

**NUTRITION CAUSAL ANALYSIS
BONTHE DISTRICT, SIERRA LEONE
OCTOBER 2022 – MARCH 2023****INFORMATION BRIEF****EXECUTIVE SUMMARY**

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

The Nutrition Causal Analysis (NCA) was conducted from October 2022 to March 2023 in the chiefdoms of Kpanda Kemoh, Yawbeko and Jong, which constitute *Action Against Hunger* intervention zone in Bonthe District, Sierra Leone. The main objective of this study was to understand causal mechanisms of undernutrition, notably stunting, in the Action Against Hunger intervention zone in Bonthe district, Sierra Leone, to improve the relevance and efficiency of its nutritional security programming. **Limited access to health services** and **low access to income** were identified as major risk factors of undernutrition in the zone.

METHODOLOGY

A Link NCA Nutrition Causal Analysis is a mixed method for analysing 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 context¹.

The study in Bonthe District included a primary qualitative data collection in the 3 chiefdoms of interest. The usual quantitative data collection of the NCA was replaced by statistical analyses of existing datasets in order to maintain a mixed method approach.

KEY STAGES

Systematic review of secondary data sources was conducted in October 2022. The review covered past surveys and research applicable to the study zone with the aim of identifying a set of risk factors and their interactions, which might trigger undernutrition among children under 5 years of age (CU5).

Secondary quantitative data analyses (bivariate logistic and linear regressions) were conducted from October 2022 till November 2022 using the 2019 Sierra Leone Demographic and Health Survey² and the 2017 Sierra Leone Multiple Indicator Cluster Surveys (MICS)³ datasets.

In-depth qualitative inquiry was conducted between November 2022 and December 2022 in three qualitatively representative locations (one village per chiefdom). At village level, a variety of participants ranging from mothers and fathers of children under 5 years of age, community leaders, and Village Health Workers were requested to participate. In total, 47 focus group discussions and 52 key informant interviews were organized with 397 participants, out of which 260 were women. Additionally, 16 in-house observations were also carried out by the team.

¹ For more information about the methodology, please refer to www.linknca.org.

² Statistics Sierra Leone (Stats SL) and ICF, 'Sierra Leone Demographic and Health Survey 2019'.

³ Statistics Sierra Leone, 'Sierra Leone Multiple Indicator Cluster Survey 2017, Survey Findings Report.'

Data synthesis was conducted from January to March 2023. The final results were presented to key decision-makers and operational partners in Bonthe on 5th April 2023.

KEY FINDINGS

A. CATEGORISATION OF RISK FACTORS

Based on a triangulation of various data sources (Cf. *Key stages*) risk factors of undernutrition, per UNICEF conceptual framework, were categorised as *major*, *important* and *minor* in relation to their believed effect on the prevalence of undernutrition in the *Action Against Hunger* intervention zone within Bonthe district. Two risk factors were identified as having a major impact, 10 risk factors were classified as having an important impact and 8 risk factors were judged to have a minor impact on the prevalence of undernutrition in the zone of study. Among the major risk factors, one was identified in the sector of health and nutrition, namely limited **access to health services** while the other one, **low access to income** sources, was identified in the sector of food security and livelihoods. Other notable risk factors include **low female autonomy/decision-making powers**, **low social support**, **low coping strategies and early marriage** and **women’s heavy workload**.

Risk factor		Overall interpretation/ Impact of risk factor ⁴
A	Limited access to health services	+++
B	Limited utilisation of health services	+
C	Low birth spacing/ early, repetitive or unwanted pregnancies	++
D	Low birth weight	+
E	Low nutritional status of women	+
F	Caregiver’s well-being	++
G	Non-optimal breastfeeding practices	++
H	Non-optimal complementary feeding practices	++
I	Low quality of interactions between a child and a caregiver	++
J	Low access to a quality diet	+
K	Low access to income sources	+++
L	Malfunctioning market or supply system	+
M	Low coping capacities	++
N	Inadequate accessibility, availability and quality of water at household level	++
O	Non-optimal sanitation practices	+
P	Non-optimal personal hygiene practices	+
Q	Non-optimal environmental and food hygiene practices	+
R	Heavy workload of women	++
S	Low female autonomy/ decision-making	++
T	Low social support for women	++

B. STATISTICAL ASSOCIATIONS

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

⁴ Risk factors perceived as having a major impact on undernutrition in the study zone (i.e. risk factors with solid evidence on strong links with one or multiple forms of undernutrition) are highlighted in red, important factors (i.e. risk factors with emerging evidence on possible links with one of multiple forms of undernutrition) are marked in orange while risk factors with minor impact (i.e. risk factors with limited or unsubstantiated evidence on links with either form of undernutrition) are coloured green.

Having a higher **birthweight** was also found to be a protective factor⁵ of *wasting, stunting* and *underweight*. Common protective factors for *wasting* and *underweight* include a higher **maternal BMI** and living in a household with higher **number of chickens**. Having a higher **birthweight, current weight or height** were associated with a lower probability of a child being *stunted* or *underweight*. A higher **height** was also associated with lower probability of child's *anaemia*.

C. PATHWAYS

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

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

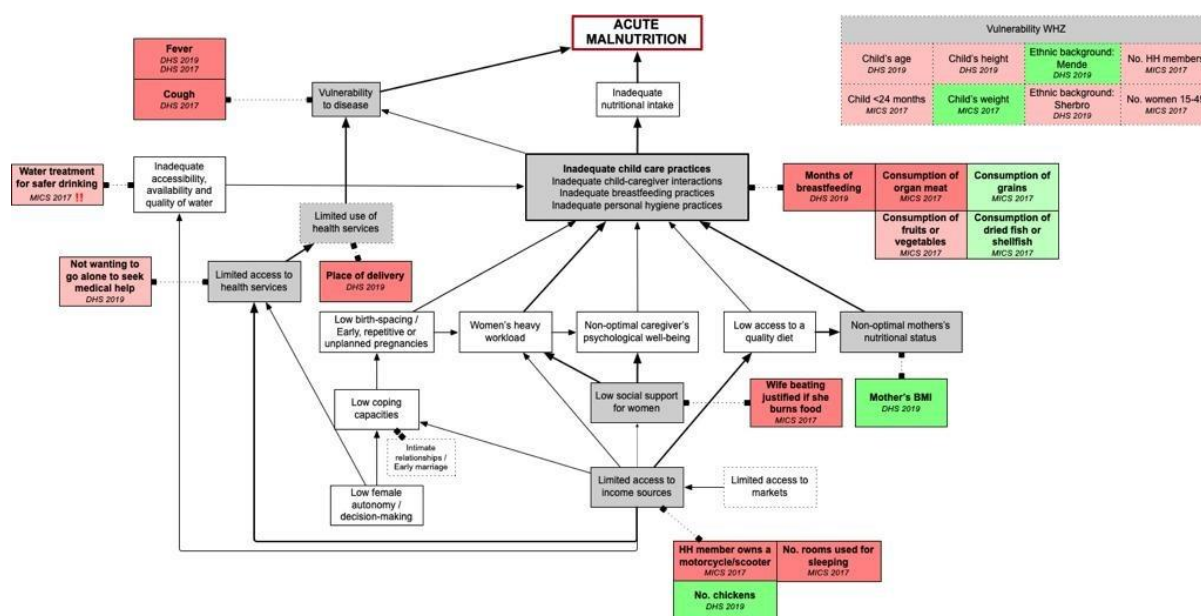


Figure 1: Causal pathway for acute malnutrition, Bonthe District, Sierra Leone

Risk factors: Children living in households that own a motorcycle⁶ households with a lesser number of rooms for sleeping⁷ or households where wife beating was justified if a woman burned food⁸ were associated with an increased probability of being wasted. In addition, children who were breastfed for

⁵ "Protective factor" refer to factors, which decrease the probability of child being wasted / stunted /wast/ underweight / anaemic

⁶ This may seem as a contradictory finding as it came out as protective factor for other forms of malnutrition and therefore needs to be considered with caution.

⁷ Proxy indicator for household income

⁸ Proxy indicator of low social support for women

a lesser number of months, children who consumed organ meat 24 hours prior the survey, children having fever or a cough in the last 2 weeks prior the survey and children delivered at home instead of at a health facility were also associated with an increased probability of being wasted. Probable risk factors of wasting⁹ included: consuming fruit and vegetables in the 24 hours prior the survey, children of a mother that did not want to go alone to seek medical help.

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

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

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

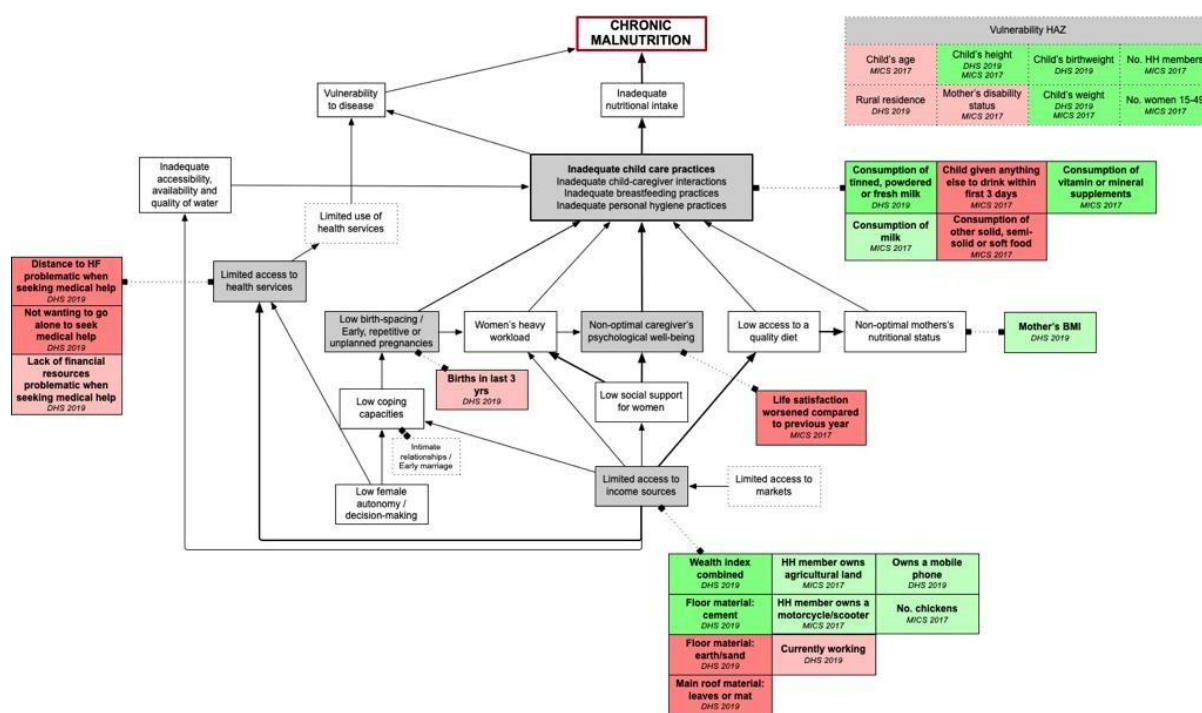


Figure 2: Causal pathway for chronic malnutrition, Bonthe District, Sierra Leone

Risk factors: Children living in households with a sand floor and/or roof made of leaves¹⁰, children living in households where the life satisfaction decreased compared to the previous year¹¹ were associated with an increased probability of being stunted. In addition, children who were given foods other than breastmilk in the first three days of life or children who consumed other solid or semi-solid foods in the 24 hours prior the survey were also associated with an increased probability of being stunted. The same

⁹ P value < 0.10

¹⁰ Proxy indicator for household income

¹¹ Proxy indicator of caregiver's psychological wellbeing

applied to children whose mothers did not want to go alone to the health centre or perceived distance as a barrier of access to health services. Probable risk factors of stunting included: children of mothers who found it problematic to access health services due to financial resources, children of mothers employed at the time of the data collection or mothers that had multiple births in the past 3 years.

Protective factors: Children living in households with a higher wealth index or households with a cement floor¹² were less likely to be stunted. The same applied to children who consumed tinned, powdered or fresh milk or who took mineral or a vitamin supplements the day prior the survey. Probable protective factors of stunting included: living in households, whose members owned a land, a motorcycle or a phone¹³, having a mother with a higher BMI or consuming milk in the 24 hours prior the survey.

Underweight. Based on available evidence, two causal pathways built around five key risk factors can likely explain most cases of underweight in the study zone. Firstly, *low access to income sources* translates into *low access to quality diet* and subsequently to *low maternal nutritional status* which impacts on *care practices*, specifically the practice of *exclusive breastfeeding*. At the same time, *limited access to income* translates into *low coping strategies* consequently repetitive pregnancies which influences directly on the quality of child care practices notably mother-child interactions, exclusive breastfeeding and personal hygiene practices playing a role on child's nutritional intake. In addition, *limited access to income sources* has effect on the ability to *access* and therefore *use health services*, consequently increasing the child's *vulnerability to disease* and underweight.

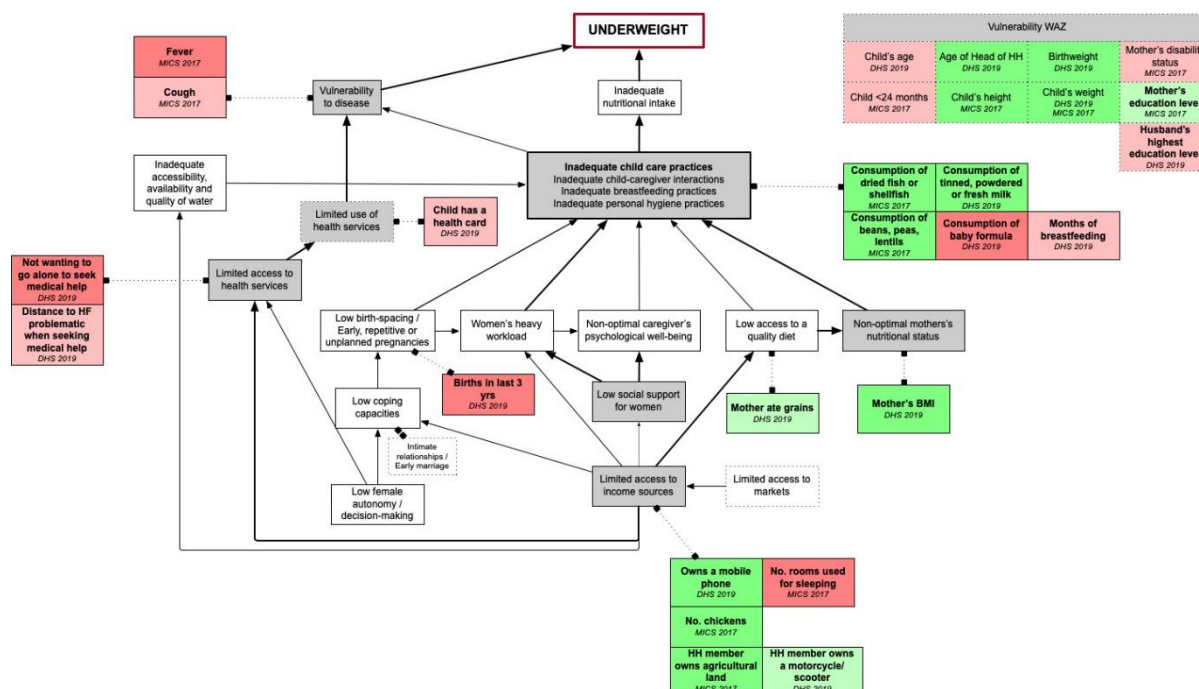


Figure 3: Causal pathway for underweight, Bonthe District, Sierra Leone

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

Risk factors: Children living in households with less rooms for sleeping¹⁴, children who received baby formula or had fever in the 2 weeks prior the survey were associated with an increased probability of

¹² Proxy indicator for household income

¹³ Proxy indicator for household income

¹⁴ Proxy indicator for household income

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

Protective factors: Children who lived in households whose members owned a mobile phone¹⁵, had a higher number of chickens¹⁶ and owned a land¹⁷ were less likely to be underweight. Children of mothers with a higher BMI and children who were given tinned, powdered, or fresh milk, dried or shell fish or pulses in the 24 hours prior the survey were associated with a decreased likelihood of being underweight. Probable protective factors of underweight included: children living in households whose members owned a motorcycle and children of mothers who ate grains in the 24 hours prior the survey.

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

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

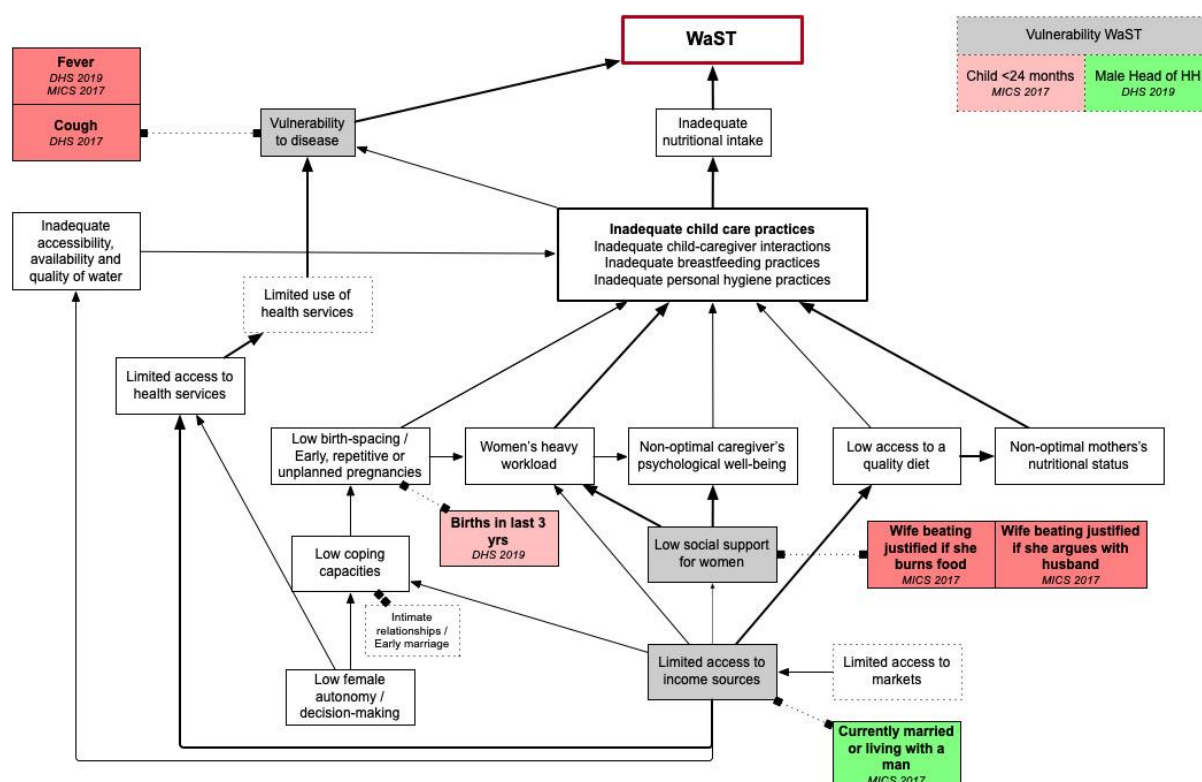


Figure 4: Causal pathway for concurrent acute and chronic malnutrition, Bonthe District, Sierra Leone

Risk factors: Children living in households where wife beating was justified if the mother burnt the food or if she argued with the husband were associated with an increased risk of concurrent wasting and

¹⁵ Proxy indicator for household income

¹⁶ Proxy indicator for household income

¹⁷ Proxy indicator for household income

stunting. Children who had a cough or fever 2 weeks prior the survey were also associated with an increased risk of concurrent wasting and stunting. Having a mother who had multiple births in the past 3 years was identified as a probable risk factor of concurrent wasting and stunting.

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

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

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

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

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

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

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

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

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

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

RISK FACTORS OF KEY NON-OPTIMAL BEHAVIOURS

Exclusive breastfeeding

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

Complementary feeding

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

Hygiene practices

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

Use of Family Planning

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

RECOMMENDATIONS

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

- Promote the re-creation of community systems and structures that were present in the past but are currently lost to re-create the sense of unity in the community and to provide intra-community support during periods of high distress and economic hardship, with a focus on adequate coping mechanisms. This may include the support of women's support groups for company, information sharing and income-generation purposes. Community consultations will need to be implemented before the initiation of any activity to reflect community preferences.
- Improve access of women to income sources and the increased decision-making power in women's priority areas.
- Promote optimal childcare practices aimed at a variety of caregivers including grandmothers.

LIMITATIONS

Unavailability of certain key NCA standard indicators. DHS 2019 and MICS 2017 datasets did not include indicators for all studied risk factors. Therefore, certain risk factors could not be sufficiently triangulated and their categorization could have been impacted as they generally ranked lower than other risk factors, for which quantitative analyses could be conducted. **Statistical associations.** It is advised to appraise statistical associations with caution as observed links do not necessarily prove the causality, while unobserved links do not mean that the causality does not exist. **Confounding variables.** Statistical analyses conducted within the framework of this study are based on unadjusted regression models that do not consider the effects of confounding variables. **Temporal limitations.** Considering that newer, population-representative data were not made available for this study, presented statistical associations do not account for incurred temporal changes due to Covid-19 and, therefore, cannot speak to potential impact of the pandemic.