LINK NCA IS EXPERIMENTING WITH REPORTING CONCURRENT WASTING AND STUNTING (WAST)

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EXECUTIVE SUMMARY

The Link NCA in Liberia, conducted across five of the country's fifteen counties from October 2019 to May 2020, was the first to investigate stunting causal pathways, based on the UNICEF Conceptual Framework for undernutrition. As wasting and stunting have common causes, concurrence of the two forms of malnutrition in the same child (WaST) was also investigated as an outcome of the study. Investigation of WaST yielded meaningful evidence regarding this form of malnutrition- especially as it relates to programmatic recommendations. The Link NCA ultimately informed a proposal for programming that would target pathways to both wasting and stunting. Future Link NCA's in contexts with high stunting and wasting burdens should consider inclusion of WaST and consider risk factors for both in recommendations that ultimately inform programs. There is a need to incorporate longitudinal evidence in the structuring of causal pathways, especially regarding the influence of wasting on stunting and vice versa.

INTRODUCTION

Link NCA 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 of undernutrition with an objective to build an evidence-based consensus on plausible causes of undernutrition in a local context[1]. While the Link NCA has predominantly been used to investigate causal pathways to acute malnutrition, meta-analyses indicate wasting and stunting share many risk factors along the causal pathway, particularly in immediate causes.

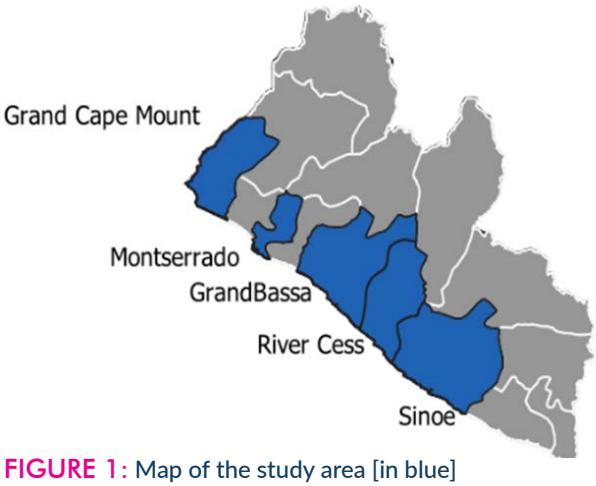

FIGURE 1: Map of the study area [in blue]

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 inequalities undermine child and maternal nutrition across the eight livelihood zones of these five counties.

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

Rates of stunting exceed 30% in the five counties[2], while rates of wasting[3] were less than 5%.2 According to the 2018 WHO thresholds, the burden of stunting is 'very high,' whereas the burden of wasting is 'medium'[4].

As part of an 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 the determinants of related behaviours. Three out of five consortium members 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.

A secondary research question emerged during qualitative inquiry, inspired by community members' perception of malnutrition as wasting and not stunting. Recent evidence suggests that children with concurrent wasting and stunting [WaST (WHZ<-2 and HAZ<-2)] may have comparable mortality risk to children with severe wasting only (WHZ<-3)[5]. WaST children also tend to have more severe wasting than children with wasting only[6]. Thus, the causal pathway to stunting and WaST was explored during analyses.

QUALITATIVE INQUIRY

The During qualitative inquiry, various risk factors for undernutrition are assessed by means of detailed focus group discussions, semi-structured interviews, guided observations, and community immersion. Community members are specifically probed about their perceptions of malnutrition - including risk factors, vulnerability, and health-seeking routes. 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 identify 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'. 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.'

The majority of community members did not perceive stunting as a medical condition; thus, concentrating causal pathways around stunting during focus group discussions was challenging, as a critical sensitization component was missing, and it is beyond the scope of researchers to provide health education. Despite a noted discrepancy in perceived severity of this form of malnutrition, there was consensus on stunting's differentiation from natural and normal shortness. With a 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.

When asked what causes a child to be wasted, responses directly or indirectly blame mother's negligence. A child is at risk of becoming wasted 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.

> "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

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 the combination of having two short parents that made the child stunted, or the parents were 'tight' themselves.

2 2019/2020 DHS for Grand Bassa (34.7%), Grand Cape Mount (32.5%), Rivercess (40.6%), and Sinoe (30.0%) Counties; CFSNS 2018 for Rural Montserrado (35.6%), which differentiates Urban Monrovia and Rural Montserrado.

3 By weight-for-height z-score only.

4 de Onis M, Borghi E, Arimond M, Webb P, Croft T, Saha K, De-Regil LM, Thuita F, Heidkamp R, Krasevec J, Hayashi C, Flores-Ayala R. Prevalence thresholds for wasting, overweight and stunting in children under 5 years. Public Health Nutr. 2019 Jan;22(1):175-179.

5 https://www.ennonline.net/attachments/3239/Beyond-WaSt.pdf

6 https://archpublichealth.biomedcentral.com/articles/10.1186/s13690-018-0277-1

A child could become stunted if s/he was not well taken care of in the home- this referred to both nutrition and household hygiene. However, this was grouped into beliefs about general health of the child, and not stunting specifically. 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 for general health of the child. 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.

"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

The overwhelming consensus was that boys were more vulnerable to stunting than girls. Boys were said to be greedy when breastfeeding. If they were not satisfied from infancy, they were believed to be frustrated and unable to grow. 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.

A summary of terms used to refer to stunting and wasting are included below[7]. It is important to note that terms used to refer to wasting implied a medical condition, while stunting was teased as growth failure. No special terms were reported for a child who was concurrently wasted and stunted- the child could be called 'tight and dry,' or some combination of the below terms.

Stunting	
Term: Liberian English or translated from local dialect	**Meaning**
Tight	Short for age
Short butt AK-47	Short for age
NGO – "Never grow old"	Unable to grow to potential
Small in the body	Short for age
Forever young	Looks younger than he should
Cornerstone	Never changing, never growing up[8]
Little man	Small for age, with a face like an old man
Small man in the iron jacket	Very tight in the body; Increased severity
Lazy child	The baby is too weak to grow
Iron rock	A child who looks older than his age, but stooped like an elderly person
Wasting	
Dry	Dry skin, no fat in the body, child who is very sickly
Witch child	Child is a witch; the child is flying at night
Chameleon	Appearance like a lizard
Boney boney	Appearance like a dry boney fish
Malnourished	The child is very dry, weak, pure, dirty, dry and small in size
Win child	Poor birth spacing[9]
Dirty child	The child is not cared for by his or her parent nor caregivers
Weaky weaky	Child who is sicker than other children
Mr. Bone or Bone Chairman	The child ribs and others bones of his/her body can be seen and counted
Skinny-winnie	The child legs and arms are very dry and his stomach is big

TABLE 1: Local terms for undernutrition

7 Translated from local dialects; full table with translations can be found on page 153 of the final report.
8 The child is the oldest of all the children in the community but he/she is very short and small in size.
9 The child was 'won' by the parents by having sex too soon after the last baby

A child who is 'dry' was identified as needing urgent treatment in the health facility, but no therapeutic itinerary was implied for stunting, even for the case of more stigmatized terms beyond 'tight.'

QUANTITATIVE RISK FACTOR SURVEY

The quantitative risk factor survey consisted of anthropometric measurements and 45 indicators, covering all risk factors identified and validated in preceding stages. The quantitative indicators reflected the 19 validated hypotheses of the study. The questionnaires were deployed on mobile devices and the collected data was uploaded and compiled in KoboToolBox, an approach optimized in the 2016 Belle-Anse Link NCA[10].

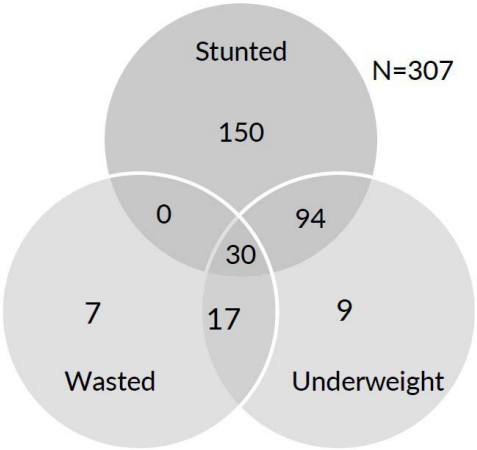

FIGURE 2: Number of cases by anthropometric deficiency, Risk Factor Survey[1]

The Risk Factor Survey revealed a prevalence of global chronic malnutrition (GCM) on the basis of height-for-age z-score above 30% in all three regions of the study[11]. Prevalence of global acute malnutrition (GAM) on the basis of weight-for-height z-score ranged from 5.4% to 8.7%. Per the findings of the Link NCA, rates of chronic malnutrition remain 'very high,' whereas prevalence of wasting is 'medium.'4 WaST prevalence ranged from 3.4% to 4.1%. All children who were wasted and stunted were also underweight.

WAST PATHWAYS AND VULNERABILITY

After collection of quantitative data, logistic regressions were conducted to calculate odds ratio's for children with WaST and children without WaST b indicator. Subsequent analyses revealed significant associations, by region, with the following indicators, which are highlighted in orange if exposure is a risk factor associated with higher odds of WaST and green if exposure is associated with a protective factor associated with lower odds of WaST (p-val <0.05).[12]

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

11 For construction of causal pathways, the 5 counties were grouped into 3 regions, based on the 2016 Malaria Indicator Survey precedent.

12 A full report of statistical associations, by region, is available in Annex 2 of the Final Report.

Risk factor *Logistics regression*					Region I – Grand Cape Mount County *Children 6-59 months*		Region II-Grand Bassa/ Rural Montserrado *Children 6-59 months*		Region III- Rivercess/ Sinoe *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]**
Age group -<24 months	356	128	36.0 [31.5-40.7]	0.8	0.002	11.22 [2.37-53.07]	0.008	6.30 [1.63-24.40]	0.029	5.90 [1.20-29.09]
Age group <36 months	356	198	55.6 [51.0-60.2]	0.8	0.033	9.52 [1.20-75.33]	0.115	3.48 [0.74-16.44]	0.114	5.41[0.67-44.03]
Measles vaccine : Confirmed by card[13]	286	194	67.8 [62.1-73.1]	1.0	0.508	1.70 [0.35-8.20]	0.596	0.65 [0.13-3.20]	0.033	0.15 [0.03-0.86]
Diarrhea [2 previous weeks]	350	91	26.0 [21.4-31.2]	1.1	0.925	0.94 [0.24-3.62]	0.557	1.44 [0.43-4.84]	0.024	6.26 [1.27-30.84]
Child watched by an auntie	270	50	18.2 [12.6-25.6]	2.0	0.569	0.54 [0.07-4.42]	0.621	1.53 [0.29-8.14]	0.045	5.40 [1.04-28.03]
Perceived breastmilk sufficiency[14]	170	156	91.8 [86.0-95.3]	1.2	0.864	0.83 [0.10-7.19]	0.282	0.45 [0.11-1.92]	0.023	0.14 [0.03-0.77]
IDDS Score Zero	159	16	10.0 [6.1-16.1]	1.0	0.983	1.02 [0.12-8.69]	*Perfect collinearity*		0.001	24.20 [3.87-151.36]
Mother perceived external support: Lowest	275	52	18.9 [13.5-25.8]	1.7	0.973	0.97 [0.20-4.74]	0.009	9.20 [1.73-49.06]	0.593	0.55 [0.06-4.85]
Reduced coping strategies index: Medium or high	350	111	31.7 [25.0-39.3]	2.2	0.129	0.20 [0.03-1.59]	0.607	0.58 [0.07-4.65]	0.004	7.54 [1.88-30.27]
Borrowing of food - 3 of 7 Days	351	70	19.9 [14.4-27.0]	2.2	*Perfect collinearity*				0.049	4.30 [1.01-18.38]
Reducing number of meals in the day- 3 to 7 days	351	83	23.7 [17.8-30.7]	2.1	*Perfect collinearity*				0.017	6.00 [1.38-26.14]
A family member died during the recall period	356	14	3.9 [1.9-8.0]	1.9					0.004	15.64 [2.44-100.16]

TABLE 2: Select indicators' association with WaST

Subsequent analyses revealed a significant relationship between age and WaST, meaning that a child who is less than 24 months old was more likely to be wasted *and* stunted. This was true across all three regions of the study. Regional variations in other risk factors should be interpreted with caution, as correlations were limited by the small percentage of children with WaST and should not be considered relevant to only one region without further investigation.

After triangulation of all available data sources, two major risk factors to stunting 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. Due to the scope of the study and lack of a WaST conceptual framework, the Link NCA did not construct causal pathways to WaST separate from those of stunting. A dominant overarching pathway to stunting took its roots in limited access to markets, which then exacerbates a variety of household factors, including environmental hygiene, personal hygiene, and consumption of diverse, nutritious foods. Furthermore, the study substantiated evidence regarding the role of women's nutritional status and social support, especially as linked to income-generating or saving opportunities, in the health and well-being of her child. The nutritional status of women, assessed using a mid-upper arm circumference (MUAC), significantly links with HAZ score. 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.

13 9-59 months
14 Children <36 months

LIMITATIONS

- CROSS-SECTIONAL EVIDENCE ON WAST: This Link NCA can not substantiate evidence to suggest effects on linear growth slowing as a child's wasting progresses, or vice versa. We are limited to a snapshot of a child within the causal pathway to malnutrition, as opposed to longitudinal information regarding how those pathways may influence each other
- SEASONALITY: Qualitative inquiry took place at the tail end of the rainy season, while the Risk Factor Survey started before the next rainy season. While stunting is less influenced by seasonality than wasting, cross-sectional data is, again, limited and does not substantiate potential seasonal stresses that influence growth faltering- whether wasting or stunting.

RECOMMENDATIONS

Construction of causal pathways to stunting yielded meaningful information about causal pathways to WaST in the Liberian context. Based on our findings, IN CONTEXTS WITH WASTING AND STUNTING BURDENS OF PUBLIC HEALTH SIGNIFICANCE, we recommend analysts CONTINUE ASSESSING WAST PREVALENCE AS AN OUTCOME, as this does not require additional data collection. We also advocate for longitudinal data collection for larger evidence on the influence of wasting pathways on stunting pathways, and vice verse. ULTIMATELY, THIS LINK NCA WAS USED TO INFORM A 4-YEAR PROPOSAL TO ADDRESS CAUSAL PATHWAYS OF BOTH STUNTING AND WAST. Shared risk factors for both WaST and stunting were emphasized in program design. The resulting program aims to increase social and financial capital for women and households, particularly those with children less than 24 months old, while leveraging existing community structures to promote sanitary environments. Growth monitoring will be promoted at household and clinic level, by means of caregiver MUAC screening and advocacy for stunting as a public health concern.