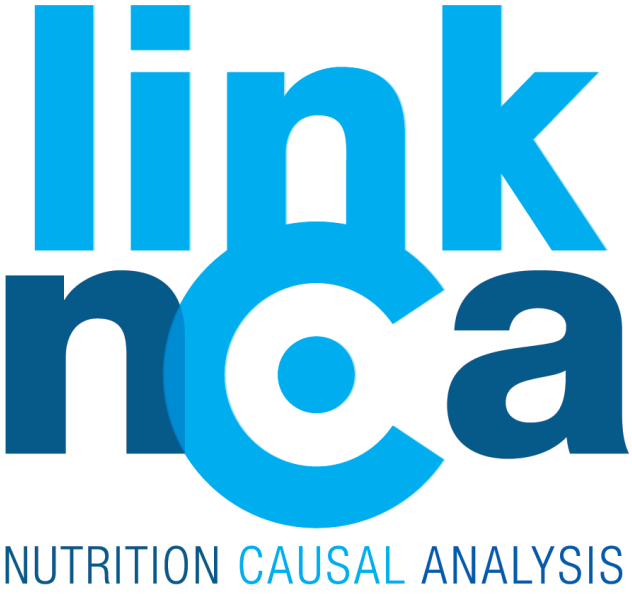
NCA Final Report



March 2014

Nutritional Causal Analysis in 4 Upazila Sathkira District - Bangladesh

Humanitarian Aid
and Civil Protection

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ACF-International would like to thank the Satkhira District, Upazila and Union Authorities for their support and collaborations during the planning and implementation of the Nutrition Causal Analysis.

ACF-International would also like to all the stakeholders who participated in the technical workshop to detail the hypotheses to be tested as well as the validation workshop for the rating of risk factors. The background information they provided was invaluable.

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Finally, ACF-International would especially like to thank all ACF staff that participated in the NCA – from providing input and advice on the issues facing Satkhira district, logistical arrangement to move around the field as well as assistance in the organisation, coordination and translation of all the fieldwork.

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Abbreviations

ACF-INT	Action Contre la Faim - International
ARI	Acute Respiratory Infection
BCC	Behaviour Change Communication
BMI	Body Mass Index
CHA	Community Health Assistants
CI	Confidence Interval
CMAM	Community Management of Acute Malnutrition
CNW	Community Nutrition Workers
FGD	Focus Group Discussions
FSL	Food Security and Livelihoods
GAM	Global Acute Malnutrition
HAZ	Height-for-Age Z-score
HH	Household
INGO	International Non-Governmental Organisation
IRD	Institute of Research and Development
IUGR	Intra-Uterine Growth Retardation
IYCF	Infant and Young Child Feeding
LBW	Low Birth Weight
MAM	Moderate Acute Malnutrition
MUAC	Mid-Upper-Arm-Circumference
NCA	Nutrition Causal Analysis
NGO	Non-Governmental Organization
NNP	National Nutrition Program
NNS	National Nutrition Service
PD	Positive Deviance/Deviant
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SFP	Supplementary Feeding Programme
SMART	Standardized Monitoring and Assessment of Relief and Transition
UNICEF	United Nations Children Fund
WaSH	Water, Sanitation and Hygiene
WAZ	Weight-for-Age Z-score
WFP	World Food Programme
WHO	World Health Organization
WHZ	Weight-for-Height Z-score

Executive Summary

Despite impressive reductions in maternal and child mortality in Bangladesh the prevalence of child and maternal undernutrition has remained persistently high. In the past 20 years there has been a gradual drop in chronic malnutrition, yet the decrease has stabilised just above 40% for the last 10 years [1]. National levels of wasting (<-2sd weight-for-height) also remain chronically critical, with rates consistently exceeding 15%.

ACF-INT has worked in Bangladesh since the cyclone Sidr emergency response in 2007, and in Satkhira district since 2011 arising from the flooding emergency and resulting waterlogging. In the 18 most vulnerable unions of Satkhira district ACF-INT, WFP and their local partner, Shushilan, have implemented a comprehensive nutrition programme, focusing on the treatment for severely malnourished children, nutritional support for children under 23 months and pregnant and lactating women, plus prevention of SAM by treating MAM through supplementary feeding programs by targeting children under 5 years and adolescent girls. A psychosocial component aiming at increasing the effectiveness of the treatment, as well as assisting behaviour change and reinforcing positive child and maternal care practices was also included.

Due to the consistently high rates of undernutrition in Satkhira, ACF-INT started a detailed investigation into the socio-cultural and economic causes of undernutrition, through an anthropological approach triangulating information from quantitative and qualitative assessments through the Nutritional Causal Analysis (NCA) methodology.

Overall Objective

The overall objective of this NCA was to provide a greater level of clarity behind the possible causes of undernutrition in the operational ACF-INT areas in Satkhira district, Bangladesh.

Specific Objectives:

- Have a detailed understanding of the immediate and underlying causes of undernutrition
- Understand the pathways to undernutrition
- Establish a prioritisation of identified causes in order to plan the technical strategy and programs for Satkhira.

Methodology

The aim of the NCA methodology proposed is not to demonstrate statistically causal association, but rather, to build up a case for causality, based on different sources of information, using the following steps:

Step 1: Designing the NCA using secondary data information to initially formulate the draft hypotheses for the causality of undernutrition

Step 2: Using the UNICEF conceptual framework as a background, identify the hypotheses of causality and creating a local hypothetical model together with stakeholders

Step 3: Gathering evidence of causality through qualitative and quantitative methods.

Step 4: Analysis of the information collected through the triangulation of secondary, qualitative and quantitative data to come up with a comprehensive understanding of the immediate, underlying and basic risk factors causes of undernutrition in the working areas

Step 5: Participatory rating of the risk factors to undernutrition by building consensus around the findings with the stakeholders.

Nutrition Situation

The acute malnutrition situation in Satkhira is currently classified as serious according to the WHO scale (GAM: 13.8%), with underweight and stunting remaining at the very high and high levels (30.0% and 29.0%) respectively. Maternal nutrition was found to be 3% (MUAC <210mm). These women are at risk of nutrition related complications if pregnant.

The perception of the causes of undernutrition in the community related primarily to poor food quality and diversity. Reasons given for this were poor land access or reduced cultivation especially due to increased frequency of waterlogging. Poor care during pregnancy also featured strongly in the communities' perception of what causes undernutrition – with purposeful reduction of food intake noted as a reason for low birth weight.

Immediate Causes

Both the factors of inadequate diet and disease were found to be worrying in the area, with only 44.4% of children age 6-23 months consuming an acceptably diverse diet (more than 4 food groups). Acute childhood illness among children 6-59 months was also high in the area, with 66.7% reporting illness in the prior 2 weeks, with co-morbidities found to have a significant effect on wasting and underweight indicators. This highlights the prevalence of both immediate causes of undernutrition in the ACF-INT working area of Satkhira.

Underlying and Basic Causes of Undernutrition

A. Inadequate Maternal and Child Care and Feeding Practices

The community and the technical experts expressed inadequate maternal and child feeding practices to be a strong causal factor directly contributing to the continued high levels of undernutrition found in the community, focusing on both infant and young child feeding practices as well as care during pregnancy. The poor initiation and continued exclusive breastfeeding (EBF) practices combined with inappropriate, unvaried and poor initiation of appropriately timed complementary feeding practices leaves younger children vulnerable to undernutrition.

Poor psychosocial care for women was found to impact on care and feeding practices, with these practices accentuated and with a greater effect during pregnancy. It was consistently identified and reinforced by women that they reduced food intake in the 3rd trimester in order to have a baby with a lower birth weight. There was a perception in the community that larger babies need to be born by caesarean section, a misbelief that was reinforced by traditional birth attendants (TBA). Indeed, the practice of caesarean section appeared to be worryingly high, with poor post-natal care follow-up by both the private or traditional health care systems. Due to the fear of complications after a caesarean section, TBA's would provide no support or encouragement to initiate breastfeeding to these women. In the private health care system poor post-natal follow up also ignored the importance of encouraging the timely initiation of breastfeeding.

Early pregnancies were another sector highlighted by the villages as being a major problem, and a link to undernutrition. The social pressures resulting in high rates of adolescent marriage and the ensuing low

age of first pregnancy all raise a cause of concern for low birth weight, premature births and poor caring practices. This was recognised by all members of the community as a problem, but socio-cultural pressures maintain the practice.

B. Poor Household Access to Sufficient, Safe and Nutritious Food

The link of food insecurity factors at the household level has been shown to have a relationship to inadequate dietary intake. The precariousness of income opportunities was highlighted as being a major factor as a large proportion of people rely on purchasing of foods, with few relying on own production. Uneven land distribution and a burgeoning population, resulting in a large number of landless, were possible driving factors. Increased migration as a coping strategy to increase income opportunities arose from the seasonal needs of agricultural labour, the impact of the increased frequency of waterlogging episodes, as well as population pressure. Loaning is another common strategy, with debt repayment accounting for 11% of monthly household costs resulting in a constant cycle of indebtedness.

C. Poor Household Access to Quality Health Services

Health seeking behaviour was identified as a point of concern, with the majority of people seeking healthcare from untrained workers and preferring private or local (traditional) doctors over established government health centres. This was primarily due to a distrust of the health system.

D. Unhealthy Environments

The unhealthy environment that the community lives in was evident. While households are aware that the water quality is poor and contaminated with minerals such as arsenic, the alternative of further distances and time are a deterrent for accessing better quality water. The use of unhygienic sanitation facilities are largely linked to income, with the community recognising the importance of appropriate structures but expressing an inability to construct them, especially in the cyclic destruction as a result of recurrent waterlogging. The discordance between knowledge and practice was also observed in hygiene behaviours where the communities know the appropriate practices but rarely practices them.

E. Seasonal Factors

Waterlogging played a pervasive role in the idea of undernutrition in the communities and was the major contributing factor to seasonal effects. The impact of waterlogging permeated all conversations in the community, affecting household income and food security indicators. Waterlogging has inundated water and sanitation facilities rendering them unserviceable or inaccessible. It has also complicated housekeeping labour, increasing the time required to complete simple routine tasks, which has had a negative impact on care practices, with deterioration in the level of care afforded to the children noted by the community.

Conclusion

Through qualitative, quantitative and secondary level enquiry, along with the validation of a wide range of experts, the following risk factors have been identified major and important causes of undernutrition in the ACF-INT/WFP working areas of Satkhira:

Major

- "Inappropriate complementary feeding practices"

- Poor initiation and continuity of exclusive breastfeeding practices"
- "Early Adolescent Pregnancies"
- "Poor psychosocial and health care for pregnant women, including poor food intake"
- "Low income opportunities"
- "Poor water and sanitation quality"

Important

- "Poor appropriate health seeking behaviour"
- "Poor hygiene practices"

Recommendations

- Strengthen Mental Health and Care Practices (MHCP) programs to work with communities in Satkhira to identify positive practices to reinforce and facilitate behaviour change for maternal and child care practices at the household level
- Strengthen communities to identify children with 'thinness' and undernutrition so to increase self-referral to centres for measurement and admission into programs.
- Strengthen nutrition sensitive programming being delivered through community clinics including pre-natal check-ups and maternal nutrition advise
- Increase knowledge of traditional birth attendants to reinforce appropriate maternal nutrition to reduce low-birth weight and limit adverse misconceptions surrounding maternal nutrition and birth.
- Increase awareness of child and maternal care practices.
- Specific programming should reinforce practical understanding about transition from exclusive breastfeeding to complementary breastfeeding for children aged 3 to 6 months, This period is identified as a nest for under nutrition
- Additional research into early inadequate food initiation practices for Satkhira
- Strengthen homestead food production activities to increase household dietary diversity, especially high protein foods and vegetables to be added into diet along with staples.
- Improve health access behaviour of pregnant women, increasing their knowledge on appropriate supplementation during pregnancy and tackling the barriers they face in accessing health.

1. Introduction

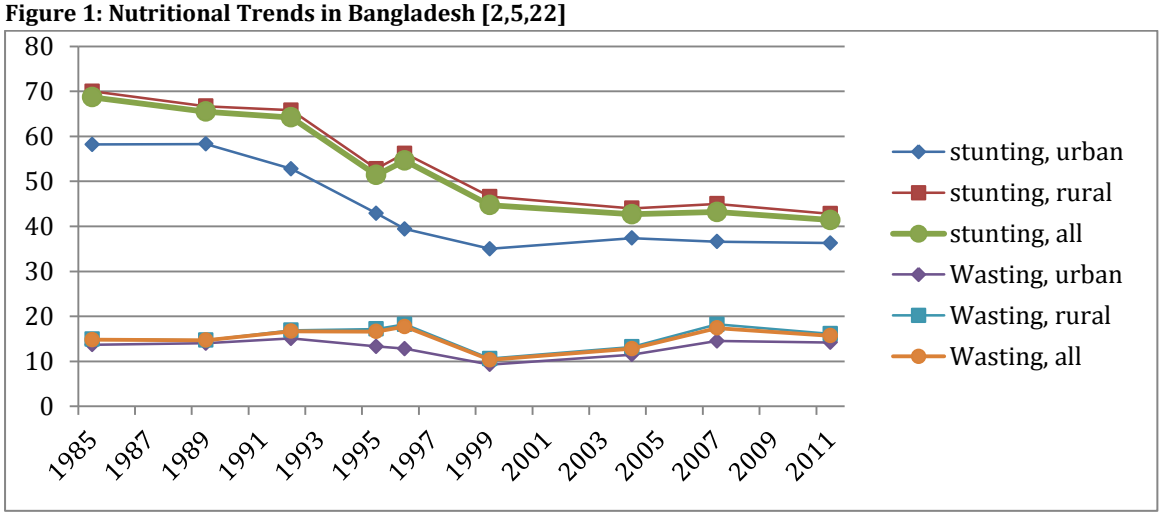
Bangladesh, located in the north-eastern part of South Asia, consists mainly of low, flat land made of alluvial soil in a fertile delta due to the extensive network of large and small rivers. At the time of independence, the country was desperately poor, and densely populated, with a primarily agrarian economy which was subject to frequent natural calamities such as floods, cyclones, tidal bores and drought.[1], [2]. With a population of 153 million, it remains the eighth most populous nation and the most densely population country in the world, excluding city states[1].

While it is still struggling to emerge from poverty, ranking 146th among nations on the Human Development Index (HDI), it must be noted that Bangladesh has seen some achievement in national incomes in the last decades [3]. This decline in poverty can be attributed to the expansion of labour-intensive exports (garments and fisheries) and the increase in employment in the rural nonfarm sector with its rising demand, facilitated by an increase in crop production, inflow of remittances and growing exports[4].

The economic improvements seen in the country have been surpassed by some exceptional health achievements, with steep and sustained reduction observed in the birth rate and mortality rates, achieving some of the largest reductions in early infant, child and maternal mortality seen anywhere [5]. In addition to these indicators of survival, the country has seen broad immunisation coverage and family planning services, with a resultant fall in the birth rates.

Despite these impressive gains in human survival, other health indicators have lagged behind. While the fall in maternal death rates have been phenomenal in the country, health service indicators show insufficient access and utilisation of maternity services. Furthermore, despite some small improvements in the last decade, the prevalence of child and maternal malnutrition remains persistently high, as shown in Figure 1 [2].

Figure 1: Nutritional Trends in Bangladesh [2,5,22]



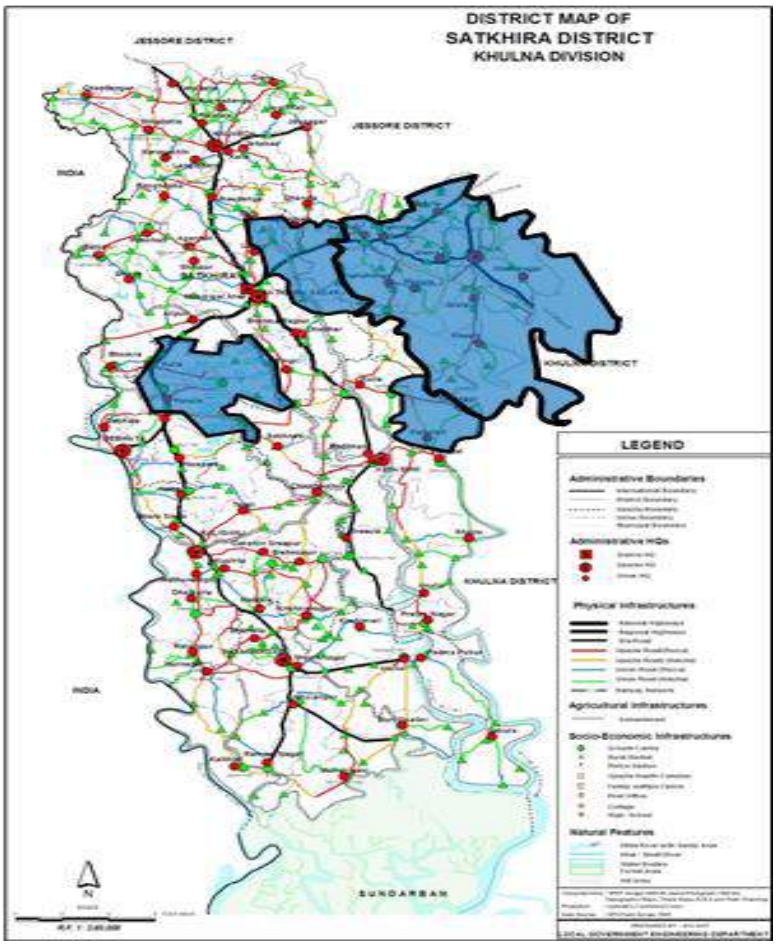
In the past 20 years there has been a gradual drop in chronic malnutrition, yet the decrease has stabilised just above 40% for the last 10 years, leading to health, economic and developmental problems [1]. Levels of wasting (<-2sd weight-for-height) also remain high, consistently above 15% in recent history and during a time of significant GDP growth. All nutrition indicators identify child nutrition continues to be a very serious problem in Bangladesh (WHO classification) [6].

The government recognizes the challenges that remains to reduce undernutrition, and have put nutrition security firmly in various national policies, programmes, strategies and bodies such as the Poverty Reduction Strategy Paper, National Food Policy, National Nutrition Service (NNS), Public Food Distribution System (PFDS), Food-for-Work Activities (FFW), National Adaption Programme of Action (NAPA) among many others[7]. Despite this plethora of policies, problems in implementation exist due to poor governance, weak bureaucratic leadership and overdependence by the government and NGO's on donors for policy formation, compounded by a complicated political environment where party and individual interests tend to dominate major national policy making [2]. Furthermore, problems in formulation and implementation on nutritional issues are aggravated by poor demarcation of ministerial domains and in the intersectional nature of the root causes of undernutrition.

ACF-International in Bangladesh

Following the destruction in the wake of Cyclone Sidr in 2007 an emergency response was launched. As a result of the chronically high levels of undernutrition, combined with limited treatment capabilities at national level, ACF-INT has continued to develop longer-term programmes, particularly in the prevention of undernutrition and disaster risk reduction activities, while continuing to focus on building the capacity of the health system with regards to the community-based management of acute undernutrition (CMAM).

ACF-INT currently works in the southwest zone (Barguna, Satkhira) as well as the camps hosting the Rohingya refugees in the Southeast bordering Myanmar.



Map 1: ACF-INT/WFP working areas in Satkhira District

ACF-International in Satkhira District

Arising from an emergency response to flooding and the ensuing prolonged waterlogging in 2011, ACF-INT launched an integrated nutrition, WASH and Food Security and Livelihoods approach. Activities included food distribution; cash based interventions; emergency shelter; nutritional rehabilitation and a WASH emergency response.

In 2012, the first phase of an ECHO funded comprehensive nutrition programme was established by ACF-INT and WFP through the support of the local actor, Shushilan. The program was rolled out in the 18 unions where ACF-INT is present (Map 1), focusing on treatment for severely malnourished children, nutritional support for children under 23 months and pregnant and lactating women, plus prevention of SAM by treating MAM through supplementary feeding programs by targeting children under 5 years and adolescent girls. It is involved through the government structure in 64 facilities for Severe Acute Malnutrition (SAM) treatment and 72 facilities for Moderate Acute Malnutrition (MAM) treatment, focusing on capacity building and integration of the CMAM approach into the health system.

In 2013, ACF and WFP, again under ECHO funding, collaborated in a closer holistic manner in a phase 2 approach. Treatment activities around CMAM continued in a similar/unison approach in Satkhira, developing the capacity of the local NGO and health facilities to implement the CMAM approach. In unison with the nutrition specific programming, ACF developed a Behaviour Change Communication (BCC) package to identify the barriers faced by caretakers and households to have adequate child and maternal care practices. Rather than merely delivering messages or conducting community awareness, ACF teams worked continuously with women and member of the community to enhance two way communication exchanges and to facilitate behaviour change to improve nutrition. Alongside nutrition specific and sensitive programs, ACF implemented a number of surveys to better understand the immediate and underlying causes of malnutrition in Satkhira. These involved both quantitative and qualitative approaches in order to have a greater knowledge base from which to address malnutrition and factors relating to malnutrition. Part of this action was the Nutrition Causal Analysis.

Nutrition Causal Analysis Objectives

Overall Objective

The overall objective of this NCA was to provide a greater level of clarity behind the possible causes of undernutrition in the operational ACF-INT areas in Satkhira district, Bangladesh.

Specific Objectives:

- Have a detailed understanding of the immediate and underlying causes of undernutrition
- Understand the pathways to undernutrition
- Establish a prioritisation of identified causes in order to plan the technical strategy and programs for Satkhira.

2. Methodology

Background to the NCA methodology development

Whilst there have been a number of documented approaches to conducting Nutritional Causal Analyses (NCA), there has yet to be a standardised, replicable methodology produced. To fill this gap, ACF-INT initiated a partnership with Tuft's University, Bristol University, WFP and IRD to elaborate and validate an NCA methodology. A first protocol was designed and tested in Bangladesh and Zimbabwe in 2011. This initial design resulted in a revision of the methodology and a final field test in Burkina Faso in 2012. Based on the research protocol and these field studies, a final guideline was peer reviewed in 2013. ACF-INT Bangladesh employed this methodology in the current NCA. The methodology proposed is a structured, participatory, holistic study based on the UNICEF causal framework (Appendix 1), to build a case for nutrition causality in a local context [8].

The NCA Approach

The objective of the NCA methodology proposed is not to demonstrate statistically causal association or infer one main cause, but rather, to build up a case for multi-sectorial causality, based on different sources of information, using a clear structured approach of five steps:

Step 1: Designing the NCA
Step 2: Identification of the hypotheses of causality
Step 3: Gathering evidence of causality through field surveys
Step 4: Analysis of the information collected
Step 5: Participatory rating of risk factors to undernutrition

Step 1: Designing the NCA

Secondary data information was collected and compiled relating to immediate, underlying and basic causes of undernutrition at national as well as district level (Appendix 9). Key informant interviews were held with stakeholders from the government, UN, International and National NGO's working in Satkhira and at Dhaka level on their programmes and what they identified as key underlying problems for undernutrition.

The literature review and key informant interviews were used as a basis for drawing up the initial formulation of the draft hypotheses for the causality of undernutrition in Satkhira.

Step 2: Identification of the hypotheses of causality

Identification of the hypotheses of causality used two main sources of information – the technical experts workshop backed by the secondary analysis compiled in the previous step.

Technical Experts Workshop:

The technical expert workshop brought together a group of experts in the fields of Nutrition, food security, WASH, Health and Care Practices, who drew up a list of hypotheses of causality together.

Fifteen experts were identified from Satkhira, Khulna (division capital) and Dhaka level from Government, UN, International and National NGOs. They were all contacted and were willing to participate in a one-day technical expert workshop planned for the 30th November (Appendix 2). However, due to the sudden call for a blockade the night before, and the fear of violence, the majority cancelled their participation to the workshop, as travel was restricted for security measure. The blockade was extended until the 6th December, and therefore a reflection on the workshop schedule was needed. It was decided to go with a more virtual workshop alongside a meeting in the afternoon (when people agreed to travel if no violence). The meeting with 10 participants was held on the Tuesday 3rd December, with others contributing via email and phone.

The final list of hypotheses of causality that were selected and chosen are presented in this report, and were used as the basis for the NCA once commented and validated by the workshop stakeholders. A mind map was drawn on the hypothesised causal pathways (Appendix 3).

Step 3: Gathering evidence of causality through field surveys

Following the finalisation of the hypotheses, a data collection strategy was drawn up on information that could be collected and triangulated through qualitative and quantitative data sources.

Quantitative Data Collection

Quantitative data collection was through two main surveys that were conducted in Satkhira by ACF-INT – a Food Security Livelihoods and WASH in-depth survey conducted in October 2013, and an Integrated SMART survey conducted in January 2014, as shown in the data collection schedule below in.

The in-depth methodological explanation for these surveys should be referred to in their respective reports, alongside their respective questionnaires. The qualitative information gathered here was triangulated with the qualitative data to help build the case of causality.

Table 1: Quantitative data collection plan

Quantitative				
	Dates	Number of Households	Methodology	Specific Objectives
FSL/WaSH	October 2013	1080	Disaggregated by 3 livelihood zones. 30 clusters - 12 households randomly selected per cluster. PSU Household	To provide an in-depth review of the Food Security, Livelihood and WASH situation in Satkhira
SMART	January 2014	473	PPS sampling of 30 clusters. PSU Mother having eligible children aged 6 to 59 months	To monitor the nutritional status of the Children aged 6 to 59 months To accredit NCA hypothesis when possible

Qualitative Data Collection

Qualitative data collection was achieved through Focus Group Discussions (FGDs), participant observations, key informant interviews (KII) and village transect walks, as per the data

collection plan in Table 2 (Appendix 8). In each of these villages a one-day interview with key informants of the village were conducted followed by three days of FGD's related to nutrition, food security, health, WaSH and care practices. Case histories of malnourished vs. well-nourished children were also conducted. Children were selected using the criteria of living in the same village, household structure and income (using positive deviance enquiry methodology). Finally, a final focus group in each village was held for the rating exercises of the hypotheses identified.

Table 2: Qualitative data collection plan

	Activities per village
Week 1	- Village Questionnaire - Key Informant Interviews - Transect walk - **Focus Group A**: Intro and Background: Social/Village map - **Focus Group B**: Perceptions of Malnutrition - – *2 groups: Male and female only*
Week 2	- Key Informant Interviews (KII): Care Practices - **Focus Group C**: Care Practices: *Female only* • Matrix of Complementary Feeding • Discussion on BF and snacking • Daily activity chart for Women's workload • Seasonal calendar for Care Practices • Historical timeline: trend analysis of Care Practices factors
Week 3	- Key Informant Interviews (KII): Food Security/WASH - **Focus Group D**: FSL/WASH Practices – *2 groups: Male and female only* • Mapping showing land use, including shrimp farms, waterlogging • Migration/mobility mapping • Seasonal Calendar of FS/WASH/Migration • Historical timeline
Week 4	- Key Informant Interviews (KII): Health - **Focus Group E**: Health – *Female only* • Venn diagram on Health Seeking Behaviour • Seasonal calendar of Health • Historical timeline: trend analysis for Health • Historical timeline: Trend analysis for FS factors - Health Centre Visit
Week 5	- Case Histories of PD and Malnourished cases - **Focus Group F**: Female Empowerment – *Female only* • Decision making matrix • Access to and control of resources matrix - **Focus Group G: Prioritisation** and **Rating** exercise of all factors

A random selection of four villages from the list of clusters selected for the integrated SMART survey, which was held in tandem with the NCA, was conducted. Despite the 3 livelihood zones present in the ACF-INT working area, a recent in-depth assessment had shown minor variations between the villages, and therefore no purposive sampling was done to select villages from livelihood zones. Nevertheless, the random sampling did draw up a village from each livelihood zone, and with a mixture of ethnic groups, a vulnerable group that was identified in the initial workshop. At the community level, respondents were chosen purposively: FGDs were drawn from mothers and fathers of children under 5 years; in-depth interviews were selected from households with a malnourished child or a positive deviant case drawing from elements of positive deviant inquiry [9]; while key informant interviews were chosen from those in key

positions in the community, such as the village leader, traditional birth attendants and local healers, with others identified by the community themselves.

While there are advantages of conducting all sections in a consecutive approach per village, it was felt that this would be asking too much time commitment per village and especially women whose households tasks were already hypothesised to reduce child care activities.. Therefore an iterative approach was chosen. Due to the distances of 2 villages, the first 2 weeks were spent covering these 2 villages before moving to the other 2 villages. The fifth week was spent conducting in-depth case study interviews in all villages. While ideally a final week of reporting back to the community was planned, the time frame proved unsustainable and therefore this could not be achieved. Feedback to the women on the "lessons learnt" from the NCA in their village was given after the rating section but time limits of the villagers did not allow a full dissemination of the results to the community.

Step 4: Analysis of the information collected

Data synthesis and analysis consisted of triangulating the qualitative and quantitative results for each of the hypotheses that were presented as a potential cause of undernutrition with also backing on the secondary and scientific literature explored in the beginning.

While the qualitative data provided a background for the information on the hypotheses collected, the quantitative data was used to identify the magnitude and the severity of the risk factors. The prevalence data, which measured the measurable risk factors, were examined to look at their place compared to public health thresholds. Where no such thresholds existed, information was triangulated and examined in relation to other national or regional estimates. Ratings on each of the sources of information were given, following the framework in Table 3.

Table 3: Rating matrix for different data sources

Source of information	Notes
Prevalence of risk factor from secondary data	[-] Below prevalence where considered as a nutrition/public health issue [+] Similar prevalence where considered as a nutrition/public health issue [++] Higher prevalence than when considered as a nutrition/public health issue [+++] Much higher prevalence than when considered as a nutrition/public health issue
Prevalence of risk factor from risk factor survey	[-] Below prevalence where considered as a nutrition/public health issue [+] Similar prevalence where considered as a nutrition/public health issue [++] Higher prevalence than when considered as a nutrition/public health issue [+++] Much higher prevalence than when considered as a nutrition/public health issue
Strength and consistency across contexts of association between the risk factor and under-nutrition	[-] Statistically weak association has been demonstrated in many or few contexts [+] Medium strength association has been demonstrated in few contexts [++] Medium strength association demonstrated in many contexts OR strong association demonstrated in few contexts

	[+++] Strong associations demonstrated in most contexts or an association demonstrated in the particular context of the NCA
Seasonality and medium-term trends of risk factor related to seasonality and medium-term trends of under-nutrition	[-] Seasonal variation and medium-term trends of the prevalence of the risk factor does not correspond to the seasonal variation and medium-term trends of the under-nutrition outcome considered. [+] No seasonal variation of the risk factor OR No contradiction observed. [++] The seasonal variations of risk factor and under-nutrition are as expected. [+++] The seasonal peak(s) of prevalence of the risk factor matches with the seasonal peak(s) of the under-nutrition outcome considered.
Participatory rating exercise with key informants	[-] The risk factor is rarely or never mentioned in the rating exercise [+] The risk factor is irregularly mentioned as one of the top 5 risk factors [++] The risk factor is regularly mentioned as one of the top 5 risk factors [+++] The risk factor is consistently mentioned as one of the top 3 risk factors

Once each of these sources of information had been rated for each hypothesis, the information was categorised according to the understanding of their level of contribution to the prevalence of undernutrition, using the framework presented in Table 4.

Table 4: Categorisation matrix

Category	Meaning	Explanation
Major Risk factor	The risk factor is interpreted as a major contributor of under-nutrition prevalence	No contradicting information AND high strength of association from literature review AND high conformity with all other sources
Important Risk Factor	The risk factor is interpreted as an important contributor of under-nutrition prevalence	Minor contradicting information AND high strength of association from literature review AND high conformity with all other sources
Minor Risk Factor	The risk factor is interpreted as a limited or sporadic contributor of under-nutrition prevalence	Moderate level contradicting information AND moderate strength of association from literature review AND moderate conformity with all other sources
Rejected Risk Factor	Risk factor is interpreted as non-relevant to the context or being a marginal contributor to under-nutrition prevalence	No contradictory information AND majority of all other sources disagree with the risk factor
Untested risk Factor	Information gathered is not sufficient to reach a plausible conclusion	Contradictory information AND/OR information gathered not complete or not available

Step 5: Participatory rating of hypotheses of the causes of undernutrition

This final step was to build a consensus around the findings through examining the rating of the causal pathways by the order of importance and validating these conclusions with stakeholders.

Information on each of the causal hypotheses were triangulated and a preliminary categorisation done, and discussed and validated in a final technical workshop.

Final Technical Experts Workshop:

The objective of this workshop, held in Khulna on the 2nd March, was to review and validate the initial preliminary analysis and categorisation in order to strengthen the credibility of the results. This drew, as much as possible, on the participants identified for the first workshop. As this was not always possible due to time constraints, a few additional key participants were identified and briefed on the NCA methodology beforehand. A confidence note was given by each at the end of the workshop, and will be presented along with the results.

Location and Population of Study Area

Satkhira district, in Khulna Division, has a population of more than 1.8million and is divided into 7 Upazila, 2 municipalities, 79 unions and 1436 villages. The main occupations of the population are agriculture (37%), agricultural labourer (27%) and commerce (13%), with rice, jute, sugarcane, mustard seed, potato, and onion and betel leaf as the main agricultural commodities. Agricultural livelihood zones are further divided into aquaculture, agriculture and a mix of the two in aqua-agricultural zones.

Four villages were randomly chosen from ACF-INT's working area (Map 1), falling in the agriculture, aqua-agriculture and aquaculture zones as shown in the livelihood descriptions in Table 5, with further details and maps drawn from FGDs held with the community found in Appendix 4. Availability of facilities varied in each village, with the majority having to walk 10 – 20 minutes to access health and bazaar facilities while others were more isolated and required longer walking times to access services.

Table 5: Characteristics of selected villages

Union	Name of village	Total Population **	Main Livelihoods*	Facilities*
Baili	Gharchala	1543	Aquaculture (fish) and Agriculture	**Village**: School, STW **Nearby**: Raipur - FWC (30+ mins, usually closed), Chowdangar – Bazaar (20+ mins)
Tentulia	Hatbas	1606	Agriculture and Some Aquaculture (freshwater fish)	**Village**: DTW, Primary School, Trained TBA. **Nearby**: Madanpur – Bazaar and FWC (10 mins);
Khalilnagar	Daskati	527	Aquaculture (shrimp and fish)	**Village**: Only Kaomi Madrassa (school), 1 DTW. **Nearby**: Kalilnagar - FWC, Bazaar (30+ mins)
Khaliskkhali	Enayetpur	1219	Agriculture	**Village**: School, STWs **Nearby**: Khaliskkhali: Bazaar and FWC (10 mins);

*** Drawn from FGD and community mapping exercise**
**** Government estimates.**

3. Results

As a result of the technical stakeholder workshop, a list of hypotheses was jointly selected and a hypothesised causal framework developed (Appendix 3). Qualitative and quantitative data was collected where possible, and will be presented in this section. Using the UNICEF causal framework as a guide, the hypotheses will be grouped in immediate, underlying and basic causes with crosscutting issues such as seasonal disasters in their own separate section. In cases where there were no hypotheses suggested in the initial workshop, but results indicate these could possibly be a risk factor for undernutrition, these were discussed in the stakeholder workshop and inserted in the relevant sections. The categorisation of each hypotheses according to the framework presented in the methodology section will also be presented.

The first section will examine the nutritional situation in Satkhira district, highlighting trends over time as well as differences in age group and gender. The community perception of the causes and characteristics of undernutrition will also be discussed, drawing from input of FGDs held with men and women in all four villages.

The second section will present results related to the immediate causes, namely disease and inadequate dietary intake, focusing on both the qualitative and quantitative input. While no direct hypotheses were drawn up on these factors, these were on the hypothesised causal pathways of the list of hypotheses and risk factors selected.

The third section will examine the underlying causes on the framework, with hypotheses grouped and presented in one of three categories. Due to the interlinking nature of the hypotheses, the basic causes will be presented alongside these, in order to examine the full causal pathway.

	Hypotheses
Inadequate child and maternal care and feeding practices	• Inadequate breastfeeding practices • Inappropriate complementary feeding practices • Inadequate care for pregnant and lactating women • Low birth weight • Early pregnancies • Poor medical support for women • Inadequate care for pregnant and lactating women • Poor psychosocial care for women • High rates of adolescent marriage • Poor Female mobility • High female workload • Low awareness on caring practices • Unequal Intra-household food distribution
Poor household access to sufficient, safe and nutritious foods	• Increase in shrimp farming • Increased intrusion of Salinity • Decreased Land Quality and Productivity • Increased Migration • Limited Household Food Production • Limited access to Land • Low income opportunities • Limited Agricultural Diversity
Poor household access to quality health services and unhealthy environments	• Poor availability and accessibility of high quality health services • Poor Health seeking behaviour

Finally, seasonal factors and recurrent disasters will be discussed in the final section, examining also the impact of increased frequency of flooding and prolonged waterlogging as well as seasonal changes which might have an impact on undernutrition.

3.1 Nutrition Situation in Satkhira

The prevalence of acute malnutrition in Satkhira at 13.8%, as per the latest SMART survey conducted in January 2014, categorises the situation as serious against the WHO classification (Table 6). A significant increase, especially in children with moderate malnutrition, was observed from the post-harvest SMART survey conducted in the ACF-INT working areas in December 2012 and the inter-harvest survey conducted in January 2014. MUAC, the indicator used for admission into nutrition programmes, showed no significant difference between 2012 and 2014, while a significant difference was observed from October 2013 to January 2014 ($p = 0.029$).

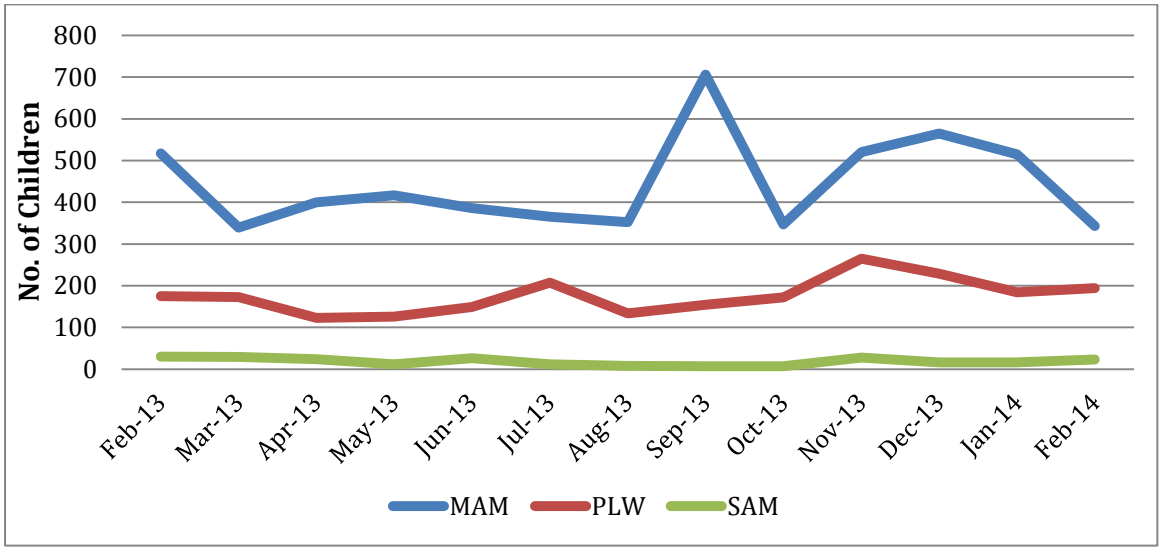
Due to the long-term nature of stunting, changes were unlikely to be observed in this indicator over a short time span. It remains worryingly classified in the "high" threshold according to the WHO classification. Underweight, a composite indicator of acute and chronic malnutrition also remains above the "very high" threshold.

Table 6: Anthropometric Indicators

	December 2012 (Post-harvest)	October 2013 (Pre-harvest)	January 2014 (Inter-harvest)
Acute Malnutrition (Weight for Height, WHO GS)			
Global Acute Malnutrition (<-2 z-score and/or oedema)	7.8 % (5.8 - 10.5)	12.3 % (8.9 - 16.8)	13.8 % (10.9 - 17.3)
Moderate Acute Malnutrition (<-2 z-score and >=-3 z-score)	6.7 % (4.9 - 9.0)	11.4 % (8.0 - 15.8.)	12.8 % (10.0 - 16.2)
Severe Acute Malnutrition (<-3 z-score and/or oedema)	1.1 % (0.5 - 2.8)	0.9 % (0.3 - 2.9	1.0 % (0.4 - 2.3)
MUAC (Mid-Upper Arm Circumference)			
Global Malnutrition (< 125 mm and/or oedema)	2.3 % (1.2 - 4.4)	0.9 % (0.3 - 2.7)	2.8 % (1.6 - 4.8)
Underweight (Weight for Age, WHO GS)			
Prevalence of Underweight (<-2 z-score)	23.7 % (19.3 - 28.7)	28.5 % (23.3 - 34.4	30.0 % (25.2 - 35.3)
Chronic Malnutrition (Height for Age, WHO GS)			
Prevalence of Stunting (<-2 z-score)	33.8 % (28.9 - 39.0)	31.2 % (26.2 - 36.7	29.0 % (23.8 - 34.8)

Recent admission data from nutrition centres in ACF-INT working areas of Satkhira highlights the case of the lower numbers of severe acute malnutrition (as measured by MUAC) compared to moderate malnutrition (Figure 2). The increase of MAM admissions over the winter season in 2013 falls in line with the hunger gap. The fall in admissions in October 2013 illustrates the difficulty of accessing health centres in the peak-waterlogging period, a factor that was mentioned repeatedly by the community themselves.

Figure 2: CMAM Admissions in ACF/WFP nutritional centres



The difference of rates of undernutrition captured by MUAC and weight-for-height has consistently been noted by ACF-INT and the use of MUAC alone as admission criteria in Bangladesh continues to remain a concern. All recent analysis conducted by ACF-INT in Satkhira demonstrates that MUAC is not as sensitive an indicator as weight-for-height. In admission centres, MUAC was also noted to have a gendered and age discrepancy, capturing females and younger children more than males and older children.

Prevalence of Undernutrition by Age and Gender

The SMART survey of 2014 observed that younger children were found to be in a significantly better nutritional condition than the older children. This pattern of younger children being in a significantly better nutritional state was also found when looking at the indicators of underweight and stunting. However, younger children were significantly more likely to be identified as acutely malnourished using MUAC than older children. Additionally, more girls than boys were identified with acute malnutrition when using MUAC. No such differences in age or sex have been identified using weight-for-height Z-score (WHO 2006). In all the nutritional indicators, no significant differences were found between male and female children[10].

Community Perceptions of Malnutrition

The term malnutrition can be directly translated into Bengali but was often also known by names synonymous with the characteristics of undernutrition, such as weakness and thinness (Appendix 5).

The understanding of the causes of undernutrition were similar through all the villages, with the first reason usually given being poor food quality and diversity as a result of poor land access or reduced cultivation possibilities due to increased frequency of waterlogging (Table 7). Poorer food quality due to the increased use of fertilisers, pesticides and formalin for the preservation of foods was also perceived as being a major cause of undernutrition in the villages. While all noted the increased production as a result of the "green revolution", distrust in the quality was noted, with a link seen to the increased rates of undernutrition as well as other health issues.

Poor care during pregnancy also featured strongly in the communities' perception of what causes undernutrition – with food intake during pregnancy noted as a reason for low birth weight. This decrease in food intake is however seen as a normal biological response to morning sickness and the resulting nausea; although there were also comments that purposeful decreased food intake was also as a result of pressures from in-laws and TBA's. It was felt that while low birth weight can lead to undernutrition, large birth weights were also to be discouraged due to the need for a caesarean section.

All groups also noted early marriages, and the ensuing early pregnancy, as being linked to the rates of undernutrition. The perception on the causal pathway for undernutrition was less on the biological reasoning and more on the socio-cultural issues, with a feeling that young mothers had poor knowledge and awareness, which results in poor care practices and an undernourished infant. It was noted that there was high cultural pressure for early marriages and high social pressures for pregnancy in the first year of marriage.

Table 7: Community perception of causes, characteristics and treatment of undernutrition

	Community Perception (all villages, summary)
Causes of Malnutrition	- Poor food quality (fertiliser, formalin) and diversity - Poor personal hygiene (washing hands, cutting nails, teeth etc) - Unclean environment, poor sanitation - Poor water quality: iron and arsenic contaminated tube wells - Addiction by males - Early marriage and pregnancies - Negligence and complication in pregnancy (food intake reduced due to nausea, low amniotic fluid) - Waterlogging - Heavy female workload - Poor caring practices (feeding only breastmilk) - Diseases (diarrhoea in rainy season) - Lack of land for cultivation - Poverty and lack of income opportunities
Characteristics of Malnutrition	- Various, frequent illnesses (coughs, colds indicate unhealthy child) - Jaundiced child - Thinness, poor eyesight and abnormal growth (late walking) - Poor child appetite - Child appearance (loose skin, distended stomach, pale, sunken eyes) - Child lethargy
Treatment of Malnutrition	- Consult Community Nutrition Workers (CNWs) - Go to the community clinic - Consult the local doctor (Kwak, Kobiraj and Huzur) - Take vitamin pills or syrup - Get nutritious foods from Shushilan centres

Older members of the community felt that undernutrition has increased in recent years as a direct result of poor food quality. Some villages did mention that the treatment for intestinal worms in recent years, combined with better water quality access (tube well vs. open source water), has resulted in lower disease. It was therefore observed that undernutrition currently is more linked to food intake rather than disease, while in the past it was the inverse. Recent health care improvements in the treatment of undernutrition, the monthly MUAC measurements taken by CNWs, and the intake into centres were noted as positive moves.

Malnutrition was felt to result in thinness, lethargy and weakness as well as abnormal growth and developmental capabilities, resulting in tardiness in walking or talking and possibly even disabilities. Frequent bouts of illnesses were also associated with an unhealthy child, which was in turn associated with a undernourished child. Whining, dissatisfied children who were a burden to the mother were also linked to undernutrition in the majority of the villages.

3.2 Immediate causes

I. Acute Childhood Illness

The overall morbidity rate in the ACF-INT working areas of Satkhira remain high, with the January 2014 survey observing 66.7% of children reported an illness in the 2 weeks prior to the assessment. This is a similar figure as that found in December 2012. Acute Respiratory Infections (ARI) is the most common illness presented with 76.1% of children identified with it.

Table 8: Reported child illnesses in preceding 2 weeks

Satkhira	December 2012 (95 % C.I.)	January 2014 (95 % C.I.)
Reported illness 2 weeks prior	72.8% (67.2 – 78.3)	66.7 % (61.5 – 71.9)
Diarrhoea	19.8% (13.4 – 26.3)	9.2 % (5.8 – 12.6)
Fever	44.6% (34.9 – 54.3)	50.1 % (39.7 – 60.5)
ARI	73.6% (65.5 – 81.6)	76.1 % (69.6 – 82.5)
Other illness	20.6% (12.1 – 29.1)	15.8 % (10.3 – 21.3)
Co-morbidity (presenting at least 2 symptoms)	48.8% (39.8 – 57.8)	47.7 % (38.4 – 57.0)

It should be noted that the morbidity data collected is by the caretaker's perception of illness, with no validation by medical personnel. The timing of the survey, late January to early February, corresponded with the end of the winter season and therefore seasonal variations in diseases should be taken into account.

As noted in the SMART survey, diarrhoea was reported in younger children more significantly than older children. Furthermore, reported comorbidity appeared to have a significant negative effect on the weight-for-height and weight-for-age indicators (p=0.016 and p=0.017 respectively).

The link of disease to undernutrition was highlighted in the community as was seen in the previous section (Table 7). Furthermore, the high rate of ARI found in the SMART survey fits with the perception of illness by the community, with ARI noted as a common disease in the winter season. The perception of the seasonal trends of common illnesses by the community were classified as follows:

Rainy Season: Fever, cough, cold, diarrhoea and skin infections
Summer Season: Diarrhoea, vomiting, dysentery and prickly heat rash
Winter Season: ARI, various chest and skin infections.

Conversations with older members of the community highlighted the perception that some diseases were lower in the past due to better quality food, while other diseases such as diarrhoea and typhoid, along with other water-borne diseases, were higher. This again links back to the perception that the quality of food is currently paramount in the health of the

population. While the green revolution has been hailed to increase production, the perception of the villages is of an unhealthier outcome.

Inadequate Dietary Intake

Poor household access to sufficient foods, as well as inappropriate care practices, have an impact on the dietary intake of the child, one of the immediate causes of undernutrition. It also lowers the immune response of the body, leaving the child susceptible to disease.

The most common indicator for dietary intake is the Infant Dietary Diversity Score (IDDS) – the proportion of children aged 6-23 months who receive 4 or more food groups taken from the following seven groups: Cereal/Root, Legumes/Nuts, Dairy products, Flesh food, Eggs, Vitamin A rich fruit, Other Fruits and Vegetable.

Table 9: Acceptable dietary diversity score

Acceptable Diet Diversity Score % (95% C.I.)	**December 2012 n = 170 children**	**January 2014 n = 134 children**
6 to 11 months	35.0% (17.8 – 52.1)	46.4 % (24.1 – 68.7)
12 to 17 months	47.9% (32.1 – 63.7)	50.0 % (38.7 – 61.2)
18 to 23 months	50.8% (33.7 – 67.9)	38.4 % (25.3 – 51.6)
Total	**45.9% (33.6 – 58.1)**	**44.4 % (34.7 – 54.7)**

In the SMART survey of 2014, 44.4% of children in total were found to consume the acceptable number of food groups while the average number of food group consumed by children aged 6 to 23 months was found to be 3.4 food groups, with no significant difference reported by age or gender.

Qualitative discussions acknowledged the need for a diverse diet, with the limitation of accessibility by the household noted as the major constraint (Table 7). This will be explored further in the following sections when looking at the underlying and basic causes of undernutrition.

3.3 Underlying and Basic causes

A. Inadequate maternal and child care and feeding practices

The link of inadequate child and maternal care, as well as inappropriate feeding practices, to both disease and inadequate dietary intake has been well documented. By both the community and the technical experts this was felt to be a strong factor in the continued high levels of undernutrition found in the community, focusing on both infant and young child feeding practices as well as care during pregnancy. The hypotheses related to inadequate child and maternal care and feeding practices will be explored in the following section:

- Inadequate breastfeeding practices
- Inappropriate complementary feeding practices
- Inadequate care for pregnant and lactating women
- Low birth weight
- Early pregnancies
- Poor medical support for women
- Inadequate care for pregnant and lactating women
- Poor psychosocial care for women
- High rates of adolescent marriage
- Poor Female mobility
- High female workload
- Low awareness on caring practices
- Unequal Intra-household food distribution

I. Inadequate Breastfeeding Practices

Hypothesis: "Inadequate Breastfeeding Practices due to poor initiation, inadequate feeding frequency and non-exclusive breastfeeding"

International recommendations advocate the initiation of breastfeeding within one hour of birth, followed by exclusive breastfeeding with no other liquids or solids introduced into the diet before six months of age [11]. The timely initiation of breastfeeding ensures that the infant consumes colostrum, providing important anti-bodies and boosting a child's young immune system, while six months of exclusive breastfeeding have substantial health and growth benefits for the child and protect against infant and child mortality [12].

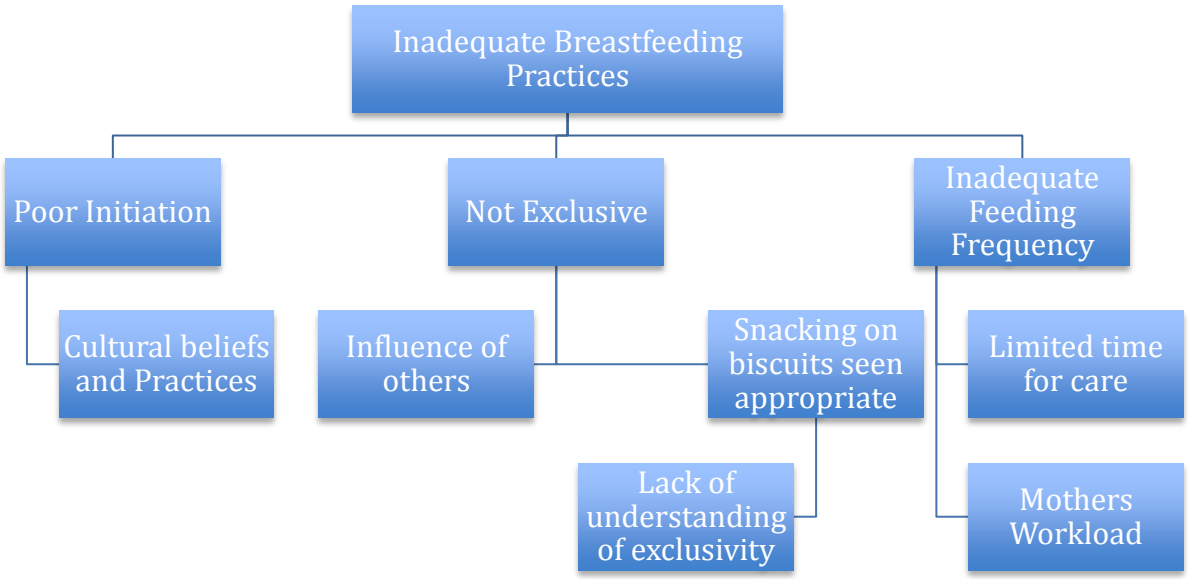
In the *National strategy for infant and young child feeding in Bangladesh* these recommendations are highlighted and endorsed [13]. The now-defunct National Nutrition Programme (NNP) was mainly involved in Behavioural Change Counselling (BCC) work [14]. Due to the challenges and constraints that it faced, and the realisation that the programme did not cater well to SAM cases The Government, in the new Health, Population and Nutrition Sector Development Programme (HPNSDP, 2011-2016), decided to mainstream the nutrition activities into the existing health system, which will be operationalised as the National Nutrition Service (NNS) [15].

While breastfeeding nationally is widely practiced at 98.6%, the timely initiation and exclusive breastfeeding practices remain woefully poor [1]. The latest *Bangladesh Demographic and*

Health Survey (2011) found initiation of breastfeeding within 1 hour to be 47.1% while exclusive breastfeeding practices were only 63.5% with a median duration of exclusive breastfeeding at 3.5 months. The national trend of poor initiation of breastfeeding and exclusive breastfeeding practices are mimicked in Satkhira district as well, with only 53% breastfed within 1 hour and only 47% exclusively so [16].

Time pressures, cultural beliefs and poor awareness on exclusive breastfeeding were hypothesised to result in inadequate breastfeeding practices as shown in the scheme below.

Figure 3: Hypothesised Pathways to Inadequate Breastfeeding Practices



Quantitative data collected using the SMART survey in January 2014 noted similar findings to the national results regarding breastfeeding practices in the ACF-INT working areas. It has to be noted that breastfeeding practices, especially with regards to the exclusive and initiation of breastfeeding practices was a subjective question given by caregiver's perception. Continued breastfeeding practices are encouragingly high, while the early initiation of breastfeeding is acceptable at 65.4%, which are similar findings to previous national and district level surveys. Exclusive breastfeeding was reported to be 5.5 months on average by the caretaker's perception, which may reflect more about the knowledge of the mother answering the question rather than the actual practice of exclusively breastfeeding.

Table 10: Initiation, exclusive and continued breastfeeding practices

	n=	Mean or Proportion January 2014	CI (95%)
Early Initiation of Breastfeeding (1 Hr. after birth)	130	65.4%	(55.2 – 75.5)
Exclusive breastfeeding duration	130	5.5 months	(5.1 – 5.9)
Continued breastfeeding at 1 year	23	95.6%	(86.7 – 100)

***Source: SMART 2014 Survey, ACF-INT**

Qualitative enquiry with groups noted that women do know the importance of early initiation, although honey and water are often given before breastmilk due to cultural beliefs, except if the mother experiences insufficient breastmilk (
Table 11). The benefits of colostrum were universally acknowledged, and a strong link to child health was evident in the perceptions of the community. This overarching importance of colostrum resulted in a fear for caesarean section. Women believed that with a caesarean section it was impossible to give the colostrum, giving the child a disadvantage early on in life.

Table 11: Infant feeding patterns (new-born - 3 months)

Foods Given	Amount	Frequency
Age: Newborn		
Breastmilk	On demand	Within 1 hour (colostrum)
Honey	1-2 drops	First day, once after birth
Hot water	Few teaspoons	1-3 days
Newborn: If Breastmilk "insufficient"		
Powdered milk/Sugar water	Few teaspoons	10-12 times daily
Cow milk	10-12 teaspoons	2-3 times daily
Age: Up to 3 months		
Snacks	1 piece	With water
Water	2-3 spoons	4 times a day, increased in summer
0-3 months: With insufficient breastmilk		
Special child foods	Half Feeder bottle	4-8 times a day

When further questions were asked as to when mothers have insufficient breastmilk, an interesting pattern emerged with the link to birth method with mothers giving birth by caesarean section believing there is insufficient breastmilk until the fifth day (
Table 12). In the BDHS, only 27% of mothers received post natal care from a medically trained personnel in the crucial first two days after delivery, echoing the poor post-natal care and follow up highlighted by the community [1].

Exclusive breastfeeding, despite being reported in the quantitative enquiry, was not found common in all the communities. Before the age of 3 months snacks are introduced to the diet as well as powdered milk and other special child foods if necessary (
Table 11).

Table 12: Community feedback on breastfeeding patterns

Risk Factors	Findings
Initiation	Breastfeeding starts within 1 hour of birth for the majority of normal births, after giving the child honey (to make voice sweeter) and some water (to open oesophagus). Different for ***C-Section***, with the idea that breastmilk does not come until day 5, so instead give powdered milk. Some women feel that breastmilk does not start producing well until day 3, and therefore need to top up with sugared water and powdered milk
Inadequate feeding frequency	Breastfeeding on demand happens. If breastmilk insufficient (C-section) will start on powdered milk.

Exclusive Breastfeeding <6 months	Exclusive breastfeeding has not been found to happen - introduction of foods happen by around 3- 4 months of age, water is given throughout and often powdered milk is given, especially for the case of C-Section

Categorisation: Inadequate Breastfeeding Practices

It is well known that there is a strong association between appropriate breastfeeding practices and undernutrition, especially on the prevention of child illnesses [17]. The community also recognise the link with inappropriate breastfeeding as contributing to undernutrition as seen in Table 13 (community perception of contribution). However, the community perceived that appropriate breastfeeding practices occurs, due to the frequent, on-demand breastfeeding and is therefore not a problem in the community (participatory rating with villages). The perception of breastfeeding is focused mainly on duration of breastfeeding, with the majority breastfeeding for 2 or 2.5 years. When the discussions were broken down into exclusivity and initiation of breastfeeding however, it was recognised that these display inappropriate practices (Prevalence from qualitative).

Table 13: Categorisation of inappropriate breastfeeding practices

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Interpretation
Inadequate Breastfeeding Practices	+++	++	++	+	+++	MAJOR

Discussions during the technical workshop proposed a change of the risk factor to "**poor initiation and continuity of exclusive breastfeeding practices"** as the problem is clearly demonstrated as not continuation, but more the initiation and exclusive breastfeeding practices. It was also noted that a contribution of poor post-natal care and follow up, poor awareness on demand, poor support given by health care staff on appropriate breastfeeding information and support should be included in the framework.

It was collectively decided that sub-optimal breastfeeding practices, in terms of poor initiation and very poor exclusive breastfeeding practices, were a potential major cause for undernutrition in the study area.

II. Inappropriate Complementary Feeding Practices

Hypothesis: "Inappropriate, poorly diversified and untimely introduction to complementary foods"

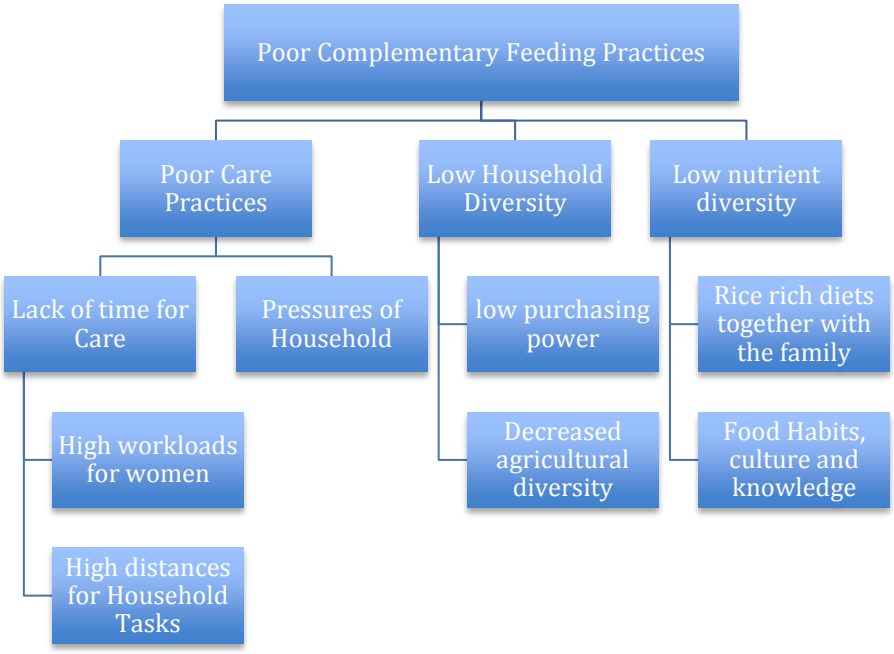
The transition from exclusive breastfeeding to family foods is one of the crucial conjunctures in a child's life and a window to promote adequate growth and development. The World Health Organisation (WHO) recommends the introduction of safe and nutritious foods at about six

months to supplement breastfeeding. There are set global recommendations arising from analysis of evidence on the timing, the frequency, amounts, diversity and consistency of the complementary foods given to a child. In addition to this, foods have to be prepared and given in a safe manner while actively encouraging and stimulating a child to eat, following the principles of psychosocial care.

The Bangladesh government recognises the importance of timely and appropriate introduction of complementary feeding, outlining it clearly in its *Infant and Young Child Feeding (IYCF) Strategy* [13]. Despite a strong culture of breastfeeding, the timely introduction of appropriate complementary foods is lacking, starting too early or too late, with inappropriate nutrient density foods [18]. National data on appropriate feeding practices range from 21% to 42% children fed according to the recommendations, with complementary foods providing only about 74% of the recommended energy [1], [18][15]. At Satkhira level, poor complementary feeding practices have been observed, with the REACH survey noting that only 23% eat a minimally adequate diet [16]. ACF-INT has also observed inadequate and inappropriate introduction of solid foods as early as 4 months, with biscuits being a common commodity given as snacks.

Poor Practices in Satkhira are hypothesised to arise from lack of time; limited agricultural diversity and poor purchasing power combined with inadequate knowledge and cultural food habits.

Figure 4: Hypothesised pathways for inappropriate complementary feeding practices



Child feeding practices revolve around more than dietary diversity with meal frequency important to examine as well, which is dependent on the age and breastfeeding status of the child. The number of meal doesn't include breastfeeding, as meals are considered complementary to breastfeeding. As can be seen in Table 14, a majority of children have an adequate number of meals, with no significant difference noted by age or gender. The number of

children having an acceptable diet remains poor, at 41.5%. Acceptable diet is an amalgamation of continued breastfeeding, acceptable IDDS and acceptable meal frequency.

Table 14: Child feeding and caregiver's workload

	n*=	Mean or Proportion	CI (95%)
Child Feeding Practices			
Minimum Dietary Diversity	134	44.4%	(34.7 – 54.7)
Adequate Meal Frequency	134	85.9%	(79.8 – 91.9)
Acceptable Diet	134	41.5%	(32.4 – 50.5)
Responsive Feeding	133	Nothing: 43.6% Coax: 27.1% Force: 29.3%	
Caregivers Workload			
Perceived overwork	130	55.4%	(43.5 – 67.1)
Average no. of hours rest time	130	1.7h	(1.5 – 1.8)
Leave child in care of others	133	Yes = 9.7%	Everyday = 50% Twice a week = 16.6% Once a week = 33%

***Source: SMART 2014 Survey, ACF-INT**

Qualitative findings also noted poor diversity of complementary foods, with the majority of children fed family foods that are overwhelmingly composed of rice, with the introduction noted as being as early as 4 months. The daily intake of juice and snacks was also noted, with children consuming biscuits, puffed rice, crisps and other snacks up to three times a day. While no significant difference was found in age and gender, qualitative FGDs highlighted a gender difference in the introduction of complementary foods, with introduction earlier for girls and longer breastfeeding duration (

Table 16).

Table 15: Child feeding practices (4-6 months)

Foods Given	Amount	Frequency
Age: 4 to 6 months		
Breastmilk	On demand	On demand
Water	Spoonful	Daily
Powdered milk	1 small cup	3-4 times/day
Family foods/Special child foods	Half bowl	3 times per day
Juice and snacks	1-2 pieces	Daily
Fruit	Few pieces	3 times per day

Following the principles of psychosocial care, children should be actively encouraged and stimulated to eat. However, only 27.1% of caregivers reported encouraging children to eat with 43.6% doing nothing. While no significant difference was found between responsive feeding and age, it was found that children being coaxed to eat were receiving significantly more food groups compared to children who were forced to eat or were left to eat alone ($p = 0.012$). Qualitative findings noted that once a child turns 1, they are often left to feed themselves, but such a relation couldn't been confirmed through quantitative data (

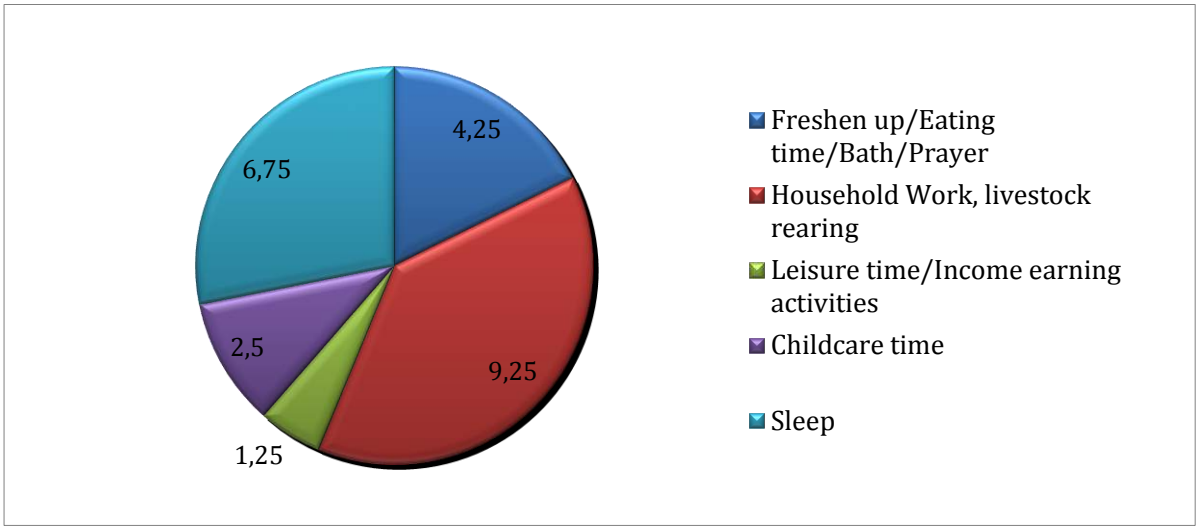
Table 16).

Table 16: Community feedback on complementary feeding practices

Risk Factors	Findings
Lack of time	Women are preoccupied with household work, and only feed the children when they also sit down and eat. Most rarely cook specially for the child after 8 months
Meal Frequency	Majority of the children are fed 3 times a day together with the family.
Responsive Feeding	When the child refuses to eat they will force-feed, encourage them with stories, beat them or leave them alone to feed themselves. After 1 to 1.5 years leave alone
Dietary Diversity	While it was understood that diversified foods are important, what was observed is that the plate is filled overwhelmingly with rice, with a little bit of other family foods
Introduction to solid, semi-solid or soft foods	This happens before 6 months. There is a gendered difference: females start food earlier and fed breastmilk for longer (to supplement food intake) as in future they will be eating last so they have to learn to be patient

One of the risk factors hypothesised for the inappropriate complementary feeding practices was the caregiver's workload resulting in a lack of time for childcare. In the survey, 55.4% of women reported as feeling they have too much work, with the mean time for rest noted as 1.7 hours. Cooking especially for the child was never really done, especially after 8 months of age.

Figure 5: Female Activity Clock



This correlates with the activity clock for females drawn by the community, where the average time noted as free time was 1.25 hours. Housework and livestock rearing took up the majority of the day, with only on average 2.5 hours dedicated to childcare time, which was mainly in the evenings. Males reported occupying themselves rarely with childcare, with some taking care of the child when they go to the bazaar in the evening (Appendix 6.)

Positive Deviant Enquiry: Feeding and Care Practices

In-depth interviews were also conducted with positive deviant cases as well as malnourished or recently malnourished children in order to learn from the selected families positive or negative

practices that could affect the well-being of their children, with all households having a similar economic level. These interviews served to highlight and strengthen the poor complementary feeding and care practices while also illuminating that there were some positive practices in the community that were identified.

The culture of snacking was a central finding, with malnourished children likely to snack often, with little attention focused on helping the child eat. Initiation of breastfeeding also came out strongly in the positive cases. The special attention given to the child is noted in the positive deviant cases, through the extra attention on foods as well as the active encouraging and feeding of the child at mealtimes. Attention during pregnancy was also highlighted in the positive cases, as was good attention to personal hygiene.

Table 17: Community identification of Positive and negative feeding practices

	Feeding Practices	Care Practices
Positive practices identified in community	• Snacks only a few times a week • Breastfeeding on demand • Initiation of breastmilk 30 minutes after birth. • Feeding 3-4 times a day, even when adults are not eating	• Cooks extra foods for the child/ gives the child some nutritious attention • Eating well during pregnancy • Using deep tube well water for the child, even if it means collecting it especially • Encouraging the child to walk and talk – stimulating the child's learning capabilities • Active encouragement and assistance of child feeding at mealtimes • Supervision of young children at all times • Good body hygiene
Poor practices identified in community	• Snacks daily, multiple times in a day, often in substitute of adequate meals • Using breastmilk as a food substitute when the child is older than 6 months. • Supplementing breast milk with powdered milk after birth	• Feeds child whatever is in the family pot • Throwing child faeces in the edge of the compound • Child left alone to feed themselves – no active encouragement.

Categorisation: Inappropriate complementary feeding practices

There is a strong consistency in the literature regarding the nutritional benefits of timely and appropriate complementary feeding practices [17]. Community perceptions on the link of complementary feeding, mainly focusing on the importance of a diverse diet, are also strong with all communities noting it is a prevalent problem in the communities.

Table 18: Categorisation of complementary feeding practices

Hypothesised Risk Factors	Strength of association with under nutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation

Inappropriate complementary feeding practices	+++	++/+++	++/+++	+++	+++	MAJOR

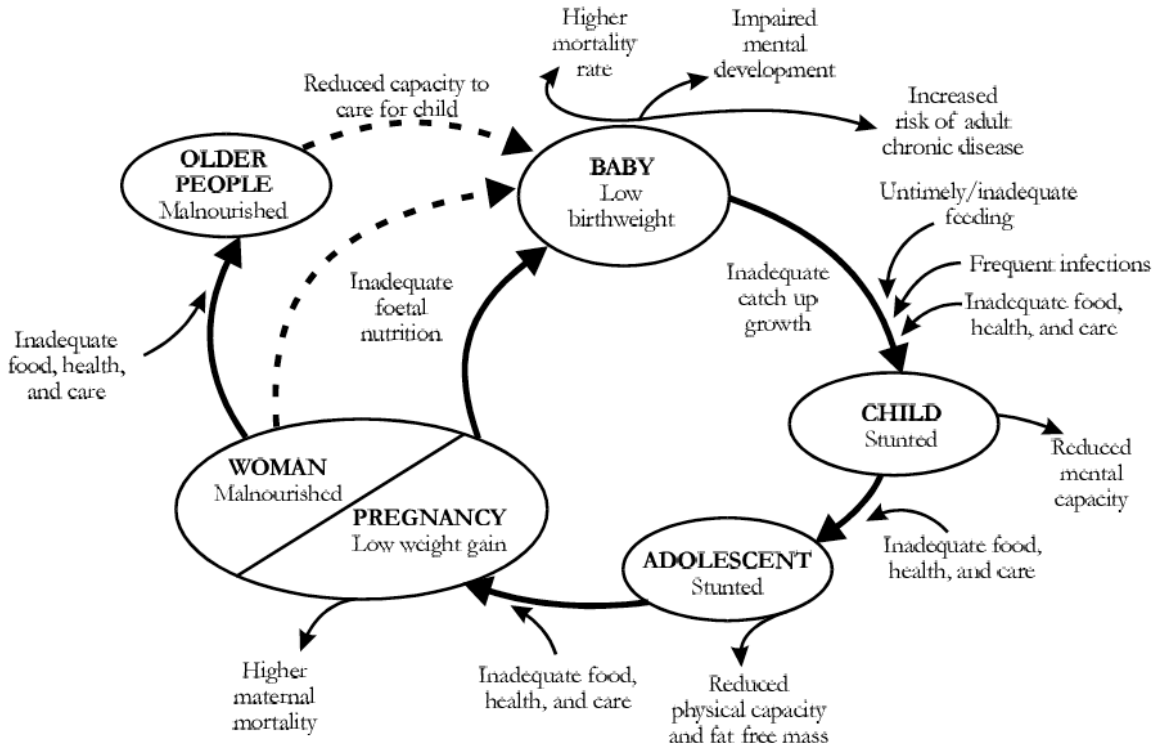
It was collectively decided that the evidence points overwhelmingly to inappropriate complementary feeding practices as likely to be a major risk factor for undernutrition in the study area.

III. Low Birth Weight, Adolescent Pregnancies and Inadequate care for PLW

Hypotheses: "Low Birth Weight due to Adolescent Pregnancies, stunted females, poor medical support for PLW, poor maternal nutritional status and Inadequate care of pregnant and lactating women"

Low Birth Weight, classified as a birth weight less than 2.5 kg, has a well-known pathway and link to undernutrition, as described by the nutrition life cycle (see below). It is associated with impaired immune functions, poor cognitive development and a higher risk of developing diseases such as nutrition-related chronic diseases later in life and diarrhoea in early life. Inadequate catch up growth leads to stunting, and could go a way to explain the high rates of stunting found in Bangladesh.

Figure 6: Nutrition in the Life Cycle[19]

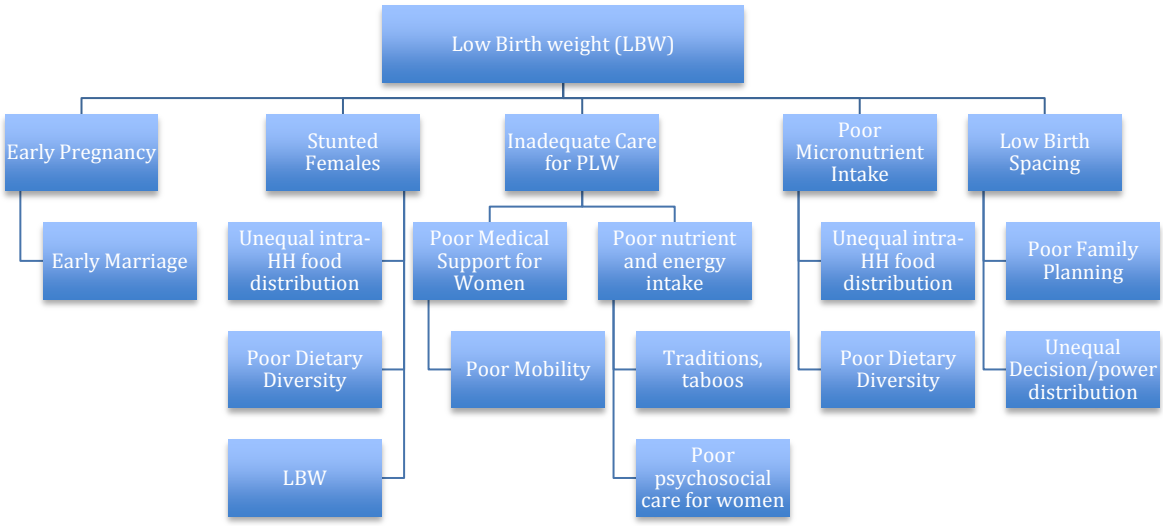


Intra-uterine growth retardation (IUGR) and pre-term births (gestational age of <37 weeks at delivery) are the two main causes of low birth weight, with the majority (96.4%) of low birth weights in Bangladesh attributed to IUGR [18], [20]. The causes of IUGR are multiple and complex, and are linked to the environment for the foetus, the mother and the placenta, with the maternal environment being the strongest factor for birth weight. These include poor maternal

nutritional status at the moment of conception, low weight gain due to restricted intake, micronutrient deficiencies such as iron deficiency and anaemia, and short maternal stature due to undernutrition the mother experienced in childhood, highlighting the intergenerational and connected nature of low birth weight. Furthermore, childbearing during adolescence adds a further risk to low birth weight, while also depriving the mother of nutrients for her own growth [20].

Studies show that maternal nutritional status is a driver for low birth weight, alongside early pregnancy, poor medical support and traditions and beliefs relating to food intake and care practices when pregnant, as shown in the pathways in the diagram below.

Figure 7: Hypothesised pathways for Low Birth Weight



While national rates of low birth weight have reduced from the high rates displayed previously of 40% in 2007, they still remain among the highest in the world, currently observed as being between 20-22%, which is still above the 15% that indicates a public health problem [18], [20], [21]. Poor maternal nutritional status, a factor for LBW, is high in Bangladesh with the latest figures recording 24.2% of women with a BMI <18.5kg/m^2 [1]. Furthermore, more than 60% are not consuming adequately diverse diets during pregnancy resulting in 42.2% of anaemia nationally alongside other micronutrient deficiencies [1], [15], [18], [22]. The nutrition situation in Satkhira is also poor, with the REACH survey indicating that 31% of pregnant women had a MUAC <230mm, the global cut-off indicating poor nutritional status, with rates of anaemia recorded at 65% [16].

The SMART survey indicates that 3.1% of women were at risk of malnutrition with a MUAC lower than 210mm, with 25.3 % of the mother interviewed having a MUAC lower than 230 mm. The average age of first pregnancy was given as 18 years, with 16 being the average age of first marriage (Table 19). However, results from the qualitative indicate an earlier age, indicating potential bias in the responses given in the quantitative feedback (

Table 20). Cultural norms and pressures result in early marriages for girls, who not only are felt to become a burden in the household, but are also married as a form of protection in a male-dominated culture where pre-marital sex is severely frowned upon. After marriage, household pressures mean women become mothers within a year when possible. It was confirmed, through the quantitative data, that age of marriage and age of the first pregnancy where strongly correlated (p=0.0001) representing on average a difference of 25 months between wedding and first pregnancy.

A worrying trend discovered is the decrease in food intake during pregnancy, encouraged by traditional birth attendants (TBA) who believe that bigger babies need to be delivered by caesarean section. Therefore the trend is to encourage mothers to eat more often, but smaller portions, in the first 2 trimesters, and decrease food intake in the last trimester in order to ensure normal childbirth at home is possible. This trend was captured in the quantitative enquiry as well, with 54.6% reporting decreasing food intake during pregnancy. An interesting trend was observed where women living with husbands were more likely to reduce intake compared to those whose husbands have migrated at the time of the quantitative survey, indicating a social pressure link (p=0.042).

Table 19: Care during pregnancy

	n=	Mean or Proportion	CI (95%)
PLW at risk of Malnutrition (MUAC <210mm)	129	3.1%	(0.0 – 6.2)
Perceived Low Birth Weight (<2.5kg)	49	46.9%	
Perceived Birth Weight **Delivered in Health Centre** **Delivered at Home**	49 36 13	2.7kg 2.8kg 2.1kg	
Average age of marriage	129	16.3	(15.9 – 16.7)
Average age of first pregnancy	143	18.1	(17.6 – 18.6)
Mother's food intake evolution during pregnancy/lactation	130	Increase: 23.0% Decrease: 54.6% Same: 21.5%	
Proportion who took supplementation	1430	75.3 %	(69.1 – 80.8)
Average number of ANC visits during pregnancy	130	2.8	(2.3 – 3.3)
Proportion who delivered at a health centre	130	43.8 %	(34.6 – 53.0)

***Source: SMART 2014 Survey, ACF-INT**

There seems to be a connected idea that women who deliver in hospitals will need to have a caesarean section, which not only is costly, but also is believed to harm the child. In the quantitative survey 43.8% reported delivering at the health centre, but the method of delivery was not asked. From the qualitative enquiry, it was noted that a high percentage of women give birth by caesarean section, which is noted also in the recent national survey. The *Bangladesh Demographic and Health Survey (2011)* found 17% of women delivered by caesarean section, higher than the 10-15% advocated by the WHO [1], [23]. Recent studies have shown that

caesarean section births reach up to 70% for births occurring in private facilities, raising concern about financial impairment and access for the poor [23].

Further quantitative analysis on the perceived low birth weight noted that there was a significant difference by location, with children born in a health centre reported bigger than those born in the father's house (p=0.0048). Furthermore, there was also a significant link between malnourished women and low birth weight (P=0.0012) but it must be noted that the numbers reported are too low to make definitive statements.

Table 20: Community feedback on care during pregnancy

Risk Factors	Findings
Mothers food intake during pregnancy and lactation	Encouraged to eat more often but smaller portions. Encouraged to decrease food intake at 5-7 months as otherwise the baby's head will be too big and childbirth difficult.
Nutrition status	There is a belief that if women are malnourished in pregnancy it's normal, because of morning sickness.
Low Birth weight	The majority of TBA's knew that LBW was below 2.5kg but none ever weighed the children so the numbers below are actually unknown. However a number did say the number of "big/fat" babies are increasing. The perception is that any baby over 3kg will have to be born through a caesarean section.
Adolescent Pregnancy	Average age of pregnancy is around 15 - 16 years old in the majority of the villages. After marriage they are pressured into producing a child within a year, to reduce rumour and gossip in the community.
Location of delivery	Women prefer to deliver at home. There is a belief if have to go to hospital they will have a C-section. Restricted food intake during pregnancy to ensure delivery at home, as do not want a C-Section
Assistance for delivery	TBA's, mother and mother in law are involved in helping the birth of the child. Plentiful number of TBAs. Minority trained.
Short Birth Spacing	On average have 2 children now, with 2-3 years spacing between. However, contraception is a woman's decision-making domain so they often decide to delay.

Health education for pregnant women, one of the pillars of the Family Welfare Clinic (FWC) structure of Bangladesh has obviously been positive in the area, with the majority of women understanding the need for iron and folic acid supplementation during pregnancy. However, due to the scattered nature of the FWC's, the distance and the distrust in the formal health care systems, many women buy supplementation from the local doctors and pharmacies in the bazaar. This explains the higher rate of women who reported taking supplementation during pregnancy. However, the quality, frequency or appropriateness of the supplementation is not controlled. This pattern explains why many are taking supplementation, but the average number of visits is below the 4 recommended ANC visits, with only 2.8 antenatal visit in average for the group of mother interviewed, and 69.3 % of the mother attending less than the recommended 4 visits.

Categorisation: Low Birth Weight, Adolescent Pregnancies and Inadequate care for PLW

Studies point to a straightforward causal pathway between low birth weight and poor nutritional status in the first few years of life. While studies showed that catch up growth can occur, it did not erase the demonstrated impact of the low birth weight on growth [17]. Despite the difficulty of measuring maternal nutritional status, studies have shown a link between

maternal nutritional status and low birth weight. Maternal weight gain has been found to have an impact on the birth weight during the 2nd and third trimesters [17].

While the secondary literature points to a high prevalence of low birth weight in Bangladesh, and the indicators from the quantitative and qualitative data point to a probably high rate in the ACF-INT working areas in Satkhira, the technical experts decided more exploration is needed to indicate the severity of the problem in the area. Therefore, while it was felt to be a cause of undernutrition, due to uncertainty on the magnitude and severity of the problem, it was categorised as an untested assumption in the area.

The trend of decreased food intake during pregnancy, and the link to maternal nutritional status and the risk for low birth weight babies was however highlighted as a worrying trend in the area. This was felt to be covered in the following hypotheses – **Poor psychosocial and health care for pregnant women, including poor food intake, during pregnancy**

Table 21: Categorisation Low Birth Weight, Early Pregnancy and support for PLW

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Low birth weight	+++	++	++	+++	++	UNTESTED
Early Pregnancies	++	++/+++	++/+++	+++	+++	MAJOR
Poor medical support for PLW		+/++	++	++	+	MAJOR
Inadequate care of PLW	++	+/++	++	+	+	

Early pregnancies was highlighted by the villages as being a major problem, and a link to undernutrition, not because of the biological factors, but more social issues – with the mother being too young to properly take care of a child, resulting in poor care practices and undernutrition. From the quantitative and qualitative enquiry it was also noted to be a common practice. An early marriage, while originally a hypothesis in its own right, was acknowledged as being on the same pathway as early pregnancies.

Medical support and inadequate care for pregnant and lactating women were initially two separate hypotheses, but the technical workshop felt a need to combine these and create a new major risk factor: "**Poor psychosocial and health care for pregnant women, including poor food intake, during pregnancy**". While it was acknowledged that it should not only focus on the pregnancy period, it was felt there was little data to examine the post-partum lactation period.

IV. Poor Female Psychosocial Care, Practices and Cultural Restriction

Hypotheses: "Poor female psychosocial care due to the cultural practices, taboos, beliefs and restrictions, resulting in high rates of adolescent marriages, poor female mobility, high workload as well as a general low awareness of care practices for women and children"

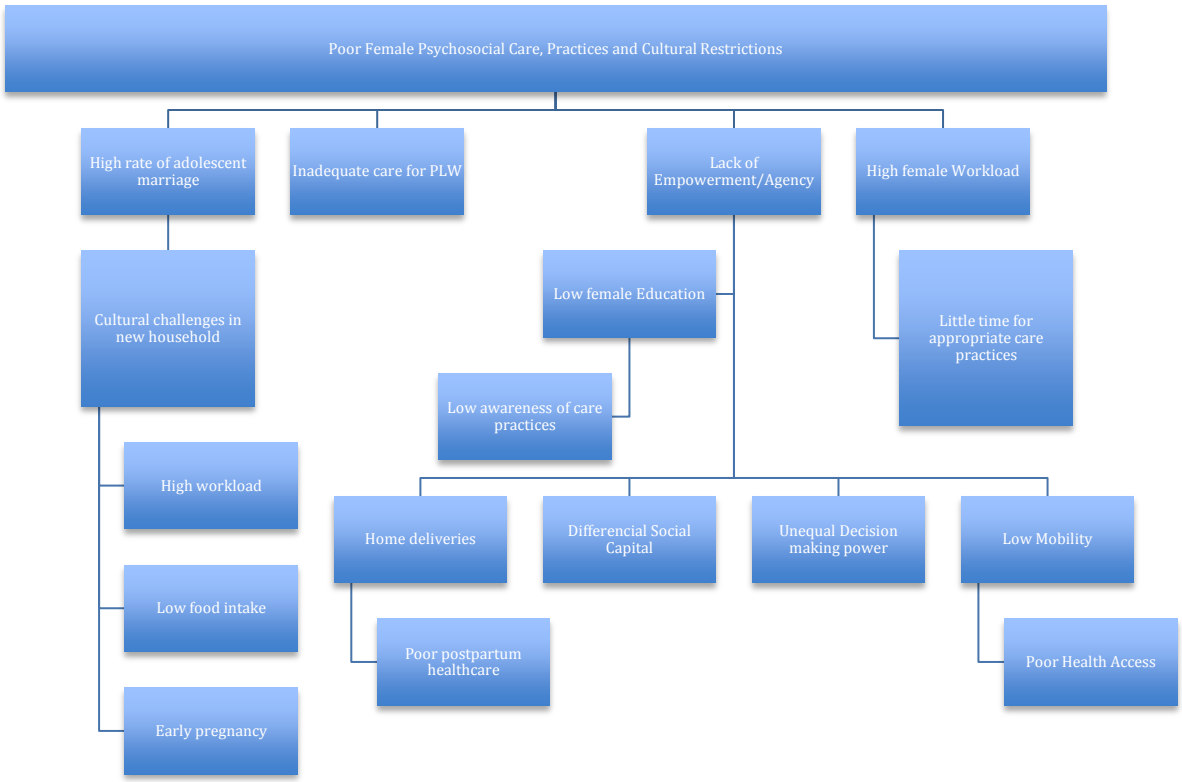
Female disempowerment has been shown to exert a significant influence on a child's health, with the focus on female-centred programmes seen as a major contributing factor to the fast health gains Bangladesh has experienced in the last 25 years [24], [25]. The focus on the expansion of female education, resulting in a country where the number of girls exceeds that of boys in education; a focus by public services and the garment industry on the employment of women, and special attention to women given by the Bangladesh's NGO's, focusing on strengthening and encouraging female agency, have all been drivers to the serious health gains that Bangladesh has experienced[2], [24], [26]. Maternal social capital was found to have a positive impact on child health outcomes in various studies, although further study is still required in this field [17].

Despite the emphasis and focus on female empowerment through micro-credit programmes and the improvement in indicators such as female education, gender inequality is still an entrenched factor of society. With a high gender inequality index[1] of 0.518 and one of the highest rates of child marriages, with more than 60% married before the age of 18, there is still a long way to go for Bangladesh [21] [27][25].

There are well-documented and known behaviours arising from cultural beliefs and practices, which have been hypothesised as being on the causal pathways to undernutrition. Rates of adolescent marriage, which are also known as a coping strategy to insecurity and poverty, come with cultural constraints for the girl child married into a new family as well as the possibility of an early pregnancy. As a newcomer into a family, she is placed on the lowest social rung of the family, which might have adverse effects on her food intake and workload. Furthermore, cultural practices influencing female mobility could have an effect on their healthcare practices and accessibility to health services. In Satkhira district, all communication has indicated that there is a serious lack of awareness on care practices, with the mother-in-law often dictating practices, even if the knowledge and awareness would be there.

[1] A composite measure reflecting inequality in achievements between women and men in three dimensions: Reproductive health, empowerment and the labour market with 0 reflecting good gender equality and 1 reflecting poor gender equality[45].

Figure 8: Hypothesised pathways for female psychosocial care



The majority of women were currently living with their husband. Qualitative findings found a recent change in living patterns – while in the past the women would move to the in-laws, current population pressures mean that families are living in a nuclear setting, close to the in-laws but independent in terms of cooking and household tasks. The location of where women live was found to have a significant impact on the household dietary diversity due to the impact on the dependency ratio [10]. Furthermore, while reported numbers of days of rest for recovery after birth was in line with the recommended 40 days rest, qualitative information did not conform to this, with women highlighting the return to housework a week after birth, or up to 2 weeks after a caesarean section (Table 24). The contradictory information again could highlight the discrepancy between knowledge and practice.

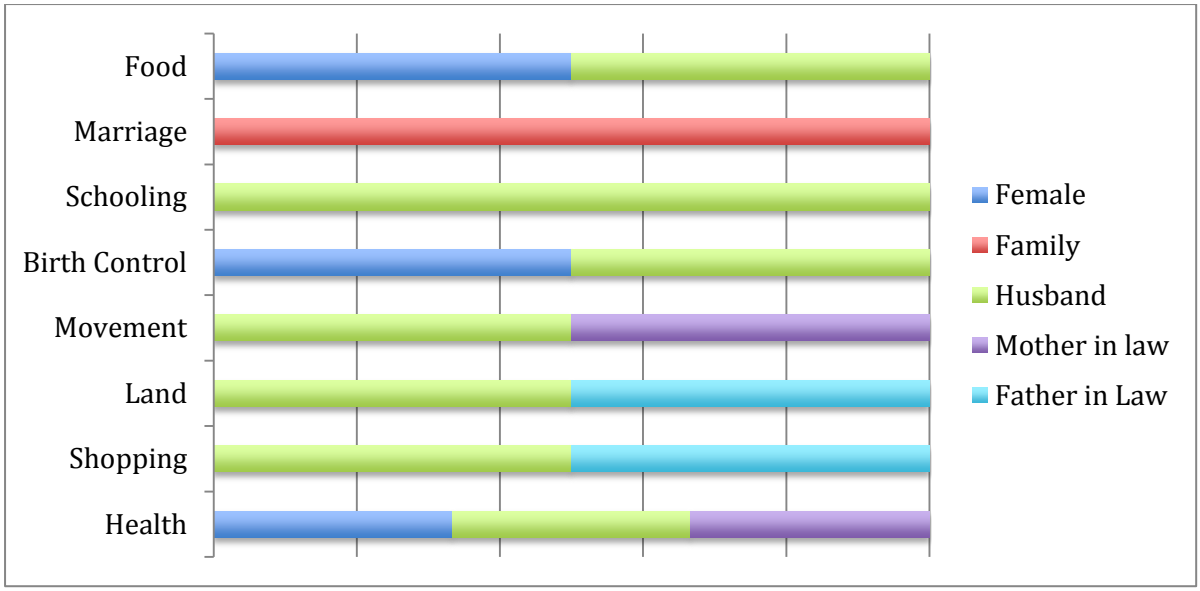
Table 22: Female psychosocial care

	N=	Mean or Proportion	CI (95%)
Living with husband (husband not migrated)	129	89.1%	(83.5 – 94.7)
Caregivers completed years of education	130	6.5	(5.7 – 7.2)
Perceived Social Capital	130	71.5%	(62.7 – 80.2)
Average number of days takes off for recovery after birth	128	43.1	(35.8 – 50.4)
***Source: SMART 2014 Survey, ACF-INT**			

While it is difficult to measure gender empowerment, various other factors were examined which indicate the status of women in society. The quantitative enquiry asked women their

perceived social capital, namely how supported they feel financially, socially and emotionally, with the majority of women indicating they feel somewhat or very supported (71.5%).

Figure 9: Decision making distribution



Qualitative enquiry into the decision-making power as well as access to and control over resources found that women have little control over decision in their own life, with the in-laws of husband involved in the majority of decisions. While it was noted that females could possibly have a choice on what foods to give, males are responsible for shopping and therefore the ultimate decision rests with them. Furthermore, while they can chose the method of contraception, pressures from the male can prevent her from getting contraception and the method of contraception is mainly selected by the males.

Looking at the access to and control over resources it is also evident that while women have access to the majority of the resources, they are not necessarily in control of them, excluding household items which is considered their domain. During seasons when males migrate for work opportunities, women felt they had more control to decision-making in households where they were not living with in-laws. However, in the majority of the cases the males would try and leave a male member of the family in charge of the household, arising from the male-dominated perceptions in Bangladesh gender division.

Table 23: Access to and Control over resources

	Access			Control		
Household Level	**Women**	**Men**	**Both**	**Women**	**Men**	**Both**
Poultry	X			X		
Cattle			X			X
Fish		X			X	
Land		X			X	
House			X		X	
Household Items			X			X

Household Compound			X		X	
Transport systems		X			X	
Electricity			X		X	
Tubewell			X		X	
Motor for water pump		X			X	

Female mobility, another hypothesised cause of undernutrition, was enquired in the qualitative discussions to both males and females, with the pattern emerging that women moved mainly for health care, or to visit their families while men moved further afield, and for longer times, for migration as can be seen in the mobility matrix in Appendix 7. From the discussions, it became evident that during migration men are more likely to move alone, with women remaining with their in-laws or moving back to their home.

Table 24: Community feedback on gender-based factors

Risk Factors	Findings
Decision making power	Not many areas of life women are involved in making a decision about. Usually have to consult the husband or mother in law.
Adolescent marriage	High. Women get married off early so that they are not a burden in their households and they do not bring "shame" from transgressions on their homes, which end up in "affair marriages".
Poor female mobility	Women do not have a high degree of mobility of movement from the house, with the majority of the mobility as a result of ill health and then often in the presence or their husbands.
Care Practice Knowledge	Knowledge of appropriate care practices appeared good - in terms of hygiene and the importance of breastfeeding. Inclusion of fruit in diet was also often mentioned, especially the more expensive ones such as apples. There appears to be an understanding of a diversified diet, but the inability to practice it. Seemed little knowledge of feeding frequency for children, with the idea of biscuits as a snack often mentioned
Poor care for women	Women, usually occupied with household get support from her female members for 8-10 days after a normal delivery and 15-16 days after C-Section.

Categorisation: Female psychosocial care, practices and restrictions

Despite the secondary literature and other underlying factors in the quantitative and qualitative enquiry pointing to a gender inequality in society, it was difficult to tangibly test this hypothesis and therefore the technical experts working group felt it should be left as untested. Many issues were examined, such as decision-making, social capital and access to resources, but a more long-term understanding is needed to understand this basic factor and its interaction with undernutrition. Studies on social capital, and its protection for a child's nutritional status, have been found to be contextual. The difficulty of measuring "social capital" due to differing operational definitions also result in a complexity of research on this link with child nutritional status [17].

While some information from qualitative was collected on psychosocial practices, such as the level of interaction and bonding between mother and child, stimulation, attention to low activity levels and slow development of child, quantitative information was not gathered. This was therefore felt to be untested.

Table 25: Categorisation of psychosocial care for women

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Poor psychosocial care for women			++	?	++	UNTESTED
High rates of adolescent marriage		++	+++	++	+/++	REJECTED
Poor Female Mobility			+/++	+	-	MINOR
High female workload	+	++	+/++	+++	+	MINOR
Poor awareness of caring practices			-	-	-	REJECTED

A high rate of adolescent marriage, while originally a stand-alone hypothesis, was felt to be linked to adolescent pregnancies. Examining the quantitative data revealed a statistical link between the two, confirming the qualitative findings that the impact was more as a result of the adolescent pregnancies and its risk for low birth weight. Therefore, while the qualitative and quantitative data confirmed this risk factor, it was felt to be already included in the pathway to adolescent pregnancies.

A great deal of debate was held on the categorisation of female mobility. While mobility is restricted for females, it was felt that the impact on a child's nutritional status was minor. Women mainly move for health care, and it was felt by the community that as a result this would have a minor impact on undernutrition.

High female workload was another hotly contested issue in the technical workshop. The perception is that a high workload will result in less time to feed the child responsively and making sure that s/he eats sufficient quantities; it also reduces the number of breast feeds; less attention and encouragement to eat. In the community itself, women often mentioned the high workload, noting it would have a minor impact on the nutritional status of children mainly as a result of poor care practices. From the quantitative and qualitative surveys women mentioned having about 1-2 hours leisure time in the day, with the qualitative data showing this is mainly in the evenings. While a number in the technical workshop felt this should be rejected, it was felt that an examination of the evidence places it in the category of a minor risk factor.

The initial hypothesis of poor awareness of caring practices was felt, in the final discussion, to be too broad for measurement and necessitating looking at it in 2 angles: the maternal and child

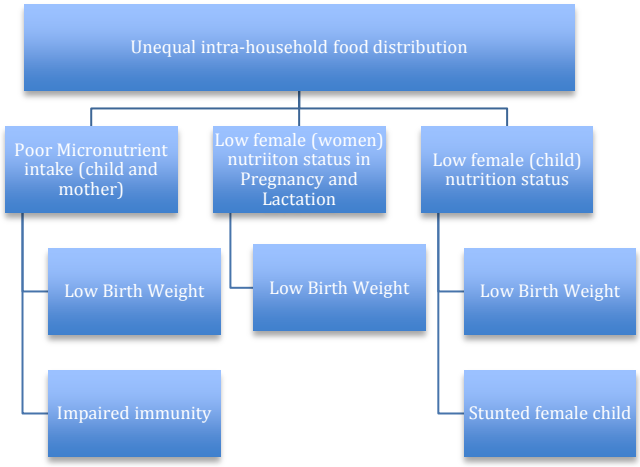
care practices, which has been incorporated into a previous hypothesis, and the issue on awareness and practices in hygiene and sanitation practices. A new risk factor of "**Poor hygiene practices"** was suggested, which will be examined in a further section.

V. Unequal Intra-Household Food Distribution

Hypothesis: "Unequal intra-household food distribution leading to poor micronutrient intake for children and mothers, poor nutritional status during pregnancy and poor female child nutritional status"

Gender-induced disparities in household distribution have been a concern, arising from a pro-son bias in the Indian sub-continent due to cultural beliefs. This not only impacts children, but also the beliefs and practices surrounding food intake and restrictions during pregnancy and lactation, linking in with low birth weight, as has been discussed previously. While empirical evidence on difference in rates of undernutrition between the sexes have been inconclusive for younger children, the difference has been shown to grow as the children get older, indicating a possible neglect of the female child in the household [28], [29].

Figure 10: Hypothesised Pathway for unequal intra-household food distribution



Qualitative findings do indicate a preference for males in the order of eating, but the difficulty of measuring this quantitatively means there are no quantitative findings. In addition, there was no difference found in the nutritional status by sex. Food intake, seen to decrease for pregnant women as already discussed in the previous section, appears to be more due to socio-cultural pressures and advice from traditional birth attendants rather than a preference in food intake in the household.

Table 26: Community feedback on household eating patterns

Risk Factors	Findings
Intra-Household Food Distribution	In general the husband and father in law eat first, then the children, then the mother in law and the mother. If there is a food shortage and they have to prioritise, will prioritise the children, then the elder males, then the mother in law, and finally the mother. If the woman is pregnant they know they should give her first, but in reality this does not happen.

Categorisation: Unequal intra-household food distribution

While the qualitative data indicated that there was indeed an unequal distribution of food within the household, and other assumptions and experience of people noted this, there was no quantitative evidence to support this. It was highlighted that this could be an important issue, linked in with gender equality issues, but more long-term research is needed on the impact of a hypothesis such as this.

Table 27: : Categorisation of unequal intra-household food distribution

Hypothesised risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Unequal intra-household food distribution		?	++	++	-/+	UNTESTED

B. Poor Household Access to Sufficient, Safe and Nutritious Foods

The link of food insecurity factors at the household level has been shown to have a link to inadequate dietary intake. By both the community and the technical experts this was felt to be a strong factor in the continued high levels of undernutrition found in the community, especially the basic causes resulting in poor household access, with income opportunities and land access highlighted as a major issue in the area. The hypotheses related to food security will be explored in the following section, as follows:

- Increase in shrimp farming
- Increased intrusion of Salinity
- Decreased Land Quality and Productivity
- Increased Migration
- Limited Household Food Production
- Limited access to Land
- Low income opportunities
- Limited Agricultural Diversity

I. Changing agricultural patterns and resulting consequences

Hypotheses: "The Increase in shrimp farming is leading to an intrusion of salinity in the soil and water, decreasing water and land quality and leading to decreased productivity and increased migration"

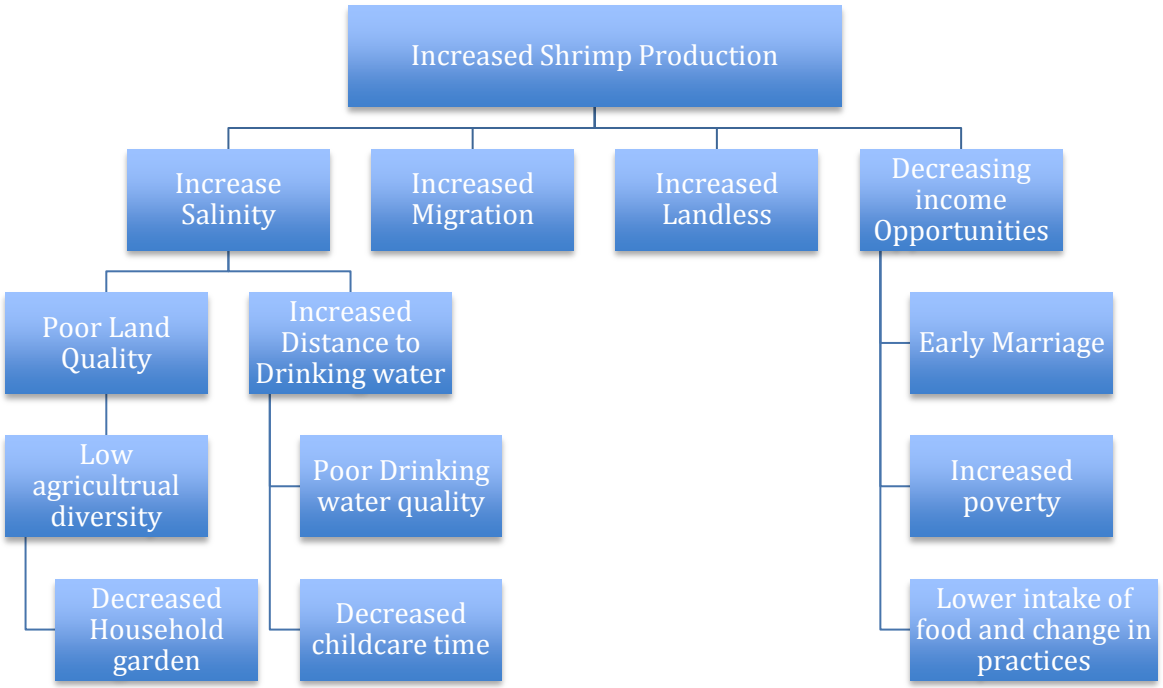
As the second largest export commodity from Bangladesh, shrimp farming has assumed greater importance over time, with land policies shifting in favour for their production [30]–[33]. The south-west coastal belt of Bangladesh has had a long tradition of practicing aquaculture, seasonally alternating this with rice cultivation. However, due to the increased economic viability of shrimps on the global market, the industry boomed, with agricultural land overrun

and flooded with saltwater for shrimp farming. Currently, this area produces 80% of the shrimps, the majority of which is bound for export[32].

This change in agricultural patterns to increasing shrimp production has led to a simplification of livelihoods due to the increased land allocated to shrimp farming and the consequent deterioration of livestock rearing, homestead gardening and rice farming. Increasing intrusion of salinity due to the shrimp farming results in a deterioration of agricultural land as well as an infiltration into water systems, resulting in increased distances to collect safe drinking water[32], [34]. Currently, around 23% of Satkhira's soil quality has been declared "very strongly saline" with around 12% found to be experiencing "strongly saline" conditions, both categories of which are unfavourable for agricultural conditions [30].

In addition to land deterioration, there have been adverse social effects as a result of the lower labour intensity of shrimp farming compared to agricultural production. This has led to an increased population of landlessness, linked to a decrease in income opportunities and increased migration which has had a knock-on effect of social fabric of society[32].

Figure 11: Hypothesised pathways for changing agricultural practices



While it is undoubtedly true that agricultural patterns have changed in Satkhira, the impact of this is difficult to test. Qualitative input did show that there has been decreasing land quality but this is not only attributed to shrimp farming. The recent increases in waterlogging episodes, as well as increased population pressure, have been said by the villagers as the main reason of decreasing land quality. However, production has been felt to increase as a result of technological advances and inputs.

Increased migration was initially hypothesised to be as a result of changing agricultural patterns. However, while this might also be true, a seasonal pattern of migration was found, linked mainly to the impact of waterlogging when work opportunities decreased in the area as a

result of a lack of agricultural production. The survey found 89.1% of husbands were currently living at home and have not migrated (Table 22).

Table 28: Community feedback on change in agricultural patterns

Risk Factors	Findings
Agricultural patterns	Changing in areas with shrimp farming as salinity encroaches on the land, but also changing elsewhere due to the impact of waterlogging.
Increased intrusion of salinity to water	Noted only slightly in the village with shrimp farming. Not seen as a problem in terms of water quality (Arsenic) more so.
Decreased Land Quality and Productivity	Due to salinity land quality and productivity in the areas near the shrimp farms have decreased, with the soil becoming too saline. In other areas also noted a decrease in land quality due to waterlogging – having a more severe impact than shrimp farming.
Increased migration	Migration only partially linked to shrimp farming and soil salinity. Seems more linked with waterlogging, population pressure and lack of land (and resulting income opportunities)

Categorisation: Changing agricultural patterns and resulting consequences

This group of hypotheses, while likely true and on the basic causes of undernutrition, were hard to test in the scope of the NCA with the impact noted to be more complex and in need of longer-term research. While the change in agricultural patterns, and an increased intrusion of salinity, has been noted likely to be true, the exact impact on the causal chain is hard to assess. Furthermore, this change in agricultural patterns was not felt by the community to be a cause for undernutrition, with changes in land quality and productivity felt to be as a direct result of the increased frequency of waterlogging.

Table 29: Categorisation of change of agricultural patterns hypotheses

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Increase in Shrimp farming		?	+/++	+	-	UNTESTED
Increased intrusion of Salinity		?	+/++	++	-	UNTESTED
Decreased land quality and production		?	+/++	++	-	UNTESTED
Increased Migration		-	+	++	-	REJECTED

While migration was indeed happening due to waterlogging and the ensuing poor land availability and access, the link to undernutrition was rejected by technical stakeholders with the reasoning that migration is used as a coping strategy and results in income for the family. As the majority of the area relies on purchase of food rather than production, economic input was regarded as important. However, there was strong debate on this – on whether a coping strategy should be highlighted as a norm, especially one that tears the family apart for

prolonged periods of time. This would be linked to social and gender issues that might be influenced by this, but once again, these were outside the scope of the NCA.

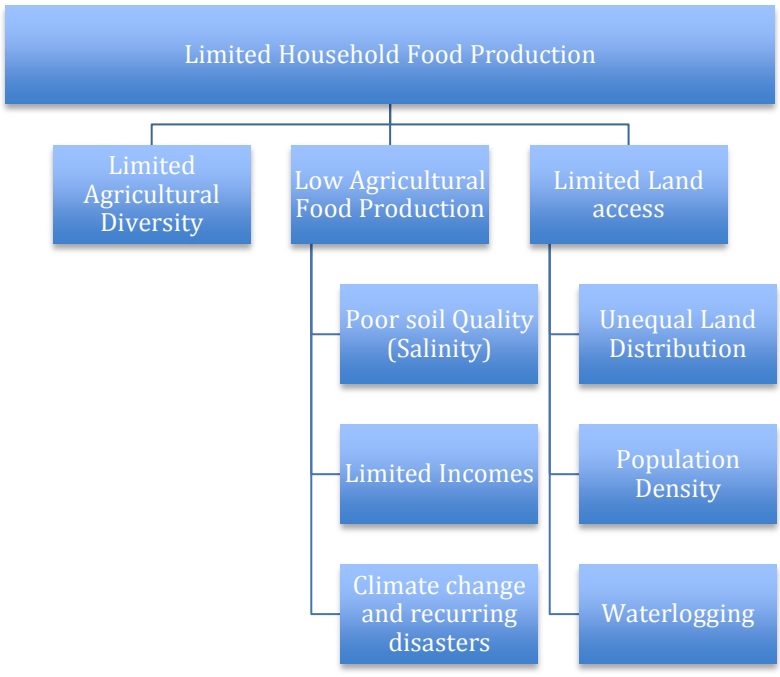
II. Limited Land Access and poor household Food Production

Hypotheses: "Low income opportunities combined with limited access to land are limiting household food production and agricultural diversity"

With the high population density and a shortage of land space for agricultural production, domestic production nevertheless plays a large role in the food security of the country, enabling Bangladesh to meet its food requirements at national scale [29], [30].Despite this apparent self-sufficiency in meeting the food demands, this is mainly concentrated in the main staple crop, rice, while other food items, such as pulses, are imported[30]. This lack of agricultural diversity trickles into a lack of diversified diets, leading to micronutrient deficiencies and can have diverse consequences in stunting and low birth weight. Land access also remains a challenge, especially in an area with an estimated 10% of the population owning half the land, and small-holder farmers representing 80% of farmers [35]. With a poverty rate estimated at 31.5% living below $1.25 per day and 84% living below $2 per day, Bangladesh has nevertheless seen impressive reductions in the numbers living in poverty in the last decade [36][32].

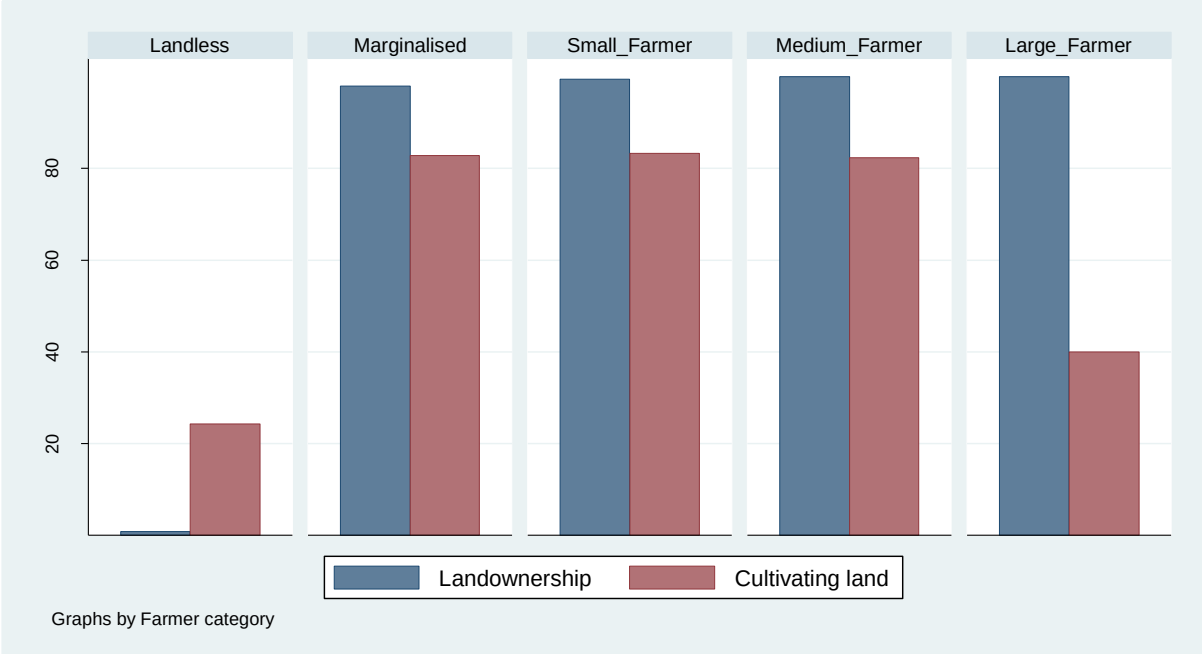
The inequality to land access, combined with decreasing income-generating opportunities arising from changing agricultural patterns and climatic conditions and the intrusion of salinity, are hypothesised as resulting in decreasing household production and agricultural diversity in Satkhira district. With an estimated only 41% of households maintaining integrated gardens in the homestead in Satkhira, it is probable to assume that there will be a resulting impact in dietary diversity[16]. Furthermore, household food insecurity is seen to affect 68% of households with children and pregnant or lactating women[16].

Figure 12: Hypothesised pathway for household food production



In the FSL/WaSH survey conducted in October 2013, in-depth questions about land ownership and utilisation were asked which highlighted the unequal division of land ownership with 58.2% classed as landless[2]. Despite this disproportionate land distribution, cropping patterns were found in the qualitative enquiry not to exclusively depend on tenure with the middle class renting land for production for a yearly rent. This was mirrored in the FSL/WaSH survey, which found that despite the unequal land access, 48.6% were involved in cropping in the previous year.

Figure 13: Land Ownership and Land Cultivation Patterns



Land ownership had a significant impact on the household dietary diversity as well as the household food insecurity score, with smaller land-owners being more food insecure and with a poorer dietary diversity.

Table 30: Household and food security indicators

	n=	Mean or Proportion	CI (95%)
Mean HDDS	473*	6.5	(6.3 – 6.7)
Food Access Insecure HH	473*	64.3%	(56.8 – 71.8)
Land Ownership	1040**	Landless: 58.2% Marginalised: 19.1%	
Land Cropping	1040**	Cropping in previous year: 48.6%	
Average Size	1040**	39.6dm^2	
Income Source	1040**	Daily Labour: 42%	
No. of Income Sources	1040**	More than 1: 75%	

***Source: SMART 2014 Survey, ACF-INT**
**** Source: FSL/WaSH Integrated Survey, October 2013, ACF-INT**

[2] As classed by the Government Lands Ministry: Landless <5 decimals; Marginalised 0=49 decimals; Small Farmer 50 – 249 decimals; Medium Farmer 250 – 749 decimals; Large Farmer >750 decimals

Income was seen to be an important factor with 75% having a diversified income source, relying on more than 1 source. This is as due to the reliance on purchase for food intake rather than production, especially in the food insecure households.

Table 31: Community feedback on household food security

Risk Factors	Findings
Food production and diversity	Despite less land increased production due to use of technology, fertilisers and pesticides, which means they have higher output per acre.
Limited Access to Land	The majority of households do not own land and minority can get food from their own production. Land is unevenly distributed with the rich owning the majority of the land, the middle income leasing it (8-10,000Tk/yr) and the poor working on the land. The rich also own the land for fish/shrimp ponds
Limited Income	Income linked to work in agricultural lands - some have to migrate daily to find work. Others migrate fully due to lack of income opportunities
Limited Agricultural Diversity	All villages noted that the diversity has decreased due to the waterlogging. Rice is grown everywhere although in the saline village (Garchala) the production of rice is decreasing and shrimp increasing.

Categorisation: Limited Land Access and Poor Household food Production

Household food production was felt by the community to be an important contributing factor to undernutrition, there was debate amongst the technical experts on the impact that the food production would have on household food consumption due to the use of purchase for food. It was felt that the major impact on food security would not necessarily be availability of produce, but more on the accessibility of produce through purchase. However, further details are needed on household food production to make a definitive statement on this, as the quantitative did not enquire into the amount of food produced. Nevertheless, it was felt that poor income opportunities are a major contributing factor for undernutrition in the area by both the community and technical experts, due to the reliance on purchase.

Table 32: Categorisation of household food production hypotheses

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Limited Household Food Production			++/+++	++/+++	++	UNTESTED
Limited Access to Land		+++	++	++	-/+	UNTESTED
Low income opportunities		++/+++	++	++	+++	MAJOR
Limited Agricultural Diversity		++	+++	++	+++	UNTESTED

Limited and unequal access to land ownership was felt to be prevalent in the community, yet the community did not perceive it as a contribution to undernutrition, as land rental was possibly to those with an income. This once again links back to the view that the poor income opportunities are the more major impact to food security and undernutrition indicators.

Limited agricultural diversity was noted by the community as a major cause for undernutrition in the area, but technical experts did not feel that there was enough evidence to point whether the diversity is a cause or once again an interlinking factor with income. The low number of household gardens observed in the community was highlighted to be as a result of the increasing waterlogging episodes. Older members of the community highlighted that in the past homestead gardens were used to increase diversity, with the location of the gardens varying by village, but increased waterlogging frequency, combined with population pressure and an expansion of agricultural lands for mono-crops have reduced their numbers..

C. Poor household access to quality health services and unhealthy environments

The link of an unhealthy environment, through health access and utilisation as well as water, sanitation and hygiene access and practices, have been shown to have a link to disease prevalence on the causal pathway to undernutrition. The studies show that water, sanitation and hygiene systems and practices are significant determinants for both the health and nutritional status of children, particularly under 5 years of age [17].

Health seeking behaviour and health access were noted during the initial workshop as a potential cause for undernutrition in the area. While water and sanitation access and hygiene practices were not part of the initial technical workshop hypotheses, results were collected, examined and included in the final technical workshop and will therefore also be presented in this section. The hypotheses related to unhealthy environments will be explored in the following section, as follows:

- Poor availability and accessibility of high quality health services
- Poor Health seeking behaviour
- Poor water and sanitation quality
- Poor hygiene practices

I. Poor appropriate Health Seeking Behaviour

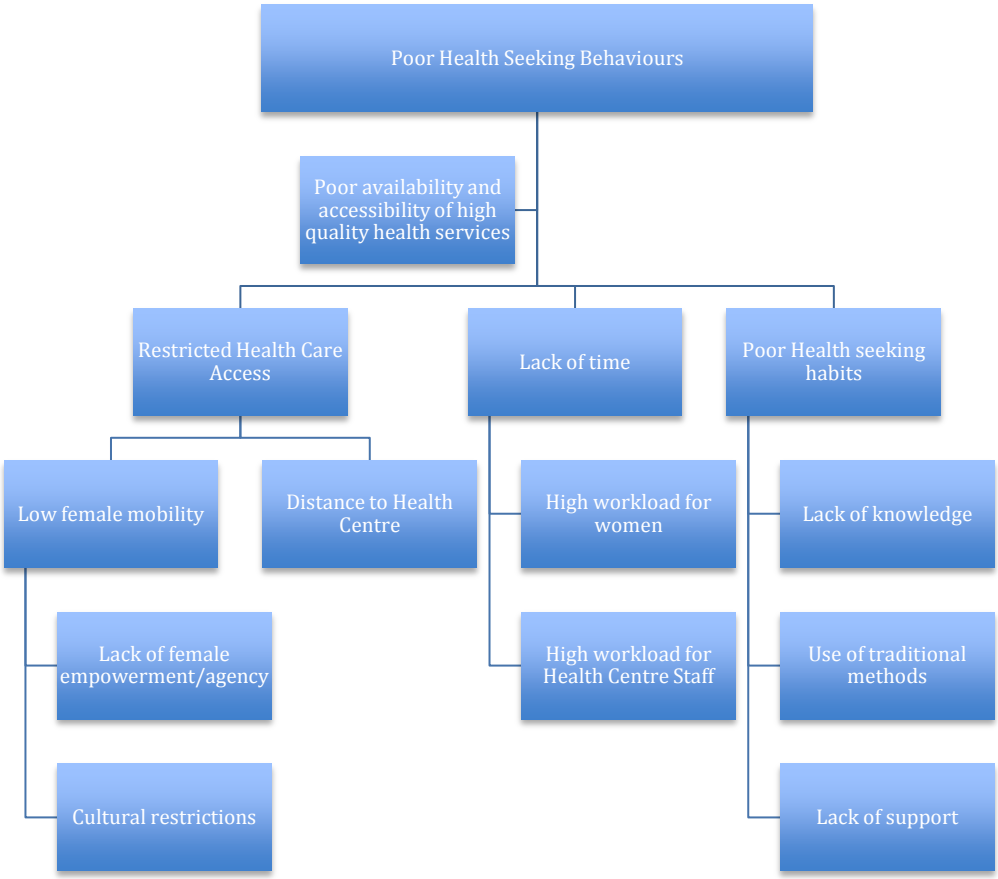
Hypotheses: "Poor Health Seeking behaviour arising from a variety of factors including poor availability and accessibility of high quality health services"

Bangladesh has been shown to have exceptional health outcomes arising from the structure of the primary health care system and the pluralistic health system [2], [26]. Equitable and extensive outreach to all households is achieved through a three-tier system: - the government, private-for-profit hospitals/clinics and finally Bangladesh's NGO's[2], [26], [37]. Its wide network of paraprofessional workers through community health workers highlights the possibility of providing services, despite a scarcity of accredited health workers[2]. Alongside these formal institutions, which provide support at the national, regional, district and sub-district levels, there are large numbers of informal health workers, traditional healers and private pharmacies that provide services throughout the rural areas as an additional and parallel health system. Through these systems, the country has achieved remarkable vaccination coverage and control of diseases[1].

In the latest *Bangladesh Demographic Health Survey* in 2011, National antenatal attendance was only 47.7%, with only 25.5% attending the recommended 4 visits [1]. In addition to this, the majority of births are delivered at home, indicating that a large number of pregnant and lactating women fall out of the reach of health services.

Despite the network of health services provided, it appears that the health seeking behaviours, especially in relation to pregnancy, are less than favourable, which is hypothesised to arise from restricted access, lack of time and poor knowledge on health seeking behaviour.

Figure 14: Hypothesised pathways for health-Seeking behaviour



Health service access was contextual with some villages, especially those closer to the union capital, being close to functioning health services while others were further away. Despite the free availability of health care, access to government health services was sporadic, with the majority preferring private health care, which, despite its cost, was felt to provide better quality services. There were often allegations of corruption by health centre workers, which, although not verified by the NCA, serves to highlight the distrust in the health services.

Table 33: Community feedback on health seeking behaviour

Risk Factors	Findings
Poor PLW Health Seeking Behaviour (ANC attendance)	ANC attendance is increasing, but a lot of women noted that it was easier to go to the local doctor and get the supplementation needed rather than go to the FWC.
Health Seeking behaviour for child	Behaviour similar for PLW and child health, with advice first being sought in the village from local doctors (who have minor trainings) and traditional healers (Kwac, Huzurs..). Later will visit the nearest private or public hospital in the Upazila level and thereafter the bigger hospitals in Satkhira (if live in Tala) or Khulna.
Poor availability and accessibility of High Quality Health Services	Rely most often on the local doctors, Kwak and Huzur. In all villages heard of cases of corruption (selling of medication by personnel), poor attention in government facilities and a preference to go to the private facilities and local doctors as they give more attention and care. FWC's availability and opening varied.

In all villages the preferred order of health seeking were first to seek help from local and traditional services who were often untrained. Local doctors, who were seen to be more qualified than traditional and religious healers, were often the next step in health seeking behaviour. Training for local doctors varied, with some found to have a diploma in health assistance, while others had no qualifications at all, relying on relatives with qualifications. Therefore the quality of care can be called into question. The next level of health seeking was often to union or Upazila capitals, where advice was sought from private clinics or occasionally government services. Costs were not mentioned as a hindrance to health seeking practices from private centres, with the majority noting that they take out a loan for major health issues.

Categorisation: Poor Appropriate Health Seeking Behaviour

Availability and accessibility of high quality health services were contextual yet in all villages the access to healthcare was not seen as a major constraint to health seeking behaviour. The community also felt that they sought advice adequately and promptly when needed, placing a lot of faith in the local doctors. However, they did see that poor advice in health could have an impact on the undernutrition, especially in relation to pregnancy and children.

Table 34: Categorisation of appropriate health seeking behaviour

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Poor Health Seeking behaviour		+++	++	+/++	-	IMPORTANT
Poor availability and accessibility of High Quality Health Services		++			-	

Technical experts felt that these two hypotheses were interlinked and should be combined into one for, although data shows people were seeking advice during illness, the qualitative component highlighted that this advice sought is from "unskilled" health professionals. Therefore a combined the risk factor suggested was: **"Poor appropriate health seeking behaviour",** which inherently includes the assumption of the quality, access and type of service sought.

II. Poor Water and Sanitation Quality

Additional Hypothesis Suggested: "Poor water and sanitation quality"

Water is central to the way of life in Bangladesh. Many of the river systems emanate from outside the country and with a burgeoning population, the country faces many challenges ahead in an era of increasing globalisation [38]. Water supply and sanitation in Bangladesh is characterized by a number of achievements and challenges. The share of the population with access to an improved water source was estimated at 98% in 2004 a very high level for a low-income country [39]. This was achieved to a large extent through the construction of hand-

pumps with the support of external donors and private initiatives. However, in 1993 it was discovered that groundwater, the source of drinking water for 97% of the rural population and a significant share of the urban population, was in many cases naturally contaminated with arsenic. The discovery of arsenic contamination of the shallow aquifer has set back past successes in bringing safe water supply to the rural population. Consequently, the share of population with access to safe drinking water had to be adjusted downward. Access to an improved source of water supply increased only slightly from 77% in 1990 to 81% in 2010, whereas coverage of improved sanitation increased from 39% to 56% during the same period [39].

The government has adopted a number of policies to remedy the challenges in the sector, including National Policies for Safe Water Supply and Sanitation (1998), a National Water Policy (1999), a National Water Management Plan, and a National Policy for Arsenic Mitigation (2004) as well as a National Sanitation Strategy (2005). These policies emphasize decentralization, user participation, the role of women, and "appropriate pricing rules". The Arsenic Mitigation Policy gives "preference to surface water over groundwater" [40]. However, this alternative may be challenging, with water surface quality under increasing pressure from industrial expansion.

Water quality, rather than access, is the major hindrance in Bangladesh, especially in Satkhira district where mineral contamination, especially of arsenic, in shallow and some deep tube wells has been a big cause of concern. Furthermore, while sanitation access is high in the area, the access to hygienic, water-sealed sanitation facilities are worrying. Access to appropriate water and sanitation quality possibly has a synergistic effect, with studies noting a better weight in those with both than in those with one or the other [17].

Secondary data reveals that on average, 25% of households share latrines between two or more families; with female access sometimes restricted to night or morning times. In the same way, child use of latrine has sometimes found to be discouraged as they considered that children make the latrine dirty [41]. This is reinforced by the mother workload for the household chores preventing her to train the children on latrine use. Open defection is common for the children, leaving them vulnerable to faecal-oral contamination cycle [41].

Due to this, it was suggested that a major risk factor of the poor water and sanitation quality was overlooked in the initiation hypotheses, especially in an area well known to have poor quality water and sanitation facilities.

Quantitative and qualitative data both showed that there was indeed access to poor water and sanitation quality. Water quality access is more contextual with the northern areas of ACF-INT working areas of Satkhira having a higher access to deep tube wells compared to the south, which rely mainly on shallow tube wells. Due to the higher risk of bacterial and mineral contamination, shallow tube wells are not considered a safe drinking water source. However, quantitative information found that the majority access these shallow tube wells, which was strengthened by the qualitative enquiry. This found that the scarcity of deep tube wells in some areas mean communities are more likely to use the more abundant shallow tube wells, which are closer to the households, despite being fully aware of the potential risks this water source

brings. From the quantitative survey, it was shown that household selecting water from DTW are spending more time for the water collection, highlighting the scarcity of the DTW as a water source as well as the extra effort required to fetch from a safe drinking water source.

Table 35: Water and sanitation access

	n*=	Mean or Proportion	CI (95%)
Water Access			
Shallow Tube Well	471	53.5%	
Deep Tube Well		42.3%	
Other		4.2%	
Average time to access water		15.1 min	(11.5 – 18.8)
Shallow Tube Well	471	7.5 min	(6.4 – 8.6)
Deep Tube Well		20.0 min	(16.1 – 23.8)
Other		68 min	(50.3 – 86.0)
Sanitation access			
Hygienic	471	52.4%	
Unhygienic		47.6%	

***Source: SMART 2014 Survey, ACF-INT**

Hygienic[3] sanitation facilities were mentioned by the community as being an important deterrent for diseases. However, the majority of the villages noted a prevalent use of unhygienic facilities, which was confirmed by the quantitative data, which found that 47.6% use unhygienic sanitation facilities. Further analysis of households using hygienic sanitation facilities found a positive significant effect on the nutritional status of the child (wasting and underweight).

Categorisation: Poor Water and Sanitation Quality

Arsenic, iron and other minerals contamination of water sources and the ubiquitous use of unsafe water sources were often mentioned by the community as being a major contributor to undernutrition which was prevalent in their communities. Findings from the community also highlight the use of unsafe water sources and unhygienic sanitation facilities, which despite being contextual are still prevalent in the communities. Therefore this was noted as being a probably major cause for undernutrition in the ACF-INT working areas in Satkhira.

Table 36: Categorisation of water and sanitation quality

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Poor Water and Sanitation Quality		++	++	++	+++	MAJOR

[3] Hygienic Latrines include all of the following: confinement of faeces away from the environment; sealing of the passage between the squat hole and the pit to effectively block the pathways for flies and other insect vectors thereby breaking the cycle of disease transmission; and Venting out of foul gases generated in the pit through a properly positioned vent pipe to keep the latrine odor free and encourage continual use of the hygienic latrine

III. Poor Hygiene Practices

Additional Hypothesis Suggested: "Poor Hygiene practices"

The faecal-oral route of disease transmission operates primarily through poor sanitation and hygiene practices. The use of soap and water can significantly reduce the frequency of diarrhoea by up to 50% among children under 5 according to some studies, and meta-analysis has found that the impact of this hygiene practice is even stronger than water quality improvement [17].

Secondary data notes that hygiene promotion, with the specific focus on faecal-oral contamination is not formally included in the national education program. With a lot of private school (madrassa) and more than a quarter of the population not going to school, exposure to sensitization messages is probably low. A study by Habitat for Humanity in Satkhira highlighted the importance of NGO's (Local and International) in filling in the gap on education of hygiene messages [41].

Table 37: Observed and reported hand washing practices

	Reported Hand washing	Reported washing Hand with Soap / ash / sand	Report using soap and have soap available
After Defecation	95.8 %	32.1 %	12.9 %
After Child defecation	51.1 %	18.6 %	7.2 %
Before Breastfeeding	42.5 %	16.7 %	7.8 %
Before cooking	35.7 %	37.5 %	6.3 %
Before eating	91.7 %	29.1 %	11.3 %
Other	0.6 %	0.0 %	0.0 %

***Source: SMART 2014 Survey, ACF-INT**

Qualitative enquiry noted the knowledge of hand washing practices, with poor practices included in the perception of the causes of undernutrition (Table 7). This knowledge of hand washing behaviour and timing is well known by the community as seen in the quantitative results, with 95.8% reporting washing hands after defecation. However, the appropriate hand washing techniques were lacking, with only 32.1% reporting washing hands with soap after defecation. Despite the knowledge of practice, the application remains woefully poor: when soap availability in the house was triangulated by the enumerators with the request of soap, the rate fell even more to only 14% having soap available in the home.

Categorisation: Poor Hygiene Practices

Personal hygiene, including poor hygiene practices, was mentioned as one of the chief causes of undernutrition by the community which, when compared to the quantitative outputs also notes a discrepancy between reported knowledge and practice. Technical experts placed this as an important contribution to undernutrition.

Table 38: Hygiene Practices Categorisation

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Final Interpretation
Poor Hygiene Practices		++	++	+	+++	IMPORTANT

While appropriate hygiene practices should be enforced and information transmitted to the communities, the constraints people face should also not be forgotten. Due to the high and varied workload usual recommendations about good hygiene practices (wash your hands with soap after handling animals, taking care of children, going to the latrine) are impractical and costly and would require the primary caregivers of small children and food-preparers to wash their hands with soap at least twenty times per day. For busy rural mothers with young children, living in low-income households where soap is used prudently to preserve money for food and other essentials, this is often unfeasible[42].

3.4 Seasonality

Waterlogging

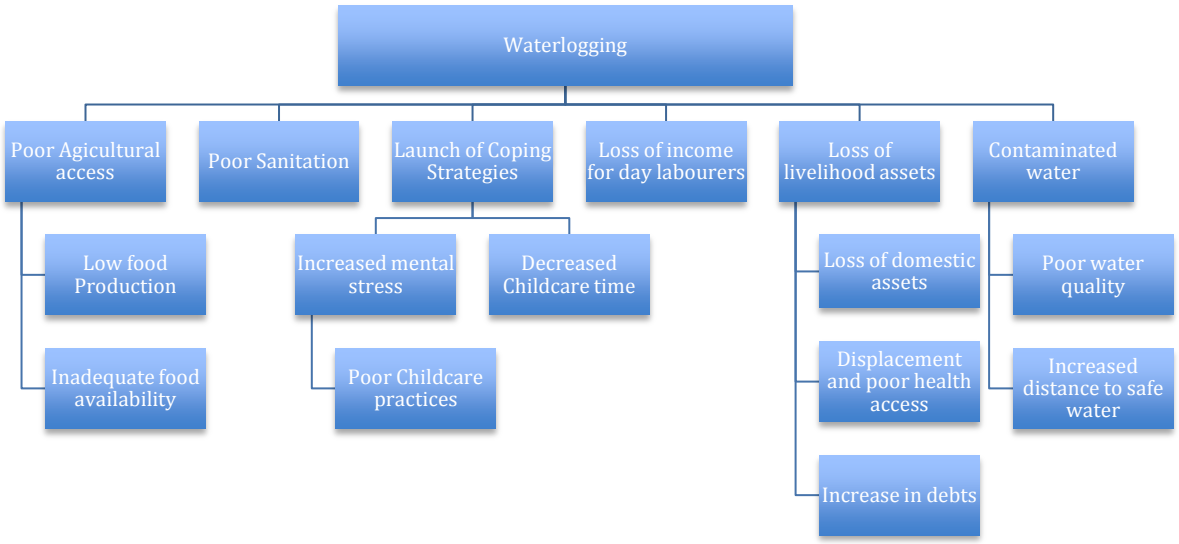
Hypothesis: "The waterlogging situation inundating land is leading to poor agricultural access, poor water and sanitation access, loss of livelihood assets and an increased in mental stress"

Due to its location on the Bengal delta, the southwest coastal belt of Bangladesh is a flood prone area, exposed to climatic conditions such as tornadoes, cyclones and tidal bores annually. Flooding happens periodically in Satkhira district, resulting in prolonged inundated lands and a situation of waterlogging. The generally low-lying and flat topography presents special challenges in draining the land and controlling erosion. Embankments, which were originally built to keep saline water out of agricultural lands, have been weakened by the increased installation of illegal piping and gates. This, combined with poor maintenance of sluice gates and mismanagement of river systems, and the establishment of river management systems upstream in India, has allowed a build-up of sedimentation and the river flow to became irregular and uncontrollable[32].

Climate change is expected to increase flooding, reduce drainage flows and increase water demands in the dry season. The projected sea level of up to 44cm by 2050, on top of an increasing tidal range of 1.2m since 1960s will exacerbate problems of salinity in the area. By contrast, the dry season from November to May will bring water shortages. Farmers have already turned increasingly to tube wells for irrigation, wherever possible and wherever surface water is not readily available. Seasonal water tables are already reaching lower and lower levels.

Prolonged waterlogging in Satkhira district is hypothesised to have a multi-faceted impact, eroding coping strategies and hampering resilience building. Due to prolonged inundation, land might become unusable for agriculture for prolonged periods of time, while the general loss of livelihood assets such as sanitation facilities might have an impact on sanitation practices and access. Furthermore, shallow-tube wells might be inundated, resulting in increased distances to collect safe water and restricted time for care practices. The additional mental stress on all the households as a result of these factors could lead to an erosion of the social fabric, as well as increased pressure on the household heads and decreased time for care practices by women.

Figure 15: Hypothesised pathways on the impact of waterlogging



Waterlogging was mentioned as having had a major impact on all the villages in the last decade, with the frequency and intensity of episodes of flooding noted to have increased due to structural factors. All villagers noted the same cause for the increased ferocity of waterlogging – siltation of all the major rivers and a lack of government input to dredge them.

Some villages closer to rivers were affected yearly, while others were affected only in years where the episodes were most severe. There was not a village that was entirely unaffected though from those surveyed.

Table 39: Food Security and WaSH indicators by waterlogging areas

	Non water logged n = 702[4]	Water Logged n = 337	Chi 2	T-test
Food Security Indicators				
Income	10,137	9,741		0.35
Food consumption Score			0.0001	
Poor	2.30 %	1.85 %		
Borderline	24.28 %	39.20 %		
Acceptable	73.42 %	58.95 %		
HH Food Insecurity access			0.007	
Food Secure	20.63 %	14.24 %		
Mild food secure	9.25 %	7.72 %		
Moderately food insecure	42.53 %	53.41 %		
Severely food insecure	27.60 %	24.63 %		
HDDS	5.29	4.94		0.0002
WaSH Indicators				
Water Access			0.001	
Deep Tube well	47.98 %	31.35 %		
Shallow Tube well	50.58 %	68.03 %		

[4] Note: Survey was not designed for assessing impact of waterlogging, but with 29 clusters in waterlogged areas was felt to be strong enough to highlight trends

Other	1.45 %	0.63 %	
Sanitation Access			0.49
Hygienic Latrine	50.64 %	54.30 %	
Unhygienic Latrine	48.93 %	45.10 %	
Open defecation	0.43 %	0.59 %	

**** Source: FSL/WaSH Integrated Survey, October 2013, ACF-INT**

Impacts of loss of livelihood assets, increased in disease as well as in deteriorating living conditions and increased stress were all noted in the qualitative group discussions. When examining the causes of undernutrition in the area, all villages noted the important effect of waterlogging, with some classifying it higher than others. Indeed, when looking at the October 2013 survey conducted by ACF-INT, a significant difference in wasting was identified with a lower mean found in those coming from waterlogged areas compared to non-waterlogged areas (p=0.048).

This survey was conducted at the beginning of the waterlogging season but already the impact on some food security and WaSH indicators were observed, concurring with the statements given by the community in terms of loss of sanitation and water access. The biggest impact noted by the communities was the loss of income opportunities due to the inundation of agricultural lands. In some areas, where the impact is severest, the number of yields has deteriorated in the last decade. Some coping strategies noted in one village was the increased in aquaculture activities (fish) during periods of inundation.

Table 40: Community feedback on impact of waterlogging

Risk Factors	Findings
Mental stress	Have to take loans as a result of unemployment in this time. Migration was also common in this season, splitting households. In one displacement was common. As a coping strategy also have to decrease meal frequency.
Livelihood assets lost	***Sanitation***: During waterlogging majority of latrines become unusable as they are under water. Defecate in the open as there is no other access. ***Water***: - some note that up to 60% tube wells become unusable *Houses:* In severe years houses are damaged and must be repaired at a loan.
Decreased access and accessibility	***Health Access****:* In some areas cannot move to the health centre other than with a boat. ***Agricultural Access***: There is no access to rice lands. The water becomes poisonous, affecting the quality of the land post-waterlogging season when planting takes place. Only households with access to aquaculture have some form of produce. ***Market Access****:* This becomes more difficult which means men visit less often and rely on storage of roots and tubers such as potatoes.
Income lost	This happens twofold: through the loss of assets (house damaged, latrines damaged etc.) as well as the loss of work in the agricultural lands. An additional impact is that food price increases resulting in reduced food intake to twice a day.
Migration	Males migrate to look for work opportunities which means women have increased decision making responsibilities if there are no males in the household.

Categorisation: Waterlogging

While waterlogging can be seen to be a seasonal effect, which has an impact on all aspects of a child's life and therefore likely the nutritional status of the child, it was also chosen to be a standalone risk factor due to its pervasiveness and the increased frequency and intensity of the flooding. .

Table 41: Categorisation of waterlogging impact

Hypothesis risk factor	Strength of association with undernutrition	Prev. from Quantitative	Prev. from Qualitative	Participatory Rating with villages	Community perception of contribution	Interpretation
Waterlogging		++	+++	+++	+++	MAJOR

While this was major, it was also noted that it impacts seasonally also on all other risk factors. Therefore, it was felt that it has a seasonal impact as well as a stand-alone risk factor. Waterlogging in this area has increased over time due to structural factors outside the control of the villagers.

While waterlogging was the major seasonal factor that was mentioned, discussion on the seasonal nature of work opportunities, linked to the seasonal cycle of agricultural opportunities was also another important seasonal factor mentioned. This has been linked to waterlogging but also the decrease labour needs in the area due to changes in agricultural practice as well as increased population pressure. The result has been the increased migration, increasingly leaving female-headed households.

4. Discussion

Acute malnutrition in Satkhira is currently classified as serious according to WHO thresholds, with underweight and stunting remaining at the very high and high levels respectively. These should continue to draw concern to the overall situation in Satkhira, highlighting the impact and problem of undernutrition in this area in both the short term and long-term, and requiring looking at undernutrition through foetal, infant and young child stages as well as maternal nutrition. In the integrated SMART survey, while child feeding practices have improved, more than 50% of children still do not have an acceptable diet and maternal nutrition was found to be 3% (MUAC <210mm), who would be at risk of nutrition related complications if pregnant.

Low birth weight, a proven precursor for undernutrition in infants, is high in Bangladesh. Due to the difficulty of measuring this indicator in an area where the majority of women prefer home births, quantitative information was not fully captured with only the perception of low birth weight represented by the caregiver's statement. This showed that birth weight influenced the place of birth, corroborating interviews with traditional birth attendants. TBA's preferred to deliver smaller babies, sending larger births to the private health practitioners so that women would have caesarean section rather than natural birth. Women who have caesarean section are trapped into a double bind as in most case need to take a loan to pay for the procedure and traditional birth attendants refuse to give follow-up care due to fear of complications.

Burden of Inadequate Dietary Intake and Acute Childhood Illness

While the results were inconclusive regarding the basic and underlying causes of food insecurity, it was clear that the resulting immediate cause of inadequate dietary intake of children 6-23 months was present especially in terms of diversity, with only 44.4% consuming an acceptably diverse diet (> 4 food groups). Acute childhood illness among children 6-59 months also remains high in the area, with 66.7% reporting illness in the prior 2 weeks. Co-morbidities had a significant effect on wasting and underweight indicators. This highlights the prevalence of both immediate causes of undernutrition in the ACF-INT working area of Satkhira.

Infant and Child Feeding Practices

Through the qualitative and quantitative enquiry, the main link to inadequate diet was found to be through poor child and maternal care and feeding practices, which were mostly classified as a major cause of undernutrition in the area.

Poor breastfeeding practices were found to be prevalent, mainly for the initiation and exclusivity of breastfeeding. Delayed initiation was linked to birth method, with the belief that breastmilk production only starts five days after caesarean section. Exclusive breastfeeding was also found to be poor, with the introduction of semi-solid and soft foods as early as 3 months. A worrying trend was also found to be with the prevalent inclusion of snacks into the diet, such as biscuits, crisps and other manufactured snacks.

Poor complementary feeding practices were also a major outcome of the investigation, with children starting on solid and semi-solid foods at an early age (<5 months), eating infrequently along with the family mealtimes and continuous snacking on cheap, readily available biscuits

and other snacks from as early as 3 months of age. While the knowledge of appropriate practices were found in the communities, a misunderstanding of what constitutes a diverse diet was found, Hypothesised reasons of why this was focused on a lack of time and a lack of household dietary diversity. Infant diversity was indeed found to be strongly correlated with the household dietary diversity, with households experiencing a better dietary diversity have a better infant dietary diversity score. In-depth analysis in the SMART survey noted that households receiving at least 8 food groups in the 24hr prior were able to provide young infants with an adequate diet diversity of at least 4 food groups.

Lack of time for care practices was however, not seen as being a strong factor by the technical experts. The average number of times each household cooked each day was 1.6 with some of the villages investigated cooking only once and others twice per day. This was linked to the season as a result of the shorter working days. Special foods were rarely cooked for the child, especially after a child had reached approximately 8 months of age. Women reported being occupied with household tasks, except in some communities (Rishi for example) where women are also involved in agricultural activities. Nonetheless, this involvement in tasks outside the home by women was found to be occupied by older rather than the younger, due to the importance recognised for childcare.

Psychosocial care for women

Another major factor found was the poor psychosocial and health care for women, especially around the time of pregnancy. In the first and second trimester women are encouraged to eat more, once the third trimester is reached a reduction of food intake is encouraged, especially by the TBAs, in order for women to have small children at childbirth making the birth easier. Women who are suspected of having larger children are instructed to have a caesarean birth. Such instructions given by TBAs are to avoid intra-partum complications. Women who have caesarean section incur other problems following the birth as they are not followed up or given advice by TBAs. Practices, both in terms of nutrition and maternal care is very worrying as it encourages low birth-weight and lack of knowledge around breastfeeding, which has a high potential to contribute to acute malnutrition of both mother and child. Continued work during pregnancy and soon after birth is also an area of concern and contrary to global recommendations.

While the basic cause of female disempowerment was difficult to measure in this time frame, underlying factors point to the poor psychosocial care of women as a major cause for undernutrition. This is not only in the poor health seeking and care during pregnancy, but encompasses a woman's place in society and their independence to make decisions. Women played a small role in making decisions in their own lives, focusing mainly on the method of contraception. Furthermore, while they had access to resources, they had little control of community or household resources. In addition, the social pressures resulting in high rates of adolescent marriage and the ensuing low age of first pregnancy all raise a cause of concern for low birth weight, premature births and poor caring practices. This was recognised by all members of the community, but socio-cultural pressures maintain the practice. The unequal treatment of women is further entrenched later in life with unequal intra-household food distribution noted in the qualitative enquiry and its link to differential breastfeeding and complementary feeding practices for girls and boys.

Health Seeking Behaviour

Investigation into the health seeking behaviour highlighted the need for a comprehensive look at the choices for health care. Qualitative information pointed to the preference for local doctors, with little control on medication prescribed or medical qualification of the practitioner remains worrying, as does the preference for private healthcare. Barriers to government health facilities rested on a lack of confidence in the practitioner as a result of corruption allegations, uneven distribution of health centres, sporadic opening hours in some areas and allegations of poor attention and high waiting times at government health facilities. The main use of the health facilities noted by the communities was as the site for the supplementary feeding and outpatient therapeutic centres.

Poor breastfeeding practices was primarily linked in to the method of birth – with the misbelief that women who undergo caesarean sections are unable to breastfeed for up to five days after birth. The need for adequate post-natal follow up, including assistance and encouragement for breastfeeding after birth in the framework of the "baby friendly hospital initiative" cannot be understated. There is also a complementary need to provide adequate training to traditional birth attendants, even though they are unrecognised within the health care system. It is from these key community members that the majority of pregnancy and breastfeeding information is sought at the village level. Furthermore, there remains a need to broaden the capacity building to all health service providers, not only government run, is needed.

Income opportunities

Both quantitative surveys conducted in October 2013 and January 2014 showed the precariousness of income opportunities, with the majority of people earning a daily wage through unskilled labour and not owning land for their own production and therefore relying on purchasing of foods using income earned. The vast majority of households earning a daily wage are required to purchase their food, confirming the lack of land owned by these households. The average wage of daily wages was significantly less than other income groups. These households, spent on average more of their monthly income on food, but in terms of actual money was considerable less than other households, leaving a limited amount of money for education, healthcare and other household necessities.

There was a very clear distinction categorising wealth groups: the rich own the land but do not work on it, the middle income rent the land and hire people to work on the land while the poor work on land for monetary income generally in the form of daily labour, which is very sensitive to shocks. While land ownership was indeed found to be unequal, the most important factor is to look at access to land through renting. Further enquiry revealed that the majority of those renting loan the money.

The frequent use of loans as a source of income, create a constant cycle of indebtedness. For households with loans, repayment accounted for more than 10% of the overall household expenditure In some hard-hit communities food is bought on loan during the lean season, which is paid off post-harvest or when the men migrate for work when the cycle starts again. This constant cycle of debts not only impacts livelihoods and innovation, but also keeps families tied

to debt and impoverished, with very limited opportunities to escape the cycle of poverty. While the debt and the impact of loans was not examined in this study, it is important to keep in mind.

Dependence on income from agricultural labour, the impact of the increased waterlogging episodes as well as population pressure results in increased migration as a coping strategy for the community. The majority of males migrated, ranging from a couple of months to a few years at some point, leaving women behind, usually in the care of another male member of the family. This tearing of the social fabric, while not examined, is an important factor to consider in future interventions. This again is linked to the precarious nature of daily labour, where if there is flooding or extended water-logging labour opportunities diminish and families are forced to implement other coping strategies such as migration or loans to purchase food.

Poor Water, Sanitation and Hygiene Quality and Practices

Water quality in Satkhira is well known to be poor, with sparse use of deep tube wells, the source considered as safe. While households are aware that the water quality is poor, the alternative of further distances and time are a deterrent for use of better water quality. The contamination of water by minerals with long-term effects also means that there is less a drive to search for better quality water. This was highlighted by the older members of the community who noted that in previous decades there was a high prevalence of water-borne diseases, resulting in the construction of shallow tube wells, which are felt to be safer than open sources. However, the long-term public health impact of arsenic should not be overlooked or ignored with long-term complications including cancer, neurological effects, cardiac disease, pulmonary disease and possibly diabetes mellitus [43], [44].

The use of unhygienic sanitation facilities are largely linked to income, with the community recognising the importance of appropriate structures but expressing an inability to construct them, especially in the cycle of destruction as a result of waterlogging. The discordance between knowledge and practice was also noted in hygiene behaviours where the communities know the appropriate practices but rarely practice. Barriers to the practice seem to be in the lack of understanding of the clear link to disease as well as in the ease of treating the disease when it occurs. This highlights why disease was never classed initially as a major contribution to undernutrition in the villages.

Seasonal Impacts

The impact of waterlogging permeated all conversations in the community, affecting income and food security indicators, rendering water and sanitation facilities inaccessible, increasing time spent on household tasks and deteriorating care practices in the community. While land inundation is not always on the large scale as witnessed in the last few years, it was noted by the community waterlogging has increased in recurrence and severity, especially in communities closer to the major rivers and waterways. There is little chance to improve this situation unless there are major structural improvements are made to the silted rivers.

Other seasonal effects should also not be ignored or placed of lower importance compared to the waterlogging. The reliance on income for the purchase of food highlights the importance of work opportunities in the region, which are in turn linked to the seasonal needs of agricultural activities. The changing agricultural patterns have also meant a decrease in labour needs, which

are driving more people to migrate to cities to search for opportunities in transport or brickwork.

5. Conclusion

Through qualitative, quantitative and secondary level enquiry alongside the validation of a wide range of experts, hypotheses were drawn up, examined and classified into either major, important, minor, rejected or untested categories. The classification in the minor risk factor category does not mean that these risk factors should not be considered in future interventions, but that they were not the most prevalent causes of undernutrition in the area. Furthermore, due to the anthropological approach of the NCA, many issues have been drawn up which have yet to be fully tested, and were outside the scope of this study.

The following risk factors have been classified as identified major, important, minor, rejected or untested causes of undernutrition in the ACF-INT working areas of Satkhira, the causal pathways, with input from the community and stakeholders, are depicted in Figure 16.

Table 42: Categorisation of risk factors

Classification	Risk Factor
Major	• "Inappropriate complementary feeding practices" • "Poor initiation and exclusivity of breastfeeding practices" • "Early Adolescent Pregnancies" • "Poor psychosocial and health care for pregnant women, including poor food intake" • "Low income opportunities" • "Poor water and sanitation quality"
Important	• "Poor appropriate health seeking behaviour" • "Poor hygiene practices"
Minor	• "Poor female mobility" • "High Female Workload"
Rejected	• "High rates of Adolescent Marriage" • "Increased Migration"
Untested	• "Low Birth Weight" • "Poor Psychosocial care for women and children" • "Unequal intra-household food distribution" • "Increase in Shrimp farming" • "Increased intrusion of salinity" "Decreased land quality and productivity" • "Limited household food production" • "Limited access to land" (vs. limited ownership of land)

Some of the risk factors were well understood by the communities, but social, cultural or economic constraints prevented positive behaviours. Societal and cultural influence had a marked impacted on maternal care practices, and any programmes tackling behavioural change in this field would need to take this into account. For example, early marriages, and the ensuing

early age of pregnancies, was highlighted by all as being a major risk factor. However, societal pressures kept this practice alive.

Other risk factors emanated from a misconception in the community, arising from fears that have been propagated by stories within the community. These misconceptions perpetuated behaviours that were a major risk factor to undernutrition. Behaviour such as decreased food intake, known as a negative practice but encouraged by the traditional health, arose from a fear of caesarean sections, with its inherent risks and costs. This is also linked to the lack of faith placed in government structures and the financial gain in conducting surgery from private health systems.

A strong belief in the community on the risk factors for undernutrition were found to be linked to issues which are not addressed through any programmes. The quality of the food, which appears to be a major worry, is never addressed. The increased use of pesticides, chemical fertilisers and formalin, which are recognised as being instrumental in increasing production, were beliefs and fears that should not be overlooked and may sustain negative practices.

While the Bangladesh government has invested a lot of effort on the health structure, the entrenched mistrust in community health structures, with allegations of corruption and inappropriate services, remains a worry. This was noted as being an important risk factor, fuelling inappropriate health seeking behaviour resulting in access to inappropriate messages, especially for child and maternal care.

Limitations of the NCA

Due to the nature of the NCA approach, there are limitations to consider for the interpretation and use of the results. Firstly, in order to triangulate the data, information is collected from a variety of sources, each with it's own inherent bias. Data analysis compiled information from various sources, examining public health thresholds to see the magnitude and severity of the risk factors. Numerous hypothesised risk factors have no clear cut-offs to be considered a public health problem, especially as the hypotheses were drawn from all levels of the UNICEF conceptual framework. These difficulties also extended to scientific evidence, where some causal associations had clear studies linking the risk factor to undernutrition, whereas others missed quality studies or were difficult to measure.

Regular strikes and demonstrations due to up-coming elections both locally and nationally increased significantly the level of insecurity delaying the start of data collection. This forced a consequence of there being was no time for pre-testing of qualitative materials. It also meant that the initial stakeholder workshop was held under circumstances of constrained movement. Therefore, not a representative group from each theme were present at the initial technical workshop, impacting the list of hypotheses drawn. Some risk factors, such as water and sanitation access and poor mental health status of the primary caregiver were missed in the initial selection of hypotheses. While information on water and sanitation was collected, information such as the mental health status of the caregiver was missed.

To ensure contextual and localized hypothesis developed during initial workshops, all efforts were used to have local level experts and key stakeholders. This allowed local experts to

express opinions openly, without the influence of broad based national themes of undernutrition.

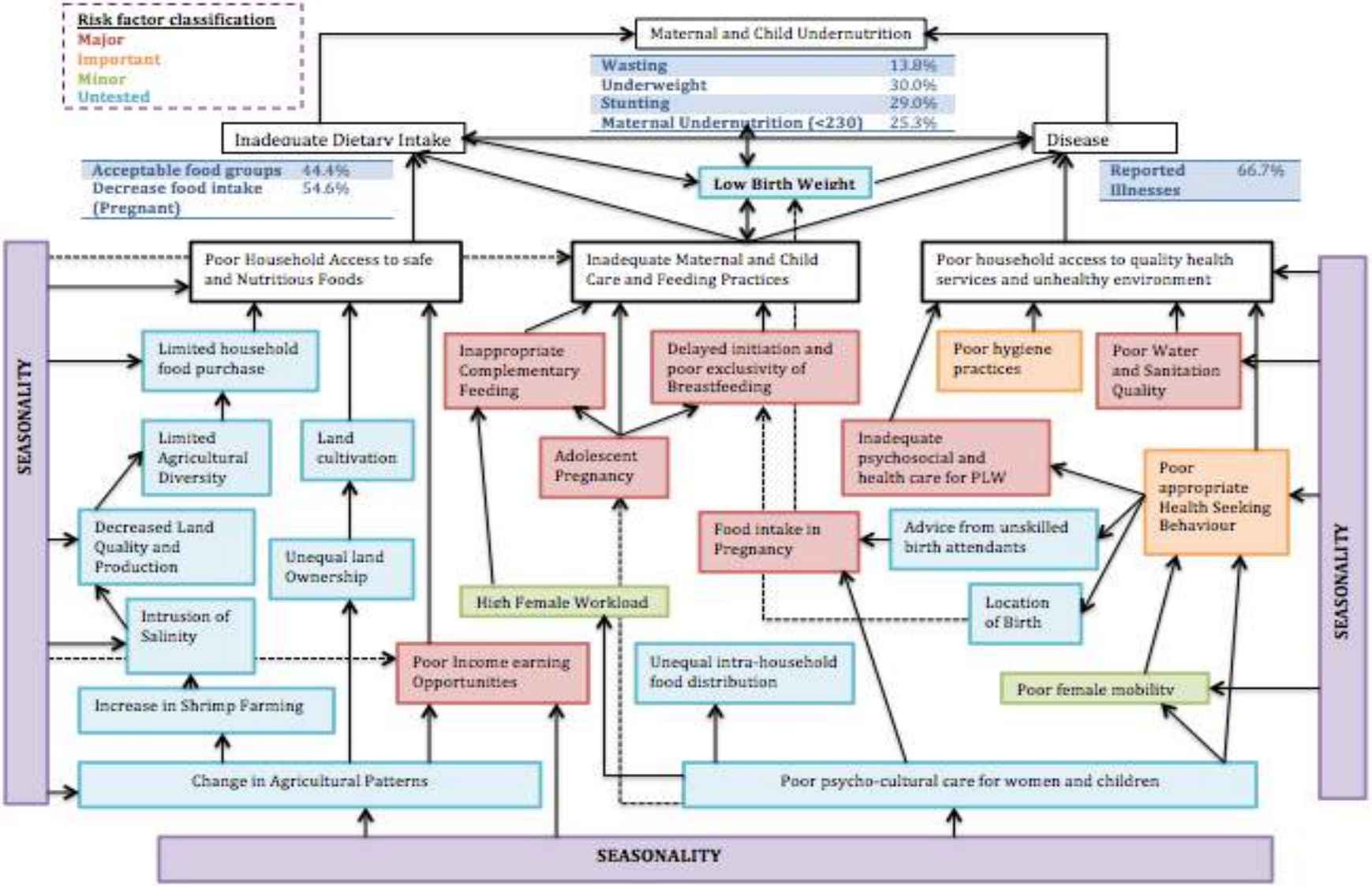
At the community level people's perceptions of what is or is not a link to undernutrition were clear in relation to food intake, but poorer links were understood to care practices. This required time to explore some of these causes, which was not always available. The list of hypotheses drawn up together with stakeholders also highlighted various basic factors as possible contributions to undernutrition. These, while easy to explore qualitatively, were difficult to measure quantitatively, which resulted in an over-reliance on purely qualitative methods.

Due to time pressures of women in household tasks, FGDs had to be kept to less than two hours. The time for conducting these discussions were considerably increased due to the need of translations but became easier as time progressed. This also meant in-depth interviews with positive deviant and malnourished children had to be kept to the minimum.

While the majority of the groups were centred on women, there were some FGDs held specifically with men – to get their input into perceptions of undernutrition and food security issues. Men appreciated the inclusion and the space to discuss. Due to the cultural norms and gender segregation in the patriarchal society, mixed groups were not used, in order to give the women the space to speak out.

There are also limits to the final interpretation of nutrition causality by geographic location - results are specific to the four Upazilas of ACF-INT's operational areas in Satkhira, limiting their extrapolation and generalizability.

Figure 16: Local conceptual model of undernutrition



6. Recommendations

As seen from the NCA, structural as well as societal changes needs to occur in the ACF-INT working areas for a holistic tackle of undernutrition to occur. Qualitative conversations with the community have highlighted the multi-faceted causes of undernutrition in the area. A number of the recommendations in the community require a real concerted effort on the part of the government to tackle structural changes. The health structure, for example, was distrusted by the community resulting in alternative health services sought. While the government has been praised for the outreach of the health services, the effectiveness and quality needs to be tackled. Waterlogging, arising from silted rivers, also requires concentrated effort on structural improvements on the part of the government.

A majority of the risk factors found were related to "soft" issues. The following are programme recommendations to be implemented to tackle the major causes of undernutrition.

- Strengthen Mental Health and Care Practices (MHCP) programs to work with communities in Satkhira to identify positive practices to reinforce and facilitate behaviour change for maternal and child care practices at the household level
- Additional research and understanding of maternal mental health and its impact on children's nutritional status and care practices.
- Strengthen communities to identify children with 'thinness' and undernutrition so to increase self-referral to centres for measurement and admission into programs.
- Strengthen nutrition sensitive programming being delivered through community clinics including pre-natal check-ups and maternal nutrition advise
- Increase knowledge of traditional birth attendants to reinforce appropriate maternal nutrition to reduce low-birth weight and limit adverse misconceptions surrounding maternal nutrition and birth.
- Increase awareness of child and maternal care practices
- Specific programming should reinforce practical understanding about transition from exclusive breastfeeding to complementary breastfeeding for children aged 3 to 6 months, This period is identified as a nest for under nutrition
- Additional research into early inadequate food initiation practices for Satkhira
- Strengthen homestead food production activities to increase household dietary diversity, especially high protein foods and vegetables to be added into diet along with staples.
- Improve health access behaviour of pregnant women, increasing their knowledge on appropriate supplementation during pregnancy, in order to improve the nutritional status of the mother.
- Strengthen access to quality water and sanitation facilities, including community education campaigns to highlight hygiene behavioural practices
- Promotion of dietary diversification either through the renewed use of home gardens of through community education on crop diversification and appropriate cropping.

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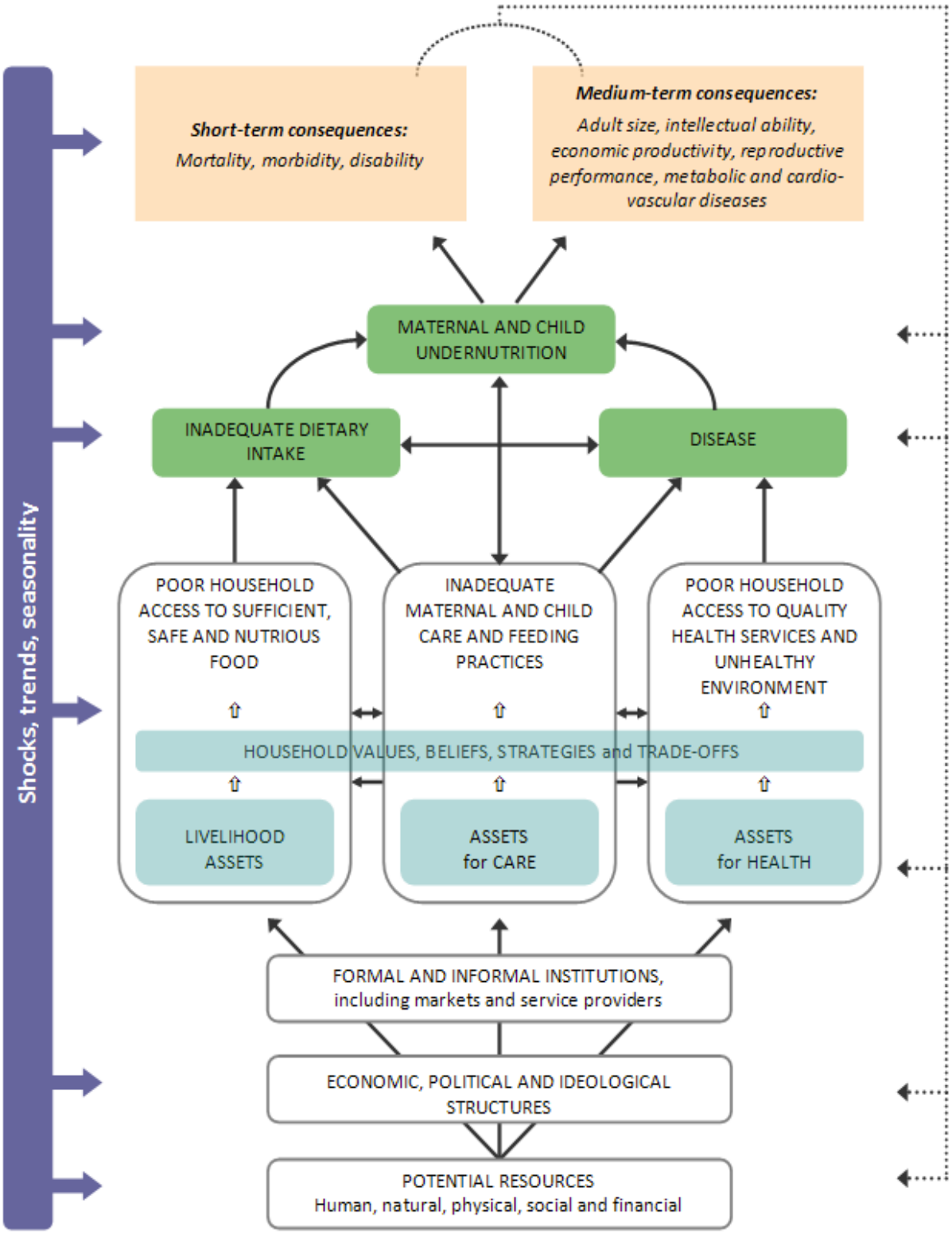
8. Appendices

List of Appendices

Appendix 1: UNICEF Causal Framework, adapted by ACF-INT



Appendix 2: Technical Experts Workshop

Initial Stakeholder Workshop

Agenda:

Topic	Time
Registration of Participants	9:00 – 9:15
Presentation by ACF-INT on study + defining objectives of meeting	9:15 – 10:15
Presentation of problem tree exercise	10:15 – 10:30
Tea break	10:30 – 11:00
Drawing problem tree based on UNICEF framework (groupwork)	11:00 – 13:30
Wrap up session	13:30 – 14:00
Lunch	14:00 – 15:00

List of Participants:

Name	Organisation/Programme
Md. Shafiqul Islam	Save the Children (SHIREE)
Sk Amirul Islam	Shushilan
Md. Abdur Razzaque	TMSS - Satkhia
Sharamin Sultano	Uttaran
Sharmin Shafique	UNICEF
Immanuel Mollah	World Vision
Daniel Halder	World Vision
Ahmed Abdullah	WFP
Mohammed Jakir Hossain	WFP
Abu Hannan	HKI - Satkhira
Suraiya Khatun	HKI - SPRING
Dr Shohel Rana	PCI- PROSHAR
Dr. Ayan Shankar Seal	PCI - PROSHAR
Agneiska Balcerzak	FAO
Tanzina Akter	ACF-INT

Final Stakeholder Workshop

Agenda:

Time	Content
9:00-9:30am	Arrival and Introductions
9:30 – 10:15am	Presentation of NCA methodology and results
10:15 – 11:00am	Questions on results
11:00 – 11:15am	Presentation of workshop objectives and introduction to working groups
11:15 – 11:30am	Break
11:00 – 1:00 pm	Working groups
1:00 – 2:00pm	Lunch break
2:00 – 3:30pm	Presentations per Working Group and Discussions on rating
3:30 – 4:00	Final confidence note and conclusions

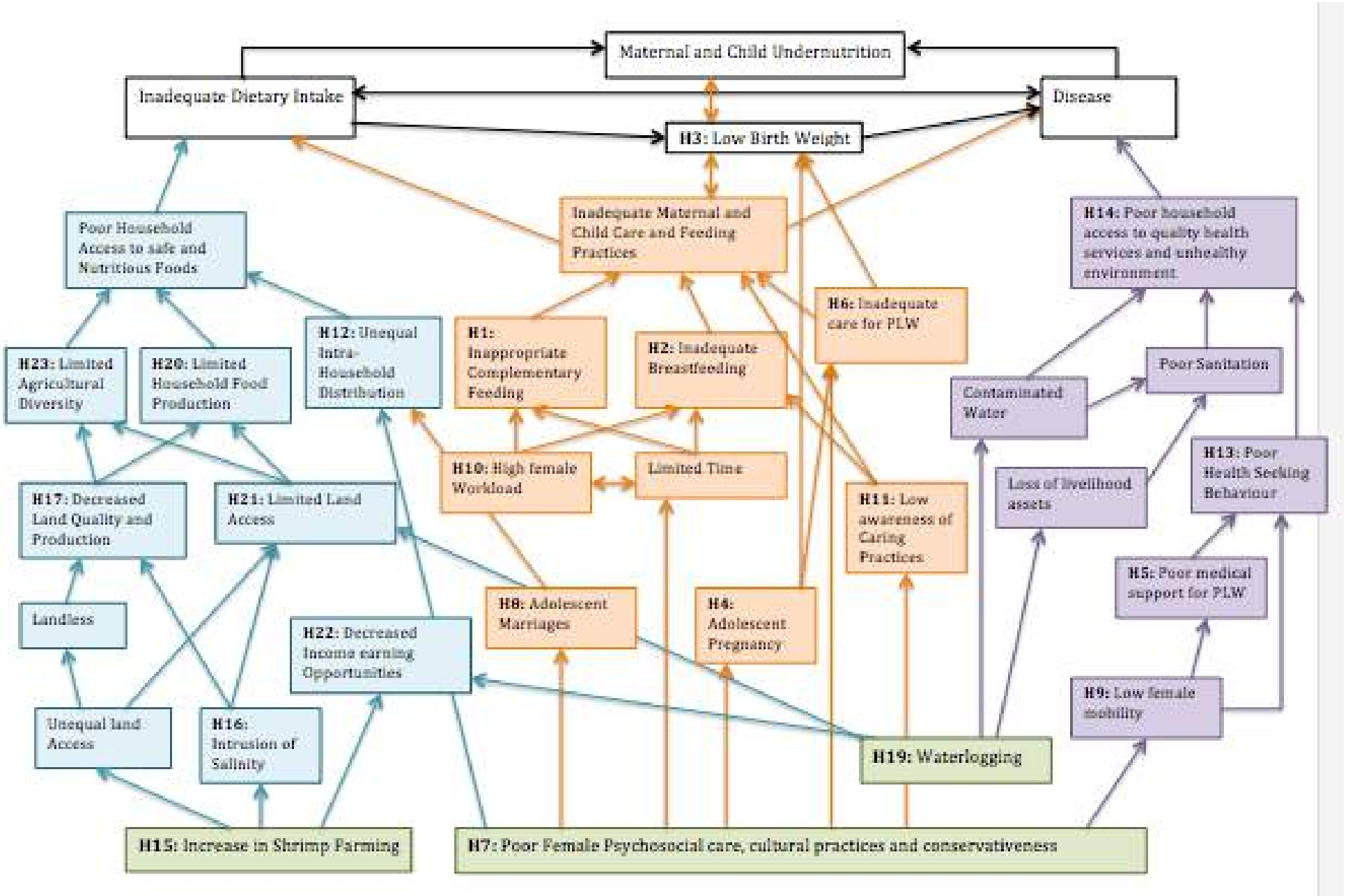
List of Participants:

Name	Organisation
Ruma Khondaker	ACF-INT
Sk. Amirul Islam	Shushilan
Gn. Moniruzzamar	Shushilan
Milton Panday	World Vision – Satkhira
Md. Mahabub Alam	Uttaran
Md. Abdur Razzaque	TMSS Satkhira
Noor Ahmed	Solidarites International
Mahfuz Alam	WFP
Daniel Halder	World vision – Assasuni
Dr. Ayan Shakar Seal	PCI
Aklima Parvin	FAO
Suraiya Khatun Putul	SPRING (HKI)
Asukr Rahnere	WFP
Agneiszka Balcerzak	FAO
Monira Parveen	WFP

Appendix 3: List of Hypotheses and Local Causal Framework Model

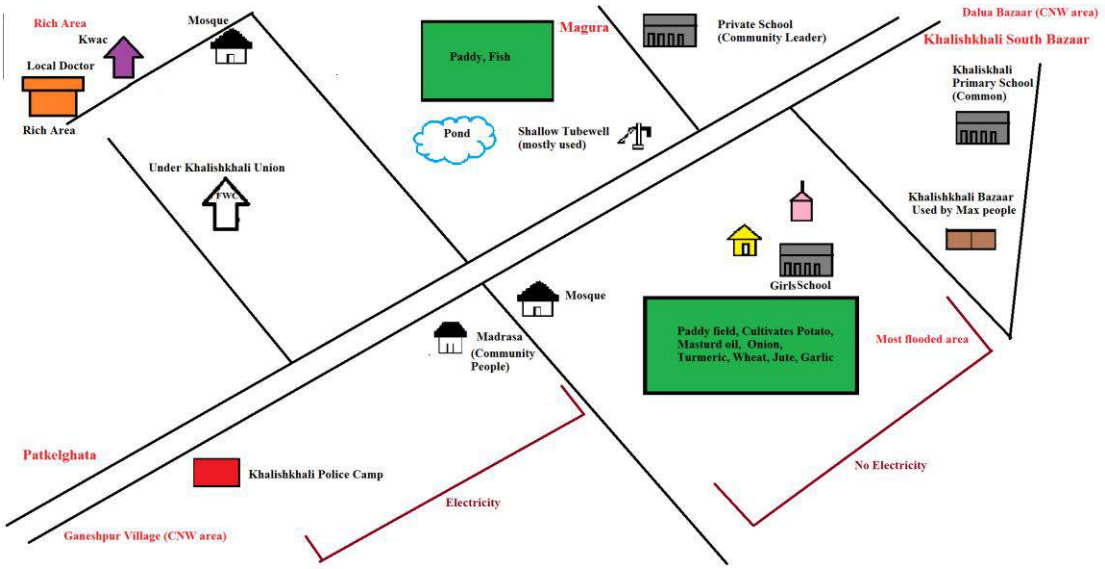
Hypotheses outcome:

1. Inappropriate complementary feeding practices
2. Inadequate breastfeeding practices
3. Low birth weight
4. Early pregnancies
5. Poor medical support for women
6. Inadequate care for pregnant and lactating women
7. Poor psychosocial care for women
8. High rates of adolescent marriage
9. Poor Female mobility
10. High female workload
11. Low awareness on caring practices
12. Unequal Intra-household food distribution
13. Poor Health seeking behaviour
14. Poor Availability and accessibility of high quality health services
15. Increase in shrimp farming
16. Increased intrusion of Salinity
17. Decreased Land Quality and Productivity
18. Increased Migration
19. Waterlogging
20. Limited Household Food Production
21. Limited access to Land
22. Low income opportunities
23. Limited Agricultural Diversity


Maternal and Child Undernutrition
Inadequate Dietary Intake
Disease
H3: Low Birth Weight
Poor Household Access to safe and Nutritious Foods
Inadequate Maternal and Child Care and Feeding Practices
H14: Poor household access to quality health services and unhealthy environment
H23: Limited Agricultural Diversity
H20: Limited Household Food Production
H12: Unequal Intra-Household Distribution
H1: Inappropriate Complementary Feeding
H2: Inadequate Breastfeeding
H6: Inadequate care for PLW
Contaminated Water
Poor Sanitation
H10: High female Workload
Limited Time
H13: Poor Health Seeking Behaviour
H17: Decreased Land Quality and Production
H21: Limited Land Access
H11: Low awareness of Caring Practices
Loss of livelihood assets
H5: Poor medical support for PLW
Landless
H8: Adolescent Marriages
H4: Adolescent Pregnancy
H22: Decreased Income earning Opportunities
H9: Low female mobility
Unequal land Access
H16: Intrusion of Salinity
H19: Waterlogging
H15: Increase in Shrimp Farming
H7: Poor Female Psychosocial care, cultural practices and conservativeness

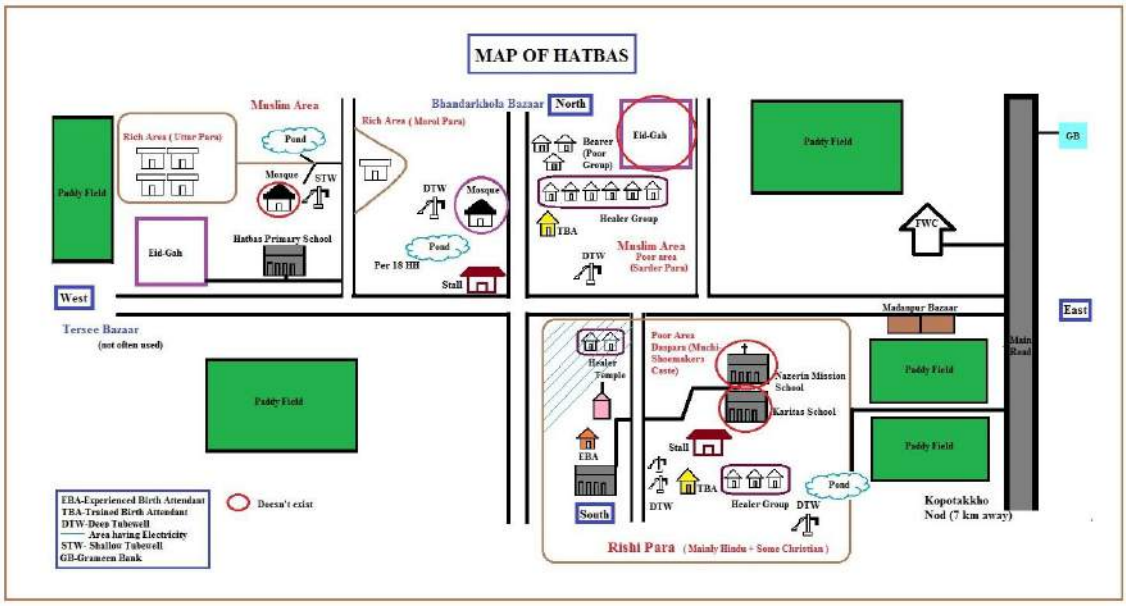
Appendix 4: Study Area Description

Enayetpur:



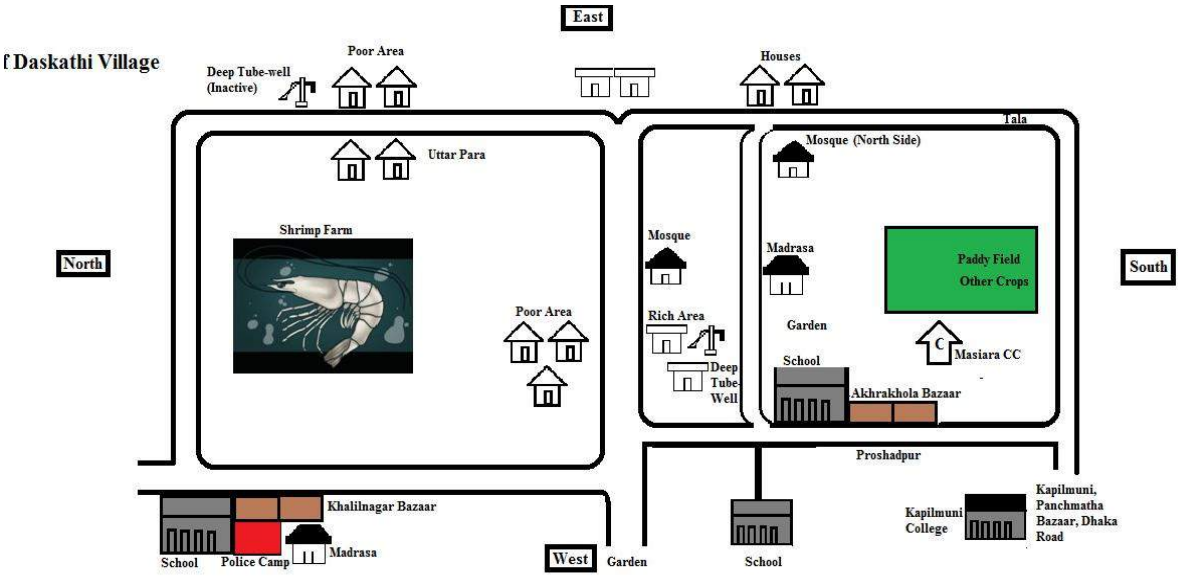
Livelihoods	Facilities	Groups	"Main Problems"
Agriculture (Rice, Jute, Turmeric, Pulse…) and some aquaculture (rich – fish, prawns)	Village: School, STWs, no electricity (poor). Nearby: Khaliskkhali: Bazaar and FWC;	Mainly Muslim, 1 Hindu HH	No DTW.

Hatbas



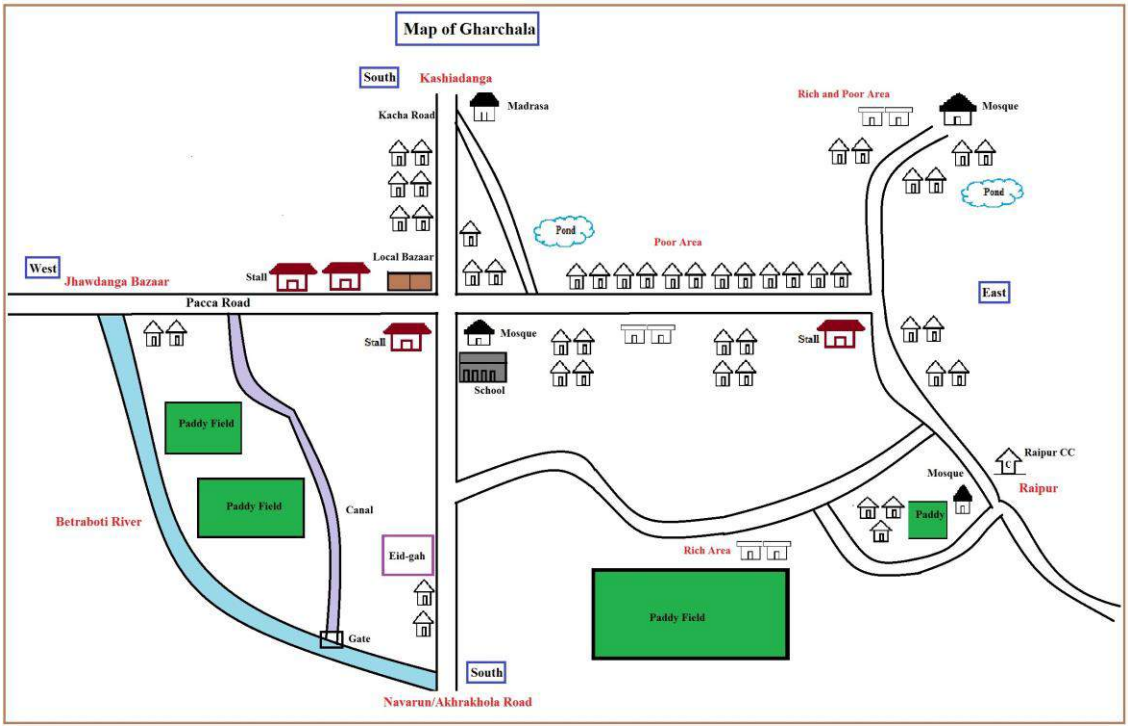
Livelihoods	Facilities	Groups	"Main Problems"
Agriculture (Rice, 2 times/year) and Some Aquaculture (fish - Rich)	Village: DTW, Primary School, Trained TBA. Nearby: Madanpur - Bazaar and FWC;	Hindu (Rishi) and Muslim groups, separated	Illiteracy; lack of sanitary latrines, child labour (no high school), waterlogging, poor work opportunities

Daskati



Livelihoods	Facilities	Groups	"Main Problems"
Aquaculture – 80/90% (shrimp) and some agriculture - 10/20% (rice, potato, cauliflower…)	Village: Only Kaomi Madrassa (school), STW.	100% Muslim (Nikari – fishermen)	Illiteracy, clean water access, Salinity, waterlogging, unemployment (10% own land), early marriage

Garchala



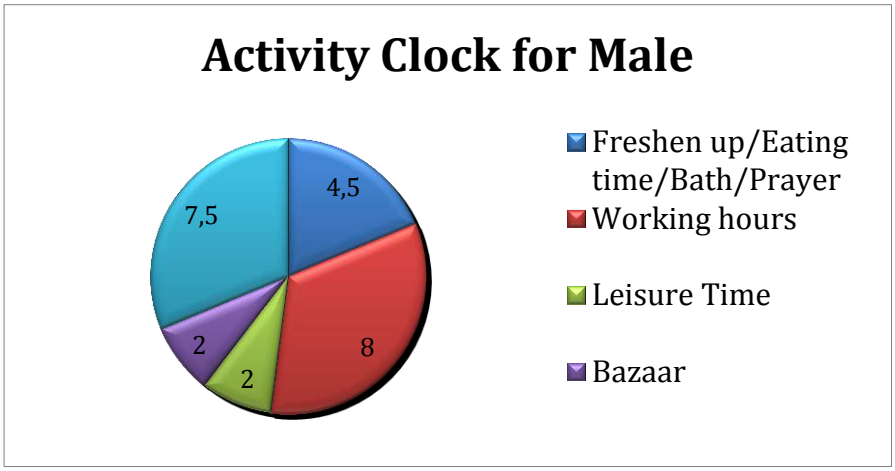
Livelihoods	Facilities	Groups	"Main Problems"
Aquaculture (fish) and Agriculture (rice – once a year)	Village: School	Muslim community	Waterlogging, Clean water access, illiteracy, corruption

Appendix 5: Perceptions of Malnutrition

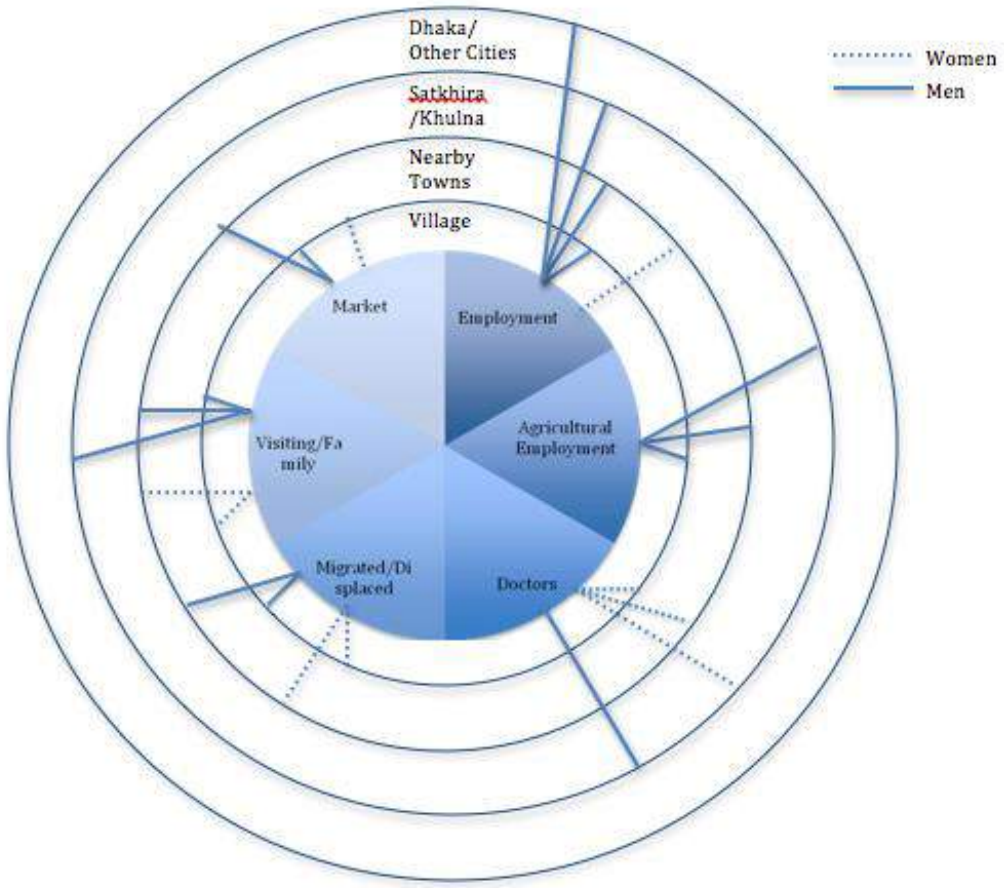
	Enayetpur	Hatbas	Daskati	Garchala
Causes of Undernutrition	• Increased use of fertilizer, pesticides and formalin decreasing food quality • Poor personal hygiene and sanitation • Lack of food: both diversity and quantity, especially for children. • Frequent illnesses • Poor water quality from tube wells: iron contaminated • Poor dietary intake during pregnancy • Addiction in the communities such as Betel leaf and cigarettes (depriving money for food for example) • Prolonged breastfeeding (leading to maternal malnutrition) • Early marriage and early pregnancy • Morning sickness • Decreasing land quality has led to poor production. • Illiteracy leading to negligence of child and maternal care practices • Short birth spacing	• Insufficient food • Inadequate food intake in pregnancy • Contaminated water • Lack of sleep and hard work (maternal malnutrition) • Early marriages and pregnancy – don't have the knowledge on childcare. • Sick parent • Poor food quality due to increased use of fertilisers and formalin, impacting also the effectiveness of medication.	• Poor child appetite • Not consuming breastmilk • Not eating enough fish • Frequent illnesses and diseases such as dysentery • Morning sickness during pregnancy • Poor feeding practices during lactation • Poor food diversity • Spiritual curse • Poor personal hygiene	• No vaccinations • Poor personal hygiene and sanitation • Poor dietary intake of mother in pregnancy • Low amount of amniotic fluid in pregnancy • Poor digestion of foods by child • Decreased quality of food due to poisonous fertilisers • Child consuming only breastmilk • Poor income opportunities • Intestinal worms • Poor crop diversity: Only harvest once • Waterlogging due to low land and bad drainage system • Moist environment due to waterlogging: child gets sick • Poor vegetable consumption
Characteristics of Undernutrition	• Various, frequent illnesses (coughs, colds indicate unhealthy child) • Jaundiced child • Thinness, poor eyesight and abnormal growth (late walking) • Poor child appetite • Child appearance (distended stomach)	• Child appearance: thin, short, sunken eyes, blackened skin • Poor appetite • Poor eyesight • Increased stubbornness and frequent whining • Child apathy • Frequent illnesses	• Late development: walking, talking leading to disabilities • Lethargies and apathy • Child appearance: thin, poor eyesight, loss of hearing • Increased stubbornness and frequent whining	• Lethargy and weakness • Poor appetite • Increased illnesses • Change in child appearance: thing legs and arms, sunken eyes • If eat little and defecate a lot. • Increased stubbornness and frequent whining • Developmental problems: stutter and late walking.

Treatment	• Consult CNW • Go to the community clinic to get weighed (pregnant women) • Get nutritious foods from Shushilan • Go to local healers • If weight does not increase, go to Satkhira child hospital (private) and buy syrup and vitamins	• Consume vegetables, colocassia, imported fruits, fish, eggs, meat, milk, chicken hearts and fat. • Go to private clinic for urine test.	• Go to Kobiraj for spiritual healing • Go do local doctors, kwak and Huzur • If no improvement, go to private hospital in Tala.	• Seek health care advice: First go to Kwak then to Satkhira sadar private health centre, then Khulna. • Buy vitamin pills and syrup from local doctor • Some children might need blood transfusions. • Obtain nutritious foods from Shushilan

Appendix 6: Male Activity Clock



Appendix 7: Mobility Maps



Appendix 8: Data Collection Plan

Topic A. Introduction and Background of Village:

Objectives

- Introduce the purpose of the study and obtain permission to work in the community
- Obtain an overview from gatekeepers opinions on the malnutrition perception and causes
- Gain assistance in recruiting participants.

Methodology and Activities

1) Gatekeeper discussions: - Key Informant Interviews

a) Government Representatives
b) Village leaders
c) CNW's and Health Workers
d) Teachers?
e) NGO workers
f) TBA's
g) Religious leaders
h) Other Key influential persons in village

General Questions to cover:

- Description of study
- What are the main problems of the village?
- What are the services available?
- Main problems of village?
- NGO's working in the village
- Services available

2) Village Questionnaire

Fill in with village leader alongside doing the transect walk?

- Services available?
- Distance to services?
- History of village- big disasters, main constraints the village faces

3) Transect walk

Duration 1-2 hours
With Whom 1 or 2 main community members

Main objectives of exercise:

- What kind of environment do children/PLW live in (ponds, roads, water situation, wells)
- How <5 interact with environment
- Population density, minority groups
- Location of shops – and check what they sell
- Location of market – and what available?

- What is grown in the village

Steps for the transect walk:

- Select a road or neighbourhood together with community members
- Take a slow walk down the road selected with community members
- While walking, observe environment, hygiene, sanitation, water, and agricultural conditions. Also observe the care practices – are children playing around, who with etc
- Interact with people and hold casual conversations
- Create a chart with all the information gathered – use in **FGDA**

4) Focus group discussion A – Village mapping and history

Duration	1 – 1.5 hours
With Whom	Village leaders, fathers, mothers, CNWs, others
Materials	Flip chart, markers, pens, various objects etc

Main objectives of exercises:

- Location of community resources and services, where the most vulnerable live
- Distance to health services etc
- History of village
- General problems and constraints

Steps for the village mapping:

- Find suitable location for FGD
- Explain why you want to do the map and how the results are used
- Ask for a volunteer to draw – community leader or someone. Put the paper on the ground (?)
- Encourage participants to draw the village map – using different colours for different areas or specific resources, or different objects as needed
- Prompt with questions when getting quiet

Probing Questions:

Health: Where do the TBA's live? How many are there? Other traditional healers? Where are the clinics? Where do CNWs or community health workers live?

Water: What are the wells available?

Sanitation: communal sanitation facilities – where are they?

Recreational activities: For the men? For the women? For the children?

Administrative buildings – Where located? Police?

Schools: Where are they? Madrassa? Any children not attending school?

Food: Where is the market? Food stalls? Snack shops?

Occupation: Where do the poor people live? What are the main occupations?

Ethnic/social groups: Different groups? Where do they live?

Religious buildings location

Steps for historical recall:

- Using the map as a basis, discuss how the situation differed 10 years ago and 5 years ago
- What are the differences and what has happened
- Note, negative and positive changes possible

Probing Questions:

- When were services built?
- Who built them?
- Waterlogging situation? Where does it affect? How often does it happen? Has it changed over the years?
- Sanitation and Arsenic?
- What are the factors that have come up in the last decade?

Outputs from Topic A
Village questionnaire
Services available
Distance to services
Social/Village map
Overview on the village –
Key points in history,
Participatory map of village
Historical Change

Topic B. "Perceptions of Undernutrition"

Objectives

- Develop an understanding of how individuals describe good nutrition and malnutrition,
- Gain an understanding of the ways in which malnutrition manifests itself in the community, their beliefs about its causes and consequences
- Document what is 'normally' done to prevent and treat malnutrition

Target group:

- Women <5 identified by village leader/CNW
- Men in Households with children <5, as identified by village leader/CNW

Methodology and Activities:

1) Focus Group B: "Perceptions of Undernutrition" (per strata)

Duration	1 hour per group
With Whom	Mothers for children <5
	Fathers of children <5
Materials	Flip chart, markers, pens etc

Main objectives of exercises:

- What is the understanding of malnutrition?
- What is the understanding of what causes malnutrition?
- What is normally done to prevent/treat malnutrition?
- What is the experience regarding nutrition in the village?
- What are the terms used for malnutrition?
- What are the locally-held knowledge of malnutrition?
- What are the beliefs on what causes malnutrition?

Discussion on "perceptions of undernutrition":

- Introduce the purpose of the coming few sessions

- Write down definitions in local terms for:
    - Nutrition
    - Healthy
    - Malnutrition
- Ask what it means to be malnourished?
- Ask each to come up with causes of malnutrition – compile and discuss

Probing Questions:

- Describe some of the characteristics of "normal" growth and development of a child.
- How do you distinguish a child that is growing and developing normally from one that is not?
- What are some reasons why an infant may grow or develop abnormally? (probe for references to malnutrition)
- Where did you learn this definition of a healthy child?
- How do you know when an infant is malnourished?
- What do you do to prevent an infant from becoming malnourished?
- What do you do when an infant becomes malnourished?

Causal Pathway:

At the end of this session, with each group, draw the causal pathway as described by them on the causes of undernutrition. Probe for basic, underlying as well as the immediate causes together.

Outputs from Topic B
Narratives: Characterisation of local understandings of malnutrition/nutrition What is the knowledge in the community about cause of malnutrition? What are the practices of when someone becomes malnourished? Comparison on the knowledge and beliefs of women in **different socio-economic strata**.
Definition and local terminology: Nutrition Health Malnutrition
Generic causal pathway outline Beginnings of an outline of the understanding of causal pathways of malnutrition. Questions of what needs to be explored further in thematic FGD.

Topic C: Care Practices Factors

Objectives

- Understand the care practices of the village (ie. typical knowledge, attitudes, practices, and resources);
- Determine which, if any, are perceived to be a challenge for childcare practices and good nutrition.
- Document whether/how respondents feel that care practices lead to malnutrition outcomes.
- Understand how practices have changed over time and with seasons.

- Prioritisation of factors
    - Which causes are believed to be prevalent (affect many people),
    - Which causes are believed be *severe*,
    - Which causes are likely to be modifiable given community knowledge and resources.

1) Key Informant Interviews "Care Practices"

a) ***CNW/Health Worker:*** ask key informants to describe how these factors, and their consequences, have changed over some meaningful historical period of time.
- What is the experience regarding childcare practices which are practices in the village?
- What are the locally-held knowledge of Care Practices?
    - Initiation of breastfeeding? Colostrum? When do people generally start complementary feeding? Frequency and amount of complementary feeding?
- How have the care practices changed over time?
    - Are there big events that hampered/aided care practices status?
- Are there times in the year when care practices are poor?
    - What causes it?
    - Does it affect everyone?

b) ***Village Leader***: asking a key informant to describe how these factors and their consequences have changed over some meaningful historical period of time.

2) Focus Group C: "Care Practices"

Duration	3.5 hours
Activities	Matrix on Complementary Feeding Practices (1Hr)
	BREAK
	Discussion on Breastfeeding Practices (30 Mins)
	Discussion on Snacking behaviour (30 Mins)
	WAKE-UP EXERCISE
	Daily Activity Chart for Women's Workload (45 mins)
	Seasonal Calendar for Care Practices Factors (30 mins)
	Historical Timeline
With Whom	Mothers for children <5
Materials	Flip chart, markers, pens, printed pictures of food etc

Target group:
- Women <5 as identified by village leader/CNW

<u>*Main objectives of exercises:*</u>
- What are the practices regarding prelactate and colostrum intake by the newborns
- What are the current practices regarding breastfeeding?
- What are the practices regarding complementary feeding? What is the typical diet of a 1 and 2 year old – the frequency, the amounts etc.
- Are there food taboos for children? For PLW?
- What are the problems faced when introducing complementary foods?

- What do people do when child has no appetite – is responsive feeding practiced?
- Is there a special diet for sick children?
- Women's workload and daily activities

Steps for the matrix:

- Have a tray of foods with examples of local food if possible? Otherwise tools that depict them….
- For each foods available for children, have the participants go through them and tell them what they know about each food. Note them down.
- Create a matrix (below) with the questions: "what are the foods usually fed for children 0-3 months, 4-6 months etc", "how much", "how often"?
- Also hold a discussion on what is NOT recommended and why
- How is the child fed?
- Conclude with a discussion what happens (if anything) when child sick and recovering
- Finally talk about what the women needs to eat and how much when pregnant and lactating

Child's age	Food Given (including breastmilk)	Amount	Frequency	Food Taboos	When child sick and when child recovering	Problems experiences	Method of giving food	Method of cooking	Sit 5 ag
Newborn									
0-3 months…									
….different age groups									
When Pregnancy									
When Lactating									

Intrahousehold Food Distribution Discussions:

- Hold a discussion on eating patterns in households – who eats first? What do they eat? How? Then who…how…what….Then….?
- Ask each woman what they ate in the last 24 hours….when,…how
- When did they cook for each of the meals?

Vitamin-rich foods:

Ask each participant to name, separately, 3 vitamin rich foods which are good for the child

Additional Discussions and Probing Questions:

After the break, use the matrix as a springboard into a discussion on breastfeeding practices:

- When do women start breastfeeding?
  - Probe: How soon after delivery?
- Apart from breastmilk, what other liquids or foods are given to newborns?

- What is your opinion on colostrum?
    - Probe: What do women usually do with colostrum in the community?
    - Probe: What is colostrum?
- What happens when the mother is sick?
- When the mother does not have enough milk, what does she do?
- Is it common that mothers don't have enough milk?
- What foods are considered good if the woman eats for breastmilk production?
- When is milk considered bad?
- When you have problems about breastfeeding, who do you ask for help?
- What do women do if they have to leave the infant (< 4 months) for half a day? For a day?
- What are vitamin rich foods? What is good for the child?

Discussion on Snacks:

- Ask each caregiver what the child's favourite snack is and how much each costs – display this out with paper, and frequency of snacking – make in piles per caregiver
- Compare snack spending with other household foods
- Discuss with participants on which are the most nutritious snacks and why

Steps for Daily Activity Chart

- Ask women to chart, for a typical day, a typical household, the activities the women will do in the day.
- Ask whether this has changed in the last 5 years?
- How does this change during pregnancy?
- How does this change with a small child? Who helps?
- Fill in the chart and matrix below:

	Women	PLW	Women with children <6 months	Men	Situation 5 years ago?
Daily Activities (24 hours)					
Who support					
– where?					
When?					
How?					

Probing Questions:

- What time generally do you wake up?
- What is done first?
- What is generally done next…and then…and then?
- What time generally do women finish their activities?
- What time do you have free? What do you do then?
- Where leave children when doing tasks away from home?

- Who helps you?

Seasonal Calendar on Care Practices:

- List the key factors that emerged during the discussion and use as basis for developing **nutrition risk factor calendar**
- Describes how those factors may or may not change seasonally.
    - Use **proportional piling techniques** to show which months of the year these factors are more/less a problem.
    - Describe what happens in those months, when things improve/get worse and what causes the changes

Historical Timeline using risk-factor timeline:

- Identify a normal year and draw horizontal line to represent that year.
- For EACH FACTOR, plot above or below over the course of 10 year.
- Must explain why they thought the trends were occurring.

Outputs from Topic C
Narratives: Narrative that describes the knowledge, attitudes and practices relating to care practices that are common to the community
Matrix on Complementary Feeding
Activity Log for women
List/Problem Tree and Description: The challenges/constraints (risk factors/causes) that respondents feel may impede their definition of optimal care practices Explain the relationships among the factors listed. Include information on how these factors are believed to relate or not to food intake, disease and malnutrition Note differences to the UNICEF model and first FGD on the perceptions of malnutrition
Seasonal Care Practices Calendar and narrative to describe explanation for trends
Historical timeline of the different factors: and narrative to explain. Inform, by season, the main constraints and event for a typical household.
Visual description of the ***rating results*** and narrative

Topic D: Food Security and WASH Factors

Objectives

- Understand the food security and WASH situation of the village (ie. typical knowledge, attitudes, practices, and resources);
- Document what respondents believe to be the main constraints (if any) to achieving optimal food security, Water and Sanitation for their children and the interrelationships among these constraints
- Document whether/how respondents feel that food insecurity and WASH lead to malnutrition outcomes.
- Understand how practices have changed over time and with seasons.
- Prioritisation of factors

    - Which causes are believed to be prevalent (affect many people),

- Which causes are believed be *severe*,
- Which causes are likely to be modifiable given community knowledge and resources.

1) Key Informant Interviews "Food Security"

a) ***CNW/Health Worker:*** ask key informants to describe how these factors and their consequences have changed over some meaningful historical period of time.
- What is the experience regarding food security/WASH in the village?
- What are the locally-held knowledge of Food Security/WASH?
- How has Food Security/WASH changed over time?
  - Are there big events that hampered/aided food security?
- Are there times in the year when food insecurity/Water/Sanitation inaccess is high? Does it affect everyone?

b) ***Village Leader***: asking a key informant to describe how these factors and their consequences have changed over some meaningful historical period of time.

c) ***Other Key Informant Interviews***

2) Focus Group D: "Food Security and WASH"

Duration	3 hours
Activities	Land use mapping including Waterlog (1Hr) Mobility mapping (45 mins) **BREAK** Seasonal Calendar (30 mins) Historical timeline
With Whom	Mothers for children <5 Fathers with children <5
Materials	Flip chart, markers, pens etc. Draw out the standard village map

Target group:
- Women <5 as identified by village leader/CNW
- Fathers <5 as identified by village leader/CNW

Main objectives of exercises:
- Consequences of Shrimp Farming
- Impact of Waterlogging

Land use mapping:

Use the outcome of the village mapping exercise, on a number of maps locate various services and land use patterns:

- Agricultural activities including aquacultural activities (historically and now)
- Sanitation facilities
- Water points – different types
- Waterlogging areas – when there is waterlogging (historically and now)
- Common productions from:
  - Vegetable gardens (historically and now)
  - Land in village (historically and now)
  - Land outside village (historically and now)

Probing Questions:

- Land quality – where is the best land quality
- Why in others is the land quality poor? Why is the land quality good?
- How has productivity changed in the last decade?
- Estimate how many have household gardens?
- What is commonly grown in household gardens?
- Who buys the shrimp?
- Who buys the rice?

Discussions on Shrimp Farming

- What has been the impact of shrimp farming?
    - When did they come?
    - What has happened since?
- Who is involved in the Shrimp farming?

Discussions on Waterlogging:

- What do people do when there is waterlogging?
- Normally how many sanitation facilities get underwater?
- How many Water points become unusable?
- Where do you have to go collect your water?
- What do children do when there is waterlogging? How do the practices change?

Mobility Mapping Activity:

- Encourage participants to draw a mobility map for where they have been in the last year (individually)
- Combine these to have a mobility map for the women with the following issues included:
    - Places visited
    - Purpose of visit
    - Duration of visit
    - Frequency of visit

  Probing Questions:
    - Do people tend to migrate? Who in the village is more likely to migrate?
    - Why do people migrate?
    - How long do they migrate for? Draw Calendar of migration….
    - What do the people who are left behind do? Try to probe about additional mental stress…

Seasonal Calendar on food security/WASH:

- List the key factors that emerged during the discussion and use as basis for developing **nutrition risk factor calendar**
- Describes how those factors may or may not change seasonally.
    - Use **proportional piling techniques** to show which months of the year these factors are more/less a problem.
    - Describe what happens in those months, when things improve/get worse and what causes the changes

Historical Timeline: using risk-factor timeline.

- Identify a normal year and draw horizontal line to represent that year.
- For EACH FACTOR, plot above or below over the course of 10 year.
- Must explain why they thought the trends were occurring.

Outputs from Topic D
Narratives: Narrative that describes the knowledge, attitudes and practices relating to Food security that are common to the community
Land use and Waterlogging mapping
Mobility Mapping
List/Problem Tree and Description: The challenges/constraints (risk factors/causes) that respondents feel may impede their definition of optimal Food Security/WASH access and use Explain the relationships among the factors listed. Include information on how these factors are believed to relate or not to food intake, disease and malnutrition Note differences to the UNICEF model and first FG discussion on the perceptions of malnutrition
Seasonal Food Security Calendar and narrative to describe explanation for trends
Historical timeline of the different factors: and narrative to explain. Inform, by season, the main constraints and event for a typical household.

Topic E: Health Factors

Objectives

- Understand the health situation of the village (ie. typical knowledge, attitudes, practices, and resources);
- Determine which, if any, are perceived to be a challenge for achieving optimal child health and the interrelationships among these constraints.
- Document whether/how respondents feel that health lead to malnutrition outcomes.
- Understand how practices have changed over time and with seasons.
- Prioritisation of factors
    - Which causes are believed to be prevalent (affect many people),
    - Which causes are believed be *severe*,
    - Which causes are likely to be modifiable given community knowledge and resources.

1) Key Informant Interviews "Health"

a) ***CNW/Health Worker:*** asking a key informant to describe how these factors and their consequences have changed over some meaningful historical period of time.

- What is the experience regarding health practices in the village?
- What are the locally-held knowledge of Health Practices and needs?
    - Health seeking behaviour?
        - What do people do when a child is sick?
    - Main illnesses for children <5?
    - Main cause of death for children <5?
- How has the Health status of children changed over time?
    - Are there big events that hampered/aided health status?
- Are there times in the year when illnesses are high?
    - Does it affect everyone?

b) ***Village Leader***: asking a key informant to describe how these factors and their consequences have changed over some meaningful historical period of time.

2) Focus Group E: "Health"

Duration	2 hours
Activities	Venn diagram of health seeking behaviours (1hr) **BREAK** Discussion on Childbirth (30 mins) Seasonal Calendar (30 mins) Historical timeline
With Whom	Mothers for children <5
Materials	Flip chart, markers, pens, paper circles of different colour and size

Target group:

- Women <5 as identified by village leader/CNW

Main objectives of exercises:

- Health Seeking practices during pregnancy
- Female Mobility regarding healthcare
- Traditions around pregnancy and delivery (including birth weight)
- Contraceptive use

Health Seeking Practices:

- Ask participants who/where they go to for help when sick and when pregnant. Make a list of everyone mentioned
- Cut the coloured paper in 3 different size circles – most important to least important. Numerous papers
- Have participants chose which circle to assign a person/institution according to the usefulness of the person/institution
- On a flipchart, draw a dot representing the person, and place the circles according to the frequency they see the person -> the closer to the "me circle" its placed, the more frequent the visit.
- For each of the people, ask what kind of help they seek, and why.

Discussion on Mobility/Decision making regarding health care:

- Who decides what to do when there is a health problem at home?
- Until what stage in pregnancy do you go far from home?
- Who goes with you?
- Contraception: Who decides?

Discussion on Childbirth:

- What problems are faced during childbirth that you know about?
- How do people lessen these complications?
- Average age people usually give birth – what are the complications associated with this?

Seasonal Calendar:

- List the key factors that emerged during the discussion and use as basis for developing **nutrition risk factor calendar**
- Describes how those factors may or may not change seasonally.

- Use **proportional piling techniques** to show which months of the year these factors are more/less a problem.
- Describe what happens in those months, when things improve/get worse and what causes the changes

Historical Timeline: using risk-factor timeline.

- Identify a normal year and draw horizontal line to represent that year.
- For EACH FACTOR, plot above or below over the course of 10 year.
- Must explain why they thought the trends were occurring.

3) Health Centre visit:

- Visit health centres and assess:
  - What is available as treatment there?
  - Staff at the Health Clinic? What is the workload?
  - Functionality of clinic? How many? Coverage area? Personnel?
  - What is the working pattern?
  - Data available – possible to get? Low Birth Weight, Malnutrition in centres….major illnesses etc
  - What state are the record books in? Is data collected and compiled as needed?
  - What is the advice given to pregnant – first trimester, second trimester, third? Postnatal? Lactating women?
    - What is the advice given/what support is given if a woman has difficulty lactating?

4) Key Informant Interviews with TBA/Traditional Health Workers:

- What is available as treatment there?
- How many? Coverage area? Personnel?
- What is the working pattern?
- What is the advice given to pregnant – first trimester, second trimester, third? Postnatal? Lactating women?
  - What is the advice given/what support is given if a woman has difficulty lactating?

Outputs from Topic E
Narratives: Narrative that describes the knowledge, attitudes and practices relating to health that are common to the community
Venn diagram on Health Seeking Practices for PLW
Health Centre visit
List/Problem Tree and Description: The challenges/constraints (risk factors/causes) that respondents feel may impede their definition of optimal health Explain the relationships among the factors listed. Include information on how these factors are believed to relate or not to food intake, disease and malnutrition Note differences to the UNICEF model and first FGD on the perceptions of malnutrition
Seasonal Health Calendar and narrative to describe explanation for trends
Historical timeline of the different factors: and narrative to explain.

Inform, by season, the main constraints and event for a typical household.

Topic F: Miscellaneous Factors

1) Case Histories:

- In-depth case histories from 2-mothers of malnourished children and 2 of well-nourished children.
  - Food security, WASH, Health and Care Practices factors that have been identified in the FGD's

2) Focus Group F: Female Empowerment Factors:

Duration	1 hour per group
Activities	Decision making matrix (30mins) Access to and Control over matrix (30 mins)
With Whom	Mothers for children <5 Grandmothers? Older women? Mothers in law?
Materials	Flip chart, markers, pens etc. Draw out the standard village map

Objectives of exercise:

- Decision making in the household
- Access and Control over Resources
- Probe more on gender issues obtained from previous Focus Groups

Steps for Decision Making Activity:

- List all the key areas of decisions at he household level
- What are the areas they take independent decisions
- What are the decisions taken as a family?
- What are the areas they seek husband's permission?
- What are the areas where they seek others permissions? Who?
- What are the decisions that you feel supported on?
- Has decision making changed in last 5 years? Why?
- Fill in a matrix on decision making power and influence (below)

Key areas of decision making	**Independent decisions**	**Decisions made as family**	**Decisions need husband permission**	**Decisions need others influence**	**Decisions feel supported on**
- - -					

Steps for Access to and Control over resources:

- Ask the group to list the resources at family/household level and community level and what there are
- For each, tick for men or women, who has more access to the resources.

Access to Resources		
Women	Resource (Family/Household)	Men
Tick	List resources here…	Tick

Control over Resources		
Women	Resource (Family/Household)	Men
Tick …		Tick

Access to Resources		
Women	Resource (Community Level)	Men
Tick	List resources here…	Tick

Control over Resources		
Women	Resource (Community level)	Men
Tick		Tick

Discussion on traditions of marriage:

- What are the traditions on marriage?
- Who decides who marries who?
- What is the normal age for marriage?

3) Focus Group G: "Prioritisation of Factors"

Duration	1 hour per group
Activities	Ranking exercise
With Whom	Mothers for children <5
Materials	Flip chart, markers, pens etc. List of the factors impacting malnutrition discussed already in past discussions

Objectives of exercise:

- Ranking exercise of the factors affecting malnutrition

Steps for prioritisation exercise:

Before this exercise is done, compile all the factors that have been discussed in all the FGD's. Discuss with the FGD whether these are still acceptable/true and hold a further discussion if needed. Finally, rate these factors.

Through a **pile sorting [rating] exercise**: to rate factors discussed in focus groups according to how big a constraint they are for their child's well-being

- Ask participants to rate factors on a scale of 1 – 10. Read out loud each factor, then write or draw them (ask a member?)
    - Step 1: Which causes are believed to be prevalent (affect many people),
        - For each factor, place 1-10 stones (10 it affects everyone, 1 meaning affects no one)
        - Ask WHY each rating was chosen
    - Step 2: Which causes are believed be contribute to malnutrition
        - For each factor, place 1-10 stones (10 factor is very, 1 is not not at all)
        - Ask WHY each rating was chosen

Outputs from topic F
In depth case histories
Decision Making Matrix
Access to and Control of resources Ranking
Visual description of the ***rating results*** and narrative
Narratives: In-depth case histories from malnourished and never-malnourished children

Discussions with other participants/on issues that need more in-depth time

Appendix 9: Preliminary Secondary data compilation

No. 1: Preliminary Secondary Data

		Country Level	Regional Level: Khulna	District level: Satkhira
Malnutrition	WHZ (Wasting)	15.6% (2011, BDHS)	12.4% (2008, BHFSNA report)	7.8% (SMART ACF-INT, 2012). 11.9% (FSL/WASH survey, Oct 2013). SMART 2013 to be done
	WHZ (Wasting) severe	4% (2011, BDHS)	2% (2008, BHFSNA report)	1.1% (SMART ACF-INT, 2012). 0.6% (FSL/WASH survey, Oct 2013)
	HAZ (Stunting)	41.3% (2011, BDHS)	40.1% (2008, BHFSNA report)	33.7% (SMART ACF-INT, 2012) 31.1% (FSL/WASH survey, Oct 2013)
	HAZ (Stunting) Severe	15.3% (2011, BDHS)	14.6% (2008, BHFSNA report)	9.3% (SMART ACF-INT, 2012) 7.9%(FSL/WASH survey, Oct 2013)
	WAZ (underweight)	36.4% (2011, BDHS)	29.6% (2008, BHFSNA report)	23.6% (SMART ACF-INT, 2012) 28.3% (FSL/WASH survey, Oct 2013)
	WAZ (underweight) severe	10.4% ((2011, BDHS)	6.9% (2008, BHFSNA report)	5.1% (SMART ACF-INT, 2012) 4.7% (FSL/WASH survey, Oct 2013)

No. 2: Preliminary Secondary Data - Immediate Causes

		Country Level	District Level
Inadequate dietary intake	HDDS	"Little diversity even at national level. Rice accounts for 68% of total calorie consumption (BDHS, 2005) and, despite it being poor source of protein, provides 50% total protein cons.	7.6 Food Groups average, 100% rice, oil, meat 21.1.% meat (SMART ACF-INT 2012
	HFIAS (HH Food Insecurity Access Scale)	52% (Dec. 2012, HKI FSNS R9)	
	FDS (Food Deficit Scale)	15% (Dec. 2012, HKI FSNS R9)	
	MAHFP		
	Daily gross calory intake	16.8% Below minimum level of dietary energy requirements (NLIS, 2011)	
Diseases	ARI (U5)	6% (BDHS, 2011)	73.6% (SMART ACF-INT, 2012)
	Fever	36.5% (BDHS, 2011)	

	Diarrhea (U5)	5% (BDHS, 2011)	
	Anaemia	70% (HKI ,2006); 68% 6-11mo (Ahmed, 2012) - 2004, NLIS. 51.3% anaemic (BDHS, 2012) Anaemia amongst young infants found to be as high as 90% and high at 6-11 months reflects the poor iron stores among children at birth (Sen et al, 2010)	65% Pregnant and 59% non-p anaemic (REACH, 2011). Majority of children 6-35months are anaemic (REACH, 2011)
	HIV (15-49)	Low prevalence country	

No. 3: Preliminary Secondary Data - Underlying causes

		Country Level	District Level
Inadequate access to food	Periodic food shortage	70% pulses imported (iied), food grain gap of 1-2M tonnes. Access is the hurdle (Mainuddin et al, 2011: MDR Progress report) "Poor are seen as more price responsive than the rick (sen et al, 2010)	41% HH maintain integrated gardens in homestead. (REACH, 2011)
Inadequate care for children (IYCF)	Early initiation breastfeeding	36% (REACH, 2013); 43% (BDHS, 2011); 35.6% (MICS, 2006). Negative care practice found in Engle 7-country report, 1999	Only 53% children are breastfed within 1hr (REACH, 2011)
	Exclusive breastfeeding under 6 months	48.7% (REACH, 2013); 63.5% (BDHS, 2011). Median duration is 3.5 months (BDHS, 2011). Negative care practice found in Engle 7-country report, 1999	47% (REACH, 2013)
	Continued breastfeeding at 1 year	95.4% (MICS, 2006)	
	Introduction of solid, semi-solid or soft foods at 6-8 months	57.6% (REACH, 2013); 62% (BDHS, 2011); 42% fed according to recommendation (Ahmed, 2012). Only 21% fed appropriately IYCF practices (BDHS, 2011) Negative care practice found in Engle 7-country report, 1999	
	Minimum dietary diversity or IDDS	40% receiving adequate DD (HKI, 2011); 24.2% receive 4+ food groups (BDHS, 2011)	3.5 Food Groups (SMART ACF-INT, 2012) 23% eat a minimally adequate diet (REACH, 2011)
	Meal frequency	48% (MICS, 2006); 64.2% minimum meal frequency (BDHS, 2011)	3 meals per day (SMART ACF-INT, 2012)

	Reported responsive feeding	Positive care practice of frequent positive interactions found in Engle 7-country report, 1999	
Inadequate care for women	Mother's food intake evolution during pregnancy and/or lactation	55% take iron during pregnancy (Transform sit analysis, 2012); 2/3 don't consume adequately diverse foods (Transform sit analysis, 2012). Provision of fair share of family food is negative (Engle 7-country report, 1999) and BMI<18.5kg/m2 is 24.2% (BDHS, 2012), 42.2% women anaemic (BDHS, 2012)	29% of pregnant so thin that nutritional status poses a risk to the child they carry (REACH, 2011)
	Caregiver's completed years of education: Women literacy rates (age 10 years and above)	83.6% literate age 15-19, decreasing as age increases. Rural urban division. (BDHS, 2011)	
	Perceived social capital		
Insufficient health services	Immunization	86% fully vaccinated (BDHS, 2011)	
	ANC (Ante-Natal-Care) attendance	47.7% (MICS, 2006); 54.6% (BDHS, 2011) but only 25.5% attended recommended 4 visits	
	Place of delivery	71% Home (BDHS, 2011)	
Unhealthy environment: Water	Access to safe water source	Use of improved drinking water facilities 81% (NILS, 2010) BUT high arsenic level	High arsenic and salinity levels (SI report, 2012). 60.5% access safe water but 36.7% access from shallow tube wells increasing arsenic poisoning risk (SMART, ACF-INT, 2012)
	Water management score		
	Quantity of water per capita, per day		
Unhealthy environment: Sanitation	Use of hygienic and safe sanitation facilities	Use of improved sanitation facilities 56% (NILS, 2010)	49.5% using unhygienic latrines (SMART, ACF-INT, 2012)
Unhealthy environment: Hygiene	Caregiver/food preparer appropriate hand-washing practices	Negative food preparation and hand/washing care practice found in Engle 7-country report, 1999	98.8% washed hands after defecating, but only 40.4% after wiping the child (SMART

			ACF-INT, 2012)

No. 4: Preliminary Secondary Data - Basic Causes

		Country Level	District level
Natural resources	Agriculture resources	75% agriculture is rice (Mainuddin et al, 2011: MDR Progress report)	80% saltwater shrimps produced in southwest leading to a decrease in livelihood options (SI report, 2012). Significant Environmental degradation (SI report, 2012)
	Land access	An estimated 10% own half the land and small farmers represent 80% farmers (HFSNA, 2009)	29% covered by Sundarbans (Mainuddin et al, 2011: MDR Progress report); big shrimp farms
	Soil quality	Increased salinity as a result of climate change ((Mainuddin et al, 2011: MDR Progress report)	Increased salinity and arsenic as a result of climate change as well as increased shrimp farms (SI report, 2012); 23.45% Very strongly saline , 11.75% Strongly saline (Mainuddin et al, 2011: MDR Progress report - source SRDI, 2010) Increased salinity due to shrimp farming caused trees to die (Si report 2012)
Risk of natural disaster	Cyclones	World Bank - 60% of global deaths in last 20yrs due to cyclones in BD (SI report, 2012)	
	DRM management	80% floodplain (SI report, 2012) one of the world's most vulnerable to negative effects of climate change and natural disasters.	Waterlogging risk increasing
Health environment	Diseases		
	Child's size and weight at birth	High LBW (Ahmed, 2012); Study in rural BD shown that IUGR major contributor to LBW - which is 20-22% (Ahmed, 2012), 21.6% (NILS, 2006).	
	U5MR	69 per 1000 (UNICEF, 2008); 46 per 1000 (NILS, 2011)	
	MMR	2.18/100,000 (BBS, Census, 2012)	
Economic environment	Poverty incidence	20% <1$ per day and 84% <2$ per day (UNDP, 2007 in SI report , 2012); 43.3%<1$ a day (NLIS, 2010) 140 in the HDI with value of 0.515 (UNICEF, DATE; NILS, 2012)); Global Hunger Index 24 (NILS, 2012),	
	GINI Index	32.12 (Wordbank database, 2010)	
Demographic	Urbanization	4.2 (BBS, Census, 2012)%	

trends	Density of population	1,015/km2 (BBS, Census, 2012)	505.37/km2 (kabirhat.com)
	Fertility rate	2.3 births per woman (BDHS, 2011)	
	Women (age 15-49) use of contraception	61% (BDHS, 2011)	
Social and gender factors	Exclusion of groups	No significant sex difference when young, but grows later showing possible neglect of female child (Sen et al, 2010; Dancer et al, 2008)	
	Empowerment of women	Gender Inequality Index 0.518 (NILS, 2012 -). Highest rate of child marriages - 2/3 of adolescent girls are married (UNICEF, 2008). "Analysis of women's empowerment variables indicates that most women enjoy some freedom of movement and also participate in household decisions...regarding control of cash rather than their own health (Bhagowalia et al, 2010)	
	Domestic violence	"Dowry and dowry related violence are widespread and pose serious threats to women. Women are the most likely victims of acid attacks (UNICEF, 2008) "attitudes towards domestic violence tend to be rather forgiving, with majority accepting violence on one ground or other. Strongly associated with HAZ" (Bhagowalia et al, 2010)	