereals²⁸⁸ at scale for petty traders to decrease a potential higher workload of women;

- Research and design appropriate support strategies for households in mining/concession areas to assist them in child care.

HEALTH SYSTEMS STRENGTHENING

- Build on the momentum of successful antenatal mortality schemes and exclusive breastfeeding promotion by also establishing stunting as a public health nutrition issue;
- Improve quality of care by increasing the number trained and dedicated personnel in health establishments, fitting out their workspaces for adequate care in a healthy environment with the permanent availability of the quality equipment / drugs necessary for this care;
- Improve the quality of growth monitoring and promotion by emphasizing the importance of linear growth monitoring by clinician and caregiver, equipping every health facility with anthropometric equipment;
- Review current TSFP procedures for passive and active screening, considering a significant percentage of malnourished children are not detected as malnourished by MUAC; incentivize compliance of updating the Child Health Passport with growth progress on every visit;
- Leverage traditional healers and TTM's as important participants in sensitized health messages for children and women.

²⁸⁸ Benny dust, plantain dust, rice dust, etc.

VI. ANNEXES

A. QUANTITATIVE SAMPLING FRAMEWORK (ANTHROPOMETRIC DATA AND RISK FACTOR SURVEY)

Region 1					
District Name	Clan Name	Enumeration Area Code	Number of households ²⁸⁹	Cluster	Livelihood zone
Tewor	Fahnbulleh D	1210008072	90	1	4
Golakonneh	Mana	1204002032	194	2	10
Porkpa	Kposo	1206002082	144	3	2
Porkpa	Seimavula	1206003042	126	4	4
Porkpa	Seimavula	1206003182	196	5	4
Porkpa	Sokpo	1206001062	231	6	4
Tewor	Passawe	1210002022	94	7	10
Commonwealth	Robertsport	1208001071	108	8	5
Commonwealth	Upper Tombey	1208003022	81	9	5
Garwula	Kaihon	1202012042	58	10	4
Garwula	Kiazolu 1B	1202011022	60	11	4
Garwula	Kiazolu 2A	1202001052	51	12	4
Garwula	Manobalah A	1202007182	157	13	10
Garwula	Manobalah A	1202007052	93	14	10
Garwula	Zodua	1202002052	81	15	4
Golakonneh	Darblo	1204003082	92	16	4
Golakonneh	Darblo	1204003142	77	17	4
Golakonneh	Mana	1204002082	144	18	10
Golakonneh	Mana	1204002112	82	19	10
Porkpa	Kposo	1206002102	131	20	2
Porkpa	Seimavula	1206003062	83	21	4
Porkpa	Seimavula	1206003052	124	22	4
Porkpa	Seimavula	1206003242	141	23	4
Porkpa	Sokpo	1206001082	100	24	10
Porkpa	Sokpo	1206001022	150	25	10
Tewor	Fahnbulleh D	1210008192	83	26	4
Tewor	Passawe	1210002142	103	27	4
Tewor	Passawe	1210002252	54	28	4
Tewor	Sambola A	1210001052	95	29	4
Tewor	Sambola E	1210010012	75	30	4

²⁸⁹ 2008 Population Estimates

Region 2					
District Name	Clan Name	Enumeration Area Code	Number of households	Cluster	Livelihood zone
Commonwealth	Old Field Community	0912010151	84	1	5
Commonwealth	Sugar Cane Farm	0912003481	85	2	5
District # 1	Gozohn	0904007032	228	3	4
District # 2	Boeglayn	0906007012	145	4	2
District # 2	Gogowein	0906006052	114	5	2
District # 2	Marlord	0906002022	97	6	4
District # 3	Gaye Peter	0914003071	75	7	4
District # 3	L A C Plantation	0914001062	110	8	10
District # 3	Norwein	0914011062	66	9	4
District # 4	Gianah	0916004082	84	10	4
District # 4	Kpowien	0916008032	262	11	4
District # 4	Neetorn	0916001012	180	12	4
Neekreen	Harlardsville	0910003032	139	13	4
Neekreen	Neekreen	0910002042	65	14	4
Neekreen	Watco	0910011061	65	15	9
Owensgrove	Giah	0902001022	96	16	4
St. John River City	Goingbo	0908009022	103	17	4
Careysburg	Bensonville City	3002004031	82	18	8
Careysburg	Careyburg City	3002005021	98	19	9
Commonwealth	Johnsonville Township	3010002022	58	20	9
St. Paul River	Gbateah	3006001041	94	21	5
St. Paul River	Geyway	3006003181	107	22	5
St. Paul River	Kaivah	3006006022	102	23	5
St. Paul River	Kpalla	3006007091	92	24	9
St. Paul River	Kpor	3006010052	85	25	4
St. Paul River	Neekon	3006027012	54	26	4
St. Paul River	Zolu	3006004401	110	27	5
Todee	Fahn-Seh	3008001162	102	28	8
Todee	Mehn	3008004012	112	29	8
Todee	Pleemu	3008003072	173	30	8
District # 3	Faitro	0914005012	87	31	5
Region 3					

District Name	Clan Name	Enumeration Area Code	Number of households	Cluster	Livelihood zone
Doedain	Central Morweh	3602001052	80	1	2
Doedain	Duahn	3602002052	70	2	2
Fen River	Garyea Zohn	3604003052	106	3	4
Fen River	Guah Naway	3604004032	112	4	4
Jo River	Jo-Wein	3614001032	71	5	10
Norwein	Kan Whea	3606002022	95	6	4
Norwein	Wheasayn	3606001142	134	7	4
Norwein	Wheasayn	3606001062	69	8	4
Sam Gbalor	Neegba/Bar	3612002032	153	9	4
Zarflahn	Boewein Toba	3616001051	96	10	4
Bodae	Upper Dweoh	3928001012	99	11	10*
Bokon	Sawboklee	3930002012	77	12	10
Dugbe River	Draoh	3932012012	71	13	4
Dugbe River	Paylue	3932018022	45	14	4
Greenville	Zone 2-Po River	3902002031	98	15	5
Greenville	Zone 3-Down Town	3902003031	178	16	5
Greenville	Zone 4-Seebeh	3902004081	96	17	9**
Jaedae	Lower Dweoh	3926001012	59	18	10*
Jeadeipo	Sarpo	3924010022	90	19	4
Juarzon	Clahngbadi	3916001022	110	20	4
Kpayan	Blue Barrel	3934003012	40	21	10*
Kpayan	Lower Jeepo	3934011012	29	22	10*
Kpayan	Worter	3934001022	85	23	4
Kulu Shaw Boe	Lower Kulu	3912004042	40	24	4
Plahn Nyarn	Lower Plahn	3914004042	57	25	4
Plahn Nyarn	Upper Plahn	3914002022	100	26	4
Sanquin Dist# 1	Trody	3910003012	75	27	4
Sanquin Dist#2	Jaquiakpo	3906003012	26	28	5
Seekon	Voogbadee	3920001012	59	29	3
Wedjah	Sorgbeyee	3918004012	189	30	4
Jo River	Bour Tarr	3614003032	72	31	10*

*Community had shifted livelihood activities from LR04 to LR10 (all households interviewed were engaged in mining). For purposes of triangulation with risk factors, community re-categorized as LR10 in Risk Factor Analyses.

**Central Greenville community, households not engaged in coastal fishing activities. For purposes of triangulation with risk factors, community re-categorized as LR09 in Risk Factor analyses

B. CALCULATIONS OF STATISTICAL ASSOCIATIONS BETWEEN HYPOTHETICAL RISK FACTORS AND ANTHROPOMETRIC MEASUREMENTS OF CHILDREN IN SAMPLED HOUSEHOLDS

Table B.1: Statistical associations between risk factors and stunting demonstrated by logistic regressions

Indicator	Stunting [Children 6-59 months]									
	Region I: Grand Cape Mount		Region II: Grand Bassa/ Rural Montserrado		Region III: Rivercess/ Sinoe		Pooled: Regions I, II, and III			
	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	N	n	P-value	Odds Ratio [95% CI]
Male child	0.809	0.94[0.58-1.53]	0.110	1.51[0.91-2.52]	0.025	1.85[1.08-3.19]	979	501	0.045	1.35[1.01-1.81]
Age group <24 months	0.219	0.71[0.42-1.22]	0.251	0.722[0.42-1.26]	0.077	0.60[0.34-1.06]	979	399	0.020	0.69[0.50-0.94]
Agricultural livelihood zone ²⁹⁰	0.438	0.82[0.49-1.36]	0.131	1.48[0.89-2.46]	0.528	1.20[0.69-2.08]	979	603	0.427	1.13[0.84-1.52]
Mining/ concession livelihood zone	0.621	1.15[0.67-1.96]	N/A ²⁹¹		0.024	2.91[1.15-7.36]	979	181	0.068	1.41[0.97-2.03]
Peri-urban livelihood zone	N/A ²⁹²		0.425	0.78[0.42-1.44]	0.401	0.66[0.24-1.76]	979	96	0.286	0.76[0.46-1.26]
Supporting a child in urban school	0.949	1.02[0.63-1.65]	0.246	1.35[0.81-2.23]	0.032	0.55[0.32-0.95]	979	520	0.702	0.94[0.71-1.26]
Head of household in agriculture	0.477	0.84[0.51-1.37]	0.735	0.91[0.54-1.55]	0.018	1.92[1.12-3.29]	979	417	0.461	1.12[0.83-1.50]
Head of household in business or petty trade	0.483	1.24[0.68-2.25]	0.003	0.34[0.17-0.70]	0.088	0.55[0.28-1.09]	979	197	0.021	0.64[0.44-0.93]
Head of household, no income ²⁹³	0.155	0.40[0.11-1.42]	0.930	1.05[0.37-2.93]	0.235	0.27[0.03-2.32]	979	49	0.148	0.58[0.28-1.21]
Head of household (F)	0.966	0.99[0.56-1.74]	0.845	1.06[0.60-1.88]	0.434	0.75[0.37-1.54]	979	216	0.721	0.94[0.66-1.33]
Household >1 child under 5 years old	0.969	1.01[0.62-1.65]	0.114	1.52[0.91-2.55]	0.442	1.24[0.72-2.11]	979	574	0.178	1.23[0.91-1.65]
Head of household female	0.991	1.00[0.51-1.97]	0.860	1.06[0.55-2.04]	0.710	0.84[0.32-2.16]	979	132	0.906	0.98[0.64-1.48]
Household size > 7 members	0.945	0.98[.61-1.59]	0.756	0.92[0.56-1.53]	0.188	0.69[0.40-1.20]	979	433	0.338	0.87[0.65-1.16]
Measles vaccine : Confirmed by card ²⁹⁴	0.231	1.41[0.80-2.47]	0.443	0.79[0.44-1.43]	0.697	1.13[0.61-2.09]	761	330	0.668	1.07[0.79-1.45]
Measles vaccine : Confirmed by card and/or Mother Recall ²⁹⁴	0.570	1.27[0.55-2.92]	0.805	1.07[0.61-1.87]	0.670	0.87[0.45-1.66]	761	591	0.848	1.04[0.72-1.49]
Micronutrient powder in previous 6 months ²⁹⁵	0.247	3.45[0.129-9.22]	0.516	1.39[0.52-3.75]	0.208	0.53[0.19-1.43]	275	104	0.279	1.35[0.78-2.33]
Vitamin A supplementation in previous 6 months	0.588	1.16[0.68-1.99]	0.513	1.23[0.66-2.27]	0.969	1.01[0.54-1.89]	809	594	0.464	1.13[0.81-1.59]
Deworming	0.448	0.81[0.48-1.38]	0.993	1.00[0.57-1.75]	0.896	1.04[0.58-1.85]	737	470	0.678	0.93[0.68-1.29]

²⁹⁰ LR02, LR03, LR04

²⁹¹ Insufficient LR10 sample in the Region (1 cluster- LAC Plantation).

²⁹² No LR09 in GCM.

²⁹³ Allowance/ remittance

²⁹⁴ Question posed to children 9-59 months

²⁹⁵ Question posed to children 6-24 months

Confirmed measles vaccine, Vitamin A, and Deworming: Children 12-59 months	0.258	1.36[0.80-2.33]	0.056	0.49[0.23-1.02]	0.768	1.13[0.49-2.63]	679	166	0.838	0.96[0.67-1.39]
Diarrhoea [2 previous weeks]	0.834	1.06[0.62-1.81]	0.251	1.35[0.81-2.26]	0.107	1.57[0.91-2.71]	968	303	0.081	1.31[0.97-1.78]
+ > 1 child under 5	0.386	0.75[0.39-1.44]	0.348	1.33[0.74-2.39]	0.073	1.79[0.95-3.37]	968	181	0.275	1.22[0.85-1.74]
+ Child unclean	0.531	1.28[0.59-2.75]	0.079	1.75[0.94-3.25]	0.121	1.66[0.87-3.13]	956	133	0.018	1.58[1.08-2.31]
Fever [2 previous weeks]	0.758	1.08[0.66-1.77]	0.644	0.89[0.53-1.48]	0.217	0.71[0.42-1.22]	968	395	0.494	0.90[0.67-1.21]
+ > 1 child under 5	0.973	0.99[0.55-1.77]	0.361	1.31[0.73-2.34]	0.829	1.07[0.59-1.92]	968	221	0.502	1.12[0.80-1.57]
+ Child unclean	0.480	1.27[0.66-2.45]	0.910	0.97[0.52-1.78]	0.520	0.82[0.56-1.48]	952	176	0.979	1.00[0.71-1.43]
Fever AND Diarrhoea	0.515	0.81[0.42-1.54]	0.420	1.27[0.71-2.26]	0.296	1.37[0.76-2.50]	969	199	0.441	1.15[0.81-1.62]
Cough [2 previous weeks]	0.250	0.72[0.41-1.26]	0.137	1.48[0.88-2.46]	0.498	1.22[0.69-2.16]	970	290	0.535	1.10[0.81-1.51]
+ > 1 child under 5	0.977	1.01[0.51-1.99]	0.027	1.92[1.08-3.42]	0.158	1.62[0.83-3.17]	970	172	0.029	1.50[1.04-2.15]
Cough + Child unclean	0.372	1.43[0.65-3.12]	0.012	2.18[1.19-4.01]	0.126	1.69[0.86-3.33]	955	128	0.003	1.80[1.23-2.65]
Fever OR Diarrhoea OR cough	0.225	1.36[0.83-2.23]	0.160	1.46[0.86-2.49]	0.657	0.88[0.49-1.56]	967	565	0.162	1.24[0.92-1.68]
+ Child unclean	0.1488	1.53[0.86-2.72]	0.029	1.83[1.06-3.15]	0.659	1.13[0.65-1.95]	942	245	0.020	1.45[1.06-1.98]
Use of health clinic and/or health worker (CHA, CHV) ²⁹⁶	0.544	1.22[0.64-2.32]	0.381	1.33[0.70-2.54]	0.238	1.51[0.76-2.97]	541	274	0.141	1.32[0.91-1.93]
Use of traditional care ²⁹⁶	0.821	0.848[0.20-3.52]	0.601	0.64[0.12-3.40]	0.827	0.85[0.20-3.56]	539	25	0.579	0.78[0.33-1.85]
Pharmacy/ black bagger ²⁹⁶	0.656	0.86[0.45-1.66]	0.517	0.81[0.43-1.53]	0.303	0.69[0.34-1.39]	539	240	0.247	0.80[0.55-1.17]
No use of health care	0.900	0.86[0.08-9.64]	0.463	0.54[0.11-2.77]	0.531	0.65[0.16-2.54]	562	23	0.347	0.63[0.24-1.65]
Distance to the health centre > 1 hour	0.636	1.13[0.67-1.92]	0.215	1.39[0.83-2.32]	0.165	1.46[0.86-2.49]	979	357	0.059	1.33[0.99-1.80]
Child watched by an older sibling <18 years old	0.514	1.35[0.55-3.30]	0.534	0.72[0.25-2.06]	0.683	0.81[0.29-2.23]	775	66	0.855	0.95[0.54-1.66]
Child watched by the father	0.596	1.29[0.50-3.29]	Perfect collinearity ²⁹⁷		0.099	0.39[0.12-1.20]	775	55	0.182	0.63[0.32-1.24]
Child watched by grandmother	0.300	0.75[0.44-1.29]	0.599	1.17[0.65-2.09]	0.074	1.71[0.95-3.09]	775	388	0.549	1.10[0.80-1.53]
Child watched by an auntie	0.251	1.50[0.75-3.00]	0.465	0.76[0.36-1.59]	0.947	1.03[0.47-2.23]	775	145	0.819	1.05[0.69-1.60]
No child keeper- mother carries the child everywhere	0.408	0.61[0.19-1.96]	0.322	1.51[0.67]	0.620	0.83[0.40-1.73]	775	113	0.916	0.97[0.60-1.58]
Continuation of breastfeeding at 1 year ²⁹⁸	Perfect collinearity ²⁹⁷		0.906	0.83[0.04-17.00]	0.322	3.75[0.27-51.37]	36	27	0.560	1.60[0.33-7.77]
Perceived breastmilk sufficiency ²⁹⁹	0.276	2.11[0.55-8.04]	0.112	0.51[0.22-1.17]	0.980	0.99[0.34-2.84]	534	463	0.643	0.87[0.49-1.55]
Complementary feeding frequency ≥ 3 times per day ³⁰⁰	0.327	0.515[0.14-1.94]	0.878	0.90[0.23-3.45]	0.264	1.97[0.60-6.51]	179	70	0.986	1.01[0.49-2.05]
Open defecation by the child (vs. latrine or disposable diaper)	0.638	1.24[0.50-3.07]	0.293	1.61[0.66-3.91]	0.671	1.35[0.33-5.47]	392	195	0.992	1.00[0.63-1.59]

²⁹⁶ First treatment sought in case of fever, cough, or diarrhea

²⁹⁷ Insufficient sample size to test association

²⁹⁸ Children 12-15 months

²⁹⁹ Children 0-36 months [recall]

³⁰⁰ Children 6-18 months

Washable diaper (vs. a latrine or disposable diaper)	0.267	0.63[0.28-1.43]	0.035	2.62[1.07-6.40]	0.386	1.88[0.45-7.77]	587	278	0.384	1.19[0.80-1.78]
<i>In children > 18 months</i>	0.984	0.99[0.33-2.94]	0.012	5.38[1.45-19.95]	0.085	7.50[0.76-74.16]	309	51	0.007	2.43[1.28-4.61]
Acceptable IDDS score ³⁰¹	0.614	0.73[0.21-2.49]	0.975	0.975[0.20-4.66]	0.521	0.67[0.20-2.25]	464	48	0.660	0.86[0.45-1.66]
IDDS Score=0	0.376	0.58[0.18-1.93]	0.264	0.29[0.03-2.52]	0.408	2.00[0.39-10.34]	464	33	0.427	0.71[0.31-1.65]
Child with unclean face and hands, unclean clothes and not recently washed	0.620	1.13[0.69-1.86]	0.624	1.14[0.68-1.90]	0.421	1.25[0.73-2.16]	888	413	0.281	1.18[0.88-1.58]
Presence of OR proof of animals in the child's play area	0.377	0.80[0.49-1.31]	0.797	0.94[0.56-1.55]	0.986	1.00[0.57-1.73]	875	460	0.521	0.91[0.67-1.22]
Appropriate caregiver-child interaction scale	0.378	1.28[0.74-2.24]	0.013	0.47[0.26-0.85]	0.615	1.17[0.64-2.12]	791	432	0.961	0.99[0.73-1.36]
Child spanked during course of the interview	0.751	0.87[0.38-2.00]	0.683	1.19[0.52-2.74]	0.230	0.55[0.21-1.46]	889	80	0.535	0.85[0.52-1.41]
MUAC of mother - <220 mm	0.130	5.81[0.59-56.77]	0.324	0.34[0.04-2.89]	0.281	3.78[0.34-42.53]	754	15	0.483	1.47[0.50-4.29]
Mother education: Completed elementary or higher	0.389	1.29[0.72-2.30]	0.654	0.87[0.48-1.58]	0.187	0.67[0.36-1.22]	773	505	0.649	0.92[0.66-1.30]
Mother education: Completed junior high or higher	0.851	1.06[0.57-1.96]	0.131	0.60[0.31-1.16]	0.057	0.48[0.23-1.02]	773	203	0.059	0.69[0.47-1.01]
Polygamous household	0.893	0.96[0.52-1.76]	0.226	1.64[0.74-3.65]	0.494	1.32[0.59-2.95]	924	135	0.239	1.28[0.85-1.94]
More than 1 co-wife	0.285	2.00[0.56-7.13]	N/A ³⁰²				900	10	0.347	1.95[0.48-7.87]
Mother of the child currently pregnant ³⁰³	0.797	0.90[0.39-2.08]	0.318	0.56[0.18-1.75]	0.230	0.53[0.18-1.50]	772	71	0.133	0.65[0.37-1.14]
<i>+ Polygamous HH</i>	0.480	0.44[0.05-4.27]	<i>Perfect collinearity</i> ²⁹⁷		0.859	1.30[0.07-23.43]	111	7	0.519	0.57[0.11-3.11]
Mother of child currently pregnant or breast-feeding	0.165	0.68[0.40-1.17]	0.141	1.56[0.86-2.80]	0.688	1.13[0.62-2.05]	772	483	0.787	1.05[0.75-1.45]
Age of first pregnancy <18 ³⁰⁴	0.162	1.47[0.86-2.54]	0.021	2.02[1.11-3.67]	0.183	0.67[0.37-1.21]	774	439	0.137	1.28[0.92-1.79]
Undesired pregnancy	0.414	1.26[0.72-2.20]	0.319	1.35[0.75-2.42]	0.878	1.05[0.58-1.88]	771	439	0.251	1.21[0.87-1.69]
Birth spacing <24 months ³⁰⁵	0.230	2.10[0.63-7.01]	0.352	0.55[0.15-1.96]	0.095	2.49[0.85-7.29]	255	77	0.170	1.57[0.83-2.97]
First born child	0.450	1.27[0.68-2.38]	0.035	0.39[0.16-0.94]	0.658	0.83[0.35-1.94]	775	148	0.328	0.81[0.53-1.24]
Increased appetite & consumption during pregnancy	0.444	2.04[0.33-12.69]	0.434	2.67[0.23-31.07]	0.882	1.17[0.15-9.01]	71	44	0.279	1.91[0.59-6.14]
Consumption of potter during pregnancy	0.907	1.1[0.22-5.45]	0.861	0.8[0.07-9.67]	0.382	2.50[0.32-19.53]	71	28	0.553	1.39[0.47-4.12]
Increased appetite & consumption during lactation	0.326	2.21[0.46-10.69]	0.398	2.62[0.28-24.38]	0.978	1.01[0.36-2.90]	410	367	0.377	1.42[0.65-3.08]

³⁰¹ Children 6-36 months

³⁰² No HH's with more than 1 co-wife in Region 2.

³⁰³ Pregnant and lactating mothers at the same time were considered pregnant for this analysis

³⁰⁴ Cut-off based on qualitative enquiry re: teenage pregnancy.

³⁰⁵ Only calculated in households with multiple children under 5

More than or equal to two weeks of rest post delivery ³⁰⁶	0.164	0.56[0.25-1.27]	0.964	1.02[0.43-2.41]	0.346	0.60[0.20-1.75]	415	282	0.308	0.77[0.47-1.27]
Currently using contraceptives: All (including LAM)	0.896	1.04[0.61-1.77]	0.866	1.05[0.57-1.94]	0.383	0.76[0.41-1.40]	727	317	0.839	0.97[0.69-1.35]
Currently using modern contraceptive	0.839	1.06[0.61-1.82]	0.873	0.95[0.51-1.77]	0.253	0.70[0.38-1.29]	727	279	0.629	0.92[0.66-1.29]
Currently using modern contraceptives: Previous pregnancy unwanted	0.798	1.09[0.56-2.14]	0.641	0.82[0.36-1.87]	0.641	1.22[0.53-2.83]	408	164	0.831	1.05[0.68-1.63]
Woman makes or jointly makes decision for household spending	0.578	1.22[0.60-2.48]	0.126	1.71[0.86-3.40]	0.809	1.08[0.56-2.10]	772	158	0.179	1.31[0.88-1.94]
Woman makes or jointly makes decision for food to cook	0.557	1.16[0.68-1.98]	0.333	1.33[0.75-2.38]	0.755	1.10[0.61-1.97]	770	366	0.299	1.19[0.86-1.64]
Woman makes or jointly makes decision for schooling	0.378	1.36[0.69-2.69]	0.377	0.73[0.37-1.46]	0.403	1.31[0.70-2.47]	774	184	0.628	1.10[0.75-1.61]
Woman makes or jointly makes decision for taking child to the clinic	0.876	0.95[0.53-1.72]	0.242	0.70[0.39-1.27]	0.551	0.84[0.46-1.51]	771	293	0.257	0.82[0.59-1.15]
Woman makes or jointly makes decision for contraceptives	0.399	1.26[0.74-2.16]	0.471	0.81[0.45-1.45]	0.816	0.93[0.51-1.71]	753	353	0.984	1.00[0.72-1.39]
Woman makes or jointly makes at least one decision	0.881	0.96[0.55-1.68]	0.636	1.20[0.57-2.53]	0.199	0.62[0.30-1.29]	745	551	0.574	0.90[0.62-1.31]
Woman makes or jointly makes at least 3 decisions	0.243	1.48[0.76-2.88]	0.429	0.77[0.40-1.48]	0.629	1.17[0.62-2.23]	745	197	0.671	1.08[0.75-1.57]
Makes 3 decisions but does not have a source of formal income	0.103	6.67[0.68-65.37]	0.928	1.07[0.24-4.74]	0.406	1.89[0.42-8.46]	195	24	0.182	1.83[0.75-4.46]
Prenatal consultations – at least 4	0.664	1.16[0.60-2.21]	0.000	0.30[0.15-0.58]	0.684	0.87[0.43-1.73]	773	608	0.044	0.68[0.46-0.99]
Childbirth in a health facility	0.448	0.78[0.41-1.48]	0.092	0.60[0.34-1.09]	0.183	0.63[0.32-1.24]	769	558	0.050	0.70[0.49-1.00]
<i>Child lives > 1 hour from the health facility, in children who were not born in a health facility</i>	0.493	1.48[0.48-4.59]	0.493	1.36[0.57-3.25]	0.026	5.23[1.22-22.45]	211	110	0.043	1.87[1.02-3.44]
Mother has independent source of income : Petty trade	0.050	0.57[0.33-1.00]	0.663	0.88[0.49-1.57]	0.566	1.19[0.66-2.13]	767	349	0.243	0.82[0.59-1.14]
Mother primary income is allowance from husband	0.448	1.28[0.68-2.42]	0.478	1.29[0.64-2.63]	0.039	0.34[0.12-0.95]	774	150	0.829	0.95[0.63-1.45]
Mother workload: Heaviest	0.814	0.93[0.50-1.72]	0.225	0.63[0.30-1.33]	0.317	1.39[0.73-2.65]	774	190	0.863	0.97[0.66-1.41]
Mother perceived external support: Lowest	0.186	0.62[0.31-1.26]	0.104	1.73[0.80-3.36]	0.073	1.81[0.95-3.45]	774	170	0.227	1.26[0.86-1.84]
Mother workload heaviest & perceived external support lowest	0.333	0.46[0.10-2.22]	0.217	0.38[0.08-1.77]	0.147	1.93[0.79-4.72]	774	50	0.934	0.97[0.51-1.85]
Mother/ family involved in at least one external support club / group	0.059	0.59[0.34-1.02]	0.946	1.02[0.57-1.82]	0.241	0.70[0.38-1.27]	771	422	0.085	0.75[0.54-1.04]
Reduced coping strategies index: Medium or high	0.431	0.81[0.48-1.37]	0.916	0.96[0.47-1.97]	0.111	1.97[0.85-4.55]	967	192	0.981	1.00[0.69-1.44]

³⁰⁶ Restriction- only asked to mothers of children 0-36 months

Consumption of Cheaper and Cheaper Foods - 3 of 7 Days	0.626	0.88[0.51-1.49]	0.324	0.72[0.37-1.39]	0.060	2.20[0.97-5.01]	971	205	0.855	0.97[0.67-1.39]
<i>Head of household F</i>	0.671	1.24[0.46-3.32]	0.690	0.79[0.26-2.46]	0.167	3.90[0.57-26.93]	216	65	0.569	1.21[0.63-2.34]
Borrowing of food - 3 of 7 Days	0.314	0.71[0.37-1.37]	0.951	1.03[0.44-2.40]	0.329	1.51[0.66-3.43]	970	135	0.850	0.96[0.62-1.48]
<i>Head of household F</i>	0.894	1.08[0.36-3.20]	0.153	2.60[0.70-9.65]	0.167	3.90[0.57-26.93]	216	43	0.137	1.76[0.83-3.71]
Reducing the portion of meals - 3 by 7 days	0.754	0.92[0.54-1.56]	0.767	1.12[0.53-2.39]	0.058	2.41[0.97-6.00]	969	182	0.560	1.12[0.77-1.62]
<i>Head of household F</i>	0.355	1.60[0.59-4.29]	0.361	2.00[0.45-8.84]	0.092	3.75[0.80-17.48]	216	57	0.077	1.83[0.94-3.59]
Children-only meals - 3 to 7 days	0.460	1.28[0.67-2.47]	0.621	1.47[0.32-6.69]	0.074	2.85[0.90-9.02]	969	83	0.120	1.50[0.90-2.49]
<i>Head of household F</i>	0.399	1.75[0.48-6.48]	0.248	3.00[0.47-19.35]	0.085	8.10[0.75-87.23]	215	25	0.042	2.66[1.04-6.84]
Reducing number of meals in the day- 3 to 7 days	0.109	0.49[0.26-0.92]	0.905	0.96[0.50-1.86]	0.227	1.76[0.70-4.43]	970	170	0.231	0.78[0.52-1.17]
<i>Head of household F</i>	0.177	0.43[0.12-1.47]	0.508	1.50 [0.45-4.98]	0.418	2.36[0.29-18.97]	216	43	0.834	0.92[0.43-1.99]
MAHFP: Year-round	0.792	1.08[0.61-1.93]	0.985	0.99[0.53-1.87]	0.445	0.75[0.36-1.57]	978	192	0.781	0.95[0.66-1.37]
MAHFP: At least 10 months	0.128	0.65[0.37-1.13]	0.149	1.58[0.85-2.95]	0.498	0.82[0.46-1.45]	978	725	0.597	0.91[0.66-1.27]
Market access: At least 10 months per year	0.993	1.00[0.54-1.88]	0.797	1.13[0.44-2.89]	0.006	0.45[0.26-0.80]	979	796	0.058	0.71[0.49-1.01]
Distance to the market: >=1 hour	0.338	1.28[0.77-2.12]	0.009	2.00[1.19-3.35]	0.012	2.11[1.18-3.80]	974	520	0.001	1.70[1.26-2.29]
Distance to the market: >=2 hours	0.383	0.80[0.48-1.33]	0.020	2.21[1.13-4.31]	0.093	1.58[0.93-2.71]	974	309	0.096	1.30[0.95-1.77]
Owns livestock	0.518	1.17[0.72-1.91]	0.033	1.75[1.05-2.93]	0.924	0.97[0.55-1.71]	968	554	0.089	1.29[0.96-1.74]
Use of improved water point	0.649	1.15[0.63-2.12]	0.966	1.01[0.60-1.71]	0.046	0.58[0.34-0.99]	963	643	0.319	0.85[0.63-1.17]
Distance to water point >20 minutes ³⁰⁷	0.381	1.31[0.71-2.42]	0.792	0.92[0.50-1.71]	0.299	1.38[0.75-2.53]	966	204	0.316	1.20[0.84-1.70]
Point of use water treatment, unimproved water point	0.513	0.57[0.11-3.05]	0.635	0.71[0.18-2.89]	0.963	1.03[0.29-3.64]	320	41	0.528	0.77[0.35-1.72]
Water transportation container checklist score unacceptable (moderate- severe risk)	0.888	0.96[0.55-1.69]	0.606	1.14[0.69-1.91]	0.527	1.20[0.69-2.08]	979	335	0.528	1.10[0.81-1.50]
Confirmed presence of handwashing soap	0.115	1.62[0.89-2.94]	0.611	1.15[0.67-1.98]	0.258	0.73[0.42-1.26]	842	603	0.975	1.01[0.71-1.43]
Confirmed presence of soap (laundry or handwashing)	0.081	1.89[0.93-3.87]	0.492	1.22[0.69-2.14]	0.400	0.79[0.45-1.38]	895	414	0.604	0.92[0.68-1.25]
Kitchen utensils left on the floor	0.905	1.03[0.62-1.72]	0.116	1.60[0.89-2.86]	0.942	1.02[0.59-1.77]	934	569	0.319	1.17[0.86-1.59]
Uncovered food	0.290	0.71[0.37-1.35]	0.356	1.27[0.76-2.12]	0.780	0.93[0.53-1.60]	931	323	0.930	0.99[0.72-1.35]
Visible kitchen waste	0.092	0.61[0.34-1.08]	0.440	0.82[0.49-1.36]	0.825	0.94[0.55-1.61]	945	383	0.145	0.80[0.59-1.08]
Floor of house is soil	0.482	0.84[0.51-1.37]	0.127	1.51[0.89-2.55]	0.222	1.55[0.77-3.16]	970	642	0.237	1.21[0.88-1.65]
Child playing in dust/mud	0.950	0.98[0.58-1.67]	0.008	2.84[1.32-6.18]	0.458	1.36[0.61-3.04]	916	705	0.052	1.44[1.00-2.09]
Very poor HH hygiene	0.104	0.59[0.31-1.11]	0.019	2.14[1.13-4.03]	0.613	0.87[0.50-1.51]	876	508	0.836	0.97[0.71-1.32]
Food preserved	0.826	1.08[0.55-2.11]	0.907	1.04[0.53-2.05]	0.777	0.90[0.43-1.87]	971	812	0.957	1.01[0.68-1.51]
<i>+ HH hygiene poor</i>	0.555	0.59[0.34-1.01]	0.095	1.59[0.92-2.75]	0.356	0.77[0.45-1.33]	903	447	0.527	0.91[0.67-1.23]
A family member has died	0.959	0.97[0.28-3.30]	0.941	0.96[0.28-3.26]	0.152	3.51[0.63-19.59]	979	34	0.560	1.25[0.59-2.63]
A family member has migrated	0.122	0.60[0.32-1.15]	0.265	0.65[0.30-1.39]	0.164	0.53[0.21-1.30]	979	151	0.017	0.59[0.38-0.91]

³⁰⁷ Including wait time

Table B.2: Statistical associations between risk factors and stunting demonstrated by linear regressions

Linear regression	Height-for-Age Z-Score Children 6-59 months												
	Region I			Region II			Region III			Pooled: Region I, II, and III			
Indicator	P-value	Coeff.	SE	P-value	Coeff.	SE	P-value	Coeff.	SE	N	P-value	Coeff.	SE
Child age [months]	0.509	<0.01	0.01	0.660	<-0.01	0.01	0.054	-0.01	0.007	979	0.330	<-0.01	0.00
Mother's age [years]	0.070	0.02	0.01	0.309	0.01	0.01	0.254	0.03	0.013	775	0.019	0.02	0.01
Mother's MUAC [cm]	0.013	0.05	0.02	0.057	0.04	0.02	0.445	0.03	0.023	754	0.007	0.04	0.01
Prenatal consultations [#]	0.723	-0.01	0.02	0.043	0.06	0.03	0.311	0.06	0.047	773	0.144	0.03	0.02
Number of people in the household [#]	0.559	-0.01	0.02	0.724	<-0.01	0.02	0.406	0.02	0.029	979	0.917	<-0.01	0.01
Distance to the clinic [min.]	0.543	<0.01	0.00	0.394	-0.00	0.00	0.105	<-0.01	0.001	978	0.116	<-0.01	0.00
Distance to the market [min.]	0.378	<0.01	0.00	0.027	-0.00	0.00	0.244	<-0.01	0.001	974	0.578	<-0.01	0.00
IDDS Score [scale, min 0- max 7]	0.564	0.06	0.11	0.611	0.07	0.13	0.190	0.21	0.156	464	0.112	0.11	0.07
Complementary feeding frequency [#]	0.169	0.18	0.13	0.387	0.12	0.13	0.062	-0.23	0.119	179	0.761	0.02	0.07
Mother age of first pregnancy [years]	0.141	0.04	0.03	0.370	-0.03	0.03	0.814	0.01	0.031	774	0.644	0.01	0.02
Women's work overload scale [scale, min 1- max 4]	0.148	0.11	0.08	0.172	0.13	0.09	0.786	-0.03	0.098	774	0.148	0.07	0.05
Women's external support scale [scale, min 1- max 4]	0.272	-0.09	0.08	0.173	0.13	0.10	0.276	0.114	0.104	774	0.459	0.04	0.05
Postpartum rest [days]	0.818	<0.01	0.00	0.195	<0.01	0.00	0.273	<-0.01	0.003	415	0.828	<0.01	0.00
Decision making involvement [scale, min. 0 – max. 5]	0.846	-0.01	0.05	0.238	0.08	0.06	0.054	-0.11	0.058	745	0.456	0.03	0.04
Decision making involvement [scale, min. 0 – max. 5], non-female headed households	0.998	<0.01	0.08	0.588	0.05	0.08	0.821	-0.18	0.08	580	0.668	0.02	0.05
Decision making involvement [scale, min. 0 – max. 5], female headed households	0.594	-0.097	0.18	0.409	0.16	0.20	0.501	0.18	0.26	165	0.705	0.04	0.12
Child caregiver checklist [scale, min -4 – max 6]	0.500	-0.03	0.04	0.588	0.02	0.04	0.967	<0.01	0.043	791	0.886	<0.00	0.03
MAHFP	0.642	-0.03	0.06	0.323	-0.06	0.07	0.310	0.06	0.06	978	0.822	0.01	0.04
Distance to water [distance to the point + wait time, min.]	0.709	<0.01	0.00	0.391	<0.01	0.00	0.781	<-0.01	0.00	966	0.713	<0.01	0.00
Livestock score [scale] ³⁰⁸	0.363	-0.29	0.32	0.130	0.65	0.41	0.554	0.07	0.11	799	0.414	0.08	0.01
Observation of household hygiene: Increasing uncleanliness [scale, min: 0, max: 5]	0.918	-0.01	0.06	0.230	-0.08	0.06	0.619	0.03	0.07	876	0.517	-0.02	0.04
Observing the child's play area: Increasing uncleanliness [scale, min: 0, max: 5]	0.736	0.02	0.05	0.894	<-0.01	0.05	0.405	-0.05	0.06	883	0.759	0.01	0.03
Water checklist risk score [Low risk, 0, highest risk, 7]	0.974	<0.01	0.06	0.006	-0.14	0.05	0.164	-0.07	0.05	901	0.018	-0.07	0.03

Table B.3: Additional statistical associations: Diarrhoea & Child Uncleanliness

Logistics regression	Regions I, II, and III- Pooled Analyses			
	Child unclean		Diarrhoea	
	P-value	Odds ratio	P-value	Odds ratio
Risk factor				

³⁰⁸ Livestock score=(chickens*.01)+(sheep*.1)+(ducks*.1)+(pig*.2)+ (cows*.5)

		[CI 95%]		[CI 95%]
Child watched by older sibling	0.278	1.33[0.80-2.21]	0.758	1.09[0.64-1.85]
Child watched by an auntie	0.287	1.22[0.84-1.78]	0.910	0.98[0.66-1.44]
Child watched by a grandmother	0.856	1.03[0.77-1.37]	0.738	1.05[0.78-1.43]
Open defecation by the child (vs. latrine or disposable diaper)	0.000	3.43[2.27-5.28]	0.339	1.22[0.81-1.85]
Distance to water point > 20 minutes	0.268	0.83[0.60-1.15]	0.001	1.74[1.26-2.40]
Agricultural livelihood zone	0.000	1.86[1.41-2.47]	0.005	0.67[0.51-0.88]
Peri urban livelihood zone	0.001	0.37[0.20-0.66]	0.221	1.40[0.82-2.39]
Mother education: Completed elementary or higher	0.544	0.91[0.67-1.23]	0.092	1.32[0.96-1.83]
First pregnancy <18	0.093	1.28[0.96-1.72]	0.147	0.80[0.59-1.08]
Caregiver interaction scale acceptable	0.000	0.43[0.33-0.58]	0.135	0.80[0.59-1.07]
Presence of handwashing soap	0.625	0.92[0.67-1.27]	0.321	0.85[0.62-1.17]
Presence of any soap	0.399	0.89[0.67-1.17]	0.047	0.75[0.56-0.99]
Distance to market > 1 hour	0.012	1.41[1.08-1.84]	0.809	1.03[0.79-1.36]
Distance to health centre > 1 hour	0.000	2.10[1.59-2.77]	0.015	1.41[1.07-1.86]

Table B.4: Additional statistical associations: Infant and Young Child Feeding

	Regions I, II, and III- Pooled Analyses							
Logistic Regression	IDDS Score Acceptable		Exclusive breastfeeding <6 months		Continued Breastfeeding- One year		IDDS Score Zero (EBF past 6 months)	
Risk factor	P-value	Odds ratio [CI 95%]	P-value	Odds ratio [CI 95%]	P-value	Odds ratio [CI 95%]	P-value	Odds ratio [CI 95%]
Mother source of income- trade	0.595	1.21[0.61-2.40]	0.429	0.72[0.32-1.63]	0.525	0.52[0.07-3.82]	0.711	0.86[0.38-1.92]
Mother engaged in agriculture	0.098	0.43[0.16-1.17]	0.608	1.30[0.48-3.49]	0.621	1.85[0.16-20.94]	0.984	1.01[0.34-3.05]
Agricultural LR	0.439	0.79[0.43-1.44]	0.994	1.00[0.45-2.19]	0.694	1.36[0.29-6.28]	0.976	1.01[0.49-2.07]
Mining/ concession LR	0.437	1.32[0.66-2.64]	0.806	0.89[0.36-2.22]	0.508	0.57[0.11-2.99]	0.067	2.04[0.95-4.36]
Mother makes the decision for money- non female headed households	0.169	0.35[0.08-1.55]	0.574	0.69[0.19-2.51]	0.495	0.41[0.03-5.32]	0.602	1.36[0.43-4.30]
Mother makes the decision for food – non female headed households	0.186	1.70[0.7-3.75]	0.400	0.67[0.26-1.71]	0.335	0.31[0.03-3.76]	0.505	1.37[0.54-3.50]
Increased consumption during pregnancy	Perfect collinearity		Perfect collinearity		Insufficient observations		Perfect collinearity	
Increased consumption during lactation	0.494	0.63[0.17-2.36]	0.919	0.93[0.21-4.12]	0.072	23.0[0.75-702.6]	0.276	3.12[0.40-24.29]
Heaviest workload	0.866	1.07[0.48-2.37]	0.488	0.72[0.28-1.82]	0.024	0.08[0.01-0.72]	0.187	1.77[0.76-4.12]
Lowest support	0.223	1.58[0.76-3.30]	0.580	1.39[0.44-4.42]	0.779	1.40[0.13-14.74]	0.821	0.90[0.35-2.30]
No child keeper- mother carries child everywhere	0.710	0.81[0.27-2.41]	0.731	1.17[0.47-2.93]	0.779	1.40[0.13-14.74]	0.036	2.68[1.06-6.77]
	Delivery in clinic/ hospital		Use of modern contraceptives		Undesired pregnancy			
Distance to clinic > 1 hour	0.000	0.41[0.30-0.57]						
Teenage pregnancy			0.073	1.32[0.97-1.79]	0.003	1.54[1.16-2.06]		

Table B.5: Additional statistical associations (Various)

		Regions I, II, and III- Pooled Analyses	
Indicator 1	Indicator 2	Pearson Chi²	P-value
Distance to health centre > 1 hour	Use of black bagger/ pharmacy	1.148	0.284
Age of mother	Use of black bagger/ pharmacy	51.72	0.068
Distance to health centre > 1 hour	Use of traditional care	0.215	0.643
CPN >4 visits	Desired pregnancy	3.82	0.051
CPN > 4 visits	Use of modern contraceptives	1.15	0.284
CPN > 4 visits	Child unclean	4.72	0.030
CPN > 4 visits	Decision making – at least 3	0.340	0.560
Breastmilk sufficiency	Increased appetite + consumption during pregnancy and/or lactation	12.667	0.000
Unwanted pregnancy	Exclusive breastfeeding - 6 months or supplementary feeding 12-15 months	0.550	0.458
Presence of soap	Head of household F	1.149	0.284
Allowance from husband	Decision making – at least 3	0.579	0.447
Indicator1	Indicator 2	Pearson Coeff.	P-value
IDDS Score [scale, 0-7]	Distance to the market [min]	0.034	0.467
Presence of soap [Yes/ no]	Distance to the market	-0.180	0.000
Birth spacing [months]	Age of first pregnancy	0.032	0.626
Distance to market	Livestock score	0.188	0.000
External support scale [scale, 0-4]	Decisions involved in [scale, 0-5]	-0.085	0.021
Prenatal consultations	Distance to health clinic [min]	-0.130	0.000
Workload scale	Age of first pregnancy	-.0270	0.462
Workload scale	Total number of children that the woman has	0.124	0.0005

Table B.6: Statistical associations between selected risk factors and stunting demonstrated by logistic regressions, by livelihood zone

Risk factor <i>Logistics regression</i>	Stunting, Children 6-59 months							
	Agricultural LR N=603		Peri-urban LR N=73		Mining/ Concession LR N=181		Coastal LR N= 136	
Indicator	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]
Age group <24 months	0.006	0.55[0.36-0.85]	0.428	0.56[0.14-2.33]	0.743	0.90[0.46-1.73]	0.861	0.93[0.40-2.15]
Supporting a child in urban school	0.490	0.88[0.61-1.27]	0.004	5.76[1.73-19.14]	0.729	0.90[0.46-1.72]	0.051	0.44[0.19-1.00]
Supporting a child in urban school, female headed family	0.560	1.29[0.55-3.04]	<i>Perfect collinearity</i>		0.384	0.50[0.11-2.38]	0.509	0.63[0.15-2.52]
Supporting a child in urban school, male headed family	0.2085	0.80[0.53-1.21]	0.093	3.89[0.80-18.97]	0.985	1.01[0.48-2.09]	0.062	0.38[0.13-1.05]
Diarrhoea [2 previous weeks]	0.027	1.56[1.05-2.32]	0.909	1.07[0.35-3.25]	0.666	1.16[0.60-2.25]	0.985	1.01[0.45-2.27]
Cough [2 previous weeks]	0.025	1.57[1.06-2.33]	0.105	0.39[0.13-1.22]	0.262	0.65[0.31-1.38]	0.038	2.40[1.05-5.46]
Fever OR Diarrhoea OR cough	0.036	1.51[1.03-2.22]	0.236	0.50[0.16-1.57]	0.713	0.87[0.42-1.81]	0.136	2.01[0.80-5.03]
Perceived breastmilk sufficiency ³⁰⁹	0.322	1.69[0.60-4.81]	0.005	0.09[0.02-0.48]	0.602	1.37[0.42-4.49]	0.550	1.68[0.31-9.14]
Washable diaper (vs. a latrine or disposable diaper)	0.922	0.97[0.57-1.67]	0.453	1.71[0.42-7.00]	0.688	1.26[0.41-3.83]	0.471	1.49[0.50-4.38]
<i>In children > 18 months</i>	0.062	2.13[0.96-4.69]	0.449	2.21[0.28-17.36]	0.171	4.00[0.55-29.10]	0.086	7.17[0.76-67.82]
Undesired pregnancy	0.387	0.83[0.55-1.26]	0.095	6.40[0.72-56.63]	0.040	2.19[1.04-4.62]	0.140	2.11[0.78-5.68]
Birth spacing <24 months ³¹⁰	0.083	2.04[0.91-4.56]	0.676	0.50[0.02-12.90]	0.305	2.31[0.47-11.42]	0.287	3.00[0.40-22.71]
Mother has independent source of income : Petty trade	0.143	1.36[0.90-2.07]	0.809	0.83[0.19-3.65]	0.005	0.34[0.16-0.72]	0.818	1.11[0.45-2.74]
Mother perceived external support: Lowest	0.065	1.56[0.97-2.51]	0.433	1.82[0.41-8.10]	0.374	0.67[0.27-1.63]	0.240	1.82[0.67-4.96]
Mother/ family involved in at least one external support club / group	0.093	0.70[0.46-1.06]	0.145	0.32[0.07-1.48]	0.367	0.71[0.34-1.48]	0.580	1.29[0.53-3.13]
Children-only meals - 3 to 7 days	0.487	1.25[0.67-2.35]			0.136	2.29[0.77-6.83]	0.038	6.0[1.10-32.65]
Distance to water point >20 minutes ³¹¹	0.011	2.02[1.17-3.46]	0.199	0.48[0.15-1.47]	0.939	1.03[0.52-2.04]	0.483	1.49[0.49-4.59]
A family member has migrated	0.185	0.68[0.38-1.21]	0.551	1.42[0.45-4.49]	0.029	0.34[0.13-0.90]	0.116	0.29[0.06-1.36]

³⁰⁹ Children <36 months

³¹⁰ Only calculated in households with multiple children under 5

³¹¹ Including wait time

Table B.7: Statistical associations between risk factors and stunting demonstrated by logistic regressions (Region 1)

Risk factor <i>Logistics regression- Region 1</i>					Wasting <i>Children 6-59 months</i>		cGAM ³¹² <i>Children 6-59 months</i>		Stunting <i>Children 6-59 months</i>		WaST <i>Children 6-59 months</i>	
Indicator	N	n	Prevalence [95% CI]	Design effect	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]
Male child	356	174	48.9[43.7-54.1]	1.0	0.551	1.36[0.49-3.76]	0.940	1.04 [0.40-2.69]	0.809	0.94[0.58-1.53]	0.329	1.86[0.53-6.51]
Age group <24 months	356	128	36.0[31.5-40.7]	0.8	0.000	18.61[4.13-83.79]	0.000	21.73[4.88-96.79]	0.219	0.71[0.42-1.22]	0.002	11.22[2.37-53.07]
Age group <36 months	356	198	55.6[51.0-60.2]	0.8	0.010	14.78[1.93-113.47]	0.006	16.88[2.22-128.58]	0.292	1.30[0.80-2.11]	0.033	9.52[1.20-75.33]
Agricultural livelihood zone ³¹³	356	234	65.7[62.5-68.8]	0.4	0.172	0.49[0.18-1.36]	0.150	0.50[0.19-1.29]	0.438	0.82[0.49-1.36]	0.419	0.61[0.18-2.04]
Mining/ concession livelihood zone	356	100	28.1[25.1-31.3]	0.4	0.135	2.18 [0.79-6.08]	0.099	2.26 [0.86-5.94]	0.621	1.15[0.67-1.96]	0.490	1.56[0.44-5.47]
HH supporting child in Monrovia/ Buchanan	356	193	54.2[46.9-61.3]	1.9	0.472	1.46[0.52-4.14]	0.256	1.79[0.65-4.91]	0.949	1.02[0.63-1.65]	0.505	1.53[0.44-5.34]
Head of household (F)	356	85	23.9[18.1-30.8]	2.0	0.120	0.20[0.03-1.53]	0.205	0.38[0.09-1.70]	0.966	0.99[0.56-1.74]	0.261	0.30[0.04-2.42]
Mother currently <19 years old	275	29	10.6[6.5-16.6]	1.8	0.704	1.35[0.29-6.37]	0.323	1.95[0.52-7.31]	0.298	1.56[0.67-3.61]	0.323	2.25[0.45-11.24]
Household >1 child under 5 years old	356	216	60.7[54.0-67.0]	1.6	0.462	0.68[0.25-1.88]	0.423	0.68[0.26-1.76]	0.969	1.01[0.62-1.65]	0.135	0.39[0.11-1.35]
+Head of household female	356	52	14.6[9.5-21.8]	2.7			0.271	0.32[0.04-2.45]	0.991	1.00[0.51-1.97]		
Household size > 7 members	356	162	45.5[38.7-52.5]	1.8	0.771	0.86[0.31-2.37]	0.822	1.12[0.43-2.89]	0.945	0.98[0.61-1.59]	0.464	0.63[0.18-2.19]
Measles vaccine : Confirmed by card ³¹⁴	286	194	67.8[62.1-73.1]	1.0	0.409	1.92[0.41-9.11]	0.722	1.27[0.34-4.83]	0.231	1.41[0.80-2.47]	0.508	1.70[0.35-8.20]
Measles vaccine : Confirmed by card and/or Mother Recall ³¹⁵	286	254	88.8[84.4-92.1]	1.1					0.570	1.27[0.55-2.92]		
Micronutrient powder in previous 6 months ³¹⁶	92	43	46.7[37.0-56.7]	0.9	0.377	0.59[0.18-1.92]	0.180	0.45[0.14-1.44]	0.247	3.45[0.129-9.22]	0.571	1.49[0.37-5.98]

³¹² Wasting, edema, and/or MUAC <12.5 cm

³¹³ LR02, LR03, LR04

³¹⁴ 9-59 months

³¹⁵ 9-59 months

³¹⁶ 6-24 months

Vitamin A supplementation ³¹⁷	300	211	70.3[64.4-75.7]	1.2	0.618	1.34[0.42-4.29]	0.423	1.59[0.51-4.99]	0.588	1.16[0.68-1.99]	0.807	1.18[0.31-4.57]
Deworming	272	176	64.7[58.4-70.6]	1.1	0.525	1.69[0.33-8.56]	0.872	1.12[0.27-4.60]	0.448	0.81[0.48-1.38]	0.525	1.69[0.33-8.56]
Diarrhoea [2 previous weeks]	350	91	26.0[21.4-31.2]	1.1	0.416	1.54[0.54-4.39]	0.648	1.27[0.46-3.49]	0.834	1.06[0.62-1.81]	0.925	0.94[0.24-3.62]
+ > 1 child under 5	350	58	16.6[12.5-21.6]	1.3	0.160	2.21[0.73-6.64]	0.267	1.84[0.63-5.41]	0.386	0.75[0.39-1.44]	0.978	1.02[0.21-4.88]
+ Child unclean	345	31	9.0[6.0-13.3]	1.4	0.298	2.01[0.54-7.49]	0.418	1.72[0.47-6.32]	0.531	1.28[0.59-2.75]	0.426	1.90[0.39-9.22]
Fever [2 previous weeks]	350	128	36.6[31.4-42.1]	1.1	0.058	2.74[0.97-7.76]	0.058	2.58[0.97-6.86]	0.758	1.08[0.66-1.77]	0.295	1.91[0.57-6.42]
+ > 1 child under 5	350	74	21.1[16.6-26.5]	1.3	0.143	2.20[0.77-6.29]	0.257	1.81[0.65-5.01]	0.973	0.99[0.55-1.77]	0.689	1.32[0.34-5.12]
+ Child unclean	343	46	13.4[9.8-18.0]	1.2	0.085	2.65[0.87-8.03]	0.152	2.21[0.75-6.54]	0.480	1.27[0.66-2.45]	0.285	2.11[0.54-8.27]
Fever AND Diarrhoea	350	57	16.3[12.8-20.5]	1.0	0.048	2.91[1.01-8.40]	0.096	2.39[0.86-6.70]	0.515	0.81[0.42-1.54]	0.433	1.73[0.44-6.73]
Cough [2 previous weeks]	351	88	25.1[20.3-30.6]	1.3	0.304	1.73[0.61-4.94]	0.209	1.88[0.70-5.04]	0.250	0.72[0.41-1.26]	0.945	1.05[0.27-4.06]
+ > 1 child under 5	351	50	14.3[10.2-19.5]	1.6	0.261	1.97[0.60-6.40]	0.131	2.31[0.78-6.83]	0.977	1.01[0.51-1.99]	0.577	0.55[0.07-4.44]
+ Child unclean	343	29	8.5[5.6-12.6]	1.3	0.608	0.58[0.07-4.58]	0.519	0.51[0.07-3.97]	0.372	1.43[0.65-3.12]		
Fever OR Diarrhoea OR cough	350	187	53.4[47.5-59.3]	1.3	0.139	2.39[0.75-7.60]	0.071	2.85[0.91-8.87]	0.225	1.36[0.83-2.23]	0.284	2.09[0.54-8.04]
Use of health clinic and/or health worker (CHA, CHV)	183	99	54.1[45.8-62.2]	1.3	0.323	1.87[0.54-6.48]	0.360	1.704[0.55-5.33]	0.544	1.22[0.64-2.32]	0.214	2.81[0.55-14.36]
Use of traditional care [in case of fever, cough, or diarrhoea]	182	9	5.0[2.6-9.4]	1.0					0.821	0.848[0.20-3.52]		
Pharmacy/ black bagger [in case of fever, cough, or diarrhoea]	182	74	40.7[32.7-49.1]	1.3	0.564	0.69[0.20-2.41]	0.646	0.77[0.24-2.40]	0.656	0.86[0.45-1.66]	0.349	0.46[0.09-2.34]
No use of health care	185	3	1.6[0.5-4.7]	0.9					0.900	0.86[0.08-9.64]		
Distance to the health centre > 1 hour	356	100	28.1[24.2-32.3]	0.7	0.701	0.80[0.25-2.54]	0.495	0.67[0.21-2.10]	0.636	1.13[0.67-1.92]	0.418	0.53[0.11-2.49]
Child watched by an older sibling <18 years old	275	23	8.4[5.2-13.2]	1.4	0.730	0.69[0.09-5.54]	0.627	0.60[0.08-4.74]	0.514	1.35[0.55-3.30]	0.926	1.11[0.13-9.16]

³¹⁷ In previous 6 months ; children 6-59 months

Child watched by the father	275	23	8.4[5.1-13.4]	1.5	0.810	0.77[0.10-6.21]	0.703	0.67[0.08-5.31]	0.596	1.29[0.50-3.29]	0.846	1.23[0.15-10.27]
Child watched by grandmother	275	158	57.5[49.5-65.0]	1.7	0.331	0.59[0.21-1.70]	0.321	0.61[0.23-1.63]	0.300	0.75[0.44-1.29]	0.568	0.69[0.19-2.45]
Child watched by an auntie	270	50	18.2[12.6-25.6]	2.0	0.721	0.76[0.16-3.49]	0.917	1.07[0.29-3.92]	0.251	1.50[0.75-3.00]	0.569	0.54[0.07-4.42]
No child keeper- mother carries the child everywhere	270	20	7.3[4.3-12.0]	1.5	0.046	4.07[1.02-16.26]	0.076	3.45[0.88-13.52]	0.408	0.61[0.19-1.96]	0.107	3.86[0.75-19.91]
Continuation of breastfeeding at 1 year ³¹⁸	10	9	90.0[6.0-99.9]	1.0								
Perceived breastmilk sufficiency ³¹⁹	170	156	91.8[86.0-95.3]	1.2	0.522	0.59[0.12-2.98]	0.663	0.70[0.14-3.49]	0.276	2.11[0.55-8.04]	0.864	0.83[0.10-7.19]
Feeding frequency >= 3 times per day ³²⁰	56	24	42.9[30.0-56.8]	1.0	0.640	0.72[0.18-2.83]	0.941	0.95[0.26-3.50]	0.327	0.515[0.14-1.94]	0.203	0.24[0.03-2.18]
Open defecation by the child (vs. disposable diaper or latrine)	86	49	56.7[45.8-67.5]	1.0			0.829	0.73[0.04-12.16]	0.638	1.24[0.50-3.07]		
Washable diaper (vs. disposable diaper or latrine)	144	97	67.4[58.9-74.8]	1.1	0.040	8.82[1.11-70.27]	0.048	4.71[1.01-21.95]	0.267	0.63[0.28-1.43]	0.137	4.98[0.60-41.43]
<i>In children > 18 months</i>	59	24	40.7[28.0-54.7]	1.1	0.342	3.3[0.28-38.78]	0.651	1.60[0.21-12.28]	0.984	0.99[0.33-2.94]	0.342	3.30[0.28-38.78]
Acceptable IDDS score ³²¹	159	14	8.8[5.2-14.5]	1.0	0.485	1.78[0.35-8.90]	0.611	1.52[0.31-7.50]	0.614	0.73[0.21-2.49]	0.860	1.21[0.14-10.40]
IDDS Score Zero	159	16	10.0[6.1-16.1]	1.0	0.176	2.63[0.65-10.61]	0.259	2.21[0.56-8.81]	0.376	0.58[0.18-1.93]	0.983	1.02[0.12-8.69]
Child with unclean face and hands, unclean clothes and not recently washed	314	131	41.7[36.3-47.4]	1.0	0.252	0.53[0.18-1.57]	0.129	0.44[0.15-1.27]	0.620	1.13[0.69-1.86]	0.232	0.44[0.11-1.69]
Presence/ proof of animals in the child's play area	311	154	49.5[43.5-55.6]	½	0.382	0.62[0.22-1.80]	0.395	0.65[0.24-1.76]	0.377	0.80[0.49-1.31]	0.189	0.40[0.10-1.57]
Appropriate caregiver-child interaction scale	258	153	59.3[53.4-65.9]	1.3	0.597	0.75[0.26-2.15]	0.276	0.58[0.21-1.55]	0.378	1.28[0.74-2.24]	0.203	0.43[0.12-1.57]
Child spanked during course of the interview	320	30	9.4[6.6-13.2]	1.0	0.728	1.31[0.28-6.08]	0.338	1.90[0.51-6.97]	0.751	0.87[0.38-2.00]	0.364	2.08[0.43-10.14]
MUAC of mother - <220 mm	271	4	1.5[0.5-4.0]	1.0	0.165	5.19[0.51-53.17]	0.010	14.4[1.89-109.49]	0.130	5.81[0.59-56.77]	0.079	8.26[0.78-87.41]

³¹⁸ Children 12-15 months

³¹⁹ Children <36 months

³²⁰ Children 6-18 months

³²¹ Children 6-36 months

Mother education: Completed elementary or higher	275	181	65.8[58.0-72.9]	1.7	0.233	0.53[0.18-1.51]	0.438	0.67[0.25-1.84]	0.389	1.29[0.72-2.30]	0.237	0.46[0.13-1.66]
Mother education: Completed junior high or higher	275	69	25.1[19.9-32.3]	1.7	0.420	1.58[0.52-4.83]	0.277	1.78[0.63-5.06]	0.851	1.06[0.57-1.96]	0.685	1.33[0.33-5.32]
Polygamous household	331	70	21.1[15.7-27.9]	1.8	0.906	0.92[0.25-3.42]	0.692	0.77[0.21-2.80]	0.893	0.96[0.52-1.76]	0.347	0.37[0.05-2.96]
More than 1 co-wife	259	12	4.6[2.2-9.5]	1.7	0.070	4.66[0.88-24.60]	0.107	3.88[0.75-20.18]	0.285	2.00[0.56-7.13]	0.341	2.89[0.33-25.64]
Mother of the child currently pregnant ³²²	274	28	10.2[6.7-15.3]	1.4	0.537	0.52[0.06-4.12]	1.000	1.00[0.22-4.62]	0.797	0.90[0.39-2.08]	0.863	0.83[0.10-6.82]
Mother of child currently pregnant or breast-feeding	274	168	61.3[53.6-68.5]	1.7	0.038	4.96[1.09-22.52]	0.022	5.76[1.28-25.79]	0.165	0.68[0.40-1.17]	0.179	2.94[0.61-14.15]
Age of first pregnancy <18	274	153	55.8[48.2-63.2]	1.6	0.184	2.22[0.69-7.18]	0.238	1.91[0.65-5.61]	0.162	1.47[0.86-2.54]	0.145	3.21[0.67015.46]
Undesired pregnancy	274	173	63.1[55.3-70.3]	1.7	0.166	2.49[0.68-9.09]	0.241	1.99[0.63-6.31]	0.414	1.26[0.72-2.20]	0.104	5.62[0.70-45.10]
Birth spacing <24 months ³²³	67	34	49.3[38.1-60.5]	0.8	0.558	0.48[0.04-5.66]	0.558	0.48[0.04-5.66]	0.230	2.10[0.63-7.01]		
Increased appetite & consumption during pregnancy	28	19	67.9[42.1-86.0]	1.5					0.444	2.04[0.33-12.69]		
Consumption of potter during pregnancy	28	12	42.9[19.8-69.5]	1.5					0.907	1.1[0.22-5.45]		
Increased appetite & consumption during lactation	138	125	90.6[81.2-95.6]	1.9	0.763	1.39[0.16-11.83]	0.694	1.53[0.18-12.97]	0.326	2.21[0.46-10.69]		
More than or equal to two weeks of rest post delivery ³²⁴	140	83	59.3[46.6-70.8]	2.2	0.058	0.29[0.08-1.04]	0.031	0.25[0.07-0.88]	0.164	0.56[0.25-1.27]	0.103	0.25[0.05-1.33]
Currently using contraceptives: All (including LAM)	272	117	43.0[35.2-51.2]	1.8	0.608	0.76[0.26-2.20]	0.354	0.61[0.22-1.72]	0.896	1.04[0.61-1.77]	0.297	0.48[0.12-1.91]
Currently using modern contraceptive	272	99	36.4[28.9-44.6]	1.9	0.280	0.52[0.16-1.70]	0.164	0.44[0.14-1.40]	0.839	1.06[0.61-1.82]	0.203	0.36[0.07-1.73]
Currently using contraceptives: Previous pregnancy unwanted	172	66	38.4[28.3-49.5]	2.1	0.217	0.43[0.11-1.65]	0.155	0.38[0.10-1.44]	0.798	1.09[0.56-2.14]	0.225	0.37[0.07-1.84]

³²² Pregnant and lactating mothers at the same time were considered pregnant for this analysis

³²³ Only calculated in households with multiple children under 5

³²⁴ Restriction- only asked to mothers of children <36 months

Woman makes or jointly makes decision for household spending	274	42	15.3[10.1-22.5]	2.0	0.752	0.78[0.17-3.61]	0.878	1.11[0.30-4.05]	0.578	1.22[0.60-2.48]	0.589	0.56[0.07-4.56]
Woman makes or jointly makes decision for food to cook	274	113	41.2[34.0-48.9]	1.6	0.216	0.47[0.15-1.54]	0.266	0.54[0.18-1.59]	0.557	1.16[0.68-1.98]	0.883	0.91[0.25-3.30]
Woman makes or jointly makes decision for schooling	275	45	16.4[11.0-23.6]	2.0	0.278	0.32[0.04-2.51]	0.218	0.28[0.04-2.14]	0.378	1.36[0.69-2.69]	0.531	0.51[0.06-4.16]
Woman makes or jointly makes decision for taking child to the clinic	275	74	26.9[20.4-34.6]	1.8	0.882	0.91[0.28-2.97]	0.896	1.08[0.36-3.17]	0.876	0.95[0.53-1.72]	0.905	1.09[0.28-4.33]
Woman makes or jointly makes decision for contraceptives	275	112	40.7[33.0-48.9]	1.9	0.866	0.91[0.31-2.65]	0.678	1.23[0.46-3.31]	0.399	1.26[0.74-2.16]	0.606	1.40[0.39-4.96]
Woman makes or jointly makes at least one decision	273	176	64.5[56.4-71.8]	1.8	0.632	0.77[0.26-2.24]	0.940	0.96[0.34-2.70]	0.881	0.96[0.55-1.68]	0.699	0.77[0.21-2.83]
Woman makes or jointly makes at least 3 decisions	273	48	17.6[12.2-24.8]	1.9	0.241	0.29[0.04-2.23]	0.441	0.55[0.12-2.50]	0.243	1.48[0.76-2.88]	0.476	0.47[0.06-3.78]
<i>Makes 3 decisions ,does not have a source of formal income</i>	48	5	10.4[3.1-29.6]	1.6					0.103	6.67[0.68-65.37]		
Prenatal consultations – at least 3	275	243	88.4[81.3-93.0]	2.3	0.514	1.99[0.25-15.72]	0.426	2.31[0.29-18.10]	0.686	0.85[0.38-1.89]		
Prenatal consultations- at least 6	275	105	38.2[31.0-46.0]	1.7	0.782	0.86[0.28-2.59]	0.922	0.95[0.34-2.66]	0.903	0.97[0.56-1.68]	0.656	0.73[0.18-2.90]
Childbirth in a health facility	275	215	78.5[72.4-83.5]	1.3	0.249	0.52[0.17-1.59]	0.409	0.63[0.21-1.88]	0.448	0.78[0.41-1.48]	0.154	0.39[0.11-1.43]
Mother has independent source of income : Petty trade	273	115	42.1[34.4-50.3]	1.8	0.681	1.25[0.44-3.56]	0.959	0.97[0.36-2.65]	0.050	0.57[0.33-1.00]	0.583	1.43[0.40-5.06]
Mother depends on allowance from husband	274	56	20.4[14.5-28.0]	2.0	0.896	0.92[0.25-3.38]	0.725	0.79[0.22-2.88]	0.448	1.28[0.68-2.42]	0.916	0.92[0.19-4.46]
Mother workload: Heaviest	275	71	25.8[19.5-33.3]	1.7	0.878	1.10[0.34-3.58]	0.671	1.26[0.43-3.75]	0.814	0.93[0.50-1.72]	0.287	0.32[0.04-2.60]
Mother perceived external support: Lowest	275	52	18.9[13.5-25.8]	1.7	0.487	0.58[0.13-2.67]	0.363	0.50[0.11-2.25]	0.186	0.62[0.31-1.26]	0.973	0.97[0.20-4.74]
Mother workload heaviest & perceived external support lowest	275	11	4.00[1.8-8.5]	1.7					0.333	0.46[0.10-2.22]		
Mother involved in at least one external support club / group	271	127	46.9[39.8-54.1]	1.4	0.264	0.53[0.18-1.61]	0.294	0.58[0.21-1.61]	0.059	0.59[0.34-1.02]	0.096	0.26[0.05-1.27]

Children 6 months and under EBF	31	21	67.7[44.9-84.4]	1.2								
Reduced coping strategies index: Medium or high	350	111	31.7[25.0-39.3]	2.2	0.243	0.47[0.13-1.68]	0.361	0.59[0.19-1.84]	0.431	0.81[0.48-1.37]	0.129	0.20[0.03-1.59]
Consumption of Cheaper and Cheaper Foods - 3 of 7 Days	351	105	29.9[23.2-37.6]	2.2	0.648	0.76[0.24-2.44]	0.817	0.88[0.30-2.55]	0.626	0.88[0.51-1.49]	0.388	0.50[0.11-2.39]
Head of household F	85	41	48.2[30.5-66.4]	2.9					0.671	1.24[0.46-3.32]		
Borrowing of food - 3 of 7 Days	351	70	19.9[14.4-27.0]	2.2					0.314	0.71[0.37-1.37]		
Head of household F	85	26	30.6[16.5-50.0]	2.8					0.894	1.08[0.36-3.20]		
Reducing the portion of meals - 3 by 7 days	351	110	31.3[24.8-38.8]	2.1	0.112	0.30[0.07-1.33]	0.180	0.42[0.12-1.49]	0.754	0.92[0.54-1.56]		
Head of household F	85	38	44.7[30.6-59.7]	1.8			0.902	1.19[0.07-19.87]	0.355	1.60[0.59-4.29]		
Children-only meals - 3 to 7 days	350	57	16.3[11.5-22.6]	2.0	0.755	1.23[0.34-5.00]	0.462	1.54[0.48-4.92]	0.460	1.28[0.67-2.47]	0.533	0.52[0.06-4.13]
Head of household F	84	15	17.9[8.6-33.4]	2.0					0.399	1.75[0.48-6.48]		
Reducing number of meals in the day- 3 to 7 days	351	83	23.7[17.8-30.7]	2.1			0.276	0.19[0.02-1.45]	0.109	0.49[0.26-0.92]		
Head of household F	85	24	28.2[15.4-45.9]	2.4					0.177	0.43[0.12-1.47]		
MAHFP year-round	356	80	22.5[17.3-28.7]	1.7	0.150	0.22[0.03-1.72]	0.114	0.19[0.03-1.49]	0.792	1.08[0.61-1.93]	0.311	0.34[0.04-2.73]
Access to the market: Year-round	356	80	22.5[17.3-28.7]	1.7	0.469	1.75[0.8-.801]	0.542	0.70[0.22-2.21]	0.500	0.83[0.48-1.43]	0.473	0.56[0.12-2.71]
Distance to the market: >=1 hour	353	213	60.3[54.8-65.6]	1.1	0.320	0.60[0.22-1.64]	0.579	0.76[0.29-1.99]	0.338	1.28[0.77-2.12]	0.612	0.73[0.22-2.45]
Owns livestock	353	187	53.0[45.5-60.3]	2.0	0.433	1.52[0.54-4.29]	0.484	1.42[0.53-3.77]	0.518	1.17[0.72-1.91]		
Use of improved water point	345	275	79.7[74.1-84.4]	1.4	0.827	1.2[0.32-4.19]	0.644	1.35[0.38-4.83]	0.649	1.15[0.63-2.12]	0.821	1.20[0.25-5.69]
Distance to water point >20 minutes ³²⁵	350	65	18.6[13.9-24.4]	1.6	0.503	1.49[0.46-4.82]	0.692	1.26[0.40-4.00]	0.381	1.31[0.71-2.42]	0.421	0.43[0.05-3.40]
Point of use water treatment, unimproved water point	73	12	16.4[6.7-34.9]	2.4					0.513	0.57[0.11-3.05]		

³²⁵ Including wait time

Water transportation container checklist score unacceptable (moderate-severe risk)	356	94	26.4[20.7-33.0%]	1.8	0.265	0.42[0.09-1.91]	0.426	0.60[0.17-2.12]	0.888	0.96[0.55-1.69]	0.253	0.30[0.04-2.37]
Presence of handwashing soap ³²⁶	280	188	67.1[60.1-73.5]	1.5	0.157	3.00[0.65-13.76]	0.098	3.57[0.79-16.15]	0.115	1.62[0.89-2.94]	0.159	4.47[0.56-35.95]
Presence of soap (laundry or handwashing)	280	217	77.5[71.0-82.9]	1.4	0.218	3.65[0.47-28.60]	0.164	4.29[0.55-33.27]	0.081	1.89[0.93-3.87]	0.397	2.47[0.31-19.97]
Kitchen utensils left on the floor	323	170	52.6[45.3-59.9]	1.8	0.762	0.85[0.29-2.48]	0.732	0.84[0.30-2.30]	0.905	1.03[0.62-1.72]	0.799	0.85[0.24-3.00]
Uncovered food	323	66	20.4[15.0-27.2]	1.9	0.994	0.99[0.27-3.69]	0.776	0.83[0.23-3.02]	0.290	0.71[0.37-1.35]	0.906	0.91[0.19-4.40]
Visible kitchen waste	331	96	29.0[23.1-35.7]	1.6	0.227	0.39[0.09-1.79]	0.352	0.54[0.15-1.96]	0.092	0.61[0.34-1.08]	0.208	0.26[0.03-2.10]
Floor of house is soil	352	216	61.4[55.1-67.3]	1.4	0.257	1.95[0.61-6.21]	0.648	1.27[0.4603.47]	0.482	0.84[0.51-1.37]	0.174	2.93[0.62-13.81]
Child playing in dust/mud	332	223	67.2[60.5-73.2]	1.6	0.676	0.80[0.28-2.27]	0.268	0.58[0.22-1.52]	0.950	0.98[0.58-1.67]	0.794	0.85[0.24-2.97]
Very poor HH hygiene	303	76	25.1[19.3-31.9]	1.6	0.764	0.82[0.22-3.03]	0.559	0.68[0.19-2.47]	0.104	0.59[0.31-1.11]	0.721	0.75[0.16-3.63]
A family member has died	356	14	3.9[1.9-8.0]	1.9					0.959	0.97[0.28-3.30]		
A family member has migrated	356	70	19.7[15.1-25.3]	1.5			0.145	0.22[0.03-1.69]	0.122	0.60[0.32-1.15]		
Food preserved	353	293	83.0[77.2-87.6]	1.7			0.244	3.37[0.44-26.00]	0.826	1.08[0.55-2.11]		

Table B.8: Statistical associations between risk factors and stunting demonstrated by linear regressions (Region 1)

Risk factor <i>Linear Regression- Region 1</i>					GAM [W/H] <i>Children 6-59 months</i>			GAM [MUAC] <i>Children 0-59 months</i>			Stunting [H/A] <i>Children 6-59 months</i>		
Indicator	n	Mean [95% CI]	Standard error	Design Effect	P-value	Coeff.	SE	P-value	Coeff.	SE	P-value	Coeff.	SE
Child age	356	30.8[29.0-32.5]	0.90	0.8	0.000	0.02	0.00	0.000	0.05	0.00	0.509	<0.01	0.01
Mother's age	275	27.5[26.5-28.5]	0.50	1.6	0.027	0.02	0.01	0.009	0.03	0.01	0.070	0.02	0.01
Mother's MUAC (mm)	271	291.0[285.5-296.5]	2.76	1.4	0.854	<0.01	0.02	0.380	0.02	0.02	0.013	0.05	0.02
Prenatal consultations	275	5.7[5.2-6.1]	0.24	2.1	0.036	-0.04	0.02	0.157	-0.04	0.03	0.723	-0.01	0.02
Number of people in the household	356	7.1[6.8-7.5]	0.18	2.2	0.902	<-0.01	0.02	0.350	-0.02	0.02	0.559	-0.01	0.02
Distance to the clinic [min.]	356	72.8[60.0-85.7]	6.52	0.3	0.797	<0.01	0.00	0.568	<0.01	0.00	0.543	<0.01	0.00

³²⁶ Confirmed presence

Distance to the market [min.]	353	113.6[98.-128.9]	7.77	1.4	0.588	<0.01	0.00	0.353	<0.01	0.00	0.378	<0.01	0.00
IDDS Score	159	2.1[1.9-2.3]	0.09	1.0	0.335	0.084	0.09	0.148	0.15	0.10	0.564	0.06	0.11
Complementary feeding frequency	56	2.1[1.6-2.5]	0.21	1.1	0.489	0.08	0.11	0.804	0.03	0.11	0.169	0.18	0.13
Mother age of first pregnancy	274	17.4[17.0-17.7]	0.18	1.7	0.126	0.04	0.02	0.268	0.04	0.03	0.141	0.04	0.03
Women's work overload	275	2.4[2.3-2.6]	0.07	1.7	0.033	-0.14	0.06	0.202	-0.10	0.08	0.148	0.11	0.08
Head of household female	68	2.42[2.14-2.69]	0.14	1.6	0.522	-0.08	0.12	0.679	-0.07	0.17	0.309	0.18	0.18
Women's external support	275	2.77[2.64-2.94]	0.07	1.6	0.411	-0.05	0.06	0.281	0.09	0.09	0.272	-0.09	0.08
Head of household female	68	2.49[2.22-2.75]	0.14	1.8	0.127	-0.19	0.12	0.963	-0.01	0.17	0.375	-0.17	0.19
Postpartum days	140	29.5[23.5-35.5]	3.05	2.2	0.050	0.01	0.00	0.110	<0.01	0.00	0.818	<0.01	0.00
Decision making involvement	273	1.41[1.22-1.60]	0.10	2.1	0.203	-0.06	0.05	0.057	-0.11	0.06	0.846	-0.01	0.05
Child caregiver checklist	313	4.1[3.9-4.4]	0.12	1.2	0.297	0.03	0.03	0.165	-0.05	0.04	0.500	-0.03	0.04
MAHFP	356	10.3[10.2-10.5]	0.07	2.0	0.081	-0.08	0.05	0.393	-0.05	0.06	0.642	-0.03	0.06
Distance to the market	353	113.6[98.3-128.9]	7.77	1.4	0.588	<0.01	0.00	0.353	<0.01	0.00	0.378	<0.01	0.00
Distance to the water point [min.]	286	13.6[11.1-16.2]	1.28	0.9	0.306	<0.01	0.00	0.259	-0.01	0.00	0.709	<0.01	0.00
Livestock score	351	0.11[0.08-0.14]	0.01	2.4	0.930	-0.02	0.24	0.579	0.17	0.31	0.363	-0.29	0.32
Observation of household hygiene: Increasing uncleanliness	303	2.31[2.13-2.49]	0.09	1.5	0.127	-0.07	0.04	0.222	-0.07	0.06	0.918	-0.01	0.06
Observing the child's play area: Increasing uncleanliness	320	2.47[2.30-2.65]	0.09	1.0	0.039	-0.08	0.04	0.004	-0.14	0.05	0.736	0.02	0.05

Table B.9: Statistical associations between risk factors and stunting demonstrated by logistic regressions (Region 2)

Region II: Grand Bassa, Rural Montserrado												
Risk factor Logistics regression- Region 2					Wasting Children 6-59 months		cGAM Children 6-59 months		Stunting Children 6-59 months		WaST Children 6-59 months	
Indicator	N	n	Prevalence [95% CI]	Design effect	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]
Male child	334	182	54.5[48.5-60.3]	1.2	0.730	0.85[0.34-2.12]	0.555	0.77[0.33-1.82]	0.110	1.51[0.91-2.52]	0.503	1.53[0.44-5.37]
Age group <24 months	334	134	40.1[35.5-44.9]	0.8	0.000	5.88[2.17-15.91]	0.000	5.90[2.32-14.95]	0.251	0.722[0.42-1.26]	0.008	6.30[1.63-24.40]
Age group <36 months	334	210	62.9[58.3-67.2]	0.7	0.043	3.19[1.04-9.83]	0.016	3.88[1.28-11.73]	0.890	0.96[0.58-1.60]	0.115	3.48[0.74-16.44]
Agricultural livelihood zone ³²⁷	334	184	55.1[51.7-58.4]	0.4	0.558	1.32[0.52-3.34]	0.473	1.38[0.57-3.30]	0.131	1.48[0.89-2.46]	0.076	4.07[0.86-19.20]
Peri-urban livelihood zone	334	73	21.9[19.1-24.9]	0.4	0.424	0.60[0.17-2.11]	0.562	0.72[0.23-2.20]	0.425	0.78[0.42-1.44]	0.743	0.77[0.16-3.66]
HH currently supporting child in urban school	334	152	45.5[38.2-53.1]	2.0	0.133	2.04[0.80-5.16]	0.088	2.14[0.89-5.13]	0.246	1.35[0.81-2.23]	0.062	3.61[0.94-13.93]
Head of household (F)	334	81	24.3[18.6-31.0]	1.8	0.298	1.67[0.64-4.37]	0.545	1.33[0.52-3.39]	0.845	1.06[0.60-1.88]	0.871	1.12[0.29-4.34]
Mother currently <19 years old	260	11	4.2[2.3-7.8]	1.1	0.279	3.48[0.36-33.28]	0.365	2.82[0.30-26.70]	0.668	1.49[0.24-9.11]	0.073	8.46[0.82-87.53]

³²⁷ LR02, LR03, LR04

Household >1 child under 5 years old	334	201	60.2[53.4-66.6]	1.6	0.834	1.10[0.44-2.80]	0.754	1.15[0.48-2.76]	0.114	1.52[0.91-2.55]	0.120	3.43[0.73-16.18]
+ Head of household female	334	55	16.5[11.2-23.5]	2.3	0.384	1.60[0.55-4.65]	0.604	1.32[0.46-3.74]	0.860	1.06[0.55-2.04]	0.971	1.03[0.22-4.92]
Household size > 7 members	334	150	44.9[38.2-51.8]	1.6	0.328	0.62[0.24-1.61]	0.282	0.61[0.25-1.50]	0.756	0.92[0.56-1.53]	0.995	1.00[0.30-3.35]
Measles vaccine : Confirmed by card and/or Mother Recall ³²⁸	253	169	66.8[60.5-72.5]	1.1	0.573	0.75[0.27-2.05]	0.492	0.72[0.28-1.86]	0.805	1.07[0.61-1.87]	0.921	1.07[0.26-4.41]
Measles vaccine : Confirmed by card ³²⁹	253	72	28.5[23.1-34.5]	1.0	0.104	0.29[0.06-1.29]	0.069	0.25[0.05-1.11]	0.443	0.79[0.44-1.43]	0.596	0.65[0.13-3.20]
Micronutrient powder in previous 6 months ³³⁰	89	28	31.5[23.0-41.3]	0.9	0.673	1.30[0.39-4.33]	0.530	1.44[0.46-4.50]	0.516	1.39[0.52-3.75]	0.703	0.72[0.14-3.84]
Vitamin A supplementation ³³¹	272	208	76.5[70.5-81.6]	1.2	0.026	0.35[0.14-0.88]	0.025	0.36[0.15-0.88]	0.513	1.23[0.66-2.27]	0.784	0.83[0.21-3.22]
Deworming	250	165	66.0[59.5-72.0]	1.1	0.882	0.92[0.30-2.84]	0.753	0.84[0.30-2.41]	0.993	1.00[0.57-1.75]	0.591	1.56[0.31-7.91]
Diarrhoea [2 previous weeks]	332	112	33.7[28.0-40.0]	1.4	0.217	1.78[0.71-4.43]	0.048	2.39[1.00-5.68]	0.251	1.35[0.81-2.26]	0.557	1.44[0.43-4.84]
+ > 1 child under 5	332	69	20.8[15.6-27.1]	1.7	0.388	1.56[0.57-4.24]	0.136	2.00[0.80-4.97]	0.348	1.33[0.74-2.39]	0.259	2.07[0.59-7.33]
+ Child unclean	315	52	16.5[12.5-21.4]	1.1	0.898	1.08[0.34-3.40]	0.370	1.58[0.58-4.25]	0.079	1.75[0.94-3.25]	0.995	1.01[0.21-4.88]
Fever [2 previous weeks]	332	125	37.7[31.6-44.2]	1.5	0.424	1.45[0.58-3.61]	0.131	1.94[0.82-4.61]	0.644	0.89[0.53-1.48]	0.726	0.80[0.23-2.80]
+ > 1 child under 5	332	73	22.0[16.7-28.4]	1.7	0.855	1.10[0.38-3.17]	0.402	1.49[0.58-3.81]	0.361	1.31[0.73-2.34]	0.753	1.24[0.32-4.84]
+ Child unclean	311	59	19.0[14.5-24.5]	1.3	0.848	0.89[0.28-2.81]	0.605	1.30[0.48-3.49]	0.910	0.97[0.52-1.78]	0.343	0.36[0.05-2.94]
Fever AND Diarrhoea	332	71	21.4[16.5-27.2]	1.4	0.223	1.82[0.69-4.79]	0.024	2.75[1.14-6.61]	0.420	1.27[0.71-2.26]	0.777	1.22[0.31-4.73]
Cough [2 previous weeks]	333	112	33.6[28.1-39.6]	1.3	0.859	1.09[0.43-2.76]	0.583	1.27[0.54-3.02]	0.137	1.48[0.88-2.46]	0.901	0.92[0.26-3.24]
+ > 1 child under 5	333	68	20.4[15.4-26.5]	1.6	0.855	1.10[0.38-3.17]	0.744	1.18[0.44-3.12]	0.027	1.92[1.08-3.42]	0.305	1.94[0.55-6.84]
+ Child unclean	312	55	17.6[13.3-23.1]	1.3	0.516	0.66[0.18-2.34]	0.906	1.06[0.37-3.03]	0.012	2.18[1.19-4.01]	0.375	0.39[0.05-3.14]
Fever OR Diarrhoea OR cough	333	190	57.1[50.6-63.3]	1.4	0.500	1.41[0.52-3.78]	0.260	1.74[0.66-4.57]	0.160	1.46[0.86-2.49]	0.965	1.03[0.29-3.61]
+ Child unclean	303	89	29.4[23.9-35.5]	1.3	0.381	0.62[0.22-1.79]	0.696	0.83[0.32-2.12]	0.029	1.83[1.06-3.15]	0.305	0.44[0.09-2.11]
Use of health clinic and/or health worker (CHA, CHV) [in case of fever, cough, or diarrhoea]	182	74	40.7[33.7-48.1]	1.0	0.404	1.60[0.53-4.79]	0.502	1.41[0.52-3.88]	0.381	1.33[0.70-2.54]	0.100	4.07[0.76-24.64]
Use of traditional care [in case of fever, cough, or diarrhoea]	182	7	3.9[1.9-7.5]	0.8	0.592	1.82[0.20-16.30]	0.739	1.45[0.16-12.80]	0.601	0.64[0.12-3.40]	Perfect collinearity	

³²⁸ 9-59 months

³²⁹ 9-59 months

³³⁰ 6-24 months

³³¹ In previous 6 months ; children 6-59 months

Pharmacy/ black bagger [in case of fever, cough, or diarrhoea]	182	101	55.5[48.4-62.4]	0.9	0.299	0.56[0.18-1.68]		0.426	0.66[0.24-1.82]	0.517	0.81[0.43-1.53]	0.154	0.30[0.06-1.58]
No use of health care	190	8	4.2[2.1-8.2]	1.0	Perfect collinearity					0.463	0.54[0.11-2.77]	Perfect collinearity	
Distance to the health centre > 1 hour	334	121	36.2[30.6-42.3]	1.3	0.845	0.91[0.35-2.36]		0.494	0.72[0.29-1.83]	0.215	1.39[0.83-2.32]	0.962	0.97[0.28-3.40]
Child watched by an older sibling <18 years old	260	21	8.1[4.8-13.3]	1.5	Perfect collinearity					0.534	0.72[0.25-2.06]	Perfect collinearity	
Child watched by the father	260	9	3.5[1.7-6.9]	1.2	Perfect collinearity								
Child watched by grandmother	260	134	51.5[34.8-59.2]	1.6	0.936	1.04[0.36-3.00]		0.836	0.90[0.34-2.37]	0.599	1.17[0.65-2.09]	0.317	2.34[0.44-12.32]
Child watched by an auntie	260	56	21.5[15.6-29.0]	1.8	0.071	2.74[0.92-8.14]		0.059	2.65[0.96-7.28]	0.465	0.76[0.36-1.59]	0.621	1.53[0.29-8.14]
No child keeper- mother carries the child everywhere	260	38	14.6[10.1-20.7]	1.5	0.456	0.46[0.06-3.60]		0.796	0.82[0.18-3.76]	0.322	1.51[0.67]	Perfect collinearity	
Continuation of breastfeeding at 1 year ³³²	13	11	84.6[29.4-98.6]	1.0	0.352	0.22[0.01-5.28]		0.532	0.38[0.02-8.10]	0.906	0.83[0.04-17.00]	Perfect collinearity	
Perceived breastmilk sufficiency ³³³	193	161	83.4[78.3-87.5]	0.7	0.155	0.43[0.13-1.38]		0.335	0.58[0.19-1.77]	0.112	0.51[0.22-1.17]	0.282	0.45[0.11-1.92]
Feeding frequency >= 3 times per day ³³⁴	58	16	27.6[16.7-42.0]	1.1	0.313	2.13[0.49-9.30]		0.617	1.43[0.35-5.79]	0.878	0.90[0.23-3.45]	0.382	2.5[0.32-19.53]
Open defecation by the child (vs. latrine or disposable diaper)	119	65	54.6[45.5-63.5]	1.0	0.703	0.68[0.09-5.01]		0.971	1.03[0.17-6.47]	0.293	1.61[0.66-3.91]	Perfect collinearity	
Washable diaper (vs. a latrine or disposable diaper)	143	89	62.2[54.1-69.7]	0.9	0.024	6.00[1.26-28.55]		0.011	7.37[1.57-34.60]	0.035	2.62[1.07-6.40]	Perfect collinearity	
+ Child > 18 months	51	17	33.3[21.5-47.7]	0.9	0.114	6.69[0.63-70.58]		0.114	6.69[0.63-70.58]	0.012	5.38[1.45-19.95]		
Acceptable IDDS score ³³⁵	161	19	11.8[7.8-17.6]	0.9	0.797	1.23[0.25-5.99]		Perfect collinearity		0.975	0.975[0.20-4.66]	0.720	1.20[0.44-4.31]
IDDS Score Zero	161	8	5.0[2.8-8.8]	0.7	Perfect collinearity					0.264	0.29[0.03-2.52]	Perfect collinearity	
Presence of OR proof of animals in the child's play area	304	159	52.3[46.7-57.9]	1.0	0.210	0.55[0.22-1.40]		0.151	0.53[0.22-1.26]	0.797	0.94[0.56-1.55]	0.948	1.04[0.31-3.50]
Appropriate caregiver-child interaction scale	305	97	31.8[26.8-37.3]	1.0	0.686	0.81[0.28-2.30]		0.752	0.86[0.32-2.26]	0.013	0.47[0.26-0.85]	0.428	0.53[0.11-2.53]
Child spanked during course of the interview	305	26	8.5[5.9-12.2]	1.0	0.418	1.71[0.47-6.28]		0.583	1.43[0.40-5.20]	0.683	1.19[0.52-2.74]	0.348	2.14[0.44-10.48]

³³² Children 12-15 months

³³³ Children <36 months

³³⁴ Children 6-18 months

³³⁵ Children 6-36 months

MUAC of mother - <220 mm	251	7	2.8[1.3-5.9]	1.1	.002	12.89[2.56-64.83]	0.005	9.96[2.03-48.98]	0.324	0.34[0.04-2.89]	Perfect collinearity	
Mother education: Completed elementary or higher	258	164	63.6[56.5-70.1]	1.3	0.185	2.41[0.66-8.81]	0.202	2.11[0.67-6.66]	0.654	0.87[0.48-1.58]	0.666	1.44[0.27-7.62]
Mother education: Completed junior high or higher	258	77	29.8[23.6-36.9]	1.4	0.185	2.05[0.71-5.90]	0.208	1.88[0.70-4.99]	0.131	0.60[0.31-1.16]	0.882	0.88[0.17-4.66]
Polygamous household	310	40	12.9[8.8-18.5]	1.6	0.410	1.73[0.47-6.42]	0.212	2.11[0.65-6.80]	0.226	1.64[0.74-3.65]	0.976	1.03[0.12-8.60]
More than 1 co-wife	258	0	Perfect collinearity		N/A							
Mother of the child currently pregnant ³³⁶	259	19	7.3[4.3-12.1]	1.4	0.538	1.64[0.34-1.87]	0.734	1.31[0.28-6.18]	0.318	0.56[0.18-1.75]	0.617	1.74[0.20-15.27]
+ Polygamous household												
Mother of child currently pregnant or breast-feeding	259	157	60.6[53.3-67.5]	1.4	0.045	3.76[1.03-13.75]	0.015	4.85[1.36-17.28]	0.141	1.56[0.86-2.80]	Perfect collinearity	
Age of first pregnancy <18	260	142	54.6[46.5-62.5]	1.7	0.615	1.32[0.45-3.84]	0.872	1.08[0.41-2.86]	0.021	2.02[1.11-3.67]	0.351	2.20[0.42-11.62]
Undesired pregnancy	259	142	54.8[46.7-62.7]	1.8	0.448	1.55[0.50-4.78]	0.172	2.12[0.72-6.25]	0.319	1.35[0.75-2.42]	0.370	2.14[0.41-11.28]
Birth spacing <24 months ³³⁷	66	23	34.9[25.7-45.3]	0.7	Perfect collinearity				0.352	0.55[0.15-1.96]	Perfect collinearity	
Increased appetite & consumption during pregnancy	21	12	57.1[27.3-82.6]	1.2	0.831	0.73[0.04-13.45]	0.831	0.73[0.04-13.45]	0.434	2.67[0.23-31.07]		
Consumption of potter during pregnancy	21	6	28.6[7.9-65.2]	1.5	Perfect collinearity				0.861	0.8[0.07-9.67]		
Increased appetite & consumption during lactation	138	129	93.5[86.3-97.0]	1.4	0.489	0.44[0.04-4.42]	0.106	0.21[0.03-1.39]	0.398	2.62[0.28-24.38]		
More than or equal to two weeks of rest post delivery ³³⁸	138	88	63.8[51.6-74.4]	2.0	0.740	1.27[0.31-5.29]	0.762	0.83[0.25-2.77]	0.964	1.02[0.43-2.41]	0.356	2.81[0.31-25.09]
Currently using contraceptives: All (including LAM)	238	89	37.4[30.1-45.4]	1.5	0.079	0.25[0.05-1.17]	0.033	0.19[0.04-0.87]	0.866	1.05[0.57-1.94]	0.262	0.29[0.03-2.53]
Currently using modern contraceptive	238	76	31.9[24.7-40.2]	1.7	0.050	0.12[0.02-1.00]	0.027	0.10[0.01-0.76]	0.873	0.95[0.51-1.77]	Perfect collinearity	
Currently using modern contraceptives: Previous pregnancy unwanted	126	47	37.3[27.1-48.8]	1.6	0.136	0.19[0.02-1.67]	0.050	0.12[0.01-1.00]	0.641	0.82[0.36-1.87]	Perfect collinearity	

³³⁶ Pregnant and lactating mothers at the same time were considered pregnant for this analysis

³³⁷ Only calculated in households with multiple children under 5

³³⁸ Restriction- only asked to mothers of children <36 months

Woman makes or jointly makes decision for household spending	259	55	21.2[15.2-28.8]	1.8	0.216	2.04[0.66-6.31]	0.438	1.54[0.52-4.57]	0.126	1.71[0.86-3.40]	0.159	3.02[0.65-14.02]
Woman makes or jointly makes decision for food to cook	258	129	50.0[42.5-57.5]	1.5	0.877	0.92[0.32-2.64]	0.900	1.06[0.40-2.79]	0.333	1.33[0.75-2.38]	0.647	1.43[0.31-6.54]
Woman makes or jointly makes decision for schooling	259	68	26.3[19.7-34.1]	1.8	0.651	0.74[0.20-2.73]	0.404	0.58[0.16-2.09]	0.377	0.73[0.37-1.46]	0.518	0.49[0.06-4.20]
Woman makes or jointly makes decision for taking child to the clinic	258	117	45.4[37.4-53.6]	1.8	0.185	0.45[0.14-1.46]	0.068	0.34[0.11-1.08]	0.242	0.70[0.39-1.27]	0.150	0.21[0.02-1.77]
Woman makes or jointly makes decision for contraceptives	254	124	48.8[41.0-56.7]	1.6	0.289	0.55[0.18-1.66]	0.241	0.54[0.20-1.51]	0.471	0.81[0.45-1.45]	0.341	0.45[0.08-2.35]
Woman makes or jointly makes at least one decision	250	202	80.8[74.1-86.1]	1.5	0.992	0.99[0.27-3.70]	0.797	0.86[0.27-2.76]	0.636	1.20[0.57-2.53]	0.707	1.51[0.18-12.90]
Woman makes or jointly makes at least 3 decisions	250	76	30.4[23.4-38.5]	1.7	0.828	0.88[0.27-2.87]	0.502	0.67[0.21-2.14]	0.429	0.77[0.40-1.48]	0.395	0.40[0.05-3.36]
Prenatal consultations- at least 6	259	135	52.1[44.8-59.4]	1.4	0.603	1.33[0.46-3.87]	0.857	1.09[0.41-2.89]	0.039	0.54[0.30-0.97]	0.568	0.64[0.14-2.94]
Childbirth in a health facility	256	152	59.4[52.4-66.0]	1.3	0.618	0.77[0.27-2.19]	0.880	1.08[0.40-2.91]	0.092	0.60[0.34-1.09]	0.372	0.50[0.11-2.29]
Mother has independent source of income : Petty trade	255	127	49.8[42.1-57.6]	1.6	0.607	1.33[0.45-3.99]	0.832	1.11[0.41-3.01]	0.663	0.88[0.49-1.57]	0.721	1.32[0.29-6.05]
Mother depends on allowance from husband	260	56	21.5[15.6-28.9]	1.7	0.479	1.54[0.47-5.10]	0.367	1.65[0.55-4.92]	0.478	1.29[0.64-2.63]	0.549	1.67[0.31-8.92]
Mother workload: Heaviest	259	53	20.5[15.6-26.4]	1.2	0.496	0.59[0.13-2.72]	0.315	0.46[0.10-2.09]	0.225	0.63[0.30-1.33]	0.636	0.60[0.07-5.08]
Mother perceived external support: Lowest	259	58	22.4[16.5-29.7]	1.7	0.077	2.72[0.90-8.27]	0.216	1.94[0.68-5.55]	0.104	1.73[0.80-3.36]	0.009	9.20[1.73-49.06]
Mother workload heaviest & perceived external support lowest	259	14	5.4[2.8-10.1]	1.5	0.204	2.85[0.57-14.33]	0.321	2.24[0.45-11.06]	0.217	0.38[0.08-1.77]	0.376	2.69[0.30-24.22]
Mother involved in at least one external support club / group	260	145	55.8[47.6-63.6]	1.7	0.695	1.24[0.42-3.61]	0.647	0.80[0.30-2.10]	0.946	1.02[0.57-1.82]	0.388	2.08[0.39-10.96]
Children 6 months and under EBF	41	19	46.3[27.9-65.9]	1.4	N/A							
Reduced coping strategies index: Medium or high	332	49	14.8[10.0-21.3]	2.1	0.556	0.64[0.14-2.86]	0.836	0.88[0.25-3.10]	0.916	0.96[0.47-1.97]	0.607	0.58[0.07-4.65]
Consumption of Cheaper and Cheaper Foods - 3 of 7 Days	332	67	20.2[14.6-27.2]	2.1	0.284	0.44[0.10-1.97]	0.193	0.37[0.08-1.65]	0.324	0.72[0.37-1.39]	Perfect collinearity	

<i>Head of household F</i>	81	19	23.5[13.1-38.5]	1.7	0.409	0.40[0.04-3.55]	0.409	0.40[0.04-3.55]	0.690	0.79[0.26-2.46]	<i>Perfect collinearity</i>	
Borrowing of food - 3 of 7 Days	332	34	10.2[6.3-16.3]	2.3	0.958	1.04[0.23-4.76]	0.869	0.88[0.19-3.99]	0.951	1.03[0.44-2.40]	0.948	0.93[0.11-7.56]
<i>Head of household F</i>	81	12	14.8[7.3-2.8]	1.5	0.886	0.85[0.09-7.85]	0.886	0.85[0.09-7.85]	0.153	2.60[0.70-9.65]	0.426	2.75[0.23-33.28]
Reducing the portion of meals - 3 by 7 days	332	44	13.3[8.6-19.8]	2.3	0.749	0.78[0.17-3.53]	0.906	1.08[0.30-3.85]	0.767	1.12[0.53-2.39]	0.744	0.71[0.09-5.70]
<i>Head of household F</i>	81	9	11.1[4.3-25.8]	2.0	0.827	1.29[0.13-12.30]	0.827	1.29[0.13-12.31]	0.361	2.00[0.45-8.84]	0.270	4.14[0.33-51.76]
Children-only meals - 3 to 7 days	332	10	3.0[1.3-7.1]	2.0	<i>Perfect collinearity</i>				0.621	1.47[0.32-6.69]	<i>Perfect collinearity</i>	
<i>Head of household F</i>	81	5	6.2[1.6-21.5]	2.3	<i>Perfect collinearity</i>				0.248	3.00[0.47-19.35]	<i>Perfect collinearity</i>	
Reducing number of meals in the day- 3 to 7 days	332	59	17.8[12.6-24.6]	2.1	0.730	0.80[0.22-2.85]	0.953	0.97[0.31-2.98]	0.905	0.96[0.50-1.86]	0.976	1.02[0.21-4.90]
<i>Head of household F</i>	81	15	18.5[9.4-33.4]	1.8	0.584	1.63 [0.28-9.47]	0.584	1.63 [0.28-9.47]	0.508	1.50 [0.45-4.98]	0.085	8.83 [0.74-105.57]
MAHFP: Year-round	333	67	20.1[14.7-26.9]	2.0	0.972	1.02[0.33-3.19]	0.771	0.85[0.28-2.60]	0.985	0.99[0.53-1.87]	0.382	0.40[0.05-3.16]
Access to the market: At least 10 months	333	256	76.9[69.4-83.0]	2.2	0.158	2.92[0.66-12.95]	0.100	3.46[0.79-15.19]	0.149	1.58[0.85-2.95]	0.677	1.39[0.29-6.62]
Distance to the market: >=1 hour	333	122	36.6[32.1-41.4]	0.8	0.834	0.90[0.35-2.34]	0.804	0.89[0.36-2.19]	0.009	2.00[1.19-3.35]	0.491	0.622[0.16-2.40]
Owns livestock	329	176	53.5[46.3-60.6]	1.8	0.115	0.47[0.18-1.21]	0.380	0.68[0.29-1.61]	0.033	1.75[1.05-2.93]	0.877	1.10[0.33-3.70]
Use of improved water point	327	207	63.3[58.5-67.9]	0.8	0.771	0.87[0.34-2.21]	0.823	0.90[0.38-2.18]	0.966	1.01[0.60-1.71]	0.965	1.03[0.29-3.61]
Distance to water point >20 minutes ³³⁹	329	67	20.4[15.7-26.0]	1.4	0.443	0.61[0.17-2.16]	0.587	0.73[0.24-2.25]	0.792	0.92[0.50-1.71]	0.316	0.35[0.04-2.76]
Point of use water treatment, unimproved water point	120	14	11.7[6.3-20.6]	1.4	<i>Perfect collinearity</i>				0.635	0.71[0.18-2.89]	<i>Perfect collinearity</i>	
Water transportation container checklist score unacceptable (high risk)	334	88	26.4[20.5-33.2]	1.8	0.223	1.82[0.69-4.79]	0.197	1.82[0.73-4.51]	0.420	1.27[0.71-2.26]	0.096	2.82[0.83-9.59]
Presence of handwashing soap ³⁴⁰	334	231	69.2[61.9-75.6]	1.9	0.782	0.87[0.34-2.27]	0.784	0.88[0.36-2.17]	0.611	1.15[0.67-1.98]	0.764	0.83[0.24-2.90]
Presence of soap (laundry or handwashing)	334	245	73.4[66.6-79.2]	1.8	0.879	0.93[0.34-2.50]	0.832	0.90[0.36-2.29]	0.492	1.22[0.69-2.14]	0.558	0.69[0.20-2.42]
Kitchen utensils left on the floor	324	227	70.1[63.2-76.1]	1.7	0.157	2.48[0.71-8.72]	0.198	2.08[0.68-6.32]	0.116	1.60[0.89-2.86]	0.167	4.32[0.54-34.33]
Uncovered food	323	151	46.8[39.4-54.2]	1.8	0.815	0.90[0.36-2.24]	0.975	1.01[0.43-2.39]	0.356	1.27[0.76-2.12]	0.889	0.92[0.27-3.08]
Visible kitchen waste	327	168	51.4[44.7-58.1]	1.5	0.191	0.53[0.20-1.37]	0.152	0.52[0.21-1.27]	0.440	0.82[0.49-1.36]	0.388	0.58[0.16-2.02]
Floor of house is soil	330	191	57.9[52.0-63.6]	1.2	0.621	1.27[0.49-3.30]	0.911	1.05[0.44-2.52]	0.127	1.51[0.89-2.55]	0.378	1.84[0.48-7.09]

³³⁹ Including wait time

³⁴⁰ Confirmed presence; 'they said yes but couldn't show me' coded as 'no'

Child playing in dust/mud	308	243	78.9[72.8-84.0]	1.5	0.579	1.43[0.40-5.10]	0.765	1.19[0.38-3.66]	0.008	2.84[1.32-6.18]	0.800	2.54[0.32-20.33]
A family member has died	334	12	3.6[1.4-8.8]	2.6	0.227	2.67[0.54-13.10]	0.313	2.26[0.46-10.98]	0.941	0.96[0.28-3.26]	Perfect collinearity	
A family member has migrated	334	44	13.2[9.3-18.3]	1.5	0.589	0.66[0.15-2.97]	0.444	0.56[0.13-2.48]	0.265	0.65[0.30-1.39]	Perfect collinearity	
Food preserved	330	272	82.4[76.5-87.1]	1.7	0.113	0.44[0.16-1.21]	0.226	0.54[0.20-1.46]	0.907	1.04[0.53-2.05]	0.357	0.53[0.13-2.06]

Table B.10: Statistical associations between risk factors and stunting demonstrated by linear regressions (Region 2)

Risk factor Linear Regression- Region 2					GAM [W/H] Children 6-59 months			GAM [MUAC] Children 0-59 months			Stunting [H/A] Children 6-59 months		
Indicator	n	Mean [95% CI]	Standard error	Design Effect	P- value	Coeff.	SE	P- value	Coeff.	SE	P-value	Coeff.	SE
Child age [months]	334	28.2[26.4-30.0]	0.91	0.7	0.007	0.02	0.01	0.000	0.05	0.01	0.660	-0.00	0.01
Mother's age [years]	260	27.6[26.7-28.4]	0.44	1.4	0.554	0.01	0.01	0.050	0.03	0.01	0.309	0.01	0.01
Mother's MUAC [cm]	251	27.4[26.9-28.0]	0.27	1.2	0.009	0.05	0.02	0.000	0.09	0.02	0.057	0.04	0.02
Prenatal consultations [#]	259	6.0[5.6-6.4]	0.21	1.8	0.673	-0.01	0.03	0.303	0.03	0.03	0.043	0.06	0.03
Number of people in the household [#]	334	7.6[7.2-8.0]	0.20	2.0	0.271	-0.03	0.03	0.766	-0.01	0.02	0.724	-0.01	0.02
Distance to the clinic [min.]	333	72.5[65.3-79.6]	3.63	1.0	0.226	<0.01	0.00	0.951	0.00	0.00	0.394	-0.00	0.00
Distance to the market [min.]	333	52.2[45.9-58.6]	3.24	0.7	0.554	<0.01	0.00	0.536	-0.00	0.00	0.027	-0.00	0.00
IDDS Score [scale, min 0- max 7]	161	2.4[2.2-2.5]	0.08	0.7	0.994	<-0.01	0.10	0.190	0.15	0.12	0.611	0.07	0.13
Complementary feeding frequency [#]	58	2.0[1.6-2.5]	0.22	1.0	0.893	0.02	0.12	0.819	0.03	0.13	0.387	0.12	0.13
Mother age of first pregnancy [years]	260	17.6[17.2-18.0]	0.18	1.6	0.177	-0.04	0.03	0.046	-0.07	0.03	0.370	-0.03	0.03
Women's work overload scale [scale, min 1- max 4]	259	2.4[2.2-2.5]	0.07	1.2	0.419	0.06	0.07	0.296	0.09	0.09	0.172	0.13	0.09
Head of household female	56	2.6[2.3-2.9]	0.14	1.5	0.847	-0.03	0.13	0.216	-0.20	0.16	0.268	-0.22	0.19
Women's external support scale [scale, min 1- max 4]	259	2.6[2.5-2.8]	0.07	1.7	0.496	0.05	0.08	0.538	0.06	0.09	0.173	0.13	0.10
Head of household female	56	2.4[2.2-2.7]	0.14	1.4	0.498	0.09	0.13	0.995	-0.00	0.17	0.128	-0.30	0.19
Postpartum rest [days]	138	28.7[21.8-35.6]	3.50	1.3	0.034	0.01	0.00	0.491	0.00	0.00	0.195	0.00	0.00
Decision making involvement [scale, min. 0 – max. 5]	250	1.9[1.7-2.1]	0.10	1.7	0.673	-0.02	0.05	0.257	0.07	0.06	0.238	0.08	0.06
Child caregiver checklist [scale, min -4 – max 5]	305	3.2[3.0-3.4]	0.12	1.0	0.740	-0.02	0.05	0.772	-0.01	0.04	0.588	0.02	0.04
MAHFP	333	10.4[10.2-10.5]	0.07	2.2	0.607	-0.04	0.08	0.028	-0.14	0.06	0.323	-0.06	0.07
Distance to the market	333	52.2[45.9-58.6]	3.24	0.7	0.554	<0.01	0.00	0.536	-0.00	0.00	0.027	-0.00	0.00
Distance to water [distance to the point + wait time, min.]	329	14.9[12.1-17.7]	1.43	1.5	0.336	<-0.01	0.00	0.831	-0.00	0.00	0.391	0.00	0.00
Livestock score [scale] ³⁴¹	329	0.1[0.1-0.1]	0.01	2.7	0.494	0.33	0.48	0.265	0.46	0.41	0.130	0.65	0.41
Observation of household hygiene: Increasing uncleanliness [scale, min: 0, max: 5]	301	3.1[2.9-3.3]	0.09	1.6	0.733	-0.03	0.08	0.839	0.01	0.06	0.230	-0.08	0.06
Observing the child's play area: Increasing uncleanliness [scale, min: 0, max: 5]	301	2.7[2.5-2.9]	0.10	1.1	0.351	0.06	0.06	0.012	0.13	0.05	0.894	-0.01	0.05

³⁴¹ Livestock score=(chickens*.01)+(sheep*.1)+(ducks*.1)+(pig*.2)

Table B.11: Statistical associations between risk factors and stunting demonstrated by logistic regressions (Region 3)

Region III: Rivercess, Sinoe												
Risk factor <i>Logistics regression- Region 3</i>					Wasting <i>Children 6-59 months</i>		cGAM <i>Children 6-59 months</i>		Stunting <i>Children 6-59 months</i>		WaST <i>Children 6-59 months</i>	
Indicator	N	n	Prevalence [95% CI]	Design effect	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]	P-value	Odds Ratio [95% CI]
Male child	289	145	50.2[44.3-56.1]	1.1	0.416	0.67[0.26-1.74]	0.303	0.61[0.24-1.56]	0.025	1.85[1.08-3.19]	0.294	0.47[0.11-1.92]
Age group <24 months	289	137	47.4[42.2-52.7]	0.8	0.000	10.16[2.87-35.99]	0.000	10.94[3.10-38.57]	0.077	0.60[0.34-1.06]	0.029	5.90[1.20-29.09]
Age group <36 months	289	193	66.8[61.6-71.6]	0.8	0.013	13.28[1.74-101.31]	0.011	14.13[1.86-107.53]	0.082	0.62[0.36-1.06]	0.114	5.41[0.67-44.03]
Agricultural livelihood zone ³⁴²	289	185	64.0[61.1-66.9]	0.3	0.022	0.32[0.12-0.85]	0.012	0.29[0.11-0.76]	0.528	1.20[0.69-2.08]	0.264	0.47[0.12-1.78]
Mining/ concession livelihood zone	289	77	26.6[23.9-29.6]	0.3	0.052	2.57[0.99-6.65]	0.016	5.69[1.38-23.49]	0.024	2.91[1.15-7.36]	0.058	1.76[0.98-3.17]
Peri-urban livelihood zone	289	23	8.0[6.7-9.4]	0.2	0.298	2.02[0.54-7.60]	0.343	1.89[0.51-7.08]	0.401	0.66[0.24-1.76]	0.180	3.07[0.59-15.82]
HH supporting child in Monrovia/ Buchanan	289	175	60.6[53.2-67.5]	1.6	0.079	2.77[0.89-8.62]	0.058	2.98[0.96-9.20]	0.032	0.55[0.32-0.95]	0.259	2.50[0.51-12.33]
Head of household (F)	289	50	17.3[12.6-23.4]	1.5	0.029	3.05[1.12-8.32]	0.041	2.80[1.04-7.54]	0.434	0.75[0.37-1.54]	0.222	2.43[0.58-10.16]
Mother currently <19 years old	240	19	7.9[4.9-12.5]	1.2	0.551	1.93[0.22-16.93]	0.082	4.51[0.83-24.62]	0.921	1.08[0.25-4.64]	Perfect collinearity	
Household >1 child under 5 years old	289	157	54.3[46.9-61.5]	1.6	0.213	0.55[0.21-1.41]	0.310	0.62[0.25-1.56]	0.442	1.24[0.72-2.11]	0.177	0.38[0.09-1.55]
+ Head of household female	289	25	8.7[5.0-14.5]	2.0	0.298	2.02[0.54-7.60]	0.343	1.89[0.51-7.08]	0.710	0.84[0.32-2.16]	0.827	1.27[0.15-10.67]
Household size > 7 members	289	121	41.9[35.0-49.1]	1.5	0.529	0.73[0.28-1.93]	0.726	0.85[0.3-2.15]	0.188	0.69[0.40-1.20]	0.198	0.35[0.07-1.73]
Household size > 5 members	289	199	68.9[62.0-75.0]	1.5	0.551	1.38[0.48-3.99]	0.458	1.49[0.52-4.26]	0.132	0.65[0.37-1.14]	0.948	0.95[0.23-3.92]
Measles vaccine : Confirmed by card ³⁴³	222	64	28.8[22.9-35.6]	1.1	0.247	0.40[0.09-1.87]	0.198	0.37[0.08-1.69]	0.697	1.13[0.61-2.09]	0.481	0.46[0.05-4.01]
Measles vaccine : Confirmed by card and/or Mother Recall ³⁴⁴	222	168	75.7[69.2-81.2]	1.1	0.016	0.25[0.08-0.77]	0.006	0.21[0.07-0.64]	0.670	0.87[0.45-1.66]	0.033	0.15[0.03-0.86]
Micronutrient powder in previous 6 months ³⁴⁵	94	33	35.1[25.8-45.7]	1.0	0.060	0.22[0.05-1.06]	0.122	0.35[0.09-1.33]	0.208	0.53[0.19-1.43]		

³⁴² LR02, LR03, LR04

³⁴³ 9-59 months

³⁴⁴ 9-59 months

³⁴⁵ 6-24 months

Vitamin A supplementation ³⁴⁶	237	175	73.8[67.4-79.4]	1.1	0.167	0.49[0.18-1.34]	0.223	0.54[0.20-1.45]	0.969	1.01[0.54-1.89]	0.431	0.56[0.13-2.40]
Deworming	215	129	60.0[52.9-66.7]	1.1	0.837	1.14[0.32-4.03]	0.863	0.90[0.28-2.94]	0.896	1.04[0.58-1.85]	0.762	1.31[0.23-7.30]
Diarrhea [2 previous weeks]	286	100	35.0[29.5-40.9]	1.1	0.058	2.51[0.97-6.52]	0.033	2.78[1.09-7.10]	0.107	1.57[0.91-2.71]	0.024	6.26[1.27-30.84]
+ > 1 child under 5	286	54	18.9[14.4-24.4]	1.2	0.548	0.68[0.19-2.42]	0.890	0.92[0.29-2.90]	0.073	1.79[0.95-3.37]	0.960	1.04[0.21-5.18]
+ Child unclean	281	50	17.8[13.8-22.6]	0.9	0.264	1.79[0.64-5.00]	0.128	2.14[0.80-5.70]	0.121	1.66[0.87-3.13]	0.099	3.13[0.81-12.13]
Fever [2 previous weeks]	286	142	49.7[43.6-55.7]	1.1	0.321	1.63[0.62-4.31]	0.465	1.42[0.56-3.61]	0.217	0.71[0.42-1.22]	0.846	1.14[0.30-4.37]
+ > 1 child under 5	286	74	25.9[20.6-31.9]	1.2	0.844	0.90[0.31-2.60]	0.735	0.83[0.29-2.39]	0.829	1.07[0.59-1.92]	0.263	0.30[0.04-2.46]
+ Child unclean	279	71	25.5[20.7-30.9]	1.0	0.352	0.58[0.19-1.82]	0.289	0.54[0.17-1.68]	0.520	0.82[0.56-1.48]	0.588	0.64[0.13-3.17]
Fever AND Diarrhea	286	71	24.7[19.8-30.5]	1.1	0.264	1.75[0.66-4.68]	0.339	1.61[0.61-4.23]	0.296	1.37[0.76-2.50]	0.056	3.73[0.97-14.37]
Cough [2 previous weeks]	286	90	31.5[26.1-37.4]	1.1	0.326	0.56[0.18-1.77]	0.266	0.53[0.17-1.63]	0.498	1.22[0.69-2.16]	0.879	1.12[0.27-4.59]
+ > 1 child under 5	286	54	18.9[14.0-25.0]	1.4	0.152	0.22[0.03-1.73]	0.136	0.21[0.03-1.63]	0.158	1.62[0.83-3.17]	0.565	0.54[0.07-4.42]
+ Child unclean	280	44	15.7[11.8-20.7]	1.1	0.371	0.50[0.11-2.27]	0.327	0.47[0.11-2.12]	0.126	1.69[0.86-3.33]	0.749	1.30[0.26-6.49]
Fever OR Diarrhea OR cough	284	188	66.2[59.9-72.0]	1.2	0.140	2.59[0.73-9.19]	0.113	2.77[0.79-9.78]	0.657	0.88[0.49-1.56]	0.558	1.61[0.33-7.96]
+ Child unclean	274	91	33.2[27.9-39.0]	1.0	0.838	0.90[0.34-2.39]	0.926	1.05[0.41-2.67]	0.659	1.13[0.65-1.95]	0.727	1.27[0.33-4.86]
Use of health clinic and/or health worker (CHA, CHV) ³⁴⁷	176	101	57.4[50.8-63.7]	0.8	0.965	0.97[0.31-3.05]	0.830	1.13[0.37-3.43]	0.238	1.51[0.76-2.97]	0.812	0.82[0.16-4.20]
Use of traditional care ³⁴⁸	175	9	5.1[2.7-9.8]	1.0	0.811	1.30[0.15-11.31]	0.873	1.19[0.14-10.30]	0.827	0.85[0.20-3.56]	0.298	3.33[0.35-31.94]
Pharmacy/ black bagger ³⁴⁹	175	65	37.1[30.6-44.2]	0.9	0.964	0.97[0.30-3.14]	0.789	0.85[0.27-2.69]	0.303	0.69[0.34-1.39]	0.780	0.78[0.14-4.41]
No use of health care	187	12	6.4[3.5-11.4]	1.1	0.068	3.84[0.91-16.26]	0.085	3.54[0.84-14.87]	0.531	0.65[0.16-2.54]	0.449	2.35[0.26-21.47]
Distance to the health center > 1 hour	289	136	47.1[41.7-52.5]	0.9	0.276	0.58[0.22-1.54]	0.406	0.67[0.26-1.71]	0.165	1.46[0.86-2.49]	0.794	0.84[0.22-3.20]
Child watched by an older sibling <18 years old	240	22	9.2[5.6-15.4]	1.4	Perfect collinearity		0.687	0.65[0.08-5.24]	0.683	0.81[0.29-2.23]	Perfect collinearity	
Child watched by the father	240	23	9.6[5.8-15.4]	1.6	0.661	0.63[0.08-5.05]	0.606	0.58[0.07-4.64]	0.099	0.39[0.12-1.20]	Perfect collinearity	
Child watched by grandmother	240	96	40.0[33.1-47.3]	1.3	0.328	0.55[0.17-1.82]	0.245	0.50[0.15-1.62]	0.074	1.71[0.95-3.09]	0.249	0.28[0.03-2.44]
Child watched by an auntie	240	39	16.3[11.1-23.1]	1.6	0.228	2.12[0.62-7.23]	0.292	1.92[0.57-6.44]	0.947	1.03[0.47-2.23]	0.045	5.40[1.04-28.03]

³⁴⁶ In previous 6 months ; children 6-59 months

³⁴⁷ First treatment sought in case of fever, cough, or diarrhea

³⁴⁸ First treatment sought in case of fever, cough, or diarrhea

³⁴⁹ First treatment sought in case of fever, cough, or diarrhea

No child keeper- mother carries the child everywhere	240	55	22.9[17.6-29.3]	1.2	0.131	2.43[0.77-7.73]	0.180	2.18[0.70-6.78]	0.620	0.83[0.40-1.73]	0.425	2.03[0.36-11.48]
Continuation of breastfeeding at 1 year ³⁵⁰	13	7	53.9[9.4-92.9]	0.9	Perfect collinearity				0.322	3.75[0.27-51.37]	Perfect collinearity	
Perceived breastmilk sufficiency ³⁵¹	171	146	85.4[78.4-90.4]	1.2	0.504	0.62[0.16-2.48]	0.587	0.68[0.17-2.69]	0.980	0.99[0.34-2.84]	0.023	0.14[0.03-0.77]
Feeding frequency >= 3 times per day ³⁵²	65	30	46.2[34.5-58.2]	0.9	0.202	0.43[0.11-1.58]	0.354	0.56[0.16-1.93]	0.264	1.97[0.60-6.51]	0.471	0.52[0.09-3.08]
Open defecation by the child (vs. a latrine or disposable diaper)	98	81	82.7[74.7-88.5]	0.8	0.036	0.17[0.03-0.89]	0.036	0.17[0.03-0.89]	0.671	1.35[0.33-5.47]	0.192	0.15[0.01-2.59]
Washable diaper (vs. a latrine or disposable diaper)	109	92	84.4[76.4-90.1]	0.9	0.797	0.83[0.19-3.58]	0.914	0.92[0.21-3.97]	0.386	1.88[0.45-7.77]	0.750	1.43[0.16-13.17]
+ Child > 18 months	19	10	52.6[23.9-79.7]	1.1	Perfect collinearity				0.085	7.50[0.76-74.16]	Perfect collinearity	
Acceptable IDDS score ³⁵³	144	15	10.4[6.4-16.4]	0.9	0.411	0.42[0.05-3.73]	0.376	0.39[0.05-3.14]	0.521	0.67[0.20-2.25]	Perfect collinearity	
IDDS Score Zero	144	9	6.3[3.4-11.3]	0.9	0.002	15.9[2.7-94.60]	0.003	14.67[2.47-87.06]	0.408	2.00[0.39-10.34]	0.001	24.20[3.87-151.36]
Child with unclean face and hands, unclean clothes and not recently washed	263	131	49.8[43.9-55.8]	1.0	0.167	0.51[0.20-1.32]	0.247	0.58[0.23-1.46]	0.421	1.25[0.73-2.16]	0.925	0.94[0.25-3.59]
Presence of OR proof of animals in the child's play area	260	147	56.5[49.5-63.3]	1.3	0.179	2.06[0.72-5.95]	0.134	2.23[0.78-6.37]	0.986	1.00[0.57-1.73]	0.639	1.40[0.34-5.75]
Appropriate caregiver-child interaction scale	228	134	58.8[52.4-64.9]	0.9	0.133	2.73[0.74-10.13]	0.243	2.02[0.62-6.60]	0.615	1.17[0.64-2.12]	0.249	3.58[0.41-31.23]
Child spanked during course of the interview	264	24	9.1[6.2-13.1]	0.9	0.472	0.47[0.06-3.69]	0.984	0.98[0.21-4.54]	0.230	0.55[0.21-1.46]	Perfect collinearity	
MUAC of mother - <220 mm	232	4	1.7[0.4-2.5]	2.5	Perfect collinearity				0.281	3.78[0.34-42.53]	Perfect collinearity	
Mother education: Completed elementary or higher	240	160	66.7[58.8-73.7]	1.6	0.278	2.07[0.56-7.68]	0.483	1.53[0.47-4.99]	0.187	0.67[0.36-1.22]	Perfect collinearity	
Mother education: Completed junior high or higher	240	57	23.8[17.9-30.8]	1.4	0.860	0.89[0.24-3.33]	0.750	0.81[0.22-3.00]	0.057	0.48[0.23-1.02]	Perfect collinearity	
Polygamous household	283	32	11.3[7.0-17.8]	2.0	0.864	0.88[0.19-4.03]	0.640	1.37[0.37-5.02]	0.494	1.32[0.59-2.95]	0.909	0.88[0.11-7.35]

³⁵⁰ Children 12-15 months

³⁵¹ Children <36 months

³⁵² Children 6-18 months

³⁵³ Children 6-36 months

More than 1 co-wife	N/A												
Mother of the child currently pregnant ³⁵⁴	239	22	9.2[5.8-14.4]	1.3	Perfect collinearity				0.230	0.53[0.18-1.50]	Perfect collinearity		
+ Polygamous HH	28	2	7.1[0.9-37.6]	1.0	Perfect collinearity				0.859	1.30[0.07-23.43]	Perfect collinearity		
Mother of child currently pregnant or breast-feeding	239	159	6.6	1.3	0.366	1.74[0.52-5.74]	0.276	1.93[0.59-6.28]	0.688	1.13[0.62-2.05]	0.266	3.42[0.39-29.85]	
Age of first pregnancy <18	240	144	60.0[52.6-66.9]	1.3	0.159	0.45[0.15-1.36]	0.245	0.53[0.19-1.54]	0.183	0.67[0.37-1.21]	0.055	0.12[0.14-1.05]	
Undesired pregnancy	238	124	52.1[44.7-59.4]	1.3	0.163	2.34[0.71-7.73]	0.112	2.60[0.80-8.48]	0.878	1.05[0.58-1.88]	0.495	1.82[0.33-10.17]	
Birth spacing <24 months ³⁵⁵	120	20	16.7[10.8-24.8]	1.0	0.391	0.40[0.05-3.31]	0.391	0.40[0.05-3.31]	0.095	2.49[0.85-7.29]	0.938	1.09[0.11-10.46]	
Increased appetite & consumption during pregnancy	22	13	59.1[25.7-85.8]	1.3	Perfect collinearity				0.882	1.17[0.15-9.01]	Perfect collinearity		
Consumption of potter during pregnancy	22	10	45.5[17.9-76.1]	1.2	Perfect collinearity				0.382	2.50[0.32-19.53]	Perfect collinearity		
Increased appetite & consumption during lactation	134	113	84.3[74.7-90.8]	1.6	0.464	2.22[0.26-18.72]	0.959	1.04[0.21-5.30]	0.978	1.01[0.36-2.90]	Perfect collinearity		
More than or equal to two weeks of rest post delivery ³⁵⁶	137	111	81.0[71.7-87.8]	1.4	Perfect collinearity			0.499	2.08[0.25-17.52]	0.346	0.60[0.20-1.75]	Perfect collinearity	
Currently using contraceptives: All (including LAM)	217	111	51.2[43.7-58.5]	1.2	0.722	0.82[0.28-2.45]	0.523	0.71[0.25-2.04]	0.383	0.76[0.41-1.40]	0.832	0.84[0.16-4.27]	
Currently using modern contraceptive	217	104	47.9[40.4-55.5]	1.3	0.824	0.88[0.30-2.63]	0.617	0.76[0.26-2.20]	0.253	0.70[0.38-1.29]	0.899	0.90[0.18-4.59]	
Currently using modern contraceptives: Previous pregnancy unwanted	110	51	46.4[35.8-57.3]	1.3	0.941	0.95[0.26-3.54]	0.689	0.77[0.22-2.74]	0.641	1.22[0.53-2.83]	0.310	0.30[0.03-3.04]	
Woman makes or jointly makes decision for household spending	239	61	25.5[19.4-32.8]	1.4	0.041	3.16[1.05-9.50]	0.064	2.74[0.94-8.00]	0.809	1.08[0.56-2.10]	0.187	3.00[0.59-15.36]	
Woman makes or jointly makes decision for food to cook	238	124	52.1[45.1-59.0]	1.2	0.163	2.34[0.71-7.73]	0.278	1.85[0.61-5.63]	0.755	1.10[0.61-1.97]	0.164	4.65[0.53-40.52]	
Woman makes or jointly makes decision for schooling	240	71	29.6[23.0-37.2]	1.5	0.563	1.40[0.45-4.37]	0.696	1.25[0.41-3.83]	0.403	1.31[0.70-2.47]	0.060	5.25[0.93-29.49]	

³⁵⁴ Pregnant and lactating mothers at the same time were considered pregnant for this analysis

³⁵⁵ Only calculated in households with multiple children under 5

³⁵⁶ Restriction- only asked to mothers of children <36 months

Woman makes or jointly makes decision for taking child to the clinic	238	102	42.9[35.7-50.3]	1.3	0.663	1.30[0.44-3.87]	0.821	1.13[0.39-3.25]	0.551	0.84[0.46-1.51]	0.266	2.66[0.48-14.87]
Woman makes or jointly makes decision for contraceptives	224	117	52.2[44.4-60.0]	1.4	0.156	2.64[0.69-10.09]	0.279	1.96[0.58-6.60]	0.816	0.93[0.51-1.71]	Perfect collinearity	
Woman makes or jointly makes at least one decision	222	173	77.9[71.3-83.4]	1.2	0.787	1.24[0.26-5.93]	0.749	0.80[0.21-3.08]	0.199	0.62[0.30-1.29]	Perfect collinearity	
Woman makes or jointly makes at least 3 decisions	222	73	32.9[25.9-40.8]	1.4	0.062	3.12[0.95-10.27]	0.103	2.58[0.83-8.03]	0.629	1.17[0.62-2.23]	0.054	8.79[0.96-80.41]
Makes 3 decisions, does not have a source of formal income	73	8	11.0[3.7-28.1]	2.3	0.937	1.10[0.11-10.51]	0.937	1.10[0.11-10.51]	0.406	1.89[0.42-8.46]	0.489	2.33[0.21-25.66]
Prenatal consultations – at least 3	239	222	92.9[87.7-96.0]	1.5	0.885	1.17[0.14-9.55]	0.453	0.54[0.11-2.66]	0.505	0.70[0.25-1.98]	0.450	0.43[0.05-3.89]
Prenatal consultations- at least 6	239	121	50.6[43.0-58.2]	1.4	0.291	0.54[0.18-1.68]	0.201	0.48[0.16-1.47]	0.491	0.81[0.46-1.46]	0.423	0.49[0.09-2.77]
Childbirth in a health facility	239	191	79.9[74.4-84.5]	1.0	0.430	1.86[0.40-8.62]	0.777	1.21[0.33-4.49]	0.183	0.63[0.32-1.24]	0.716	1.50[0.17-13.15]
Mother has independent source of income : Petty trade	239	107	44.8[38.2-51.6]	1.1	0.344	1.70[0.57-5.10]	0.496	1.44[0.50-4.15]	0.566	1.19[0.66-2.13]	0.298	2.49[0.45-13.95]
Mother primary income is allowance from husband	239	38	15.8[11.9-20.8]	0.9	0.122	2.65[0.77-9.12]	0.162	2.39[0.71-8.13]	0.039	0.34[0.12-0.95]	0.857	1.22
Mother workload: Heaviest	240	66	27.5[21.2-34.8]	1.4	0.282	0.43[0.09-2.00]	0.232	0.40[0.09-1.81]	0.317	1.39[0.73-2.65]	0.576	0.54[0.06-4.72]
Mother perceived external support: Lowest	240	60	25.0[18.8-32.5]	1.5	0.315	0.46[0.09-2.11]	0.590	0.70[0.19-2.58]	0.073	1.81[0.95-3.45]	0.593	0.55[0.06-4.85]
Mother workload heaviest & perceived external support lowest	240	25	10.4[6.6-16.1]	1.4	0.702	1.36[0.28-6.52]	0.782	1.25[0.26-5.93]	0.147	1.93[0.79-4.72]	0.663	1.63[0.18-14.61]
Mother/ family involved in at least one external support club / group	240	150	62.5[55.1-69.4]	1.4	0.946	1.04[0.33-3.23]	0.788	1.17[0.38-3.55]	0.241	0.70[0.38-1.27]	0.503	0.57[0.11-2.92]
Children 6 months and under EBF	38	22	57.9[40.2-73.8]	1.1	Perfect collinearity							
Reduced coping strategies index: Medium or high	283	32	11.2[7.3-17.0]	1.7	0.006	4.59[1.57-13.47]	0.008	4.24[1.46-12.32]	0.111	1.97[0.85-4.55]	0.004	7.54[1.88-30.27]
Consumption of Cheaper and Cheaper Foods - 3 of 7 Days	288	33	11.5[7.3-17.6]	1.9	0.171	2.29[0.70-7.52]	0.208	2.14[0.66-6.96]	0.060	2.20[0.97-5.01]	0.302	2.36[0.46-12.00]

Head of household F	50	5	10.0[2.6-31.7]	2.0	0.853	1.25[0.12-13.24]	0.853	1.25[0.12-13.24]	0.167	3.90[0.57-26.93]	0.278	4.25[0.31-58.06]
Borrowing of food - 3 of 7 Days	287	31	10.8[6.7-16.9]	1.9	0.174	2.28[0.69-7.48]	0.211	2.13[0.65-6.92]	0.329	1.51[0.66-3.43]	0.049	4.30[1.01-18.38]
Head of household F	50	5	10.0[2.6-31.7]	2.0	0.853	1.25[0.12-13.24]	0.853	1.25[0.12-13.24]	0.167	3.90[0.57-26.93]	0.278	4.25[0.31-58.06]
Reducing the portion of meals - 3 by 7 days	286	28	9.8[6.3-15.0]	1.5	0.074	3.01[0.89-10.09]	0.092	2.81[0.84-9.35]	0.058	2.41[0.97-6.00]	0.186	3.02[0.59-15.59]
Head of household F	50	10	20.0[8.4-40.7]	1.8	0.595	0.54[0.05-5.19]	0.595	0.54[0.06-5.19]	0.092	3.75[0.80-17.48]	0.625	1.88[0.15-23.40]
Children-only meals - 3 to 7 days	287	16	5.6[3.0-10.3]	1.7	0.062	3.75[0.94-15.01]	0.075	3.51[0.88-13.99]	0.074	2.85[0.90-9.02]	0.480	2.18[0.25-18.85]
Head of household F	50	5	10.0[3.2-27.5]	1.5	Perfect collinearity				0.085	8.10[0.75-87.23]	Perfect collinearity	
Reducing number of meals in the day- 3 to 7 days	287	28	9.8[5.9-15.6]	1.9	0.009	4.64[1.47-14.64]	0.012	4.31[1.38-13.48]	0.227	1.76[0.70-4.43]	0.017	6.00[1.38-26.14]
Head of household F	50	4	8.0[1.7-29.9]	2.0	0.661	1.72[0.15-19.49]	0.661	1.72[0.15-19.49]	0.418	2.36[0.29-18.97]	0.196	5.83[0.40-84.60]
MAHFP: Year-round	289	45	15.6[10.8-22.0]	1.8	0.472	0.58[0.13-2.60]	0.422	0.54[0.12-2.43]	0.445	0.75[0.36-1.57]	Perfect collinearity	
Market access: At least 10 months per year	289	194	67.1[61.1-72.7]	1.1	0.476	1.47[0.51-4.24]	0.710	1.21[0.45-3.28]	0.006	0.45[0.26-0.80]	0.505	0.63[0.17-2.43]
Distance to the market: >=1 hour	288	185	64.2[59.1-69.1]	0.8	0.123	0.48[0.19-1.22]	0.181	0.53[0.21-1.34]	0.012	2.11[1.18-3.80]	0.868	1.13[0.27-4.63]
Owens livestock	286	191	66.8[59.6-73.2]	1.5	0.032	0.35[0.13-0.91]	0.051	0.40[0.16-1.00]	0.924	0.97[0.55-1.71]	0.188	0.41[0.11-1.56]
Use of improved water point	288	161	55.9[51.1-60.6]	0.7	0.476	1.45[0.52-4.00]	0.680	1.23[0.46-3.24]	0.046	0.58[0.34-0.99]	0.858	0.88[0.23-3.38]
Distance to water point >20 minutes ³⁵⁷	287	72	25.1[19.4-31.7]	1.5	0.345	0.54[0.15-1.93]	0.598	0.74[0.24-2.30]	0.299	1.38[0.75-2.53]	Perfect collinearity	
Point of use water treatment, unimproved water point	127	15	11.8[6.6-20.4]	1.4	0.690	1.58[0.17-14.92]	0.817	1.30[0.14-11.93]	0.963	1.03[0.29-3.64]	Perfect collinearity	
Water transportation container checklist score unacceptable (moderate- severe risk)	289	107	37.0[30.2-44.4]	1.6	0.800	0.93[0.51-1.67]	0.162	1.93[0.77-4.85]	0.527	1.20[0.69-2.08]	0.219	2.32[0.61-8.90]
Presence of handwashing soap ³⁵⁸	289	184	63.7[56.8-70.0]	1.4	0.477	0.71[0.27-1.84]	0.311	0.62[0.25-1.56]	0.258	0.73[0.42-1.26]	0.543	0.66[0.17-2.53]
Presence of soap (laundry or handwashing)	288	186	64.6[57.7-70.9]	1.4	0.778	0.87[0.33-2.30]	0.548	0.75[0.23-1.92]	0.400	0.79[0.45-1.38]	0.955	1.04[0.25-4.28]
Kitchen utensils left on the floor	287	172	59.9[52.9-66.6]	1.5	0.053	3.51[0.99-12.49]	0.039	3.77[1.07-13.34]	0.942	1.02[0.59-1.77]	Perfect collinearity	

³⁵⁷ Including wait time

³⁵⁸ Confirmed presence; 'they said yes but couldn't show me' coded as 'no'

Uncovered food	285	106	37.2[30.4-44.5]	1.6	0.066	2.52[0.94-6.77]	0.039	2.79[1.05-7.37]	0.780	0.93[0.53-1.60]	0.112	3.14[0.76-12.89]
Visible kitchen waste	287	119	41.5[34.8-48.5]	1.5	0.024	3.43[1.18-9.96]	0.015	3.73[1.30-10.74]	0.825	0.94[0.55-1.61]	0.069	4.39[0.89-21.62]
Floor of house is soil	288	235	81.6[75.9-86.2]	1.3	0.441	0.65[0.22-1.92]	0.523	0.71[0.24-2.06]	0.222	1.55[0.77-3.16]	0.069	0.28[0.07-1.10]
Child playing in dust/mud	276	239	86.6[81.2-90.6]	1.3	0.817	0.86[0.24-3.14]	0.896	0.92[0.25-3.33]	0.458	1.36[0.61-3.04]	0.472	0.55[0.11-2.79]
A family member has died	289	8	2.8[1.0-7.4]	2.1	0.045	6.12[1.04-35.84]	0.052	5.75[0.98-33.57]	0.152	3.51[0.63-19.59]	0.004	15.64[2.44-100.16]
A family member has migrated	289	37	12.8[8.5-18.8]	1.7	0.357	0.38[0.05-2.97]	0.327	0.36[0.05-2.79]	0.164	0.53[0.21-1.30]	0.928	0.91[0.11-7.54]
Very poor HH hygiene ³⁵⁹	272	162	59.6[52.4-66.3]	1.4	0.285	1.79[0.62-5.22]	0.218	1.95[0.67-5.61]	0.613	0.87[0.50-1.51]	0.291	2.36[0.48-11.64]
Food preserved	288	247	85.8[80.3-89.9]	1.4	0.501	0.67[0.21-2.15]	0.235	0.52[0.18-1.53]	0.777	0.90[0.43-1.87]	0.579	0.63[0.13-3.18]
+ HH hygiene poor	273	141	51.7[44.5-58.7]	1.4	0.711	1.20[0.46-3.17]	0.908	1.06[0.41-2.71]	0.356	0.77[0.45-1.33]	0.808	1.18[0.31-4.52]

Table B.12: Statistical associations between risk factors and stunting demonstrated by linear regressions (Region 3)

Risk factor <i>Linear Regression- Region 3</i>					GAM [W/H] <i>Children 6-59 months</i>			GAM [MUAC] <i>Children 0-59 months</i>			Stunting [H/A] <i>Children 6-59 months</i>		
Indicator	n	Mean [95% CI]	Standard error	Design Effect	P-value	Coeff.	SE	P-value	Coeff.	SE	P-value	Coeff.	SE
Child age [months]	289	27.2[25.2-29.2]	1.00	0.8	0.000	0.025	0.01	0.000	0.052	0.005	0.054	- 0.013	0.007
Mother's age [years]	240	28.8[27.7-29.9]	0.55	1.4	0.310	0.013	0.13	0.061	0.023	0.012	0.254	0.015	0.013
Mother's MUAC [cm]	232	27.8[27.1-28.4]	0.32	2.0	0.879	<0.001	0.02	0.206	0.030	0.02	0.445	0.018	0.023
Prenatal consultations [#]	239	5.6[5.3-5.9]	0.15	1.6	0.655	0.020	0.05	0.080	0.075	0.04	0.311	0.048	0.047
Number of people in the household [#]	289	7.4[7.0-7.8]	0.20	1.7	0.617	-0.014	0.03	0.994	<0.00 1	0.03	0.406	0.024	0.029
Distance to the clinic [min.]	289	88.7[78.0-99.5]	5.45	0.9	0.109	0.002	0.00	0.828	<0.00 1	0.00	0.105	- 0.002	0.001
Distance to the market [min.]	288	117.0[101.4-132.7]	7.96	0.9	0.436	<0.001	0.00	0.951	<0.00 1	0.00	0.244	- 0.001	0.001
IDDS Score [scale, min 0- max 7]	144	2.7[2.5-2.9]	0.08	1.0	0.099	0.283	0.17	0.004	0.420	0.14	0.190	0.206	0.156
Complementary feeding frequency [#]	65	2.3[1.9-2.7]	0.20	1.0	0.167	0.215	0.15	0.383	- 0.085	0.10	0.990	0.004	0.31
Mother age of first pregnancy [years]	240	17.5[17.1-18.0]	0.23	1.2	0.964	-0.001	0.03	0.745	- 0.009	0.03	0.814	0.007	0.031
Women's work overload scale [scale, min 1- max 4]	240	2.5[2.4-2.6]	0.08	1.3	0.266	-0.105	0.09	0.874	0.014	0.09	0.786	- 0.027	0.098
<i>Head of household female</i>	46	2.2[1.9-2.6]	0.18	1.6	0.896	-0.045	0.34	0.238	0.229	0.19	0.710	0.081	0.218
Women's external support scale [scale, min 1- max 4]	240	2.6[2.4-2.7]	0.07	1.5	0.823	0.022	0.10	0.367	0.086	0.09	0.276	0.114	0.104

³⁵⁹ A score of 1 point or more qualifies the household as having inadequate hygiene conditions. 'Very poor' has been coded as 3 and above.

<i>Head of household female</i>	46	3.0[2.7-3.3]	0.14	1.4	0.602	0.218	0.41	0.274	0.260	0.23	0.334	- 0.258	0.263
Postpartum rest [days]	137	50.1[42.4-57.7]	3.87	1.3	0.426	-0.003	0.00	0.479	- 0.002	0.00	0.273	- 0.004	0.003
Decision making involvement [scale, min. 0 – max. 5] in non female-headed households	179	2.0[1.7-2.2]	0.12	1.5	0.147	-0.09	0.06	0.285	- 0.081	0.08	0.821	- 0.019	0.08
Child caregiver checklist [scale, min -4 – max 5]	228	4.3[4.0-4.6]	0.14	0.9	0.096	-0.077	0.05	0.351	- 0.046	0.05	0.967	0.002	0.043
MAHFP	289	10.1[9.9-10.3]	0.09	1.5	0.920	-0.007	0.07	0.069	0.130	0.07	0.310	0.062	0.06
Distance to water [distance to the point + wait time, min.]	287	14.9[12.4-17.4]	1.26	1.5	0.371	0.004	0.00	0.487	0.003	0.00	0.781	- 0.001	0.00
Livestock score [scale] ³⁶⁰	285	0.4[0.3-0.5]	0.05	1.5	0.925	-0.010	0.11	0.498	0.073	0.11	0.554	0.070	0.11
Observation of household hygiene: Increasing uncleanliness [scale, min: 0, max: 5]	272	3.1[3.0-3.3]	0.09	1.5	0.007	-0.178	0.07	0.132	- 0.099	0.07	0.619	0.034	0.07
Observing the child's play area: Increasing uncleanliness [scale, min: 0, max: 5]	259	2.6[2.4-2.8]	0.11	1.00	0.467	0.040	0.05	0.122	0.087	0.06	0.405	- 0.047	0.06

³⁶⁰ Livestock score=(chickens*.01)+(sheep*.1)+(ducks*.1)+(pig*.2)

C. QUALITATIVE GUIDE

A. Information note³⁶¹

Link Nutrition Causal Analysis (NCA) Liberia, implemented by Action Against Hunger

Name of Principal Investigator: Grace Heymsfield

INVITATION: We would like you to participate in a study conducted by Action Against Hunger, a non-governmental organization, which fights against the causes and effects of hunger in almost 50 countries around the world, including in Liberia. The organisation has expertise in the domain of health and nutrition, including mental health and care practices, water, sanitation and hygiene, as well as food security and livelihoods.

STUDY OBJECTIVES: The main objective is to identify the major risk factors and causal pathways leading to stunting in Grand Bassa, Grand Cape Mount, Rural Montserrado, River Cess, and Sinoe Counties. The findings will be used to develop recommendations that will be used to make necessary adjustments in future programmes in order to utilise a more integrated approach in addressing the burden of malnutrition in the counties. The study will take place from [day 1, qualitative inquiry in the community] to [day 6, qualitative inquiry in the community].

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 mobilizer, preferably the community health volunteer. 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

³⁶¹ To be 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.

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 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.

B. SEASONAL CALENDAR³⁶²

A Seasonal Calendar is a diagram of changes over the seasons – usually over the period of 12 months. Seasonal Calendars are useful to identify seasonal patterns of change – for example, changing availability of resources, such as food; 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 the seasons of the 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.

C. HISTORICAL CALENDAR

A Historical Calendar is a diagram that shows change over a certain period of time. A period of 10-15 years will be considered. However, if participants mention key events dating prior to these periods (including those that occurred in other countries), 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

³⁶² Participatory Learning and Action (PLA) tool no. 19 & 20 (<https://www.aidsalliance.org/>).

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

D. STORYTELLING³⁶³

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.

E. 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 ask 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.

F. 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 two scenarios will be considered: typical food intake during lean season,

³⁶³ Participatory Learning and Action (PLA) tool no. 58 (<https://www.aidsalliance.org/>).

typical food intake during rainy season, 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.

G. 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 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.

H. HEALTH JOURNEY / THERAPEUTIC ITINERARY³⁶⁴

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.

I. GENDER BOXES³⁶⁵

This tool involves participants placing 'typical' women and men in 'gender boxes' and identifying the roles, qualities and behaviours expected of them. It involves exploring what happens if a woman or man breaks out of their box and does not do what is expected of them. The aim of this exercise is to explore, in a non-threatening way, where those roles, qualities and behaviours come from and the pressures that they bring. It also allows to identify what roles, qualities and behaviours need to be changed and how that can be done. Gender boxes are particularly useful for exploring issues related to gender vulnerability, power and cultural traditions.

³⁶⁴ Participatory Learning and Action (PLA) tool no. 17 (<https://www.aidsalliance.org/>).

³⁶⁵ Participatory Learning and Action (PLA) tool no. 25 (<https://www.aidsalliance.org/>).

During the qualitative survey, the study team will introduce a blank sheet of paper (A2 format) and ask the participants to trace two same-size boxes next to each other. One will represent a woman and one will represent a man. The participants will then be asked to place all qualities, roles or behaviours expected of them inside the box. Any qualities, roles or behaviours not aligned with societal expectations will need to be drawn outside of the box. Once completed, the participants will be requested to compare and discuss what gender boxes show.

J. AGREE/DISAGREE GAME³⁶⁶

This tool involves participants to express their agreement or disagreement with different statements relating to studied risk factors in their community. Agree/disagree game is highly interactive and engaging. It can serve as an energiser and an opener of more structured exchanges, which will follow. It helps to provide a lively and non-threatening way for people to explore their attitudes about key issues in their community. The agree/disagree game is particularly useful for exploring attitudes about gender, cultural traditions and stigma. It can also provide an additional layer of understanding to a researcher in a community, which is reliant on humanitarian assistance and whose answers to different questions may be biased by expectations of a follow-up aid.

During the qualitative survey, the study team will place three printed signs with emoticons in front of focus group participants. Each sign will represent 'I agree' 😊, 'I disagree' ☹️ or 'I am not sure'. The study team will then read out pre-prepared statements relating to a discussed topic and ask the participants to stand next to a sign, which represents their opinion on the matter. The participants will be encouraged to explain why they are standing by different signs. They will also be encouraged to try to persuade each other and change their minds if they wish to. Once all statements will be used, participants will be encouraged to discuss what the game has shown.

K. COURAGE TO CHANGE³⁶⁷

This tool involves participants standing at different points along a line to show how easy or hard it is to adopt certain behaviours or make changes relating to challenges experienced in their communities. Using courage to change helps to create a non-threatening environment, in which participants can express freely how they feel about certain sensitisation messages deemed to improve their quality of life. The exercise allows participants to identify barriers, which they face in relation to suggested behaviours, which will eventually lead to a deeper understanding of a gap between knowledge and practice. This may be particularly helpful to organisations implementing projects focusing on behaviour change.

During the qualitative survey, the study team will draw a line on the ground. One end will represent "easy" while the other end will mean "difficult". The study team will then introduce pre-prepared behaviours, which are expected to be adopted by the community. The participants will be asked to position themselves at that end of the line that represents their attitude towards the stated behavior, i.e. whether it is easy or difficult to adopt. Participants will be encouraged to explain why they feel that way about those behaviours and what makes it easy/difficult to adopt.

³⁶⁶ Participatory Learning and Action (PLA) tool no. 36 (<https://www.aidsalliance.org/>).

³⁶⁷ Participatory Learning and Action (PLA) tool no. 39 (<https://www.aidsalliance.org/>).

L. RISK GAME³⁶⁸

This tool involves participants identifying a perceived risk relating to certain behaviours along a line showing a low to high risk. Using the risk game helps to explore people's knowledge and attitudes about levels of risk related to their current behavior and/or suggested behavior through sensitization activities. In this respect, the tool may help to identify areas of risky behavior that might need to be prioritized for future action. A risk game is particularly useful for raising awareness about illness prevention among the general community, including breastfeeding, care and hygiene practices.

During the qualitative survey, the study team will draw a line on the ground. One end will represent "low risk" while the other end will mean "high risk". The study team will then introduce pre-prepared behaviours, which are current in the community or expected to be adopted by the community. The participants will be asked to position a flashcard depicting the concerned behavior at that point of the line that represents their perception of risk related to the stated behavior, i.e. whether it is safe or dangerous practicing/not practicing certain behavior. Participants will be encouraged to explain why they feel that way about those behaviours.

M. COPING STRATEGIES EXERCISE³⁶⁹

This tool involves participants being asked to sequence coping mechanisms employed during difficult times. Adapted from the rCSI, different coping strategies are drawn on an A4 sheet: i.e. Reducing food portion size, reducing meal frequency, crediting money, begging food, reducing meal intake of adults to prioritize small children, eating less preferred foods (fufu instead of rice), prostitution, sending an adolescent girl for dowry payment, sending children to sleep in a different home, withdrawing children from school to save school fees. Participants are asked to select the first to last coping mechanisms to employ, as well as coping mechanisms that community members would never engage in.

INTERVIEW GUIDE: HEALTH

1. How would you describe a healthy child? Are children on these images healthy? (Cf. [Child illness flashcards](#))
2. Are these illnesses present in your community? Which ones are the most widespread? (PROBE: [diarrhoea/cholera](#), [fever](#), [acute respiratory infections](#), [scabies](#), [malaria](#), [thrush](#))
3. Do they differ by season? (Cf. [Seasonal Calendar](#))
4. How have they changed over the past 10-15 years? (Cf. [Historical Calendar](#))
5. What do you think are the causes of these illnesses? (PROBE: [diarrhoea/cholera](#), [fever](#), [acute respiratory infections](#), [scabies](#), [malaria](#), [thrush](#))
6. How are these illnesses treated? (Cf. [Health journey/Therapeutic itinerary](#)) (NB: Trace for each cause independently. Inquire about seasonal differences)
7. Have the treatment options changed in the past 10-15 years? (Cf. [Historical Calendar](#))
8. How do you decide which treatment to choose? Who gives you advice?

³⁶⁸ Participatory Learning and Action (PLA) tool no. 55 (<https://www.aidsalliance.org/>).

³⁶⁹ Adapted from rCSI by Lenka Blarova.

9. What role do traditional health care providers (country doctors) play in your community? What about TTM's?
10. How do you care for a sick child? Do you do special things for them? (PROBE: Do you breastfeed a sick child? Why/Why not? Do you feed him/her less/more? What types of food cannot be fed to a sick child? Why?)
11. Are some children in your community sicker than others? Do you know why? How would you describe them?
12. What do you do to keep your child healthy? How much effort does it take to do it every day?
13. Where is the nearest health post/health centre? How long does it take you to get there? Does your access change by season? (Cf. Seasonal Calendar)
14. What are health post's opening hours? Is the staff available when there is an emergency? How do you contact them?
15. What kind of services are available in the nearest health post? Which ones do you use? Why?
16. Does the staff know how to treat illnesses, which are frequent in your community? Do they speak your dialect? Are they kind?
17. Who do you prefer to seek medical treatment from? Why?
18. What motivates you to seek treatment in the health post? What discourages you to do so? (PROBE: quality of health care, staff absence, lack of drugs, decision-making power, workload, distance to the health facility, etc.)

Recommendations

19. Have you tried to address these problems individually/collectively on a community level? If so, how?
20. Have there been any projects that attempt/attempted to address problems related to health/access to health facilities?
21. What do you think about them? Have you benefitted from them the way you wished? Why/Why not?
22. How do you think they could be improved? (SOLUTIONS)
23. Are there any obstacles to make it happen? (OBSTACLES)
24. What could be done on your side? (LOCAL CAPACITIES)
25. What do you need to make it happen? (NEEDS)
26. Which solution should have the greatest priority? What is the most important action to be taken? (PRIORITISATION)
27. Who should be targeted by this action in priority? Why?

INTERVIEW GUIDE: MALNUTRITION

1. What do you think of children on these photos? Are children on these images healthy? Why/Why not? (Cf. Photos of wasted children (Marasmus/Kwashiorkor) + stunted children)
2. Is there any relationship between a child's height and his/ her health? If yes, what kind of relationship?
3. What factors determine a child's stature? (PROBE: genetics, undernutrition, God's will)
4. How often is your child's height taken? Are you given feedback about your child's growth when you go to the clinic?
5. Which illness are they suffering from if a child is shorter than natural short stature? What words do you use to describe such children in your community? (PROBE: all words for

stunted children) Are certain words more sensitive than others? Why? Are the same children who are (stunted) also too thin for their height (wasted/ marasmus)? How do you describe a child who is very thin for their height? What words do you use to describe them?

6. What are the causes of this illness? What are the reasons a child would become like this?
7. What do you think of this illness? (**PROBE: Is it similar to/different from other child illnesses? If so, how?**)
8. Do you have children like this in your community? If yes, which type is most common?
9. Are there any households in your community, which are more affected by stunting? If yes, what do they have in common? (**PROBE: Are children of certain age group more affected? Why? Boys or girls? Why?**)
10. Do you think your child can become like this? Why/Why not? (**PROBE: What behaviours/practices can induce/prevent this condition?**)
11. Do you know any women in your community who are stunted? If so, why do you think they are like this?
12. Since when have children in your community been suffering from this illness? (Cf. **Historical Calendar**)
13. How do you treat this illness in your community? (Cf. **Health journey/Therapeutic itinerary**) (**PROBE: What is the most common treatment? Why?**)
14. What do you do to keep your child healthy?
15. What challenges do you face to keep your child healthy? During which seasons/months, does it become more difficult?
16. **Narration** : *XX has a large family with two little boys who are close in age. She was breastfeeding the first child for a few months but then she became pregnant again when he was only 5 months old. After that she stopped breastfeeding and started to give her first boy food that she prepared for the rest of the family. Her first son started to lose weight and become sick. He is not getting any better. She gave him Kpele leaf because the health clinic is 3 hours walk one way.*

What do you think of this story? Did XX make good decisions? Why/why not? What would you do differently? What would you suggest XX does next?

Recommendations

17. Have there been any projects that attempt/attempted to address problems related to malnutrition?
18. What do you think about them? Have you benefitted from them the way you wished? Why/Why not?
19. How do you think they could be improved? (**SOLUTIONS**)
20. Are there any obstacles to make it happen? (**OBSTACLES**)
21. What could be done on your side? (**LOCAL CAPACITIES**)
22. What do you need to make it happen? (**NEEDS**)
23. Which solution should have the greatest priority? What is the most important action to be taken? (**PRIORITISATION**)
24. Who should be targeted by this action in priority? Why?

INTERVIEW GUIDE: NUTRITION

1. What is a staple food in your community (what do you eat most?) How many times a day do you eat?
2. Have there been any changes to your eating habits in the past 10-15 years? (Cf. [Historical Calendar](#))
3. Are there any changes to your eating habits throughout the year? (Cf. [Seasonal Calendar](#))
4. What do you normally eat for a day during the dry season? (Note: Frequency & specific foods, breakfast, lunch, dinner) (Cf. [Meal composition](#))
5. What do you normally eat for a day during a post-harvest period? (Note: Frequency & specific foods, Cf. [Meal composition](#))
6. Would you like to eat differently (What would be your dream meal)? If yes, how? Why / why not? (Note: Frequency & specific foods, Cf. [Meal composition](#))
7. Who decides what you eat?
8. Are the eating habits of pregnant / lactating women the same? Why / why not?
9. Which foods can not be eaten by pregnant / lactating women? Why? Are certain foods taboo for all pregnant/ lactating women?
10. What foods can not be eaten by girls / boys? Why? Are certain foods taboo for all pregnant/ lactating women?
11. Which foods do you consider good for your health? Why?
12. Do you have access to these foods in your community? Where do you go? (**PROBE:** [Own production / purchase / food aid / other](#))
13. Does access change throughout the year? (Cf. [Seasonal Calendar](#))
14. Has access changed in the last 10-15 years? (Cf. [Historical Calendar](#))
15. Do you have enough food to feed your household all year round?
16. Has this changed in the last 10-15 years? (Cf. [Historical Calendar](#))
17. What do you think of two children's meals in the photo? (Cf. [images of balanced / unbalanced meals](#))
18. What do you think of two children's meals on the second picture? (Cf. [Images of food portions](#))
19. How would you divide this food in your family? Does the family eat together or in a specific order?
20. **Narration:** *XX has a husband and 5 children. Her husband's parents eat in their yard. One day the husband gave her small money to prepare an evening meal. XX bought rice but that will not be enough for the whole family. At dinner time, she reserved a plate for her husband and his parents. She gave the rest of the meal to her older children, two boys. XX and her three little girls eat the crust and go to bed unsatisfied.*

What do you think of this story? What do you think of XX's situation? Do women in your community face the same difficulties? Why / why not? What would you do differently?

Recommendations

21. Have there been any projects that attempt/attempted to address problems related to nutrition?
22. What do you think about them? Have you benefitted from them the way you wished? Why/Why not?
23. How do you think they could be improved? (**SOLUTIONS**)

24. Are there any obstacles to make it happen? (OBSTACLES)
25. What could be done on your side? (LOCAL CAPACITIES)
26. What do you need to make it happen? (NEEDS)
27. Which solution should have the greatest priority? What is the most important action to be taken? (PRIORITISATION)
28. Who should be targeted by this action in priority? Why?

INTERVIEW GUIDE: BREASTFEEDING & COMPLEMENTARY FEEDING

1. How does your daily routine with a baby look like? (Cf. [IYCF & Care practices flashcards](#))
2. Does your routine change throughout the week? If so, how?
3. Does your routine change throughout the year? If so, how? (Cf. [Seasonal Calendar](#))
4. Has the daily routine changed in the past 2 / 10-15 years? Do you do things differently than your parents/grandparents? Explain. (Cf. [Historical Calendar](#))
5. Would you like the daily routine to change? If so, how? Why?
6. Does someone help you with child caring? If so, when (daily/weekly/sporadically)?
7. How are fathers involved in child caring activities? How do you feel about their involvement? (sufficient/not sufficient?) Why?
8. What challenges do you face when caring for your children? (PROBE: lack of knowledge/resources/time/other)
9. **Narration:** *XX is 23 years old. She has four children. The last one was born three months ago. She is breastfeeding when she is at home in the morning and evening. In the meantime, she has many activities (fetching water, collecting firewood, scratching the field) and she does not bring her baby with her. She leaves the baby with her mother. A few weeks ago, she went to the health center and the staff told her to breastfeed her baby on demand so that he could grow well. But she has so many things to do! She can not carry the child all day!*

What do you think of this story? What do you think of XX's situation? Do women in your community face the same difficulties? Why / why not? What would you do differently?

Agree/ Disagree (+ DEBRIEFING)

10. When my baby is born, the first thing I give him to drink is water.
11. When my baby is born, I wash him and put him to sleep.
12. When my baby is born, I immediately breastfeed.
13. When my baby is born, the first milk in my breasts is not good. I throw it.
14. When my baby is born, I take him to a religious leader for blessing.
15. When I breastfeed, I also give water to my baby because it is very hot and the baby is thirsty!
16. When I'm breastfeeding, I do not have enough milk to keep my baby happy.
17. Breastfeeding is time-consuming.
18. When I'm breastfeeding, I feel weak.
19. When I'm breastfeeding, my breasts hurt.
20. When I'm breastfeeding, I eat more.
21. When I'm breastfeeding, I can not eat all types of foods.
22. When I become pregnant, I stop breastfeeding because it is bad for the child receiving titty.
23. When I work, my milk is hot and I can not breastfeed my baby.
24. I start feeding my baby family foods at 4 months old.

25. I start feeding my baby family foods at 8 months old.
26. If I start feeding the baby too early, it will be less resistant later.
27. I do not prepare special meals for my baby; I feed my baby with the food I prepare for the whole family.
28. During meals, I help my baby to eat.
29. During meals, older children help my baby eat.
30. When my baby does not want to eat, I do not force him.
31. When my baby cries, I take him in my arms to calm him down.
32. When my baby cries, I feed him.
33. When my baby cries, I give him something to drink.
34. When my baby is crying, I let him calm himself.

Risk game (+DEBRIEFING)

35. Breastfeeding on demand.
36. Breastfeeding when a woman is pregnant.
37. Breastfeeding when a woman is hot or ill.
38. Eating little during breastfeeding.
39. Giving water to the baby before he is 6 months old.
40. Giving the baby food before the age of 6 months.
41. Give family meals to the baby.
42. Leave a baby with older siblings.
43. Leave a baby with his grandmother / grandfather.
44. Raise your voice or slap a baby while doing something wrong.

Courage to Change (+Debriefing)

45. Early initiation of breastfeeding.
46. Exclusive breastfeeding up to 6 months.
47. Breastfeeding on demand.
48. Prepare special meals for babies.
49. What do you normally give to your baby throughout the day when he is first starting to eat big people food? (Cf. [Composition of meals](#))
50. Would you like to give him something else? If yes, how? Why / why not? (Cf. [Composition of meals](#))
51. Have children's eating habits changed in the last 10-15 years? Do you do things differently from your parents / grandparents? Explain. (Cf. [Historical Calendar](#))
52. **Narration:** *XX has a little boy. He is very active. He likes to play. He likes to run. Sometimes he is really disobedient. While XX's husband migrates to find work, XX remains alone with her little boy. She is now pregnant with her second child. This morning, the little boy woke up very energetically. He sings and jumps. XX has just returned from the water point and put a canister next to the door. As the little boy ran around, he knocked over the can and the water flooded the yard. XX was really angry and slapped him.*

What do you think of this story? What do you think of XX's situation? Do women in your community face the same difficulties? Why / why not? What would you do differently?

Recommendations

53. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
54. How do you think they could be solved? (SOLUTIONS)
55. Are there any obstacles to getting there? (OBSTACLES)
56. What could be done on your side? (LOCAL CAPACITIES)
57. What do you need to get there? (NEEDS)
58. Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)
59. Who should be targeted by this action as a priority? Why?

INTERVIEW GUIDE: MARRIAGE, BIRTH SPACING, PREGNANCY

1. At what age do young men get girlfriend and/or marry in your community? What is the usual age of women they are getting boyfriend and/or marrying? Do you consider it problematic? Why/Why not? What are the reasons for marrying at that age?
2. **Narration:** *XX is 14 years old. She has 7 other siblings and she is the oldest one. There are many mouths to feed in the female. Her parents think XX should marry because she is of the right age, and it would reduce the burden on the family, but XX would like to continue with school.*
What do you think of this story? What do you think about XX's situation? Do women in your community face same difficulties? Why/why not? If you were XX's parents, what would you do differently?
3. Are there other reasons for early marriage in your community?
4. When do you think a girl is ready to be a mother (physically and emotionally)?
5. Who advises women, especially adolescent girls, during pregnancy?
6. Do couples in your community have disagreements during the marriage? Are they frequent? How are they managed? What is the cause of these disagreements?
7. **Naration:** *XX is 20 years old; she has 2 children and is pregnant with her third. She met her boyfriend when she was 14 years old. At the time, she was in school; both of her parents were together and her pa supported her. XX's mother went and loved outside, so the father left, and the mother went to her new man, who did not support XX. XX was not getting any good support from the new pa so she starting loving with her boyfriend. She got pregnant and had to drop out of school. XX has a big dream to return to school, but her boyfriend is so jealous that he can't even allow XX to go to the market or sit with her friends. Even if she sits in a gathering like this (Link NCA FGD), the boyfriend will want to sit across and supervise.*
What do you think of this story? What do you think about XX's situation? Do women in your community face same difficulties? Why/why not? If you were XX parents, what would you do differently? What advice would you give to her?
8. How many children do people in your community usually have? Why?
9. What is the usual birth spacing in your community? How do you feel about this? (Short / adequate / long) Why?

Agree/ Disagree Game (+ DEBRIEFING)

10. When I'm pregnant, I go to a health center for a medical consultation.
11. When I am pregnant I go to a religious leader for a blessing.

12. When I am pregnant I can take country medicine when I get sick.
13. When I am pregnant, I visit the TTM.
14. When I'm pregnant, I do not go to a health center, it's too far.
15. When I'm pregnant, I do not go to a health center because staff are rarely there.
16. When I'm pregnant, I do not go to a health center because I do not have money.
17. When I'm pregnant, I do not go to a health center because I do not have time.
18. When I'm pregnant, I eat more so my baby can grow.
19. When I'm pregnant, I eat potter.
20. When I'm pregnant, I chew cola.
21. When I'm pregnant, I have certain foods that are taboo for me that are not taboo when I'm not pregnant.
22. When I'm pregnant, I eat less because I do not feel well.
23. When I'm pregnant, I eat less because I'm afraid my baby will grow up too fast.
24. When I'm pregnant, I pound the mother (beat cassava/ rice).
25. When I'm pregnant, I work less.
26. I prefer to give birth at home.
27. I prefer to give birth in a health center.
28. After birth, I resume my activities after a few days.
29. If I wanted to space births, I would be poorly perceived in my community.
30. If I wanted to use family planning, my husband must agree to me.
31. If I used family planning, I could not have children anymore.

Risk game (+Debriefing)

32. Young woman having a baby at 14 or 15 years old.
33. Woman having a baby at 40 years old.
34. Woman having a baby every twelve months.
35. Woman who gets pregnant while nursing her baby.
36. Woman not attending antenatal care at a health center.
37. Woman not following the food prohibitions during pregnancy.
38. Woman working during pregnancy.
39. Woman giving birth at home.
40. Woman working after childbirth.

Courage to change (+ DEBRIEFING)

34. Have a first child at 13 years old.
35. Have children about two years apart.
36. Have fewer children.
37. Use different methods of contraception.
38. Attend antenatal care at the health center.
40. Do not work during pregnancy.
41. Do not observe dietary restrictions during breastfeeding.

Recommendations

42. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
43. How do you think they could be solved? (SOLUTIONS)
44. Are there any obstacles to getting there? (OBSTACLES)

45. What could be done on your side? (LOCAL CAPACITIES)
46. What do you need to get there? (NEEDS)
47. Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)
48. Who should be targeted by this action as a priority? Why?

INTERVIEW GUIDE: SOCIAL STATUS & WOMEN'S WORKLOAD

1. What does your daily routine look like, by hour? (Cf. [daily activities](#))
2. Does your routine change during the year? If yes, how? (Cf. [Seasonal Calendar](#))
3. How do you perceive your workload? How do you feel?
4. When do you feel the busiest or tired? What do you do when you feel like that? Do you have someone to help you?
60. Has the daily routine changed in the last 10-15 years? Do you do things differently from your parents/ grandparents? Explain. (Cf. [Historical Calendar](#))
5. Are there differences in daily routines between different households? If so, what differences? What characterizes these households ?
6. How does your daily routine differ from that of men?
7. Did you attend school when you were younger? What are the reasons why girls do not go to school in your community? What are the reasons they drop out of school?
8. Can women in your community make their own decisions? If so, what can you decide for yourself? (PROBE: [schooling, marriage, household expenses, meal composition, daily activities, workload, postpartum rest, medical treatment in case of illness, family planning?](#))

(or alternatively for 8&9) Agree/disagree game (+DEBRIEFING)

1. I could decide if I go to school or not.
2. I can decide whether my children are going to school or not.
3. I decided when I wanted to get married.
4. My husband decides how I spend money.
5. I decide what I cook.
6. My husband tells me how much I can spend on food.
7. I only prepare dishes that my husband likes.
8. I can not decide on my job, I have to do everything that women are supposed to do.
9. My husband has less responsibility than me.
10. After birth, I can rest for 6 weeks.
11. When I'm sick, I can decide who to see to treat my illness.
12. When my children are sick, I have to ask my husband who to see to treat their illness.
13. I can tell my husband that I do not want more children.
14. I can decide on all household affairs when my husband is not at home.
15. If you have a problem, who will you see to help you? What was the most recent situation when you needed someone's help? Explain.
16. What makes you feel most tired in your relationships? (PROBE: [children, husband, friends](#))
17. What can cause confusion/ holla holla in your home? How do you sort your confusion?
18. What opportunities do women in your community have? (PROBE: [What roles can young women aspire to play in their community as adults?](#)) What do you think of these possibilities

- are they sufficient? If not, what is missing? What would you like to change / do differently? What's stopping you from doing it?

19. Do you feel safe in your community? Has there been a change in community relations in the last 10-15 years? (Cf. [Historical Calendar](#))
20. What activities do you usually do with other members of the community? Are there any opportunities that you celebrate together? (Cf. [Seasonal Calendar](#))

Recommendations

21. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
22. How do you think they could be solved? (SOLUTIONS)
23. Are there any obstacles to getting there? (OBSTACLES)
24. What could be done on your side? (LOCAL CAPACITIES)
25. What do you need to get there? (NEEDS)
26. Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)
27. Who should be targeted by this action as a priority? Why?

INTERVIEW GUIDE: SOCIAL STATUS & WORKLOAD OF MEN

1. What does your daily routine look like? (Cf. [daily activities](#))
2. Does your routine change during the year? If yes, how? (Cf. [Seasonal Calendar](#))
3. How do you perceive your workload? How do you feel?
4. When do you feel most busy or tired? What do you do when you feel like that? Do you have someone to help you?
5. Has the daily routine changed in the last 10-15 years? Do you do things differently from your parents / grandparents? Explain. (Cf. [Historical Calendar](#))
6. Are there differences in daily routines between different households? If so, what differences? What characterizes these households?
7. How does your daily life differ from that of women?
8. Did you go to school when you were younger? What are the reasons why boys do not go to school in your community? What are the reasons they drop out of school?
9. How is decision-making power within the household shared? ([PROBE: schooling, marriage, household expenses, meal composition, daily activities, workload, postpartum rest, medical treatment in case of illness, family planning?](#))
10. What opportunities do men in your community have? ([PROBE: What role can young men aspire to play in their community as adults?](#))
11. What do you think of these possibilities - are they sufficient? If not, what is missing? What would you like to change / do differently? What's stopping you from doing it?
12. Do you feel safe in your community? Has there been a change in community relations in the last 10-15 years? (Cf. [Historical Calendar](#))
13. What activities do you usually attend with other members of the community? Are there any opportunities that you celebrate together? (Cf. [Seasonal Calendar](#))
14. If you have a problem, who will you see to help you? What was the most recent situation when you needed someone's help? Explain.
15. What can cause confusion/ holla holla in your home? How do you sort your confusion?

Recommendations

16. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
17. How do you think they could be solved? (SOLUTIONS)
18. Are there any obstacles to getting there? (OBSTACLES)
19. What could be done on your side? (LOCAL CAPACITIES)
20. What do you need to get there? (NEEDS)

Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)

Who should be targeted by this action as a priority? Why?

INTERVIEW GUIDE : SOURCES OF INCOME & AGRICULTURAL PRODUCTION

1. What are the main sources of income in your community (M / W separately)?
2. Do they vary during the year? (Cf. [Seasonal Calendar](#))
3. Have they changed in the last 10-15 years? (Cf. [Historical Calendar](#))
4. What caused the change ?
5. How much does the typical household make in a month?
6. What challenges do you face in agriculture? (PROBE: access to water / land, soil degradation, unavailability of seeds / tools / know-how / work, cost of labor, plant diseases, market access for sale, price fluctuations in period sowing / harvesting, fluctuations in market demand, quality requirements)
7. Do these challenges vary during the year? (Cf. [Seasonal Calendar](#))
8. Have these challenges changed in the last 10-15 years? (Cf. [Historical Calendar](#))
9. What caused the change?
10. What are the consequences for your household income?
11. What challenges do you encounter in livestock management? (PROBE: access to water / grazing / vaccination, animal diseases, unavailability of know-how, market access for sale, price fluctuation, fluctuation of market demand, quality requirements)
12. Do these challenges vary during the year? (Cf. [Seasonal Calendar](#))
13. Have they changed in the last 10-15 years? (Cf. [Historical Calendar](#))
14. What caused the change?
15. What consequences do they have on your household's income?
16. What coping strategies are you deploying to offset potential losses? (Cf. [Coping Strategies](#))

Recommendations

17. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
18. How do you think they could be solved? (SOLUTIONS)
19. Are there any obstacles to getting there? (OBSTACLES)
20. What could be done on your side? (LOCAL CAPACITIES)
21. What do you need to get there? (NEEDS)
22. Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)

23. Who should be targeted by this action as a priority? Why?

INTERVIEW GUIDE: MARKET ACCESS, USE OF RESOURCES AND COPING STRATEGIES

1. What markets do you normally use? How long does it take you to get there?
2. Does your access vary during the year? (Cf. [Seasonal Calendar](#))
3. Has your access changed in the last 10-15 years? (Cf. [Historical Calendar](#))
4. What caused the change? What consequences does this have on your household?
5. Are products available all year round? If no, what and when is not available? Why? (Cf. [Seasonal Calendar](#))
6. Has the availability of the product changed in the last 10-15 years? (Cf. [Historical Calendar](#))
7. Are product prices stable throughout the year? If no, which product prices fluctuate? When? Why? (Cf. [Seasonal Calendar](#))
8. Have product prices changed over the last 10-15 years? (Cf. [Historical Calendar](#))
9. How do you use your household income? (Cf. [Household expenses](#))
10. Who makes the decision regarding household expenses? (PROBE: [purchases \(various categories\) vs. sales of agricultural production](#))
11. Do women receive a weekly allowance? If so, how much and for what? Is it enough? Why / why not?
12. Do men and women spend differently? If yes, how? Why?
13. Where do you usually get your food? (PROBE: [agricultural production, purchase, food aid, barter / exchange, picking / hunting](#))
14. Does this vary throughout the year? (Cf. [Seasonal Calendar](#))
15. Has this changed in the last 10-15 years? (Cf. [Historical Calendar](#))
16. How do you make sure you have enough food for your household throughout the year?
17. What do you do when you do not have enough money to feed your household? (PROBE: [destocking, sale of productive assets, sale, use of excessive debt, reduction of daily food intake and number of daily meals, migration for work, etc.](#))
18. Are some households in your community more vulnerable to food insecurity? Why?

RECOMMENDATIONS

19. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
20. How do you think they could be solved? (SOLUTIONS)
21. Are there any obstacles to getting there? (OBSTACLES)
22. What could be done on your side? (LOCAL CAPACITIES)
23. What do you need to get there? (NEEDS)
24. Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)
25. Who should be targeted by this action as a priority? Why?

INTERVIEW GUIDE: MIGRATION & COMMUNITY SOLIDARITY

1. How would you describe access to land in your community? (PROBE: [source \(inheritance / purchase / credit / lease / other\), property \(M / F\), size, distance, geographical and seasonal accessibility, quality, access to water / irrigation, taxes / fees](#)).
2. Has access to land changed over the last 10-15 years? (Cf. [Historical Calendar](#))

3. What consequences does access to land have on your agricultural production? (PROBE: crop selection, crop rotation, use of natural / chemical fertilizers)
4. How do you approach these challenges?
5. Do members of your community tend to form community groups / associations / organizations? If so, for what purpose? (PROBE: membership (M / F), fees, activities, benefits, external support (government, NGOs))
6. Do members of your community tend to save money / resources? If so, for what purpose? What are they saving? How?
7. Do people in your community have access to credit? If so, how does it work? (PROBE: who can access it (M / F), supplier, amount, interest)
8. Do people in your community tend to have debt? Why? How? What do they do when they can not repay them?
9. Do members of your community tend to migrate? If yes, who is migrating? Or? When? For how long? Why? (Cf. Seasonal Calendar)
10. Have migration trends in your community changed over the last 10-15 years? (Cf. Historical Calendar)
11. What are the consequences of migration or changing migratory flows on the remaining members of a household? (PROBE: income, workload, decision making, nutrition, health, hygiene and childcare practices)
12. Apart from migration for farming reasons, do people in your community tend to leave the village for long periods (weeks / months)? If so, who leaves? Or? When? For how long? Why? (Cf. Seasonal Calendar)
13. Does he travel with children? If so, what consequences does this trip have for them? (health, care and hygiene practices)
14. **Narration:** *XX and YY got together when they were 15 and have a four month old child. XX decides to migrate to ZZ (NAME of local concession area) for work, while YY stays in the town with the new child. She has dropped from school to take care of the baby. XX promises to send back money and return every three months with food for the family.*

What do you think of this story? What do you think of YY's situation? Do women in your community face the same difficulties? Why / why not? What would you do differently?

Recommendations

15. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
16. How do you think they could be solved? (SOLUTIONS)
17. Are there any obstacles to getting there? (OBSTACLES)
18. What could be done on your side? (LOCAL CAPACITIES)
19. What do you need to get there? (NEEDS)
20. Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)
21. Who should be targeted by this action as a priority? Why?

INTERVIEW GUIDE : LIFE PERSPECTIVES (PARENTS)

1. Games: If you should describe your life through a song, which one would you choose? Why ?

2. What did you hope to achieve in your life? Have the circumstances allowed the complete / partial realization of your dreams? Why / Why not? What do you feel about your dreams / reality? (PROBE: satisfaction / dissatisfaction / fulfillment / disappointment, etc.)
3. How did you describe how your parents interacted with you and how you interact with your children? What has changed in the meantime? Why ?
4. Were you used to discussing various topics with your parents? Do you usually do it with your children? Why / Why not?
5. Are there disagreements between young people, their parents and / or grandparents? Why / Why not? What values do you share / share with younger generations? Why ? What do you blame most for your children? Why ?
6. How did you describe the ideal man / woman when you were younger? Why do you think these features are important? Where does this ideal come from? Is there a book / movie / other that describes this type of man / woman? (Cf. Gender boxes)
7. Do men / women in your community come close to this ideal? Why / Why not?
8. What do you think are the most common problems between women and men? Why do they exist? (PROBE: (if not mentioned by participants, what do you think about jealousy / infidelity?) How is confusion sorted?
9. What do you never tolerate in your relationships? Why ? (PROBE: Physical / Psychological / Sexual Abuse) Do these behaviors exist in your community? Why / Why not?
10. If needed, who do you seek advice / help from? Who has the greatest influence on your decisions? Why ?
11. What work / development opportunities do you have in your community? What do you think of these possibilities - are they sufficient? If not, what is missing?
12. How do these opportunities influence how you live in your families / community?
13. Feel safe in your community? What activities do you usually attend with other members of the community?
14. Which institutions are of greatest value to you in your life? (PROBE: family / diaspora / school / church / state / international aid). How has their role changed over time?
15. (If not mentioned above) : What role do traditions play in your community? Is this different than when you were a child? (If traditional societies are not mentioned, probed about ways girls/ boys learn from family members and other community members)

INTERVIEW GUIDE: OUTLOOK FOR LIFE (YOUNG MEN / WOMEN)

1. What do you hope to achieve in your life? Will the current conditions allow you to complete your dreams? Why / Why not?
2. What work / development opportunities do you have in your community? What do you think of these possibilities - are they sufficient? If not, what is missing?
3. How do these opportunities influence how you live in your families / community?
4. Looking at the life of those around you, what do you feel? (PROBE: satisfaction / dissatisfaction) Why?
5. Are there disagreements between young people, their parents and / or grandparents? Why / Why not? What values do you share / share with the generations of your parents / grandparents? Why ? What do you blame most for your parents / grandparents? Why ?

6. If all the conditions were right, how would you like to live your life? How do you imagine your ideal life?
7. Where do these ideals take root? Where did you observe this kind of life?
8. From this ideal, what do you think you will be able to achieve even if not everything will be achievable?
9. Are there people who can help you achieve these dreams? What do your parents think about your dreams?
10. How did you describe the way in which you interact with your parents? Do you often discuss various topics?
11. How did you describe your childhood? What events / memories have you noticed the most? Why ?
12. How do you perceive the relationships of your parents? Do they represent the ideal you are looking for in your life as a couple? Why / Why not?
13. Do you think that you will manage your own home in the same way as your parents? Why / Why not? What will you do differently?
14. How did you describe your ideal man / woman? Why do you think these features are important? Where does this ideal come from? Is there a book / movie / other that describes this type of man / woman?
15. Does your ideal man / woman exist in your community? If not, where will you find him? If you are not going to find him, what type of man / woman will you choose instead?
16. When needed, who do you seek advice / help from? Who has the greatest influence on your decisions? Why ?
17. What do you think are the most common problems between women and men? Why do they exist?
18. Do you think you will have the same type of problems in your relationships? Why / Why not? (PROBE: (if not mentioned by participants, what do you think about jealousy / infidelity?))
19. What do you never tolerate in your relationships? Why ? (PROBE: Physical / Psychological / Sexual Abuse) Do these behaviors exist in your community?
20. Do you feel safe in your community? What activities do you usually attend with other members of the community?
21. (If not mentioned above) : What role do traditions play in your community? (If traditional societies not directly mentioned, ask about other ways boys/ girls learn from family members or members of their community members)

INTERVIEW GUIDE : WATER, SANITATION, AND HYGIENE

1. Where do you find water for your household? Do you use a different source for drinking / cooking / bathing / animal consumption / agriculture?
2. Does your source change during the year? (Cf. [Seasonal Calendar](#))
3. Has your source changed in the last 10-15 years? (Cf. [Historical Calendar](#))
4. Does anyone manage this water source? Are there any conditions of use?

5. Do you have enough water for your needs throughout the year? If no, when? (Cf. [Seasonal Calendar](#))
6. Has access to water changed in the last 10-15 years? (Cf. [Historical Calendar](#))
7. Do all members of the community have the same access to water? If not why? Who are they?
8. Who is responsible for collecting water for the household?
9. How long does it take to get water? (NB: time of arrival at the water point, queue, time of return of the water point). Does this change throughout the year? (Cf. [Seasonal Calendar](#))
10. How much water do you collect during a day? Does this change throughout the year? (Cf. [Seasonal Calendar](#))
11. Has this changed in the last 10-15 years? (Cf. [Historical Calendar](#)) How? Why? What are the consequences of these changes?
12. Are there toilets in your community available to use?

Game of Agree/ Disagree (+ DEBRIEFING)

1. The water in my community is good to drink.
2. The water in my community causes us stomach problems.
3. Water in my community makes children sick.
4. The water in my community is clear.
5. I wash my hands and body in the morning.
6. I wash my hands after a visit to the toilet.
7. I wash my hands before cooking.
8. I wash my hands before eating.
9. I do not wash my hands often because there is not enough water in my community.
10. I do not wash my hands often because I have to keep it for another use.
11. I do not think I need to wash my hands often, we have always lived this way.
12. I buy soap every time I go to the market.
13. The soap is sold at a good price.
14. I do not like latrines.
15. I do not need a latrine at home. I spend a lot of time working away from home.
16. I do not need a latrine at home. It is more natural to meet our needs in the open.
17. I wash my baby every time he's dirty.
18. I let my baby play outside the house.
19. There are animals roaming around my house.
20. There are animals wandering in my house.

Risk game (+Debriefing)

1. Drink water at the water point.
2. Drink water in the creek.
3. Drink rainwater.
4. Leave the water tanks open.
5. Let the flies sit on a meal dish.
6. Eat without washing your hands.
7. Cook without washing your hands.
8. Do not wash your hands after defecation.
9. Child defecate around the house.
10. Cleaning a latrine.

11. Baby playing in the mud.
12. Baby in contact with pets.
13. Animals wandering in the house.

Courage to change (+ DEBRIEFING)

1. Water supply
2. Water treatment
3. Washing hands
4. Bathing
5. Open defecation
6. Use of a latrine
7. Cleaning a latrine
8. Purchase of soap
9. Cleaning a house
10. Cleaning a yard
11. Laundry
12. Food storage

Recommendations

16. Have you tried to solve these problems individually / collectively at the community level? If yes, how?
17. How do you think they could be solved? (SOLUTIONS)
18. Are there any obstacles to getting there? (OBSTACLES)
19. What could be done on your side? (LOCAL CAPACITIES)
20. What do you need to get there? (NEEDS)
21. Which solution should have the highest priority? What is the most important action to take? (PRIORITIZATION)
22. Who should be targeted by this action as a priority?

INTERVIEW GUIDE: COMMUNITY BELIEFS & AWARENESS ACTIVITIES

1. How would you describe an ideal baby? (Size / characteristics / behavior)
2. What can you do to have such a baby before / after birth?
3. Has the image of the ideal baby changed in the last 10-15 years? Why?
4. Do you feel pressure from your family / neighbors / community to have an ideal baby? If so, what do they say / do they do?
5. What happens if someone's baby does not meet this criterion? What are the consequences on the reputation of the household in the community?
6. Have you noticed that some mothers / fathers care for children differently? How? 'Or' What? How do you feel about this?
7. Have you noticed that some mothers / fathers neglect their children? What do they do or do not they do? Why / why not? What are the consequences for the growth and development of these children?
8. What do you think is very important for the healthy development of children? Do all parents do it? Why / why not?
9. What do you think of vaccination? (PROBE : access, availability, cultural acceptability, etc.)

10. Do you attend sensitization sessions organized by health workers or community development workers from different NGOs? Why / why not?
11. Who is invited to these awareness sessions? Are there other people who should be included? Why?
12. What do you think about the different topics they talk about? Have you found them useful / relevant / easily applicable? Why / why not?
13. With what behaviors did you particularly struggle? Why? (Advantages disadvantages)
14. Are there people in your community who do not approve of certain messages / behaviors? Who? Why? (APPROVAL)
15. What should be improved? (SOLUTIONS)
16. Are there any obstacles to getting there? (OBSTACLES)
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? What is the most important action to take? (PRIORITIZATION)
20. Who should be targeted by this action as a priority? Why?

D. THERAPEUTIC ROUTES FOR RECURRENT DISEASES

Illness	Cause	Treatment	Community justification- additional information
Local dialects color coded as follows: Bassa, Kpele, Kru, Vai			
Respiratory diseases/cough <i>"Breathing in/out fast"</i> <i>Sunn, Quen, Quah</i> <i>Thonglung, Ton-ohn</i> <i>Neneh</i> <i>Kpo</i>	<ul style="list-style-type: none"> Unsanitary environment- especially the sleeping area Playing in water Sleeping in a cold area Contagious infection Spending time in rain Being close to a river 	Formal health care services are sought; traditional remedies to alleviate symptoms often applied in parallel. Initial treatment pattern: <ul style="list-style-type: none"> Liquid therapeutics: ginger water; lemon with pepper mint candies, boiled and swallowed Clinic – checkup, coltrine syrup or paracetamol Black bagger if no medicine available at the clinic <p>* Rivercess: Community Health Assistant first</p> <p>Herbal remedies:</p> <ul style="list-style-type: none"> Herbs for cough can be chewed or drunk. Only one community indicated 'peppering the child' for cough- a practice where hot pepper is swallowed or pumped into the rectum to clear the child's system <i>Blukorb</i> herb- chewed for the whole day for a week <i>Tomvine</i> leaf – chew it, some can drink it <i>Yeahwuh</i> leaf- chewed Bath the child with cold water and pepper the child with hot pepper 	<p>There is no one or certain cause of cough ("we haven't yet discovered the cause; sometimes you can feel the cough coming in your chest"- Focus group participant).</p> <p>In case the cause isn't easily identified, general pain relievers are applied. "There is no real treatment for this cough right now, so we give child certain tablet (paracetamol) to stop the cough." – Focus group participant, Rivercess</p> <p>For cough, herbs are most often applied by female caregivers (mothers and/or grandmothers) or sometimes country doctors.</p>
Malaria <i>"Skin hot, skin hard, malaria"</i> <i>Sonee</i> <i>Colufima</i> <i>Kolor-kalan-ma</i>	<ul style="list-style-type: none"> Mosquito bite Dirty water Proximity to water source (river) Eating too many green plum (oranges) 	The preferred malaria treatment is with anti-malarial medications (no preference for injection or pill) from the clinic or CHA. Black baggers can also be consulted if the distance to the clinic is far or the clinic stocked out/ prescription too expensive.	Communities bordering the coast or a river perceive themselves as more susceptible to malaria.

<p><i>Bomee</i> <i>Dogbayan, Nyen</i></p>	<ul style="list-style-type: none"> • Sugarcane • Working in sun • Worms from food and water 	<p>Herbal remedies can be applied to abate the fever (rub leaf and chalk mixture on the child's chest) and <i>kojolobo</i> bitter leaf is common drunk across the study zone 2- 3x per day, or as tolerated by the child.</p> <p>Other herbal remedies:</p> <ul style="list-style-type: none"> • <i>Gana gana</i> leaf- drink • <i>Blor</i> leaf- drink, makes child to gain strength and more blood • Young pineapple leaves, golden plumb leaves- pound and rub on the child body with chalk, can also drink 	<p>"The malaria can really embarrass us³⁷⁰ here because we are close to the river, breeze blowing on us" – Focus group participant, Grand Bassa</p> <p>Less common causes of malaria are believed to be related to tart foods (unripe oranges, certain sugarcane), other parasites, and overexertion.</p>
<p>Fever "Skin hot, skin hard, burning skin"</p> <p><i>Musein-kpe,</i> <i>Yossumoni</i> <i>Kpani-fan-ma ,</i> <i>Kolorkelen-ma</i> <i>Bomee</i> <i>Dogbayan, Nyen</i></p>	<ul style="list-style-type: none"> • Malaria/ Mosquito • Rashes • Indigestion or diarrhea • Constipation • Overexertion • Eating green plum (unripe citrus) • Mosquito • Unclean ("Ugly") food • Child eating their or their family's taboo food 	<p>The child's skin is first cooled with water and/or chalk, sometimes given tonic to bring down the fever, then brought to the clinic. Traditional herbs are continued if no money to purchase drugs at the clinic.</p> <p>In addition to herbal remedies applied for malaria:</p> <ul style="list-style-type: none"> • <i>Nya</i> leaf- drink • Pepper the child twice a day 	<p>Fever is assumed to be malarial; if it is not malarial, then it can be a symptom of other child illnesses.</p> <p>"When the child stomach is tight and the find it hard to toilet, this makes their skin hot" – Focus group participant, Montserrado</p> <p>"The child rashes, bump on the skin can make their skin to get hot" – Focus group participant, Grand Bassa</p> <p>"Sour in the stomach, the child can be straining and their skin can get hot." – Focus group participant, Rivercess;</p> <p>Herbal remedies are sometimes applied if the child's fever is very high and the distance to the clinic is far before bringing the child to the clinic.</p> <p>"We can take off the child clothes and put them in a tub of cold water to make the fever come down before taking the child to the hospital" – Focus group participant Grand Cape Mount, "special chalk</p>

³⁷⁰ Heavily affect us.

			<p>to rub and soothe the skin” – Focus group participant Sinoe</p> <p>“We mix reefs leaf, paw paw leaf, dry plantain leaf with lime. Boil and give the water to the child for treatment. After this, walk to the hospital.” – Focus group participant, Rivercess</p> <p>When there is no money to purchase drugs prescribed at the clinic, the same traditional bitter leaves used for malarial treatment are administered two to three times per day.</p>
<p>Typhoid fever “Body, neck pain”</p> <p><i>Kpa-ne-anehn</i> <i>Foi-kolan</i></p>	<ul style="list-style-type: none"> Eating foods that are exposed to air, flies and other insects and food that are not properly cook Rashes Other fever 	<p>The pawpaw³⁷¹ plant was a common remedy for this condition, across the study zone- boil papaw leaf with papaw root give it to the child to drink in a bottle and bath the child 3 times a day with it. Care can also be sought at the clinic and/or the black baggers, who can administer ciprofloxacin drip (IV) and/or oral therapeutics (chloramphenicol, ferrous).</p>	<p>Typhoid fever is distinguished from malaria/ other fever’s by neck pain and body aches. Adults considered more vulnerable to typhoid fever than young children.</p>
<p>Diarrhea “Running stomach , Sour/sore in the stomach”</p> <p><i>Qualezeze ,</i> <i>Wedezinzein,</i> <i>doeyazarzor, Kulie</i> <i>Zinzin</i> <i>Kwitay, Quoi-Pala ,</i> <i>Quoi-pu</i> <i>Zwerue</i> <i>Koenuobwe</i></p>	<ul style="list-style-type: none"> Unsafe drinking water Malaria When child eats too many sweets, like candy or pineapple Breastfeeding mother eats too many sweets, like candy or pineapple Flies sitting on food Child playing in dirty water and not washing their hands before they eat 	<p>Preferred treatment is deworming medications and/or ORS, from the clinic or CHA. Home electrolyte solutions (coconut water, banana water, water from burnt country rice) can also be given to the child to drink. If medications are not available in the clinic, the black bagger and/or herbalist can also be consulted. Black baggers most frequently administer ORS, Flagyl drip, and microtripozole for diarrhea.</p> <p>Additional herbal remedies listed for diarrhea:</p> <ul style="list-style-type: none"> <i>Gboleabee</i> (young leaf) – pour water on the leaf and drink the water and chew it <i>Kpele</i>³⁷² leaf- put some on the fire, boil it, add liquid and give to the child 	<p>It is often considered secondary to a syndrome of “sour in the stomach”- the cause of which can be from many things, most frequently unsafe drinking water/ food, acidic or sweet foods, and other illnesses. Sour in the stomach can pass through the mother’s breastmilk to her breastfeeding infant.</p> <p>“Many things can make the child stomach to run. Too much or cold food. Too much water. Sore the stomach. Fever. Dirty water. Water that we drink, we drink the creek water and it make in both children and big people stomach to run.” - KII, Herbalist, Rivercess</p>

³⁷¹ Papaya

³⁷² Common name in several dialects

	<ul style="list-style-type: none"> • Sore in the stomach- Child stomach is dirty • Heat produced by the child's illness • Sometimes children eat in their sleep (overconsumption of food) • Food not well prepared 	<ul style="list-style-type: none"> • Plantain latex- after Kpele leaf doesn't work, give the child unboiled plantain latex (stringy parts of the plantain) • <i>Meelokpo</i> leaf- chewed. "Within 4 minutes the pupu will come out ok" • Boil the <i>Bom-Bon</i> leaves or roots properly and give the child a mouth full three times a day • <i>Garavy</i> leaf-boiled, drunk • Dry gari (processed cassava) 	<p>Unlike other conditions (i.e. cough and fever), breastfeeding mothers indicated they were more likely to introduce herbal remedies to stop diarrhea in children under 6 months of age.</p> <p>Dry starches, such as dry gari and country bread (dried, pounded rice), are sometimes consumed to stop the flow of diarrhea.</p>
Cholera <i>Gbawada</i> <i>Quipu, kouplulu</i> <i>Zwerue</i> <i>Wholapo</i>	<ul style="list-style-type: none"> • Unsafe water or food • Eating at a late hour • Eating too much food • Eating food without salt, eating fish 	<p>Including the therapeutic route for diarrhea, an increased emphasis on local ORS solutions (Plantain water, coconut water) is placed on cholera.</p>	<p>Cholera is differentiated from diarrhea by both vomiting and diarrhea at the same time.</p>
Abdominal distension, constipation <i>"Big belly, water bag"</i> <i>Suhmon</i> <i>Kpahneh</i>	<ul style="list-style-type: none"> • Worms in the Stomach • Gas • Food blocked 	<p>Abdominal distension is associated with worms in areas close to clinics and/or with an active CHA. It is subsequently treated with deworming medication (flagyl drip, and microtripozole). It is common also to perceive abdominal distension as gas or blocked food in the stomach. Homemade enema's (<i>tatee</i>) are used to unblock the child's stomach. The most common ingredients in homemade enemas are boiled pepper, garlic, and/or cassava, pumpkin leaves.</p> <p>After the ingredients are boiled, they are screened/ filtered, put the water into a pump and pumped into the child's rectum. The child is then turned upside down and thumped until he toilets.</p> <p>Herbs (<i>plor plor</i>) can also be rubbed on the stomach of the child until he toilets freely.</p>	<p>Homemade enemas most commonly mentioned as a therapeutic option by grandmothers and previous generations.</p> <p>"We used to use traditional treatment, like peppering the child to enable their stomach to be clean. We used this method until 2013, the people at the facility now teach us." – Focus group participant, Sinoe</p> <p>Symptoms of parasitic infections are often interpreted as indigestion, constipation, or bloating, and home remedies can be applied to reduce the stomach size.</p>

<p>Thrush "Trash, sore in the stomach, worm in the stomach"</p> <p><i>Bangee, sore</i> <i>Quoi-pala</i> <i>Kpahnen</i> <i>Maimai</i></p>	<ul style="list-style-type: none"> • Child playing in dirty water • Eating sweets- pineapple or candy • Eating sweets while pregnant 	<p>Thrush is seen as a symptom of sore in the stomach, closely linked to diarrhea. It is primarily treated with local remedies (oral and salve). Bitter leaves (<i>Kpele</i> or other) are boiled to drink, as well as boiled to bathe the child.</p>	<p>Thrush is seen as the outward symptom of trash in the stomach. "Trash" and "sore in the stomach" can also be used to describe discomfort in the child's stomach, without the clinical symptoms of thrush.</p>
<p>Fontanelle "Open mole"</p> <p><i>Duwyeh, Dolo-We</i> <i>Koi-lee, ohn-bla-</i> <i>kpan-na</i> <i>Tweeh</i></p>	<ul style="list-style-type: none"> • Witchcraft- that's the place the child eats from in the night • Maggot going in the head and does not come out • Thinking too much • Heavy work load • Sore • Bewitched 	<p>Open mole is treated with local therapeutic salves, usually in consultation with a local herbalist, as it is considered a spiritual sickness. The head is scraped, beaten leaves applied, and left on the person's head for several days. The area is rinsed with sugar cane water (<i>Bassa</i>) and the process repeated until the open mole is cured.</p>	<p>Open mole includes fontanelle, or a softening in the child's skull, but in adults, open mole is also a syndrome associated with depression, anxiety, insomnia, malaise, neck pain, and dizziness.²⁷⁰ It can be initiated by a sudden trauma.</p> <p>Open mole is most commonly described as the "center of my head is hurting," which can be literally softened in a child and/or stress- "too much thinking business."</p>
<p>Jaundice "Big malaria, white jondah, yellow jondah"</p> <p><i>Sunni flam</i> <i>Kplxkih, Welyou</i> <i>Loplue</i> <i>Jarkpo</i></p>	<ul style="list-style-type: none"> • Severe malaria • Worms 	<p>See malarial treatment.</p>	<p>Jaundice is considered a symptom of malaria and treated as such.</p>
<p>Conjunctivitis "Eye dirty, eye pupu"</p> <p><i>Yeawa, apolo</i> <i>Apolo</i> <i>Jarkpo</i></p>	<ul style="list-style-type: none"> • Unclean environment- dirt enters the eye or ear from the air 	<p>Traditional treatment is used for conjunctivitis; tree bark, salt water, or fever leaf mixes are squeezed into the eye of the person with a handkerchief. Country doctors/ herbalists can also rub chalk around the ear/ eye.</p>	<p>-</p>

Rash, Scabies <i>"Measles"</i> <i>Mosie, Monssin</i> <i>Kpe-ne-kpan-ma,</i> <i>Molon-yen</i> <i>Tuton</i> <i>Crowcrow</i>	<ul style="list-style-type: none"> • Skin irritants- dust in the wind, especially during the dry season • Bewitching the child • Bathing with unsafe water and sanitary practices 	Rashes/ spots on the skin are typically treated at home, unless there is a CHA in the community. Herbs are applied to the skin as well as drank. Herb tonics varied across the study zone: <ul style="list-style-type: none"> • Beat cassava and mix with liquor and/or potter (chalk), rub it on the child • Boil country bean leaves and give some to the child and bath him with the remaining • Rub cane juice mix with <i>galai</i> on the child everyday 	Measles is used to describe clinical measles as well as rashes on the skin.
Epilepsy <i>Seeyin</i> <i>DinkDink</i> <i>N'knoon</i>	<ul style="list-style-type: none"> • Family line (from parents to children) • Witchcraft 	Epilepsy is considered a spiritual sickness. The only cure is to seek traditional health services from local spiritual figures/ herbalists.	One herbalist indicated that epilepsy is non-curable with local therapeutics and would be referred to the National Government hospital (JFK). "Some diseases I cannot cure include: epilepsy, crazy person. Those are caused by mental problem or because there was something bad that happened before." – KII Grand Bassa
Tuberculosis <i>"Bloody cough"</i> <i>Kuavenan</i> <i>Ven-Kpo-Tonkon</i> <i>Momber</i>	<ul style="list-style-type: none"> • Smoking • Drinking • In contact with infection person 	Traditional treatment- see cough. The person can also be given local electrolyte solutions (including mango root water) to drink.	Tuberculosis is considered contagious- "if you come in contact with the saliva of the infected person or you can also get it through communication and drinking or eating from materials infected people use" – Focus group participant, Montserrado

Table 35: Major child illnesses, believed causes, local treatment, and community justification

E. COMMUNITY RECOMMENDATIONS

Domain	Solutions	Obstacles	Local capacities	Needs	Prioritisation
Limited availability of health services	<ul style="list-style-type: none"> Construction of a clinic within 3 km of every community (30 minute walk) (<i>Regions 1, 2, 3</i>) Train black baggers so they can give higher quality services when they come to town with medicine (<i>Region 2</i>) 	Gov't reduced capacity in terms of financial and human resources to respond to further demand of network expansion.	<p>Advocacy; human resources; construction materials (wood and thatching); hospitable attitude to the clinic and clinic staff</p> <p>Buying from the black baggers when they do come to town</p>	<p>Construction and staffing</p> <p>N/A</p>	<ul style="list-style-type: none"> Construction and staffing Black bagger training
Poor access, utilization, and quality of health services	<ul style="list-style-type: none"> Improved availability of medicine at the clinic (<i>Regions 1, 2, 3</i>) Pharmacy/ clinic agreement: vendor on-site to purchase the medications from, if the clinic is stocked out, so the caregiver doesn't have to walk further (<i>Region 2</i>) Increase in the number of CHA's at community-level who carry medicine to treat children under 5 years old (<i>Regions 1, 2, 3</i>) Improve accessibility of health facilities, especially for women who are giving birth, by 	<p>Gov't reduced capacity in terms of financial and human resources to respond to further demand of network expansion.</p> <p>Difficulty managing the vendor relationship</p> <p>Reduced availability of community-based organizations who could manage the service.</p> <p>No ability for the community to</p>	<p>N/A</p> <p>N/A</p> <p>Farm for the CHA so he can spend 100% of his time caring for the children</p> <p>Form a birthing committee with the CHA, women leaders, and/or</p>	<p>N/A</p>	<ul style="list-style-type: none"> Improved availability of medicine in the clinic Safer options for pregnant women to reach the clinic when they are going to deliver Increased number of CHA's in the community Pharmacy/ clinic agreement

	increasing the number of ambulances or supporting women to sleep in the clinic area a few nights before they expect to deliver (<i>Regions 1, 2, 3</i>)	change the location of the clinic	gCHV to escort pregnant women to the clinic, so they do not walk on the road alone		
Malfunctioning market or supply system	<ul style="list-style-type: none"> Decrease distance walked to market to less than 1 hour for all communities – investment (materials) given to communities who designate space and communicate their vision (market day, number of vendors) (<i>Regions 1, 2, 3</i>) Improved road conditions to increase market access (<i>Region 2, 3</i>) 	<p>Set market schedule; difficult to achieve enough unity for market day to be scheduled and market place to be set</p> <p>Frequent travel by heavy logging/ mining vehicles</p> <p>Lack of government commitment to holding logging companies accountable to clear the roads</p>	<p>Community unity to organize the market; construction materials</p> <p>Community to maintenance section of road in their jurisdiction</p> <p>N/A</p>	<p>Materials</p> <p>Clan chiefs & other relevant authorities to coordinate different localities</p>	<ul style="list-style-type: none"> Increase market coverage Road maintenance
Early marriage and/or pregnancy	<ul style="list-style-type: none"> Trade and vocational programs to be made available to children when they are 13 or 14 years old (<i>Region 2, 3</i>) 	Most programs are in urban hubs	Host extension trade/ vocational teachers who travel from the urban center to bring the program to the community	Parents and other community members to support adolescents as they explore longer term income generating activities	<ul style="list-style-type: none"> Trade trainings that will encourage youth to seek longer term income generating activities Women's groups Sex education/ family planning training

	<ul style="list-style-type: none"> Incorporating women who give birth early into mother's clubs or other women support groups, so that they don't feel unsupported (<i>Region 1, 2, 3</i>) Trainings for parents on how to discuss family planning options with their children (<i>Region 2, 3</i>) 	<p>Belief that an external group should start mother's clubs or support groups</p> <p>Belief that sex is a private/ personal issue</p>	<p>Create a group of women who are interested to meet on a voluntary basis and co-chair a discussion on a given topic on a regular basis</p> <p>Training for mothers and fathers on sex education</p>	Comprehensive trainings	
Low coping capacities	<ul style="list-style-type: none"> Provide trainings to koo's and individual farmers on improved agricultural practices; inputs of tools (<i>Regions 1, 2, 3</i>) 	<p>Low coverage of ag extension agents</p> <p>Reduced availability of community-based organisations who could manage the service.</p>	Host extension trade/ vocational teachers who travel from the urban center to bring the program to the community	Tools and comprehensive trainings	<ul style="list-style-type: none"> Tools Trainings
Low access to food	<ul style="list-style-type: none"> Tools to solve most troublesome agriculture pests/ underproductivity (<i>Regions 1, 2, 3</i>) Bird nets to be distributed with malaria nets, to keep birds from troubling the crops (<i>Region 2</i>) 	Low access to cash for tools	Loan schemes in the community to share tools/ incorporate them in koo activities	Tools to be provided	<ul style="list-style-type: none"> Bird nets Cutlasses
Heavy workload of women / IYCF	<ul style="list-style-type: none"> Seed investment loans to women who would like to engage in petty trade, including the materials needed to set up a home-front market (<i>Regions 1, 2, and 3</i>) Reinforce involvement of men in household tasks and 	<p>"When you don't have any money, it stops you from breastfeeding because you're hustling for money."</p> <p>Fixed gender ideals that prevent men's</p>	<p>Meeting with traditional authorities to discuss the possibility of these loans being made available to women by other men in the community</p> <p>Celebrate positive male role models in the</p>	Community leaders who also believe in the importance of women's workload & the importance of breastfeeding	<ul style="list-style-type: none"> Income generating activities for women that keep them closer to the home Water point access

	<p>women's roles to offset heavy workload of women, especially when they are breastfeeding (<i>Region 1, 2, 3</i>)</p> <ul style="list-style-type: none"> • Men should be allowed to substitute for their wives in the women koo time if their wives are breastfeeding (<i>Region 2</i>) • Tubs or <i>lappa</i> to be gifted by the community to new mothers, so that they can carry the baby with them with they resume, to symbolize community welcoming the baby and supporting the mother (<i>Region 2</i>) • Increase availability of water points so mothers do not walk as long for water (<i>Region 1, 2, 3</i>) 	<p>willingness to be involved in women's roles</p> <p>Community members' unwillingness to participate in donation</p> <p>N/A</p>	<p>community who participate in women's work</p> <p>Make this a town tradition, to let mothers and babies know they are special members of the community</p> <p>Identify water point</p>	<p>Surveying the land so that the water point can be drilled appropriately</p>	<ul style="list-style-type: none"> • Incentive schemes/ community pressure for men to participate in women's typical tasks • Tools for mothers when they resume workload
Poor sanitation/ hygiene practices	<ul style="list-style-type: none"> • Town laws to regulate the keeping of animals, including containment fines (<i>Region 1, 2, 3</i>) • Trainings on different forms of toilets & costed out options, so every household can make an informed choice on private latrines, and at least two latrines can be constructed (public/ private) (<i>Region 1, 2</i>) 	<p>Unwillingness of some community members to keep their animals contained, because more expensive to feed them</p>	<p>Agreeing as a community on the fines to be enforced if an animal is not contained</p>	<p>Regular refreshers on the importance of animals being contained (defecation mobility demonstration)</p> <p>NGO or Gov. partner to demonstrate proper procedure to cleaning toilets</p>	<ul style="list-style-type: none"> • Animal management • Sanitation rules

	<ul style="list-style-type: none"> Sanitation committee, including incentives scheme, for cleaning toilets (<i>Region 2, 3</i>) Reinforce the importance of key sanitation and hygiene issues, including handwashing and safe defecation (<i>Region 1, 2, 3</i>) 	<p>Lack of community members with proper knowledge</p> <p>Some community members resistance to proper sanitation and hygiene</p>	Town hall meetings to agree on focal persons for sanitation		
Low diversity/ access to income sources	<ul style="list-style-type: none"> Initiate a community co-operative farm, for selling crops at a larger scale for larger benefit (<i>Region 2</i>) Diversify income opportunities as a town- expand koo's to support other livelihood activities, such as palm oil production (<i>Region 2</i>) Unconditional cash transfers or cash for work programs (<i>Region 1, 2, 3</i>) Increased access to electricity in homes, to increase hours worked in the night, and ability to have cold storage, for selling beverages/ drying fish (<i>Region 2, 3</i>) Increased access to loans to women with lower interest rates, for starting business, including business mentorship from other community 	<p>Low access to start-up capital</p> <p>Reduced availability of community-based organizations who could manage the service.</p> <p>Community does not have access to an electricity grid; alternatives are expensive</p> <p>Low availability of persons to give low interest loans</p>	<p>Coordinate VSLA/ susu clubs in the community to donate interest toward the community co-operative farm Designate committee to manage the farm activities</p> <p>N/A</p> <p>N/A</p> <p>Human resources and interests</p>	<p>Community facilitation</p> <p>NGO or other benefactor to form agreement with the community leadership</p> <p>Distribution of multi-purpose solar panels</p> <p>Technical knowledge</p>	<ol style="list-style-type: none"> Cash transfers/ cash-for-work Electricity Gari processing machines Community co-operatives Business loans for women

	<p>members or trained professionals (<i>Region 1, 2</i>)</p> <ul style="list-style-type: none"> Provision of gari machines for community use, to produce processed cassava on a larger scale (<i>Region 2, 3</i>) 	Expense of the machine; limited market options	Human resources; willingness to repay a loan to purchase the machine as a community	Technical knowledge; provision of a machine	
Low access/ availability of water	<ul style="list-style-type: none"> Construction of a hand pump in every community (<i>Region 2</i>) Pump management committee: rotating responsibilities for managing the pump & enforcing fines (<i>Region 1, 2, 3</i>) Community focal person to manage conversations with local authorities/ experts when the pump runs dry in the dry months (<i>Region 1, 2</i>) 	<p>Gov't reduced capacity in terms of financial and human resources to respond to further demand of network expansion</p> <p>Reduced availability of community-based organizations who could manage the service.</p> <p>Limited options in the community for building sites (rocky surfaces)</p> <p>Community disunity and knowledge on the correct regulations</p> <p>Lack of community members with the right political power to have those conversations with higher authorities</p>	Human resources	Technical knowledge & supervision; materials	<ul style="list-style-type: none"> Hand pump Water point liaison Pump management committee

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G. IDEAL GENDER TABLES

'Ideal woman': Good woman, sweet mother, everyone's mother, our mother, dependable woman, Beloved wife, married woman, good hearted, Mama, honey, our ma			
	Ideal Woman: Women	Ideal Woman: Men	Ideal Woman: Youth
Character	<ul style="list-style-type: none"> Committed, good mother of approach Cherishing / gentle Hospitable to visitors- cook for them, find them a place to sleep Respectful 	<ul style="list-style-type: none"> Obedient Loyal Respectful Hospitable (clothing/ accommodation for visitors, receives husband's friends well) 	<ul style="list-style-type: none"> Respectful Loving and caring Obedient to other people Special respect for elders (especially parents, in-law's) "Good ways" – can talk to others well Hospitable, welcomes guests with food and accommodation
Role as a mother	<ul style="list-style-type: none"> Anticipate child's needs Health and hygiene of child 	<ul style="list-style-type: none"> Take the child's health seriously Maintain hygiene of the child Reproductive, able to bear children 	<ul style="list-style-type: none"> Take care of children Supports her children in school Reproductive
Role as a wife	<ul style="list-style-type: none"> Serve him, embrace him, sing songs for him Satisfy her husband in bed In good harmony with her in-law's 	<ul style="list-style-type: none"> Care and concern for the husband Committed to one man Cook on time and well "Sits at home, you can expect her there when you're back" 	<ul style="list-style-type: none"> Take care of the man's family Sexual – 'Service her man well in bed' In love with her husband
Role as a homemaker	<ul style="list-style-type: none"> Water/ cooking/ cleaning Fills livelihood role; helps man in times of high workload Keep a tidy home, clean yard 	<ul style="list-style-type: none"> Water/ cooking/ cleaning Fills livelihood role; helps man in times of heavy workload ("industrial woman") Promotes unity in the home and community 	<ul style="list-style-type: none"> Cooking/ cleaning Cook well Industrial, economic- finds ways to earn money
Physical appearance	<ul style="list-style-type: none"> Dress neatly 	<ul style="list-style-type: none"> Neatly dressed Shiny face, always clean Dress with a long skirt 	<ul style="list-style-type: none"> Dress decently – wears long dress or <i>lappa</i> Clean

Education	---- Not mentioned by women as a requirement for being an ideal woman	LR02, Rivercess; LR08, Montserrado <ul style="list-style-type: none"> Educated (some elementary and/or high school) 	LR08, 09, Montserrado; LR02, Rivercess <ul style="list-style-type: none"> Well educated Finish high school, finish college
Names for non-ideal woman	<ul style="list-style-type: none"> Wicked mother (<i>Kwenyoh-Kpele</i>) Good for nothing Foolish woman (<i>Fooliseenyoh</i>) Prostitute (<i>Blanponyah</i>, <i>Hopajoe</i>) Rude Proud Dirty woman 	<ul style="list-style-type: none"> "Useless woman" Don't care woman Dirty woman 	<ul style="list-style-type: none"> Unserious woman ('hopajoe, grona woman') out on the street Careless woman Dirty woman Noisy woman- woman who interferes in others' business <i>Fooliseenyoh</i>- foolish woman <i>Blanponyah</i>- prostitute

Table 37: Ideal Woman Exercise

'Ideal man': Beloved husband, good man/ man with good ways, good father, our father, responsible man			
	Ideal Man: Women	Ideal Man: Men	Ideal Man: Youth
Personality/ character	<ul style="list-style-type: none"> Thoughtful Caring Hard working Good manner of approach- not insulting Shows concern Generous Humble 	<ul style="list-style-type: none"> Hard working Faithful Respectful, especially elders- greet elders 'my mother, my father' Friendly Good respect in the community Caring 	<ul style="list-style-type: none"> Hardworking Respectful Friendly to community members Generous Give good counsel to friends Kind Loyal
Role as head of household	<ul style="list-style-type: none"> Financial provision- willing to work for the family, uses money wisely Takes only one wife (consults the first wife if wants a second wife) Maintains the home without confusion or argument Fills livelihood role; 'good hunter' Has plans for the family's future Loving and willing to take responsibility 	<ul style="list-style-type: none"> Converses with the family Control of the home- financial provision, leadership Fills livelihood role; 'is known as a great farmer', 'great hunter'- LR02, 04 Monogamous (mentioned 2/10 Focus group participant's) 	<ul style="list-style-type: none"> Financial and emotional support of the home (meet the home's needs) Good at his job Respect boss Take care of his parents Generous Advocate on behalf of his family Monogamous
Role as a father	<ul style="list-style-type: none"> Sweet surprises/ gifts for child Send child to school, hospital when sick Does not beat on children 	<ul style="list-style-type: none"> Caring father Shows love to other children too Send children to school 	<ul style="list-style-type: none"> Talk to children well Pay school fees
Role as a husband	<ul style="list-style-type: none"> Care and concern for the woman, her family Sweet talk; sweet surprises Gives allowance at free will Makes wife happy Initiates relationship Seeks and listens to wife's counsel Respectful to the wife in public 	<ul style="list-style-type: none"> Respect wife Special care for wife's relatives Playful with the wife Listen to the wife's advice Transparent with his earnings Potent in bed 	<ul style="list-style-type: none"> Care for the wife, not abusive Respect the family of the wife Sexual prowess- 'can do his homework' Knows how to talk to the wife
Physical appearance	<ul style="list-style-type: none"> Strong Clean 	<ul style="list-style-type: none"> Dresses well, no sagging 	<ul style="list-style-type: none"> Dress decent, neatly Clean
Education	No specific educational attainment mentioned	<ul style="list-style-type: none"> Pursue learning of ideas Educated (secondary school)- LR10 	<ul style="list-style-type: none"> Educated (secondary school)
Names for non-ideal man	Don't care father, Wicked, Good for nothing, Foolish man (<i>foolistegar</i>), Useless, <i>Babay gar</i> - loving all around, Street man, Suffering man, Rude	Bad man, Irresponsible, Useless, Stupid, Street teller, Don't care man, Foolish man, Dirty, Unserious	Lover boy (<i>kpakpagai</i>), Street man

Table 38: *Ideal Man Exercise*