NUTRITION CAUSAL ANALYSIS

ACTION AGAINST HUNGER

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NIGERIA

NANGERE LGA, YOBE STATE

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FINAL REPORT

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NIGERIA

NANGERE LGA

YOBE STATE

DECEMBER – JULY 2017

By **Marie-Noëlle Ottavi**

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With the support of **Blanche Mattern**

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ACRONYMS

AAH: Action Against Hunger

ANC: Antenatal Care

ARI: Acute Respiratory Infections

BA: Birth Attendance

BM: Breast Milk

BSFP: Blanket Supplementary Feeding Program

CDC: Centers for Disease Control

CI: Confidence Interval

CM: Centimeter

CMR: Crude Mortality Rate

CMAM: Community Management of Acute Malnutrition

CRS: Catholic Relief Services

CV: Community Volunteer

UK AID: Department For International Development

DPS: Data Plausibility Score

ECHO: European Civil and Humanitarian Operations

ENA: Emergency Nutrition Assessment

EU: European Union

FANTA: Food and Nutrition Technical Assistance

FAO: Food and Agriculture Organization

FCS: Food Consumption Score

FFP: Food For Peace

FGD: Focus Group Discussion

FSL: Food Security and Livelihood

GAC: Global Affairs Canada

GAM: Global Acute Malnutrition

GDP: Gross Domestic Product

HAZ: Height for Age

HC: Health Center

HDDS: Household Diversity Diet Score

HH: Household

HW: Health Worker

ICRC: International Committee of the Red Cross

IDDS: Infant Diversity Score

IDP: Internally Displaced Person

IFAS: Iron-Folate Supplementation

IMCI: Integrated Management of Childhood Illnesses

IPC: Integrated Phase Classification

JSS: Joint Support Supervision

KII: Key Informant Interviews

LGA: Local Government Area

LBM: Lack of Breast Milk

LWB: Low Weight Birth

MAHP: Monthly Average Household Production

MICS: Multiple Indicators Cluster Survey

MAM: Moderate Acute Malnutrition

MM: Millimeter

MNCHW: Maternal, Newborn and Child Health Week

MNP: Micronutrient Powders

MR: Medicinal Recipes

MSF: Médecin Sans Frontières

MU: Moderate Underweight

MUAC: Mid-Upper Arm Circumference

NBS: National Bureau of Statistics

NCA: Nutritional Causal Analysis

NDHS: National Demographic and Health Survey

NG: Nigeria

NGO: Non-Governmental Organization

NFP: Nutrition Focal Person

NHSN: Nutrition and Health Situation of Nigeria

NNHS: National Nutrition and Health Survey

NPHCDA: National Primary Health Care Development Agency

ODK: Open Data Kit

OTP: Outpatient Therapeutic Program

PHCMB: Primary Health Care Management Board

PHC: Primary Health Care

PNC: Postnatal Care

PPS: Probability Proportionate to Size

PLW: Pregnant & Lactating Women

QS: Qualitative Survey

RCSI: Reduced Coping Strategy Indices

RFS: Risk Factors Survey

RUTF: Ready to Use Therapeutic Food

RUWASA:

RFS: Risk Factor Survey

SAM: Severe Acute Malnutrition

SM: Self-Medication

SMART: Standardized Monitoring for Assessment in Relief & Transitions

SU: Severe Underweight

TBA: Traditional Birth Attendant

TH: Traditional Healer

TM: Traditional Medicine

U5MR: Under 5 Mortality Rate

UNICEF: United Nations Children's Fund

UNOCHA: United Nations Office for the Coordination of Humanitarian Affairs

USAID: United States Agency for International Development

VIP: Ventilated Improved Pit latrine

WASH: Water, Sanitation and Hygiene

WAZ: Weight for Age Z scores

WDDS: Woman Diversity Diet Score

WFP: World Food Program

WHO: World Health Organization

WHZ: Weight for Height Z scores

YSPHCMB: Yobe State Primary Health Care Management Board

GLOSSARY

Tamua: Hausa term used to designate undernutrition

Social Organization

Alunguru: Kanuri term used to designate the highest person in presence.

Garin: Hausa term used to designate village.

Islamia: Quranic School.

Malham: Honorific title for local chief. Islamic tradition.

Wazami: Traditional practitioners of body and face scarification, circumcision and first hair shaving after birth.

Ethnical Organization

Hausa: One of the largest ethnics groups in Africa. They speak the Hausa language an Afro-Asiatic language of the Chadic group.

Fulani: One of the largest and widely dispersed ethnic groups in the Sahel and West Africa. Mostly nomadic and semi-sedentary people they used to practice pastoral activities.

Kare-Kare: Local ethnic group of 150 000 people. They speak Afro-Asiatic language spoken in Bauchi and Yobe State.

Kanuri: African ethnic group composed by several subgroups. Mostly sedentary, engaging in farming, fishing and trade activities, they speak Kanuri language, which belongs to the Western Saharan and Nilo-Saharan languages.

Local disease

Rana: Perianal ulcer for the Medical Corps; Global child disease for the study participants.

Olsa: Ulcer for the Medical Corps; Global adult disease for the study participants.

Bacire: Hemorrhoid

Local items

Pap: Local porridge for children mostly done with millet and water.

Tuwo: Local meal based on millet or sorghum.

Rappa: Materials, fabrics.

Cattle: Local cows.

EXECUTIVE SUMMARY

Giant of Africa, Nigeria continue is journey towards a contemporary world with success and determination. Nonetheless, for a part of the country it remains difficult to have the same perspective. The northern part of Nigeria meets lot of issues since the beginning of the second millennium. Economic instability, decrease of agricultural production, climate change and more recently armed conflict against Boko Haram excluded a part of this population to the benefit of Nigeria growing. Moreover, since 2011-2012, the nutritional insecurity is alarming and Yobe State is a good example of conflict impact in terms of nutritional degradation through the following year. Indeed, until 2013-2014, Yobe state and Nangere LGA as well has been impacted and very drastically during 2014-2015. The Link NCA study highlights the premises of stabilization (agricultural production, market price), which will be favor of agropastoral population. Nevertheless, the levels of monetary inflation and agricultural production still put Nangere LGA population in food insecurity with a stronger lean season. The situation remains alarming and the social resilience is tired. The undernutrition prevalences in the study area (14.6% wasting, 68.3% stunting), captured in November 2016, out of the lean season, invited Action Against Hunger to question the causes of this situation and their mechanisms.

The main objective of the NCA is to identify the most important causes of child undernutrition, in particular wasting of children age 0-59 months, in Nangere LGA – Yobe State, Nigeria. Indeed, severe wasting is associated with more than nine times higher risk of death[2]. The NCA is considering vulnerable nutritional groups identified as children less than 23 months, the findings are applicable to all the communities but are focussing on farmers.

This NCA study specific objectives include

- identify main causes of wasting and stunting in order to inform the technical strategy and programs for the prevention of the same at a local level
- understand the local seasonal and historical pathways to wasting and stunting
- support technical advocacy on causes of wasting and stunting so as to plan technical strategy

Methodology

- **- Preparatory Phase:** The preparatory phase is to ensure timely recruitment process; objectives are clear and the choice of NCA methodology (comprehensive, qualitative, quick) is selected.
- **- Development of causal hypotheses:** a literature review, data review and stakeholders interviews (National Nutritional Council, Department of Agriculture and

[2] Joint statement WHO – UNICEF, 2009. "Child growth Standards and the identification of severe acute malnutrition in infants and children"

Department of Health, health workers) were undertaken to generate an overall understanding of the local context of undernutrition and design a set of local causal hypothesis of undernutrition. Those hypotheses had been validated to be field tested by Technical Experts during a workshop held on the 30th January 2017 in Damaturu, Nangere LGA, Yobe State.

- - **Data Collection:** Both quantitative and qualitative data were collected to provide more evidence on levels of undernutrition, key risk factors and community perceptions, practices and constraints.
- - **Identification of highest priority causes of undernutrition, design of recommendations:** Based on the evidence gathered during the data collection, the causal hypotheses were then ranked by order of importance with particular attention to seasonal differences and vulnerable groups. The results were then validated with the local community before being presented at a final workshop on the 8th and 9th May 2017, where technical and NCA experts tried to reach a consensus on the most important risk factors and priorities for action. Together with the technical experts a consensus was reached on the main recommendations to formulate in order to address and prevent undernutrition in the studied area.

Underlying causes of malnutrition

Breastfeeding practices and complementary feeding

The study highlights very clearly that a child is more vulnerable between 3 to 24 months old, which shows the violence of this nutritional crisis. During this time, she/he will be more exposed to wasting from 3 to 9 months, and to stunting from 15 months to above.

Wasting seems related to weak breastfeeding practices and an earlier complementary feeding. Vulnerability to hydric disease is also high due to unhealthy environment and weak hygiene practices. Then, the repetitiveness of child diseases devitalise the child who will be more vulnerable to hydric diseases in a context of weak health care practices (medicinal recipes).

Stunting seems to be related to the drastic decreased of the HDDS since 2010, which affected WDDS and IDDS. Availability of food items in the household is problematic and the children do not have access to sufficient nutritional supply. Nutritional insecurity impactz women who started to be more undernourished and mentioned difficulties on using adequate breastfeeding practices. Lack of breast milk, fear of producing breastmilk of poor nutritional quality, low weight birth, lead mother to start introducing complementary feeding too early (around 3 months old when it was around 5 months old in 2011). Nevertheless,complementary feeding food is nutritionally poor and remains a door open for hydric diseases. Looking at this global picture, it seems that after suffering from wasting, the child nutritional and health status drives her/him to stunting.

HEALTH

Degradation in accessing health system contributes also to the nutritional situation. Not prepared to face the surge of low weight birth cases or undernutrition peak, the main problem for Nangere household is the sudden lack of monetary access to health care. This fact reinforce the existence of local diseases (rana, olsa), which are not taken in consideration by the actual health system and drastically impacts the nutritional status of children. The traditional health system try to adjust to this undernutrition situation but if the traditional doctors seems to encourage women to reach health centre with their undernourished child, the use of medicinal recipes into an unhealthy environment appeared problematic. Moreover, adults suffered from the degradation of access to health centre what impact household management.

WASH

The unhealthy environment and hydric diseases are important causes of undernutrition in this context. Indeed, despite governmental efforts, the study of water access teaches us that quantity

of water is less problematic than quality of water. Condition of water management outside and inside the household, weak presence of soap, weak practice of water treatment, all sources of contamination (water point or household: animal excreta) appeared challenging. Level of hygiene practices is low and levers to maintain some of them are absent. The sanitation situation is also extremely concerning. The extremely weak presence of safe latrine is a major cause of contamination inside and outside household (water point). Nonetheless an important sink appeared. The sub-optimal management of women livestock into the household contribute mainly to the unhealthy environment and the low level of incomes.

FSL

The terrible degradation of the food security in the northern part of Nigeria appeared in this study as the major cause of undernutrition. If low level of care and health practices, or problematic access and water management can explain chronic malnutrition, high prevalence of acute malnutrition seems more linked to the drop of agricultural production. This drop is caused by an unfavourable economic context, climate change context and conflict context. The problem is that actual agricultural production is twice less than in 2005 and in Nangere LGA, well known to be Yobe's granary, the average household can no longer product food for 6 months. Infertility of soil, modern fertilizer price increase, rudimentary agricultural tools and knowledge affects agricultural resilience.

The best way to have a quick impact on this undernutrition situation will be to improve livelihoods such as crop production or women livestock.

PROTECTION

Lack of knowledge is also an important cause of this situation according to our participants. Illiteracy rates among parents and particularly among mother is alarming and this situation is deteriorating. School coverage and school monetary access are the main issues for the average household of Nangere. In front of this situation, girls are more exposed than boys to illiteracy.

Women empowerment and recent drop of self-confidence due to the conflict context have to be supported by a strong social policy. It should be the best way to start a new humanitarian program in collaboration with the national, state and local authorities. Indeed the social structure of each family, village, ward, LGA, State has to be considered as the first pattern in the fight against undernutrition.

MAJOR HYPOTHESIS RISK FACTORS	IMPORTANT HYPOTHESIS RISK FACTORS
NUTRITION - Young child non-optimal feeding practices - Inadequate child health care HEALTH - Poor access and utilization of health services WASH - Inadequate water access - Non-optimal of water management (water chain) - Poor hygiene practices - Inadequate management of human and animal	NUTRITION - Non-optimal breastfeeding practices for children up to 6 months old - Poor nutritional status among pregnant and lactating women HEALTH - Weakness of health system - Short birth interval FSL - Sub-optimal food & other sources of incomes management

excreta FSL - Limited access to food - Limited food availability PROTECTION - High illiteracy rates among parents	- Emerging coping strategies PROTECTION - Women empowerment

RECOMMENDATION

Humanitarian interventions or programs at Yobe State, in Nangere LGA, have to be design with the collaboration of State, local authorities and communities. This cooperation should be the base of humanitarian action implementation. A local and contextual approach can be used and would assure the intervention success and sustainability.

One main challenge for program implementation might be the volatility of the context. The conflict and climate change need to be considered when designing future interventions. Community resilience has to be improved and nutritional security programs for the next coming years should take in account both issues (conflict and climate change).

A multisectorial approach would contribute to having a rapid impact on the situation. Nevertheless, this integration has to be done on specific objective.

INTRODUCTION AND STUDY OBJECTIVES

Action Against Hunger has been working in the Nigeria since 2010. Being present in Yobe State was one of the first achievements of the mission. Since, Action Against Hunger interventions focus in Nutrition, Food security and Livelihoods, Water, Sanitation and Hygiene (WASH) and Health sectors.

Due to the degradation of the nutritional situation in Northern Nigeria, Action Against Hunger had decided to implement programs in 12 Local Government Areas (LGA) on the 17 LGAs composing Yobe State with the support of UK AID, GAC and USAID/FFP. The study area, Nangere LGA, welcomed recent interventions in Nutrition and Health, Water, Sanitation and Hygiene and Food Security and Livelihoods sectors.

The Local Government of Nangere was well known to be the granary of the Yobe State. But, in November 2016, after the publication of the SMART survey results, degradation of the nutritional security became clearer. In order to gather information regarding the mechanism of undernutrition and its roots causes, Action Against Hunger decided to implement a Link Nutrition Causal Analysis (Link NCA).

The Link NCA study is a standardized method aiming at analyzing the causes of malnutrition and therefore improving the relevance and effectiveness of stakeholders programming in a given context.

Based on the Link Nutrition Causal Analysis (Link NCA) approach and in collaboration with NGO partners, Research Institutes, Universities and local authorities, Action Against Hunger conducted the first Link NCA study in Nigeria, in Nangere LGA, from December 2016 to May 2017.

This report presents the findings from this Link NCA study.

1/ INTRODUCTION: PRESENTATION OF THE STUDY CONTEXTS

1.1 NIGERIA AND BOKO HARAM INSURGENCY

Named the "Giant of Africa" Nigeria is a country with multiple challenges. As the first economy and population of Africa, one of the major challenges remains the access of the entire population to a sufficient nutritional security. In fact, the high prevalence of food insecurity and vulnerability is historically reported in Nigeria making it one of the five large low-middle income countries where more than half of children under age 5 either are stunted or wasted (NNHS, 2015)[3].

However, during the World Health Assembly Resolution "some progress" were described in Nigeria in terms of undernutrition. In fact, according to the National Nutrition and Health Survey (2015) at the national level the global acute malnutrition (GAM) and severe acute malnutrition (SAM) prevalence for under-five children (7.2 and 1.8% respectively) were reported sensibly lower than the levels described in National Nutrition and Health Survey (NHSN, 2014: 8.7 and 2.2%).

Regarding stunting prevalence, it still indicates a long-term nutritional problem in the country although being quite stable (33%) confirming a general prevalence positively below Sub-Saharan regional level (37%)[4].

Nevertheless, over 35% of under-five deaths are attributed to child undernutrition and the North East region of Nigeria has the highest acute malnutrition caseloads in the country. In Yobe State the levels of GAM and SAM prevalence among children aged less than 5 years were in 2015 10.9% and 2.0% respectively (NNHS: 2015).

Northeastern Nigeria had been affected for over six years by Boko Haram insurgency. In fact, the ongoing military operation targeting Armed Opposition Groups in Northeastern Nigeria and in the Lake Chad Basin are affecting freedom of movement, livelihoods, markets, and humanitarian access. It results on a severe food insecurity and nutrition emergency in parts of Borno and Yobe States. Yobe State, situated just behind the active conflict zone of Borno State, was among the most affected States with an estimated 2.3 million people categorized as food insecure in 2015, meaning that those population cannot meet their basic food needs[5].

Recent rapid SMART surveys conducted at Gujba and Gulani localities of Yobe State, indicate levels of global acute malnutrition (GAM, MUAC<125mm) ranging from 20 to nearly 60%.

[3] Global Nutrition Report, International Food Policy Research Institute, 2015 (NNHS, 2015: 1).

[4] The State of the World's Children 2015, Reimagine the future, UNICEF 2015.

[5] Between June 2011 and August 2014 there were numerous documented attacks by Boko Haram within Yobe state resulting in an estimated 1341 fatalities. Incidents peaked in October 2012, with over 12 reported attacks and 140 fatalities. There were 252 deaths in Yobe state in the first 6 months of 2014 alone (Haken and Kaufman, 2015).

In addition, the prolonged Boko Haram insurgency combined with the widespread economic recession[6] across the country-increased hardship for the very poor communities. Populations who depend on Nigerian agriculture and labor markets for their livelihoods are actually the most affected.

Fig. 1. Map of Federal Republic of Nigeria

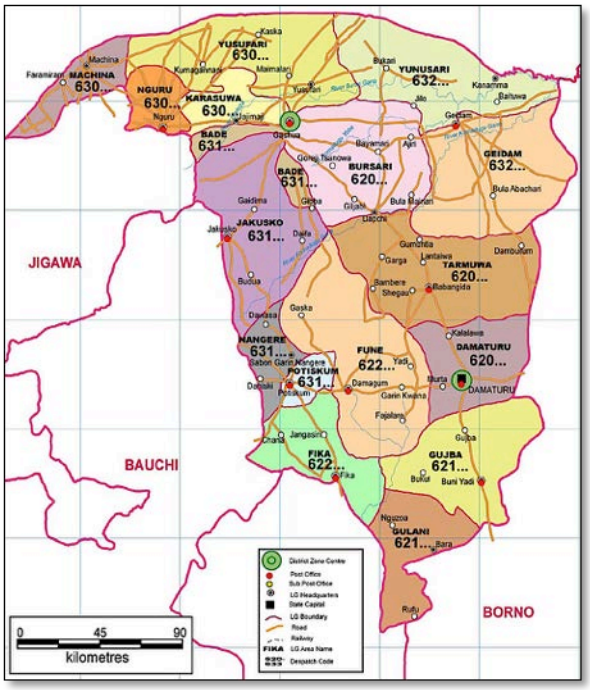


Fig. 2. Map of Yobe State by Local Government

[6] The Nigerian Naira has depreciated by more than 40% since mid-2016, a trend that has persisted to date.

1.2 CONTEXT INFORMATION: NANGERE THE BACK ZONE OF THE CONFLICT

Nangere Local Government Area (LGA) is one of the 17 LGAs located in Yobe State. It borders Potiskum LGA to the East, Fune LGA to the North East, Jakusko to the North, Bauchi State to the West and Fika LGA to the South. The LGA has an estimated population of 151,344 persons[7] spread over a geographical area of 1,183km^2.

Nangere LGA is divided into 11 Wards (Chukuriwa, Dawasa, Kukuri, Watinani, Dudduye, New Nangere, Tikau, Dazigau, Chilariye, Degubi and Langawa Darin) with headquarters located in *Sabon Garin Nangere (Sabon Gari*). There are 461 villages formed on basis of livelihood activities, social activities, market places, water sources, and health services among others. The main crop and livestock markets are also located in Potiskum and Dawasa.

Smallholder farmers who operate at the subsistence level mostly compose the population of Nangere LGA. The farmers depend on rain-fed crop cultivation of Millet, Sorghum, Beans, Cowpeas and Groundnuts. The LGA is also inhabited by pastoralism activities led by communities as *Fulani and Karaï-karaï* who rear cows, sheeps and goats.

The recent SMART survey done at Nangere LGA (2016), revealed acute malnutrition prevalence at 14.6% and a stunting prevalence at 68.3% with a percentage of children exposed to both stunting and wasting at 51.6%. Those levels, classified at serious levels and critical level in the WHO thresholds of >10% and >40% respectively, can be understand regarding the perspective of the nutritional security deterioration due to the consequences of the insurgency. The first impact of the armed conflict was felt in Yobe in 2013-2014 but since 2015 nutritional security of all the population is in danger. In fact the substantial proportion of the population in Yobe State continues to face Crisis (IPC Phase 3) or Emergency (IPC Phase 4) acute food insecurity (FewsNet, March 2017).

This study as for main goal to understand the local mechanisms and roots causes of undernutrition (Acute and Chronic). To reach this point the Link NCA research will question the impact of the conflict on the life of Nangere Population.

[7] Census 2006

2/ OBJECTIVES OF THE LINK NCA-NG (NANGERE LGA)

2.1 MAIN STUDY OBJECTIVE

The main objective of the Link NCA is to identify the most important causes of child undernutrition, in particular wasting of children aged 0-59 months, in Nangere LGA – Yobe State, Nigeria. Indeed, severe wasting is associated with more than nine times higher risk of death[8]. The study is also looking at causes of stunting.

The Link NCA is considering vulnerable nutritional groups identified as children aged less than 23 months, the findings are applicable to all the communities but are focussing on farmers.

2.2 SPECIFIC STUDY OBJECTIVES

This NCA study specific objectives include:

To assess the prevalence and severity of wasting and stunting in the study population

To assess the prevalence of known risk factors for undernutrition among the population and "key vulnerable groups"

To identify main causes and pathways of wasting and stunting in order to inform the technical strategy and programs for the prevention of the same at a local level

To understand the local seasonal and historical pathways of wasting and stunting: how wasting and stunting and their causes had changed over time due to historical trends, seasonally due to cyclical trends, due to recent shocks

To identify which causal pathways are likely to explain most cases of undernutrition

To support technical advocacy on causes of wasting and stunting so as to plan technical strategy

In addition, this specific study includes an addition research objective. Indeed, the Link NCA method was build to be implemented in stable context. Based on the lessons learnt of studies implemented in Afghanistan, Yemen and Central African Republic, the Link NCA implemented in Nigeria focuses on how implementing a Link NCA in chronical crisis with a volatile security context.

[8] Joint statement WHO – UNICEF, 2009. "Child growth Standards and the identification of severe acute malnutrition in infants and children"

SECTION I: METHODOLOGICAL CONSIDERATIONS

1/ THE LINK NCA METHODOLOGY

1.1 OVERVIEW OF THE LINK NCA APPROACH

A Link NCA is a structured, participatory, holistic, multi-sectorial study, based on the UNICEF causal framework, to build a case for nutrition causality in a local context.

Structured – the steps of the methodology are precisely defined and have all been tested in the field.

Participatory – the study is giving a real opportunity to national technical experts as well as caregivers in the community to express their opinion on the causes of undernutrition, and to discuss, review and finally validate the conclusions of the study.

Holistic – undernutrition is here studied as a whole to avoid a sectorial approach, and to highlight the inter-relations between risk factors.

Multi-sectorial - a nutrition causal analysis (NCA) investigates and presents a "multi-sectorial" overview of the contributing factors affecting nutritional status within a given community.

Building a case for nutrition causality – the core exercise of an NCA is to identify and rank causal hypotheses by order of importance.

Specific to a local context - causes of under-nutrition are often different from one location to another.

The purpose of the methodology is to go beyond generic interventions by identifying context specific causes in order to propose adequate solutions.

1.2 STUDY DESIGN

The NCA methodology involves four key steps:

1. Preparatory Phase: The preparatory phase is to ensure timely recruitment process; objectives are clear and the choice of NCA methodology (comprehensive, quantitative, qualitative, quick) is selected.

2. Development of causal hypotheses: a literature review, data review and stakeholders interviews (National Nutritional Council, Department of Agriculture and Department of Health, health workers) were undertaken to generate an overall understanding of the local context of undernutrition and design a set of local causal hypothesis of undernutrition. Those hypotheses had been validated to be field tested by Technical Experts during a workshop held on the 30th January 2017 in Damaturu (Yobe State).

3. Data Collection: Both quantitative and qualitative data were collected to provide more evidence on levels of undernutrition, key risk factors and community perceptions, practices and constraints.

4. Identification of highest priority causes of undernutrition, design of recommendations: Based on the evidence gathered during the data collection, the causal hypotheses were then ranked by order of importance with particular attention to seasonal differences and vulnerable groups. The results were then validated with the local community before being presented at a final workshop on the 8th May 2017, where technical and NCA experts tried to reach a consensus on the most important risk factors and priorities for action. On the 9th May 2017, together with the technical experts a consensus was reached on the main recommendations to formulate in order to address and prevent undernutrition in the studied area.

1.3 SAMPLING PROCEDURES

1.3.1 Selected method and sample size calculation

The method selected was random cluster sampling. A sample size had been calculated for a list of key indicators present on the Link NCA indicators guide. This list was a sufficient basis to calculate the sample to be surveyed.

The key indicators are based on the list presents on the Link NCA indicators guide.

This list had been reviewed at the time of survey preparation: the key indicators that were not matching the context had been removed; optional indicators more adapted had been added[9]. However, this list is a sufficient basis to calculate the sample to be surveyed (cf. Table n°1).

TYPE OF INDICATOR	INDICATOR	TARGETED POPULATION
MEASUREMENT OF RISK FACTORS	HDDS	Household
	HFIAS[10]	Household

[9] To be tested: 57 Indicators, *29 Core indicators, 17 Optional indicators, and 11 Local indicators.*

TYPE OF INDICATOR	INDICATOR	TARGETED POPULATION
	MAHFP	Household
	Early initiation of breastfeeding	0-23 months
	Exclusive breastfeeding under 6 months	0-5 months
	Continued breastfeeding at 1 year	12-15 months
	Introduction of solid, semi-solid or soft foods	6-8 months
	Minimum dietary diversity or IDDS	6-23 months
	Meal frequency	6-23 months
	Reported responsive feeding Caregiver-child interactions scale	6-59 months 0-59 months
	Mother's food intake evolution during pregnancy and/or lactation	Mother
	Caregiver's completed years of education	Caregiver
	Perceived social capital	Mother
	Caregiver's perceived workload	Caregiver
	WHO5	Caregiver

[10] Although HFIAS is a core indicator, it will not be collected during this study since rCSI is collected as an additional indicator and will provide the same type of information.

TYPE OF INDICATOR	INDICATOR	TARGETED POPULATION
	Caregiver-child interactions scale	Caregiver
	ARI past 14 days	0-59 months
	Diarrhoea past 14 days	0-59 months
	DPT3[11] immunization status	12-23 months
	ANC/PNC attendance	Mother
	Barriers from going to the health centre	Caregiver
	Access to a safe water source	Household
	Water management score	Household
	Quantity of water per capita per day	Household
	Use of hygienic and safe sanitation facilities	Household
	Presence of soap or ashes in the house	Household

Tab. 1. Indicators to be measured and population targeted for each indicators (RFS, 2017)

HH[12] average size: 8.5[13].

The following age groups was considered for this study: 0-59 months, 0-5 months, 0-23 months, 6-8 months, 6-23 months, 6-59 months, 12-15 months and 12-23 months[14].

[11] DPT3 not being used anymore, Pentavalent 3 immunization status will be collected instead.

[12] HH: Household.

[13] Action Against Hunger baseline KAP Survey 2016 gives similar figures.

[14] The proportion of children aged (0-59 months) was derived from Yobe State Immunization Office, 2016. SMART and KAP survey reports provides similar findings.

The numbers of children from each group had been deduced from data provided by Yobe Immunization Office as presented in the table 2.

AGE GROUP	PROPORTION IN THE POPULATION
0-5 months	1.71
0-23 months	6.84
0-59 months	17.1
6-8 months	0.09
6-23 months	5.13
12-15 months	1.14
12-23 months	3.42
Average household size	8.5

Tab. 2. Demographic data (RFS, 2017)

To calculate the household sample to be surveyed, the prevalence of wasting (6-59 months) from the SMART Survey done by Action Against hunger in Nangere in November 2016 was used.

Prevalence of the following indicators: early initiation of breastfeeding (0-23 months), exclusive breastfeeding (0-5 months), continued breastfeeding at one year (12-15 months), minimum dietary diversity (6-23 months) came from the MICS (2011) baseline report[15].

Without specific data, a conservative estimated prevalence of 50% had been used for the following indicators: Presence of soap in the household, ANC attendance, DPT3 coverage.

[15] MICS, 2011.

Tab· 3· Calculation of household sample to be surveyed (RFS, 2017) 16

EXAMPLE OF INDICATOR	POPULATION TARGETED	D1	D2	P3	NB OF MEASURED NEEDED4	NB OF MEASURES /HH VISITED5	% OF NON RESPONDENT	HH SAMPLE SIZE6
PRESENCE OF SOAP IN THE HOUSE	Household	2.0	0.095	50%	232	1	1.05	244
ANC ATTENDANCE	Caregiver	2.0	0.095	50%	232	1	1.05	244
EXCLUSIVE BREASTFEEDING	0-5 months	2.0	0.095	30%	195	0.15	1.05	1409
EARLY INITIATION OF BREASTFEEDING	0-23 months	2.0	0.095	20%	148	0.58	1.05	267
ARI IN THE PAST 14 DAYS	0-59 months	2.0	0.095	5.2%	46	1.45	1.05	33
INTRODUCTION OF SOLID, SEMI-SOLID OR SOFT FOODS	6-8 months	2.0	0.095	98%	18	0.01	1.05	2471

16 [1]Design effect.

[2]Precision. Based on the RFS objectives, the precision used (9.5%) justifies the need to meet the expected sample size for cross-sectional study based on Nangere LGA context, although the Link NCA guidelines recommends a precision of 10% as standard.

[3]Estimated prevalence: a conservative estimated prevalence of 50% is chosen, as data regarding these indicators are not available and/or not relevant.

[4]Calculated from ENA Software version 2011 (July 2016 updated version).

[5]The number of measures targeted per household was defined according to the figures provided in the table 3. As example, there are approximately 1.45 children from the age group 0-59 months per household.

[6]The risk factor survey considering only the families with at least one child aged from 0 to 59 months, the target population by household had been found. Then, the number of household to be surveyed had been defined.

IDDS	6-23 months	2.0	0.095	39%	220	0.44	1.05	530
CONTINUED BREASTFEEDING AT 1 YEAR	12-15 months	2.0	0.095	96%	36	0.10	1.05	390
DPT3 COVERAGE	12-23 months	2.0	0.095	50%	232	0.29	1.05	838

1.3.2 Sampling procedure for the Risk Factor Survey

Number of household to be surveyed

A margin of 5% is considered been applied to cater for non-respondent rate. In the table 2, we will consider only the white rows. The sample sizes calculated on the green rows are too big or too small to be surveyed within the human resources, budget and time available, as well as security considerations for this Link NCA.

We will consider the highest sample size within the white rows: that is 530 households.

Selection of the number of clusters to be surveyed

Each interview should last for 45 minutes (validated by a pilot test [17]). Without the morning/evening journey to the field, the lunch break, the journey from one house to another and the time allocated to the HH sampling, each team is considered to work average 6 hours per day.

A low hypothesis considered that 4 to 5 interviews within the randomly selected households per day per team could be conducted. A high hypothesis considered that 6 interviews/day/team could be conducted. For the combinations, the lowest hypothesis was considered (average number of 4.5 interview/day were considered to determine the number of clusters needed). Indeed, depending on several issues (especially safety issues and movement timing restrictions) it was more realistic.

The Link NCA methodology recommends to work with 8 teams (2 members), moving by pair of 2 teams with one supervisor. The recommended set-up had been adjusted to the context. The justification for working with 6 teams was to ensure maximum support of teams during the data collection as well as team coordination, security protocols for field movement and reporting schedules. The table 4 provides the detailed overview of teams engaged, HHs covered and number of households visited (cf. Table n°4).

[17] A pilot test was organized in a cluster that was not selected for the quantitative study

N. TEAM	N. TEAM/CLUSTER	N. SURVEY/DAY/TEAM	N. SURVEY DAYS/CLUSTER	TOTAL SURVEY DAYS	N. HH/CLUSTER	N. CLUSTER	TOTAL N. FAMILIES
6	2	4.5	2	20	18	30	540

Tab. 4. Combinations number of clusters and survey duration (RFS, 2017)

The risk factors survey data collection was completed in 20 days[18] and scheduled to take place from 10th February to 1st March 2017.

A total of 30 clusters were considered totalling to 540 HHs (approx. 224 children 6-23 months).

6 teams composed by 2 enumerators, one translator[19] and one supervisor were engaged to survey 5 clusters each.

A total of 2 teams were engaged in collection of data in one cluster for 2 days.

18 households were surveyed in each cluster (2*4.5*2=18)[20].

List of sampled clusters

The updated list of all villages21 and their population in Nangere LGA was used. The list is aligned to existing 11 administrative Wards in Nangere LGA namely: Chukuriwa, Dawasa, Kukuri, Watinani, Dudduye, New Nangere, Tikau, Dazigau, Chilariye, Degubi and Langawa Darin. The total list of villages were entered in ENA for SMART software and 30 clusters (30 administrative villages) were randomly selected using Probability Proportion to Size (PPS) design as highlighted in table 5. The map 3 permits to locate the 30 clusters in Nangere LGA (cf. Table n°5 and Map n°3).

4 clusters/villages were selected purposively for the qualitative survey from the 30 randomly selected clusters.

[18] The risk factors survey was calculated for duration of 117.78 days (530/4.5=117.78). With 6 teams of 2 surveyors/enumerators (i.e. 12 surveyors), the survey was done in 20 days (118/6=19.63).

[19] Among several justifications, one was the language. The justification for working with translators is to cater for diverse local languages present in Nangere LGA that are not all known by the enumerators not been all written. Hausa language is the main local language spoken in most parts of Northern Nigeria and versant with most locals in Yobe State. However, communities in Nangere LGA have distinct local languages such as *Hausa*, *Karaï-Karaï, Fulani,* and *Kanuri* among others.

[20] This means each team per cluster covered an average of 4.5 HH in a day (questionnaires being addressed in one time, each team surveyed a total of 9 households in two days, with 4 or 5 interviews the first day and remaining interview the second day).

[21] Village is the smallest geographical area in Nangere LGA and was considered as cluster.

WARD	SAMPLED CLUSTERS	POPULATION	CLUSTER NUMBER
CHILLARIYE	Muzuwa	320	1
DAWASA	Katsalle	360	2
DAWASA	Ang kare kare	360	RC
DAWASA	Zaria madi	450	RC
KUKURI	Mohammed soja	320	3
KUKURI	Maina juli	250	4
D LANGAWA	Sabon layi	350	5
D LANGAWA	Fadawa	250	6
NEW NANGERE	Nangere	2500	7
NEW NANGERE	Dan disa	320	8
NEW NANGERE	Daura bulama	300	9
DEGUBI	Degubi Zakar	280	10
DEGUBI	Lule sarki	180	11
CHUKURIWA	Unguwar lele	250	12
CHUKURIWA	Jauro beleri	210	RC
WATINANI	Garin Mandagali	3500	13

WARD	SAMPLED CLUSTERS	POPULATION	CLUSTER NUMBER
WATINANI	Jigawa	650	14
WATINANI	Balanka	550	15
WATINANI	Nzimi s. Kura	250	RC
WATINANI	Garin Gambo Imam	1500	16
WATINANI	Damaturu Fulani	370	17
DAZIGAU	Dazigau Bagau	350	18
DAZIGAU	Ningi	215	19
DAZIGAU	Garin Gaye	550	20
DAZIGAU	Zomai Kare Kare	270	21
DAZIGAU	Mireni	320	22
TIKAU	Rimi	300	23
TIKAU	Manawachi Bulama	310	24
TIKAU	Kaisala bulama	250	25
DUDDAYE	Garin Barde	800	26
DUDDAYE	Dadiso	650	27

WARD	SAMPLED CLUSTERS	POPULATION	CLUSTER NUMBER
DUDDAYE	Lafiya	550	28
DUDDAYE	Kiyayo	400	29
DUDDAYE	Gabako	500	30

Tab. 5. List of the selected villages for the Risk Factors Survey (2017)

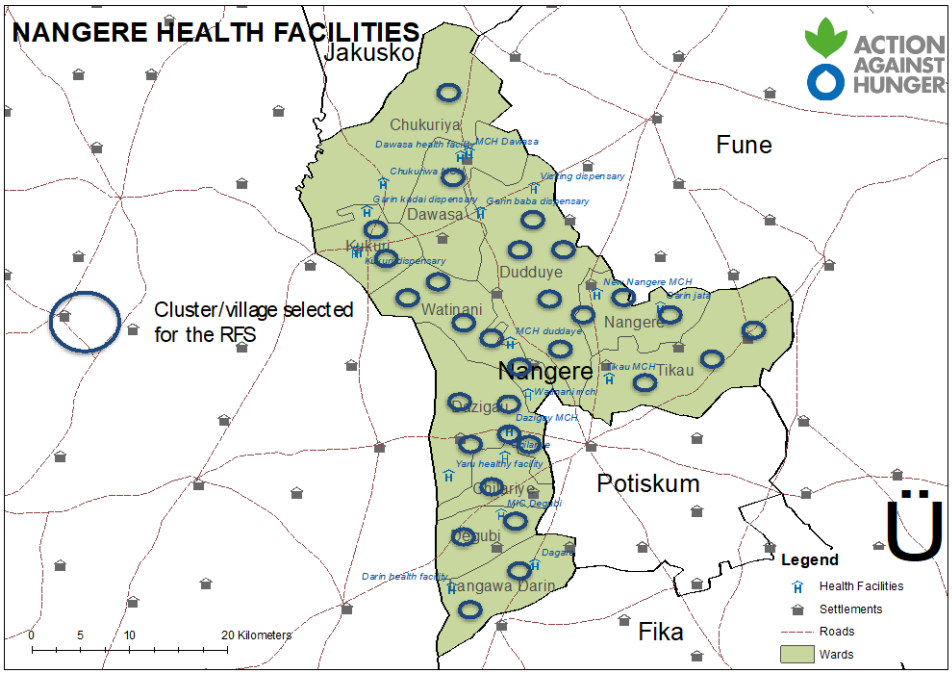


Fig. 3. Map: Selected village for the RFS at Nangere LGA (2017)

Once the selection of clusters was done, it appeared that all the villages were reachable and the replacement clusters will not be used.

1.3.3 Sample for the qualitative study

In the Nigerian context, selection of villages to visit in the Nigerian cannot be done without the permission of the local authorities. The cabinet of the Emir of Nangere as the Emir him-self played a big part in this qualitative sampling. After a presentation on the purpose and the methodology of the study in front of the Emir's cabinet, on the 20th January 2017, the Link NCA team was allowed to conduct the qualitative survey. If the authorization and the full cooperation were instantly given, a long discussion was open on the choice of the ward, the

size of the village and the selecting criterion of the study (rural, spatial organization of the village, access to vulnerable people, and distance to the Health Center (HC)).

After agreeing on Kukuri, Dazigau, Nangere, Degubi wards as the main area for the qualitative survey, 4 clusters reaching the criteria previously discussed were randomly selected among the list of 30 clusters selected for the RFS and one village was selected in addition following rural and spatial criteria of the village's selection (cf. Table n°6).

In fact, at the beginning of the qualitative survey the need appeared to divide the studied area between rural and *semi-rural*[22] and between *settle compounds* and *nucleus compounds*[23]. Mostly FSL and WASH issues were different between those four spatial configuration and contexts; we tried to reach a representative balance in the selected villages. For these reasons, we choose to add one smaller nucleus village far from a HC: Garin Kolo. The list of 5 villages is exposed in the table 6 and highlighted in the Map n° 4.

NAME OF THE VILLAGE	POPULATION	RFS CLUSTER NUMBER	QUALITATIVE CLUSTER NUMBER
GARIN KOLO	350	X	Village 4
GARIN GAYE	350	20	Village 2
GARIN KADAÏ: MOHAMMED SOJA	1000 (350)	3	Village 1
DEGUBI: DEGUBI ZAKAR	2500 (350)	10	Village 3
NANGERE: *DAN DISA*	+3000 (350)	8	Village 5

Tab. 6. List of the selected villages for the qualitative survey (2017)

[22] Villages bellow 1000 people were considered as representative of a rural context. Villages up to 2500 people were considered as representative of a semi-rural context. This distinction was necessary because social and commercial mechanisms are not homogeneous between both contexts.

[23] The qualitative survey shows that the main differences between settle and nucleus compounds were farming and raising activities that are stronger in settle compound; and a greater availability of hand-dug well per capita.

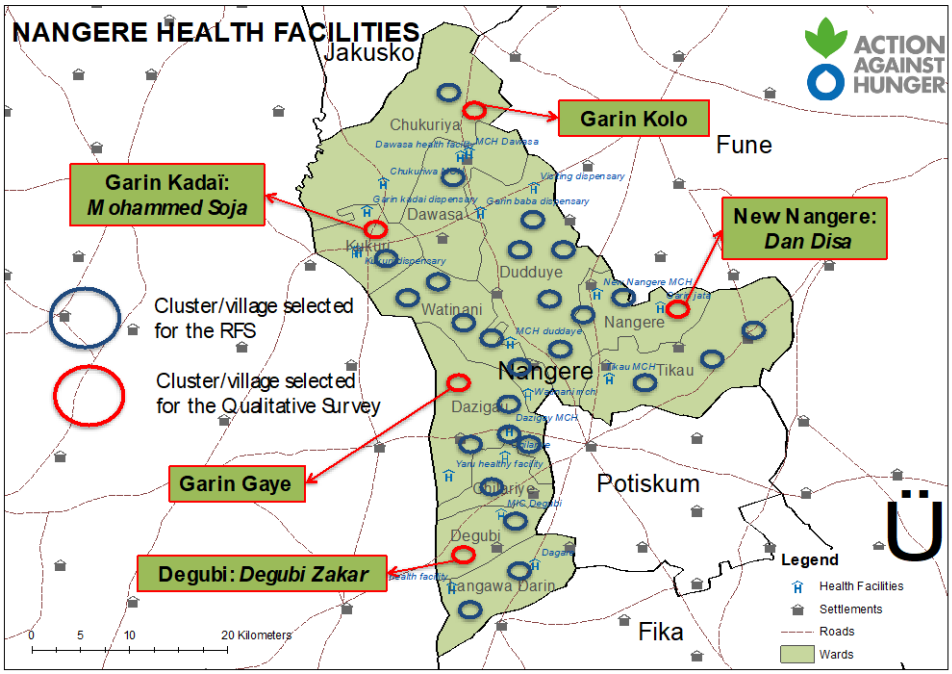


Fig. 4. Map : Selected vilage for the qualitative surbey at Nangere LGA (2017)

2/ DATA COLLECTION METHODS

2.1 QUANTITATIVE SURVEY: RISKS FACTOR SURVEY (RFS)

2.1.1 Data collection methods

To assess the causes of undernutrition in Nangere LGA, the Link NCA methodology applied a mixed-methods study design. A quantitative component was designed to objectively assess malnutrition status and prevalence of known risk factors, while the qualitative component aimed to uncover the community's own conceptualization of malnutrition, the degree to which they perceive it as a problem, and what are observed to be the causes. Thus, the qualitative and quantitative components are intended to generate complementary data.

Training of Risk Factor Survey Data Collection Team

The training on Risk Factor Survey of enumerators, translators and supervisors took place at GAAT hotel in Damaturu for 4 days from 6th to 9th February 2017. The justification for the four

days of survey training is attributed to the fact that the same teams were trained on RFS training a month before and this training served as a refresher for the teams based on additional inputs provided on RFS tools and indicators. The training took place a month earlier then a refresher was done, as the quantitative survey had been delayed due to field constraints.

Random selection of Households[24]

The selection of households was done following a two-stage cluster sampling or three-stage cluster sampling methodology. For both of the ways used, the first stage is the random selection of villages from updated list of villages in Nangere LGA using ENA for SMART software.

Villages with a population exceeding 300 households, a geographical segmentation was done at the village through identifying natural boundaries or facilities such as roads, water points, rivers etc. And one segment was randomly selected. Afterwards, random selection of one segment from the total segments was conducted. The segment selected represented the cluster and thus the selection of the 18 households for the Risk Factor Survey data collection was applied in that segment.

For villages with a population not exceeding 300 households, household selection was conducted following a simple random sampling to determinate the household to survey. This configuration follows a two-stage cluster sampling.

A number had been attributed to each household in each village, and then the household to be surveyed had been randomly selected using a table of random numbers.

Information collected within selected households

The RFS questionnaire is divided in 5 sections; each section had been addressed to different members of the household (cf. Annex n°1):

Household questionnaire:

This section was addressed to primary caregivers as they are in charge of meal preparation.

Child questionnaire 0-23 and 0-59 months:

This section was addressed to primary caregivers of each child (0-59) months present in the household.

Caregiver questionnaire:

This section was addressed to the primary caregivers.

Observation questionnaire:

For each cluster, the surveyors were drawing a map of the different water points. The surveyors then showed the map to the interviewee asking her/him what were the principal sources of water used by the household. Then the surveyors were going to this specific water points and filled the “water source observations” section. Observation had been also done at household level (water management and caregiver/child interactions).

Severe Acute Malnourished children and severely ill identification

The survey team ensured that they refer all children sick or regarded Severely Acute Malnourished by MUAC less than 115mm to the nearest health facility or outpatient therapeutic center.

[24] “All the persons who eat from the same cooking pot and live together”. Adopted from WFP definition of household.

2.2 QUALITATIVE ENQUIRY: SOCIO-ANTHROPOLOGICAL APPROACH

2.2.1 Stakeholders and experts consultations

Create and use a cooperation process during the Link NCA study, put everyone around the same table, agreeing on the same scientific process and facts lead to the success of the research. In this perspective, the involvement of stakeholders (NGOs, technical agencies, academic institutions, community members, frontline workers) is a key aspect of the Link NCA methodology.

To contribute to the development of causal hypotheses, key stakeholders were interviewed in the preliminary stages of the survey. In addition, two technical expert workshops were organized. The initial workshop was held to validate the causal hypotheses to be field-tested and a final workshop to evaluate and rate the causal hypotheses based on the evidence collected during the Link NCA study and to validate the results by providing a confidence note for each result.

2.2.2 Research instruments and methods

To understand and collect rich contextual data on community perceptions, practices and constraints with regards to child undernutrition, the Link NCA Analyst used FGDs and interviews methods (cf. Annex n°2). To which are added observation-participatory, observations and visits.

In addition, to embrace the socio-cultural context, two teams organized by gender were in charge of FGDs, interviews, observations and visitations. Each time that the socio-cultural context required it, we had adjusted the methodology: Nutrition FGD with men; gender community meal; local election; visits-observations (WASH or FSL).

FGDs and individual interviews guidelines were developed and discussed by the Link NCA team members, with a particular emphasis placed on traditional beliefs conceptions and gender organization.

FGD guidelines were developed covering 9 key sessions[25]:

- Undernutrition
- Good nutrition and nutritious food
- Care Practices including IYCF and care for women
- Health
- Food Security and Livelihoods
- WASH
- Protection
- Perception of fathers and grandfathers
- Seasonal and historical trends
- Risk factors rating by the communities

[25] The interview guideline for key informant was developed following those 9 topics.

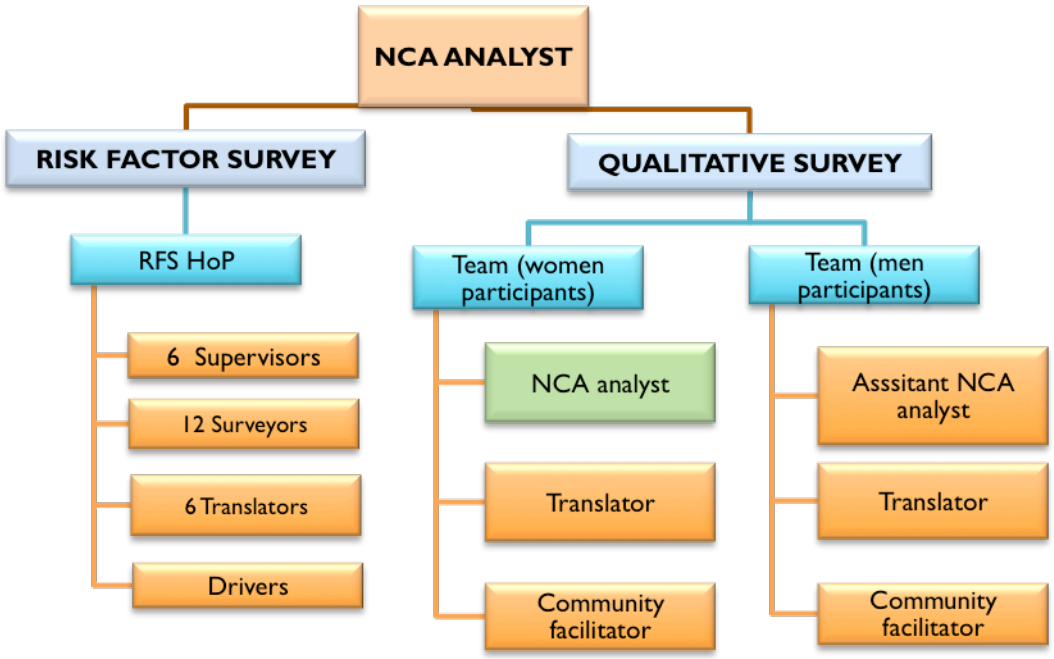


Fig. 5. Organizational chart of Link NCA teams

The method chosen for interview was semi-structured interview as it allows new ideas to be brought up during the interview and make the interviewer able to follow topical trajectories in the conversation.

During the fieldwork, we have developed interviews guidelines for health worker, birth attendance, and traditional doctor. We have tested a specific methodology for WASH sector based on mini-FGDs and gender approach.

2.2.3 Field teams

The NCA analyst led the qualitative data collection with an assistant[26], two translators[27], who all received an induction to the survey and qualitative research methods. In addition, in each village volunteers "community facilitator" to help gathering the community (one for woman and one for man). Finally, the assistant participating received an "in-training" throughout the entire process to gain more knowledge on the Link NCA methodology. He was in charge of the restitution of the results to the male population within the communities; led men FGDs and interviews.

A total of 6 field teams conducted the risk factors survey under the supervision of 12 supervisors. The risk factor survey was under the supervision of a RFS Head of Project.

The following diagram displays the NCA field team's composition:

[26] Sir Hussaini Ibn Mohammed, Sociologist-lector at Damaturu University.

[27] Liatu Gaye and Adamu Abubakar.

2.2.4 Field work: design of the data collection and presentation of villages

2.2.4.1 Overview of qualitative data collection

Socio-anthropological approach:

The Link NCA methodology allowed different approach regarding the qualitative survey: Human geography, economy or anthropological[28].

For this study, we have validated a socio-anthropological approach. Sociology leads us towards a better understanding of the vulnerable people's context. Anthropology conducts us to develop a comprehensive and holistic conception of the undernutrition problematic. To constantly permit the evolution of these 2 aspects the Link NCA analyst conducted daily briefings and debriefings at the beginning and the end of each day with the team. For example, we have decided since the second week to do Nutrition FGD with men since the socio-cultural context was favourable.

To help developing a deep understanding of the 5 major sectors cover by the study (Nutrition, Health, Food Security and Livelihood, WASH, and Protection) we choose to devote one day by sector in each village. During the fieldwork process, we have developed a specific methodology for the WASH sector across two days[29] (cf. Table n°7).

Volatile context:

The security context described as volatile has brought us to consider two strategies for the qualitative fieldwork. Based at Potiskum the first strategy proposed was to spend 6 consecutive days by village. One day would be dedicated to one sector: FGDs (Men and women), interviews, visits, and participatory observations. In addition, one half-day would be added to the presentation of the study to the village heads, and other half-day for the community meal. Several daily security checks were done with the Security manager of Damaturu Base[30].

If the security context of Nangere starts to be unfavourable during the survey, the second strategy allowed the team to use easier questionnaire and methodology, but also, one entire week would be given by sector. Meaning that each village would be visited one day by week, allowing the team moving from one village to the next one, then come back later in each village. In this case, the visibility of the team in the field would be low: the team routine changing, and the methodology remaining strong.

We were able to use the strategy number 1.

[28] For more example of Link NCA study: www.linknca.org.

[29] To be adequate with the cultural context the male team was in charge of WASH observations outside of the household. The female team was in charge of the WASH observations inside the household. Regarding the subjects of interviews and mini-FDGs, the male team was in charge of the collective water point management, the water management outside of the HH, the water management in crops/garden, the waste management outside the household. The female team was in charge of the water management and the waste management inside the household. Regarding the mini-FGDs the topics chosen was: Hygiene practices, sanitation and waste management. Both male and female teams conducted these mini-FGDs with men and women. During the first days of the qualitative survey it appeared that it was easier to conduct FGDs on WASH with few people (between 4 and 6). For male population participants were selected depending of the context: Elders, users of the well or well builder. For female population due to the HH context these FGDS were often conducted between relatives (Co-wives, mothers-daughters, sisters, neighbours).

[30] Muhammad Zahraddeen as Security Manager of Damaturu Base.

Qualitative fieldwork's design:

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
MAJOR ACTIVITIES-SECTOR	Study Presentation in front of village heads	NUTRITION	HEALTH	FOOD SECURITY and LIVELIHOOD-WASH	PROTECTION-WASH	Community meal
METHODOLOGY SUMMARY	Acceptance of the study 2 community facilitators 2 locations for the FGDs Key Informants Interviews (KII) Historical calendar Village visit	FGDs (men and women) GDs grandparents KII: Vulnerable HH, OTP Interviews, TBA Interviews Visits: Household during cooking, village head wives	FGDs (men and women) KII: health workers, pharmacists, traditional doctor, Visitation of the HC Disease calendar	FGDs (men and women) FSL Mini-FGDs (men and women) WASH KII: farmer, shop owner Visits: Crops, women business inside HHs, water point	FGDs (men and women) PROTECTION Mini-FGDs (men and women) WASH KII: Teachers, leaders, Visits: Schools, water point Seasonal calendar	Organization of the community meal Opening of the men community meal31 Opening and participation of the women community meal

Tab. 7. Design of the qualitative field methodology (2017)

5 villages were visited in one-month duration. During the last week two villages were visited. Two days and a half were dedicated to each community. We explain this methodological choice by the necessity for the field study to be representative of the Nangere context. The rural aspect and the population diversity were the two main criterion decisive for this choice. Moreover the field team was trained enough to support this methodological adjustment and additional work. The Link NCA Unit validated the approach.

Following the first analysis, the preliminary results were presented and discussed in the 5 villages one month after the end of the qualitative fieldwork (10th April to 15th April 2017).

2.2.4.2 Overview of 5 villages visited during the qualitative survey

Garin Gaye: Village number 2

Approximately 300 people live in the village. It is a settled compound of families.

[31] The community meals were lead with the collaboration of Lampo Abubakar (Nutrition officer of Nangere LGA for Action Against Hunger).

Malham Salisa Gaye (37 years old)[32] is the village head since 6 years. Originally, Garin Gaye people are from Tikau Ganuwa. They had immigrated 65 years ago to find a place to cultivate on the initiative of the elder brother 'Gaye'. Karaï-Karaï and Hausa mostly constitute Garin Gaye who mostly farm millet, sorghum and raise cattles, goats, sheeps and birds. This kind of settle compounds is particularly well adapted for farming and raising activities. In the village, there is also two chemists and two TBAs. There is no Traditional Doctor (TH) and no shop.

There is no local market; they visit Potiskum, Dawasa and Daganda markets (by foot or commercial car). There are 6 hand-dug wells (one big central). They have a semi-functional primary school, no health dispensary. The Garin Gaye's population goes to Dazigau HC far from 3 km, almost 20mn by foot.

Garin Kolo: Village number 4

Approximately 350 people live in the village. It is a nucleus compounds.

Malham Hassan Adamu (45 years old) is the village head since 4 years. He is a tailor. This independent community was settle with the previous village head, who was Bare-Bare and married 3 Fulani women. Since then, sedentary Fulani, Hausa, Karaï-Karaï and some Bare-Bare compose the village in majority. Some Hausa or Karaï-Karaï came for marriage. They are mostly farmers and raisers. In the village, there is a chemist, a tailor, and little shops. There are 2 THs and 2 TBAs. They mostly go to Dawasa market and Chukuriwa HC, which is 8 km away. The school build with the villagers fund is non-functional. There is an Islamia school as well. They have 3 collective water points (one non-functional borehole and 2 hand-dug wells).

Garin Kadaï: Village number 1

Approximately 350 people live in the Mohammed Soja quarter that is a part of a bigger village: Garin Kadaï (Approximately 1000 people). It is a nucleus compounds settle with others compounds.

Malham Hashimu Kadaï (70 years old) is the head of the village since 40 years old. Historically people from Kano built the village 100 years ago, on the initiative of Mallam Kadaï. Since the beginning, this village houses Islamic schools and people came just to receive Quranic education. Hausa and Karaï-Karaï compose the population, who depend mostly on farming. Raising and business represent few of their incomes. They have chemist, TBA, and 2 THs. There is no market but shops. For buying food items, they visit Dawasa and Kukuri markets. There are 4 collective water points (one non-functional borehole, 3 collective hand dug wells and some private wells). They have a semi-functional school, 2 Islamia schools, one health dispensary close by the village but no fully functional. This explain why people go to Kukuri HC, which is 7 km away.

Degubi Zakar: Village number 3

Approximately 400 people live in the Degubi Zakar quarter, which is a part of a bigger village: Degubi (approximately 2500 people). It is a nucleus compounds settled with others compounds.

Malham Garba Zakar (70 years old) is the head of the quarter since 50 years. He is a raiser and farmer. His father, Mallam Garba, initiated the foundation of the community during the digging of the central well and was an Islamic teacher. According to the head of the village, Karaï-Karaï, Hausa, Fulani and Yoruba compose the majority of the population. The population mostly depends of farming and few of raisings; some of them have little business. The main two religions are Christian and Muslim. Degubi village hosts many IDPs since 2014. According to the local population, half of them went back to their original place.

[32] After discussions with the technical advisor, it appeared that the security and cultural context allowed giving the head of village name.

There is a HC, a local market, primary and secondary school, Islamia School, 3 collective water points (one functional solar borehole, 2 hand-dug wells), lot of little shops (Chemist, tailoring, charging center etc.). There are 2 TBAs, 2 THs.

Dan Disa: Village number 5

Approximately 400 people live in the Mohammed Soja quarter of a bigger village: Nangere (Approximately 3000 people and plus). It is a nucleus compounds settle with others compounds.

Malham Mohamed Dan Disa (65 years old) is the head of the quarter since 40 years. He is an Islamic teacher came at Dan Disa as a student who first settled here. The community was initially a Fulani settlement called Nangere. Now there are mostly Hausa and Karaï-Karaï people. He declares that 70% of the Dan Disa population is farmer, 20% do some little business and 10% or less has some salary job.

There is one HC at Dan Disa but the population can also reach the Nangere Hospital. They have a primary school, Islamia School and 3 water points (one non-functional borehole, 2 hand-dug wells). The population mostly goes to closer market: Dawasa. There is many small shops (Chemist, tailor, phone-charging center etc.). There are 2 TBAs, 2 THs.

2.2.4.3 Resume of the qualitative methodology

In total, 65 FGDs, 80 interviews and almost 40 visits-observations were hold in five villages. The participation is detailed in the table below:

	Village's criteria					
	Village until 1000 people			Village more than 2500 people		
	Settle compounds	Nucleus compounds	Nucleus compounds +	Nucleus compounds +	Nucleus compounds ++	
	WEEK 2	WEEK 4	WEEK 1	WEEK 3	WEEK 4	
Village	GARIN GAYE 300 people	GARIN KOLO 350 people	GARIN KADAI (1000 people) Mohammed Soja (350 p.)	DEGUBI (2500 people) Degubi Zakar (400 p.)	OLD NANGERE (3000 people & plus) Dan Disa (400 p.)	
Nutrition and Care Practices						**TOTAL**
FGD NUT	2 (W. & M.)	2 (W. & M.)	1	2 (W. & M.)	2 (W. & M.)	**9**
Int. NUT OTP	4	3	3	4		**14**
Int. NUT VILLAGE	5	2	1	5	3	**16**
Int. B.A.	2	1		2	2	**7**
FGD G-Mother	1			1		**2**
Visit family	1	1	1	1		**4**

Obs. Meal		1		1	1		3
Recipes child food33		1	1		2		4
Health							
FGD Health		2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	10
Int. HW		2	1	3	2		8
Int. Trad. Doctor			2 (Wazami)	1	1	1	5
Int-Med. Recipes		1	1				2
Int. Pharmacist		2	1	1	3	1	8
Obs. HC		1	1	1	1		4
Food Security and Livestock							37
FGD FSL		2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	10
Int. FSL		2		4	4		10
Visit FSL		2	1	2		1	5
Visit Crops		2		1			3
Visit HH		2	2	4	4	1	13
Market Exercise		1		1	1	1	4
WASH							45
Mini FGD Wash		2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	10
WASH Obs.		2	2	2	1 (assessment)	2	9
PROTECTION							
FGD Prot.		2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	2 (W. & M.)	10
FGD Young men		1		1			2
FGD G-father		1				1	2

[33] These child food recipes can be collected during personal interview or focus group discussion.

Int. Teacher		1	1	1	1	2	6
Visit school		1	1	1	1	1	5
Calendar							
Seasonal calendar		1	1	1	1	1	5
Historical calendar		1	1	1	1	1	5
Village's plan		1	1	1	1	1	5
Visit			Fulanis (2)	Trad. Doctor; Village	Village, church, mosque	Dawasa market	
Life/artefact story		"Mama kit"[34]	Tradi.	Henna Tattoo [35]	Water	Emir	5
Int. KI		6	2	5	3	2	18

Tab. 8. Summary of the qualitative field methodology (2017)

2.3 MAIN CHALLENGES FOR THE QUANTITATIVE AND QUALITATIVE FIELDWORK

Quantitative survey:

Tough geographical ground and poor roads: The assessment team encountered difficult access conditions (poor roads and bushes) while trying to reach the villages using the survey vehicles. The team had to endure long distances to reach to the villages. It was observed across the LGAs that households within the community settlements/villages among Fulani were scattered over long distances.

Age of the target children: Majority of under-fives representing 98% of total children assessed, had no birth certificate or health record to confirm their exact age. The survey team had to rely on calendar of events to estimate the age of the children.

Qualitative survey:

Historical records: The collect of historical events to build the historical calendar was difficult. Few collective memories can be collected with the help of the elders, but, most of the time it was impossible to have data on historical disease calendar or historical pest issues.

[34] « Mama kit » Is provided by Health Center to women in need during delivery. There are gloves, tissues. (cf; Annex n°3)

[35] Women practice the henna tattoo for bride or young women.

3/ DATA MANAGEMENT AND ANALYSIS

3.1 QUANTITATIVE DATA MANAGEMENT AND ANALYSIS

A database was developed in Excel 2013. Data were collected on tablets using ODK software through Kobo Toolbox and transferred to the excel database.

Anthropometric measurements was analysed with ENA software. Quantitative data analysis of risk factors was conducted using Excel then Epi Info v.3.5.3 and Stata software

3.2 QUALITATIVE DATA MANAGEMENT AND ANALYSIS

The process of qualitative data analysis was on going and iterative. Every evening, transcripts were written down and summary of key themes were developed.

Data were coded on a weekly basis according to selected key themes and in order to address the main study questions. Lastly, the data were analysed using content analysis methods.

3.3 RATING HYPOTHESES

Based on the results of the Link NCA, the Link NCA analyst rated the causal hypotheses by order of importance and through triangulation of:

The prevalence of risk factor from secondary and primary data;

The strength of association between the risk factor and under-nutrition (scientific literature review);

The seasonality of causal hypothesis related to seasonality of undernutrition;

The participatory rating exercise with communities.

Data from the RFS were used as indicators to verify the pertinence of the Link NCA analysis.

Causal hypotheses were rated based on the following classification:

CATEGORY	DEFINITION
MAJOR CAUSAL PATHWAY TO CHILD UNDERNUTRITION	The causal pathway is interpreted as a major contributor to child undernutrition prevalence in the study area.
IMPORTANT CAUSAL PATHWAY TO CHILD UNDERNUTRITION	The causal pathway is interpreted as an important contributor to child undernutrition prevalence in the study area.
MINOR CAUSAL PATHWAY TO CHILD UNDERNUTRITION	The causal pathway is interpreted as a limited contributor to child undernutrition prevalence in the study area.
REJECTED CAUSAL HYPOTHESIS	The causal hypothesis is interpreted as a not relevant or significant contributor to child undernutrition in the study area.
UNTESTED CAUSAL HYPOTHESIS	Information gathered is not sufficient to reach a plausible conclusion.

Tab. 9. Classification of the risk factors

The results of the rating exercise were presented and validated by several stakeholders during a final technical expert workshop hold on the 8th and 9th May 2017 at Damaturu. Technical experts were invited to inform the level of confidence they had in each result through a confidence note attribute to each of the findings[36].

Draft recommendations of the Link NCA analyst was also reviewed and validated. Modification or adding were done together with the Link NCA analyst and the technical experts.

[36] Confidence notes provide an evaluation of how reliable technical experts think the rating is, based on the strength of the information gathered for each result.

4/ ETHICAL APPROVAL AND INFORM CONSENT

A protocol of the Link NCA surveys was submitted to the Commission of Planning and monitoring of Yobe State to ensure adherence to ethical standards and protection of human participants.

Prior approval was sought from the Emir of Nangere as well as leaders of each surveyed village. Additionally, informed voluntary consent was obtained from each Link NCA participant. Children who were found as severely malnourished or severely ills were referred for medical attention as per the protocol defined at section 3.4.1.4 of the presented Link NCA study report[37].

5/ VALIDATION OF HYPOTHESIS RISK FACTOR (PRELIMINARY AND FINAL WORKSHOP)

5.1 PRELIMINARY TECHNICAL EXPERT WORKSHOP

5.1.1 Organization

On the 30th of January 2017, Action Against Hunger held a preliminary/initial technical workshop with 33 national and local experts from the following domains: Food Security and Livelihoods, WASH, health, nutrition, Protection and education.

Based on the results of a secondary data and literature review on risk factors and pathways of undernutrition, a list of 22 hypothesised risk factors and a hypothesised causal model were presented to the technical experts. The technical workshop aimed at identifying nutrition vulnerable groups and validating a list of causal hypotheses to be field-tested (cf. Preliminary Workshop Report).

[37] Section 3.4.1.4. *Severe Acute Malnourished children identification,* p.22.

These 22 hypothesised risk factors were debated and individually rated from 1 (hypothesis believed to contribute marginally to undernutrition) to 5 (hypothesis believed to be a major contributor to undernutrition).

5.1.2 Hypotheses to be field tested

A debate helped to reach a consensus on the hypotheses to be field-tested. Some definitions were modified in order to be more precise. It was decided to keep most of the pathways, as it was easy to reach a consensus on it. Global pathway was validated during the final workshop.

Hypotheses were validated, modified or added as follow:

Validated	1, 2, 3, 4, 6, 10, 13, 14, 15, 16, 17, 19, 20, 21, 22
Modified	5, 7, 8, 9, 11, 12, 18
Added	None

Tab. 10. Resume of the preliminary validation of the risk factor hypothesis

To follow a correct chronology, hypothesis 5 “Poor child psychosocial practices” was modified in order to question the psychosocial network and the impact of the conflict on the same. The purpose of this modification was to be more specific.

Hypothesis 7 **“Poor utilization and access to health center”** was modified to fit with the Health services present in Nigeria and Nangere LGA. Indeed, there are two sorts of structures Health Center and Health Facilities (or dispensary). We decided to include both of them under Health services.

Hypothesis 8 **“Early pregnancies (very early, around 12/13)”** created an important debate. The main purpose of this hypothesis was to understand the local context where the average age of marriage is 15 years old. In addition, official age of majority seems to depend on the region; therefore, the hypothesis could not be mentioned as “Child pregnancy” as it might lead to some understanding bias. The only consensus that we were able to find was to speak about “Pregnancy bellow 18”.

Hypothesis 9 **“Poor child spacing (Low birth control)”** was modified in order to integrate the fact that the conception of reproduction health and family planning is not accepted in the local culture. We agreed to mention “Short birth spacing”.

Hypothesis 11 **“Non optimal water management”** was modified to be more specific and to interrogate the water chain management.

Hypothesis 12 **“Difficulties in handling adequate hygiene practices”** was modified to be more general and mentioned as “Poor Hygiene Practices”.

Hypothesis 18 **“Non optimal use of food incomes and low monetary incomes”** was debated and we decided to focus on food and income management at household level.

Hypothesis 1: Non-optimal breastfeeding practice for children up to 6 months (Validated)	4.82
Hypothesis 2: Young child non-optimal feeding practices (Validated)	4.50
Hypothesis 3: Poor nutritional status among pregnant and lactating women (Validated)	4.75
Hypothesis 4: Inadequate child health care (Validated)	4.50
Hypothesis 5: Poor child psychosocial practices and lack of psychosocial network (Revised)	4.50
Hypothesis 6: Weakness of the health system (Validated)	4.46
Hypothesis 7: Poor utilization and access to health services (Revised)	4.50
Hypothesis 8: Pregnancy (bellow 18) (Revised)	3.96
Hypothesis 9: Short birth interval (Revised)	4.57
Hypothesis 10: Inadequate access to water in quality and quantity (Validated)	4.57
Hypothesis 11: Non optimal water management/water chain (Revised)	4.79
Hypothesis 12: Poor hygiene practices (Revised)	4.54
Hypothesis 13: Inadequate management of human and animal excreta (Validated)	4.57
Hypothesis 14: Inadequate management of solid waste (Validated)	4.43
Hypothesis 15: Difficulties to manage water for crops and livestock (Validated)	4.46
Hypothesis 16: Limited access to food (quality/quantity) (Validated)	4.43
Hypothesis 17: Limited food availability (quality and quantity) (Validated)	4.50
Hypothesis 18: Sub-optimal food & other sources of incomes management (HH level) (Revised)	4.39
Hypothesis 19: Emergency coping strategies (Validated)	4.61
Hypothesis 20: High maternal household workload (Validated)	4.75
Hypothesis 21: Poor women empowerment (Validated)	4.79
Hypothesis 22: High illiteracy rates among parents (Validated)	4.82
Average note	4.56

Tab· 11· Causal hypothesis rating from the preliminary workshop (Hypothesis to be field-tested)

Technical experts mostly considered hypotheses 1, 11, 21, 22, as major risk factors and hypotheses 8 and 18 as minor risk factors in the undernutrition causes model. The final risk factor hypotheses list got a high confidence note with an average rating score of 4.56 on 5.

5.1.3 Nutrition vulnerable groups

The following groups were identified as nutrition vulnerable groups: children under 59 months with a specific emphasis on children under 24 months.

By working in 6 multi-sectorial groups, technical experts identified hypothesized risk factors and pathways to undernutrition presented in local causal models.

5.2 VALIDATION BY THE COMMUNITY

5.2.1 Preselecting of the hypothesis and exercise design

In order to understand how the causes of undernutrition are perceived by communities, a final rating exercise was carried out with the participants of the 5 villages surveyed during the qualitative survey. The following tables (table 12 and 13) illustrate the results and the top 5 of the major risk factors perceived by villagers (the most important risk factors are presented in dark green).

The exercise had been conducted in two steps. After the fieldwork, 13 hypothesis had been choose among the 22 preliminary ones. This choice was led by a preanalysis of the answers and speeches gathered during the fieldwork. The exercise had to be adapted as the format proposed by the Link NCA guidelines was not adapted to the local context. The methodology was defined and tested by the Link NCA analyst before being validated by the Link NCA Unit.

Hypothesis A = **Hypothesis 1** → Non-optimal breastfeeding practice for children up to 6 months

Hypothesis B = **Hypothesis 2** → Young child non-optimal feeding practices

Hypothesis C = **Hypothesis 3** → Poor nutritional status among pregnant and lactating woman

Hypothesis D = **Hypothesis 6-7**→ Weakness and poor access to health system

Hypothesis E = **Hypothesis 10** → Inadequate access to water in quality and quantity

Hypothesis F = **Hypothesis 12** → *Poor hygiene practices*

Hypothesis G = **Hypothesis 13-14** → Inadequate management of human, animal excreta and waste

Hypothesis H = **Hypothesis 16** → *Limited access to food*

Hypothesis I = **Hypothesis 17** → *Limited food availability*

Hypothesis J = **Hypothesis 22** → High illiteracy rates among parents

The main objective of the exercise was to present 10 pictures representing those 13 hypotheses. This design was chosen to assure a good understanding of each cause and an easy mental representation of them by the population. If the participant choose the hypothesis D or G, we asked them if he or she considered one or two explanations for his/her choice.

Each participant had 3 choices to do by putting 3 stones on the chosen pictures. Then, with each of the participants we discussed the reason of their choices and the classification he or she can do in order to understand which cause is perceived has major or important causes of undernutrition.

The categorization exercise was conducted in 5 villages. In each village, one exercise was done with the men and one with the women. Each exercise was lead with 30 participants. After an explanation of the pictures in front of the group of men and women, each participant did the

exercise in a quiet place supported by a translator and interviewed by the Link NCA analyst (women) and the deputy NCA analyst (men). The duration of the exercise was generally around 2 hours.

After the exercise, a discussion was led with women and with men. The first part of the discussion was about the results of the study and the second part was about the recommendation. During those discussions, participants expressed their satisfaction to verify that the selected hypothesis were representing their preoccupations and speeches articulated during the fieldwork. Duration of those discussions was around one hour.

5.2.2 Categorization by the community

As we can observed a number of perceived causes are shared across each of the five villages:

Hypothesis	Garin Kolo	Garin Gaye	Garin Kadaï	Degubi	Dan Disa
A: Non-optimal breastfeeding practice for children up to 6 months					3
B: Young child non-optimal feeding practices					
C: Poor nutritional status among pregnant and lactating woman	5	3	3	3	4
D: Weakness and poor access to health system	3	4	4	5	
E: Inadequate access to water in quality and quantity				4	
F: Poor hygiene practices		5			
G: Inadequate management of human, animal excreta and waste					
H: Limited access to food	1	1	1	2	1
I: Limited food availability	2	2	2	1	2
J: High illiteracy rates among parents	4		5		5

Tab· 12· Results of the categorization exercise done with men (with top 5 ranking)

Hypothesis	Garin Kolo	Garin Gaye	Garin Kadaï	Degubi	Dan Disa
A: Non-optimal breastfeeding practice for children up to 6 months		4		4	3
B: Young child non-optimal feeding practices			4		
C: Poor nutritional status among pregnant and lactating woman	5	3	3	2	4

Hypothesis	Garin Kolo	Garin Gaye	Garin Kadaï	Degubi	Dan Disa
D: Weakness and poor access to health system	2		5	3	
E: Inadequate access to water in quality and quantity		5			
F: Poor hygiene practices					
G: Inadequate management of human, animal excreta and waste					
H: Limited access to food	4	2	2		2
I: Limited food availability	1	1	1	1	1
J: High illiteracy rates among parents	3			5	5

Tab. 13. Results of the categorization exercise done with women (with top 5 ranking)

Major factor: 20-30 participants	
Important factor: 10-19 participants	
Minor factor <10 participants	
Factor under related to under-nutrition <1	
None vote	
Rank	Calculating with the rank number given by the participants

We noticed that in a majority of the case, women and men mentioned hypothesis H ("Limited access to food") and I ("Limited food availability") as major risks factors of undernutrition. Men had considered access to food as problematic, while women had privileged food availability. This clear tendency could be explained by women's preoccupations regarding the success of having good crops as a men responsibility. Regarding food availability, the explanation is mostly oriented on the weakness of the land, the lack of access of fertilizers, the limited access to land (to rent, distance) and the lack of irrigation system for cropping. For the hypothesis on access to food, poverty, lack of financial capital, absence of business or farming support, unemployment and lack of money are considered as a major cause of children undernutrition (no access to food, medicine, school, business).

Men and women also considered hypothesis C ("Poor nutritional status among pregnant and lactating women") as important risk factor. They mostly explain that when a woman does not eat enough and enough diversify during her pregnancy or breastfeeding period then she will be suffering from a lack of breast milk, which leads to giving birth to a child smaller than the average size and also leads, to an earlier and inadequate complementary feeding of the young child. They explain also very clearly that poverty and lack of crops lead to a lake of food and

incomes in the household which as for consequence a lack of nutritious food and poor nutritional status among women and men. In another hand, women will considered the nutrition hypothesis risks factors (A, B, C) as causes of children undernutrition more than men. We also observe that for the hypothesis A women talk about lack of breast milk while men will considered that women do not have a sufficient knowledge to have good breastfeeding practices.

The hypothesis D ("Health system") appears similarly as an important risks factor. Weakness of structures, lack of nurse, doctor, and lack of medicine are the arguments, which explain first how weak the health system is perceived by the population. Second, mostly among women, the price of medicines and cares appear as a barrier to access of health center. Women preoccupations regarding prices and price increase can be explain by the fact that women are the first health care givers and that they are in charge of health payment (using women livestock as goats or chicken, sell into market). During this exercise, it appears that having more than 5 km to travel to reach the health center become a major problem due to the lack of transportation (Garin Kolo).

The hypothesis J (illiteracy among parents) appear also frequently as an important cause of children undernutrition, men and women claimed that without knowledge it can be difficult to solve life problems (as incomes management or health issues and to access at a better social level.

WASH hypotheses (E, F, G) are rarely considered by the participants as important risks factors. The hypothesis about hygiene practices is the most expressed because of its relation to lack of soap, quantity and quality of water.

Regarding the distinction between villages size, it seems that for villages more than 2500 people (semi-rural), the food availability is a bigger problem because of the distance to travel to reach crops fields.

5.3 FINAL WORKSHOP

On the 8th and 9th May 2017, Action Against Hunger held a final technical workshop with national and local experts from the following fields: Nutrition, Health, Food Security and Livelihoods, WASH, Protection and Education. This workshop followed a preliminary workshop held on the 30th of January 2017.

The final workshop was held to validate the findings of the field survey. After a presentation of the Link NCA findings, working group sessions were organized to validate the results and draw recommendations. Group confidence note were attributed to the risk factors rates proposed by the Link NCA analyst. Experts proposed their own rating for each risk factor and a debate was organized to attribute a final rating to each factor (cf. Final Workshop Report).

Final the experts were asked to discuss and improve the Link NCA recommendations during a validation exercise (cf. Annex n°10).

Risk Factors	NCA Analyst rating	Average group confidence note	Final rating (validated during the workshop)	Average individual confidence note	Comment from working group
1	Major	3.00	Major[38]	2.95	
2	Major	3.00	Major	2.95	
3	Major	2.60	Major[39]	2.85	
4	Important	3.00	Major	2.75	Bad child health practices can lead to undernutrition and in this local context, it does
5	Minor	2.80	Minor	2.35	
6	Important	3.00	Important	2.55	
7	Major	3.00	Major	2.85	
8	Minor	2.40	Minor	2.40	
9	Important	2.80	Important	2.30	
10	Major	3.00	Major	2.95	
11	Important	2.80	Major	2.85	Water management is the link to hygiene practices and quantity of water
12	Major	3.00	Major	2.95	
13	Major	3.00	Major	2.90	
14	Minor	2.40	Minor	2.20	
15	Important	2.60	Important	2.50	
16	Major	3.00	Major	2.95	
17	Major	3.00	Major	3.00	
18	Minor	2.40	Important	2.55	There is a real situation of sub-optimal incomes with a big impact of the seasonality
19	Important	2.80	Important	2.45	
20	Minor	2.40	Minor	2.30	

[38]

[39] For both hypotheses, the rating should be taken with caution as some evidences gathered after the workshop seem to indicate an "over rating". Therefore, readers might prefer to consider them as "important risk factors".

Risk Factors	NCA Analyst rating	Average group confidence note	Final rating (validated during the workshop)	Average individual confidence note	Comment from working group
21	Minor	2.80	Important	2.55	Empowerment of woman have a direct impact on the financial health of the household
22	Important	2.00	Major	2.70	Level of education among parents have a direct impact on parents empowerment

Tab· 14· Final rating of the risk factor by the local experts

6/ LIMITATIONS OF THE STUDY

The methodology used is indeed a causal analysis although causality is not demonstrated from an epidemiological point-of-view. A low confidence note for certain results would mean that the information gathered is not convincing enough and advocate for complementary research to be conducted.

Qualitative results from the Link NCA presented is valid only for the population studied in Garin Gaye, Garin Kolo, Garin Kadaï, Degubi Zakar and Dan Disa, Nangere LGA, Yobe State, Nigeria. Although, the quantitative survey and literature review covering the entire LGA, the overall presentation could be considered as enough representative of Nangere LGA. All the results should be considered at this geographic level and not beyond without complementary analysis.

Data base, Data analysis

Since ACF is an NGO active in Nutrition activities in some part of the studied area, a possible bias in the results should be considered. Participants from the communities may have perceived some benefit from taking part of the survey. This potential threat to the research was mitigated as far as possible by providing detailed information to participants on the objectives of the Link NCA study, and explaining that their participation would be independent to any NGO or Government support. Furthermore, this potential bias was mitigated in the analysis stage.

Regarding the RFS data analysis, and giving the complex survey context, analysis was done several time by different technical experts to insure the validity of the results. Indeed, security issues, level of the staff in the given area, access conditions; complexity of implementing a multi-sectorial survey could have affected the quality of the data. Therefore, data based was closely checked by several technical advisors (M/E, WASH, Nut, FSL) to insure that the results were logical and representative of the context. In addition, several triangulations were done during the analysis to verify that the information was making sense according to the known situation. As example, WASH indicators prevalence were triangulate with Link NCA team observations, WASH field teams, secondary data, knowledge of the context (WASH TA, HQ) to be sure that the data was of good quality and to insure that all questions could be answered. As a more precise example, water access and questions related to rainfall were triangulated with information provided by the DRM team in Dakar who is closely following the question through mapping and surveillance system in the sub-region.

Age of target children

Majority of under-fives representing 98% of total children assessed, had no birth certificate or health record to confirm their exact age. The survey team had to rely on calendar of events to estimate the age of the children.

Seasonal calendar

The lean season starts in March; surveys were conducted in February. The timing of the study should be taken in account while reading the report.

SECTION II: LINK NCA FINDINGS

After presentation of the Link NCA methodology and hypotheses to be field-tested, the section II highlights the findings. The results are presented by sector and discussed into each part following the triangulation data main.

It has been decided to present the results in an holistic way instead of describing results by hypothesis. However, hypotheses coding number are members beside each associated part of the report.

In introduction of each part, hypotheses are mentioned and at the end of each sectorial part, main findings and hypotheses validation is presented.

1/ NUTRITION AND CARE PRACTICES

Hypothesis I	Non-optimal breastfeeding practices for children up to 6 months
Hypothesis 2	Young child non-optimal feeding practices
Hypothesis 3	Poor nutritional status among pregnant and lactating women
Hypothesis 4	Inadequate child health care
Hypothesis 5	Poor child psychosocial practices and lack of psychosocial network

1.1 UNDERNUTRITION

1.1.1 Anthropometric results

The anthropometric results associated to this research originate from the SMART survey conducted from 17th to 20th October 2016 by Action Against Hunger in Nangere LGA[40].

INDEX	INDICATOR	Proportion
WHZ-scores	Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	14.6% (11.4-18.6 95%CI)
	Prevalence of moderate acute malnutrition (<-2 z-score and >=-3 z-score, no oedema)	12.0% (9-15.8 95%CI)
	Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	2.6% (1.5-4.4 95%CI)
MUAC	Prevalence of global acute malnutrition by MUAC (<125mm) or oedema	14.0% (10.8-17.9 95%CI)
	Prevalence of moderate acute malnutrition by MUAC (>=115-<125 mm)	10.2% (7.9-13.1 95%CI)
	Prevalence of severe acute malnutrition by MUAC (<115mm or oedema)	3.8% (2.2-6.5 95%CI)
HAZ-scores	Prevalence of stunting (<-2 z-score)	68.3% (63-73.2 95%CI)

[40] SMART Survey Report - Nangere LGA (2016), Kevin Mutegi.

	Prevalence of severe stunting (<-3 z-score)	37.4% (32.7-42.4 95%CI)
WAZ-scores	Prevalence of underweight (<-2 z-score)	51.6% (46-57.1 95%CI)
	Prevalence of severe underweight (<-3 z-score)	17.5% (14.7-20.6 95%CI)

Tab. 15. Summary of SMART Anthropometric results at Nangere LGA (WHO-2006 Standards)

The survey findings revealed acute malnutrition or wasting levels (GAM WHZ<-2SD) was 14.6% (11.4-18.6 95% CI) classified at serious levels of acute malnutrition on WHO thresholds (>10%) and likely to deteriorate as peak of lean season approaches. The GAM prevalence by MUAC also confirms existence of serious levels of acute malnutrition in Nangere LGA. The stunting levels of 68.3% were critically very high based on WHO thresholds (>40%). The percentage of children exposed to both stunting and wasting, underweight, what is associated to high risk of mortality[41], is 51.6%.

Local trend of undernutrition prevalence

According to the Nangere LGA SMART survey, one child on two is in a situation of undernutrition. In 2011, the MICS survey found in Yobe State that the prevalence of acute malnutrition was 14.9%, stunting 64.8% and underweight 48% (p.20.). Clearly, levels are similar to those revealed by the SMART survey, indicating overall a little deterioration of the nutritional situation. However, the National Nutrition and Health Survey conducted in 2015 discovered that in Yobe state all the prevalence were less than ours: GAM=10.9%, (MAM: 8.9%, SAM: 2%; p.46.); Stunting=52% (MS: 30.5%, SS: 21.6%; p.55.); Underweight =32.8% (MU: 22.6%, SU: 10.2%; p.50.).

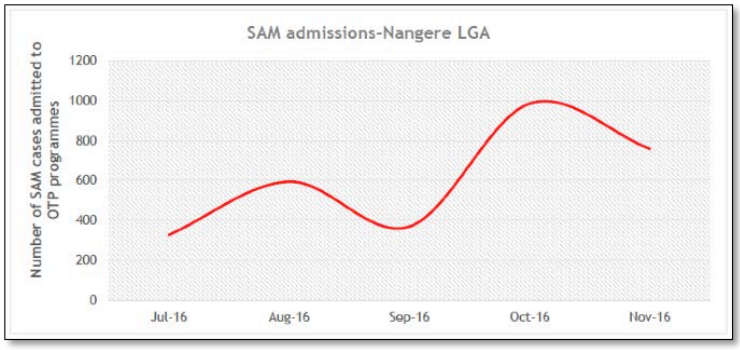


Fig. 6. Local trend of undernutrition prevalence since 2011

[41] Globally over 35% of under-five deaths are attributed to child undernutrition (SMART report, 2017: 11).

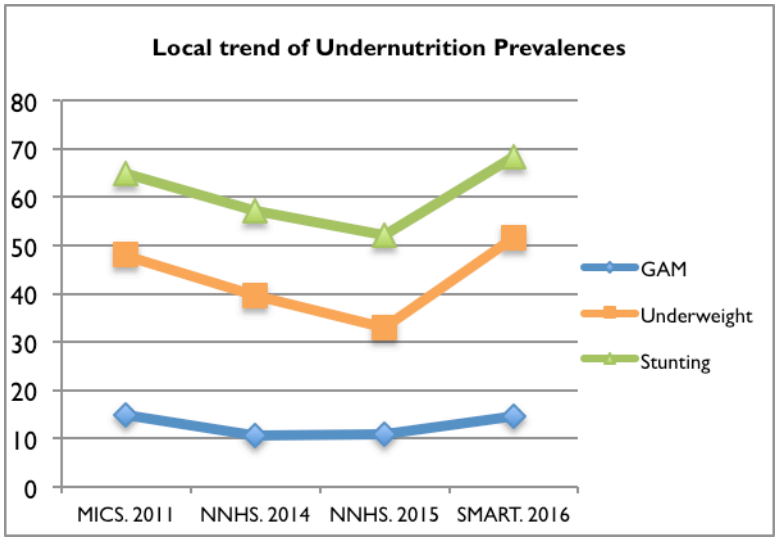
If those results remain high, particularly the severe trends of GAM from the SMART survey (2016), generally the NNHS survey (2015) shows a decrease in the prevalence. This diminution can be surprising in regard of the conflict temporality and his consequences in terms of child nutrition. Although it seems reasonable to suppose that before the conflict the nutritional situation was improving, which is observable in the NNHS survey, but the conflict stop this progression. Actually, in Nangere LGA, the nutritional status of children under five years is worst than before the conflict despite the national and international effort to improve the situation.

This research attempt to understand the roots causes of chronic and acute undernutrition as well as it apprehends recent causes, as the conflict, in terms of degradation of children nutritional security.

Seasonal trend of malnutrition admission (OTP)

To initiate our discussion on the seasonal calendar of undernutrition, surveillance data, based on MUAC screening, have shown increasing trends over time in severe acute malnutrition cases admitted to the Out-Patient Therapeutic Programs (OTP) across Nangere LGA (Figure 2). Nevertheless, the peak of undernutrition case in October can be explained by beginning of treatment and not by a peak of nutritional degradation. It reflects a decision-making process link to other factors that this study proposed to explore.

Fig. 7. Number of SAM Admission on OTP Programs supported 2016 (SMART, 2016: 11)



In fact, the results of this Link NCA study will show that the increase of undernutrition case in the children bellow 5 years old population starts in March due to a link with short storage of food into the household[42]. If there is a clear impact of malaria on the undernutrition prevalence during the cropping season, this research will demonstrate the role played by diarrhea on the degradation of children nutritional status since the start of the lean season. As shown in Figure 2, this degradation

[42] Normally the lean season is supposed to start in May, March is quite early. This report will demonstrate that the shortage of food into the HH is a consequence of the conflict and can be linked to lack of rainfalls, followed by bad harvest, lack of food availability in markets, prices, and access to land.

gets stronger in June-July-August due to the long shortage of food, an increase of malaria case (rainy season) and the augmentation of caregivers' workload due to the cropping season. It is only when parents are more available and that they can use a small amount of money from the first harvest that they can finally go to the health center (October-November).

1.1.2 Nutrition Vulnerable Groups

In Nangere LGA, the majority of the population depends on the agro-pastoral production. During the study, we found that the nutritional security of this part of the population was deteriorating mainly because of a bad harvest season (cf. Chapter II; Part IV. FSL).The following groups were identified as vulnerable nutrition groups by local experts during the preliminary workshop: children under five years old and more especially children aged more than 6 months, children of single parents and particularly single mother, children of large families, lactating and pregnant women. Some participants (experts or respondents) also mentioned elder children, elderlies and persons with disabilities.

1.1.3 Local definition of undernutrition and good nutrition

1.1.3.1 Local definition and description of undernutrition

ENGLISH	HAUSA	KARAÏ-KARAÏ
MISSING WEIGHT OR FOOD	Tamua	Dartau tina
MISSING FOOD	Rashin cin	Dartau tina
MISSING FOOD	Abincin mai	Wada ma

Tab. 16. Undernutrition lexica English/Hausa/Karaï-Karaï

The local term used by the population to designate undernutrition is "*Tamua*". It means, "something is missing"; it can be food or weight. This definition indicates a basic understanding of undernutrition as a lack of food, lack of nutritious food, lack of weight but also hunger or lack of money.

The participants mentioned as symptoms of undernutrition: fever, skin swelling and shrinking (legs, hands), lack of strength and general weakness, vomiting, changing in hair color from black to yellow or red, big belly, abnormal child's head size. We noticed that some criterion did not characterize the physical appearance of the young child as immune system inability to fight diseases, not able to walk, unhappy and more recently low birth weight. Usually, men give a longer list of signs than women do but all the previous symptoms had been mentioned by both gender. In

addition, it happened that participants talk about fever as a symptom of undernutrition, in fact for most of them undernutrition is a consequence of sickness.

In this perspective, during FGDs about nutrition and health, we figured out a second definition culturally deeper. Lot of qualitative data show that a disease called "*Rana*" for children and "*Olsa*" for adults seems to be linked to undernutrition. All the signs of undernutrition describe this disease: mouth, hands, feet, articulations and sometimes genital parts are red, skin is swelling, the child or the adult loose appetite and weight. After investigation toward Nigerian medical practitioners, '*Rana*' is defined as perianal ulcer and *Olsa* as an ulcer. This definition illustrates the link between undernutrition and diarrhea. In a local language, *Rana* means sun, hot, afternoon (when the sun is high) because initially this disease appears when the weather becomes hot and the sun is strong. However, the qualitative survey shows that sickness is no longer depending on the season even if there is an increasing of cases before and during the rainy season. According to the participants, the main symptom of *rana* is diarrhea and sometimes vomiting. Moreover, they indicated that since 5-3 years the number of cases of *rana* and *olsa* is increasing as the cases of Low Birth Weight. Commonly they linked these increase with lack of food and hunger, which started for them in 2010-2011 with low crop production and get stronger since Boko Haram insurgency started in 2012-2013[43]. Moreover, the study did not highlight any specific ethnic representations or food taboos correlated with undernutrition. For most of the persons interrogated, undernutrition is not related with believes like curses, maledictions or spirits. In addition, the study did not highlight any cultural artifact connected to undernutrition such as '*grigri*'. Necklaces or cords around belly can be sawn but, most of the time, for children, these artifacts are specifically associated with diseases like respiratory infections or growth of teeth.

1.1.3.2 Local understanding of undernutrition (*causes, temporality, calendar*)

Local understanding of undernutrition causes

For the participants undernutrition is a disease related to others diseases. It can be directly linked with fever, respiratory infections and diarrhea or indirectly with *rana*. However, for them if this disease is not contagious it knows no boundary in terms of whom can be affected. It targets and touches all the population and not only a small part of the population it can touch all the members of their community. Nevertheless, they declared that poor people, farmers' family and IDPs are the most exposed.

In fact, in their own understanding they perceive undernutrition as a sickness also linked to a lack of food to eat in terms of quantity, quality and frequency during the day. For them, farmers, poor people and IDPs do not have access to enough food, which explains why they are more susceptible to encounter some undernutrition issues. But the best instance of this link between undernutrition and lack of food comes when they said that if pregnant and lactating women do not eat enough the child will be directly affected from his/her birth but also after as he/she will not be properly and efficiently breastfed. It happens that some participants declared "unhealthy and undernourished adults" give birth to "unhealthy and undernourished children". Finally, it happened that undernutrition was also linked with "dirty" as lack of hygiene practices and water in quality and quantity. Indeed, participants also called undernutrition "dirty".

[43] For the population the increase of undernutrition cases is related to the conflict. For them, consequences of the conflict such as "lack of money", "lack of fertilizer", "lack of food" and "stress" induce an increase of undernutrition cases since 3-4 years. There is a tendency of the participants living in big villages (more than 2500 people) to refer to 4-5 years.

"We don't eat enough, the women don't eat enough and when a pregnant or lactating woman don't eat enough, the children will suffer. We can give birth to small child, not healthy, or the child can become undernourished because of the lack of breast milk." Woman in Gain Gaye

When a child is suffering from undernutrition his/her parents will first try to improve his/her dietary and stop the associated disease. Mothers will try some medicinal recipes (cf. Annex n°8), they will also take the child to the medicine shops or/and the traditional doctor and if the situation continues, they will go to the health center for further tests and examinations by health experts. Nonetheless, they declare that if they have enough money they will privilege the HC.

Local understanding of the undernutrition: temporality

According to women and health workers, during the FGDs and interviews, there are two periods of risks of undernutrition during the first 24 months of life of a child. The first period starts and continues for 4-6 months at 10 months old and the second period starts around 15 months and goes to 24 months and above.

Mostly for the women the first period of vulnerability is linked to the first big diarrhea episodes but also to lack of milk and the introduction of *pap* (local porridge). The second period starts when the child is weaned. The total dependence of the child to his/her usual food source (breast milk) and the total absence of others sources rather than milk makes him/her fragile[44]

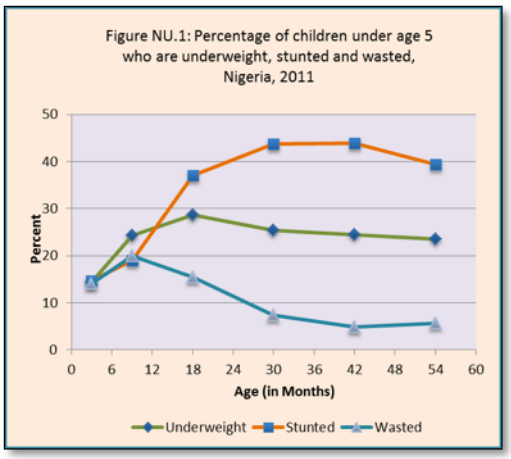


Fig. 8. Percentage of undernourished children in Nigeria (MICS, 2011: 22)

[44] These two peaks are observable in the repartition of undernourished child by age groups in Nigeria (MICS survey 2011: 22, Figure 3). The graph shows that first, child is particularly exposed to wasting around 6-18 months and stunting between 12 at 59 months. This observation allowed us to suppose that early complementary feeding might be related to wasting, and the non-adequate breastfeeding practices might lead to stunting in the given context

According to the NNHS survey (2015: 56), during the first 1000 days of life, children are more exposed to undernutrition. In this survey, two peaks are also observable. The first peak is around 6 months old (GAM-MUAC) and the second one around 20 months (Chronic Malnutrition).

Those observations confirm that children are more exposed to wasting when complementary feeding is introduced and stunting when they are weaned.

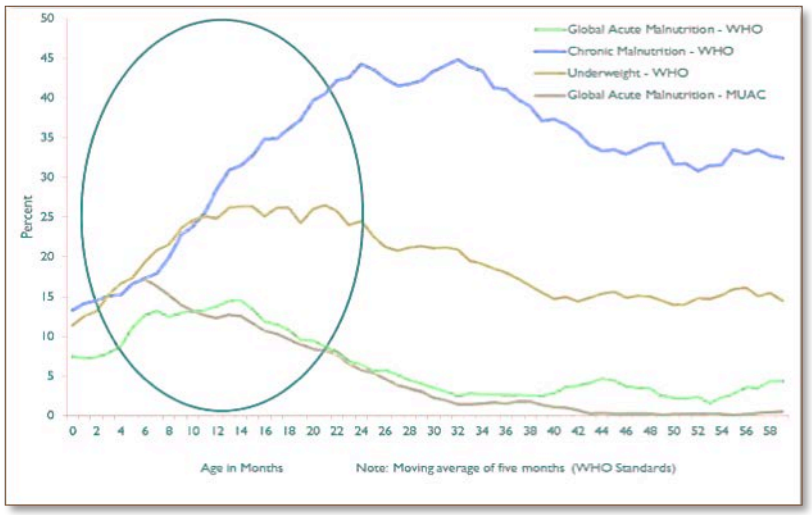


Fig. 9. Trends of GAM, Stunting, Underweight and MUAC <125mm by age in months (NNHS, 2015: 56)

The local understanding of the undernutrition temporality during the first 1000 days (3 years) is corroborating by the analysis done during the MICS (2011) and the NNHS (2015) surveys.

This perspective allowed this research to suppose that early complementary feeding introduction (4-6 months) expose children to wasting. According to the caregiver declarations, diarrhea seems to participate to the degradation of the nutritional child status.

Then, particularly after the weaning period (12-20 months), children are exposed to stunting consequences. If the low HDDS and IDDS score found during this study seems to allow an explanation for this vulnerable period, the purpose of this research is to understand and classified the risk factors of undernutrition in order to explain chronic and acute undernutrition.

Local calendar of undernutrition

The seasonal calendar of undernutrition derived from Key Informant Interviews conducted among caregivers, village guides/heads and health workers at the time of data collection (SMART survey and Link NCA survey). This calendar appears to be homogenous between villages. In Nangere LGA as in the rest of Yobe district, there are three main seasons namely: cold dry season "*Sanyi*", hot dry season "*Rani*" and rainy season "*Damina*".

During the FGDs it appears that the first peak of undernutrition happen in March-April-May due to the lack of food. The available food is no longer enough to feed families until August. Starting in March, sometimes before, households start to buy food with their small saving then borrow money.

The second peak of undernutrition happens during the rainy season (June-July-August-September: Mostly August). This peak is due to the extreme lack of food, high workload in fields and high prevalence of disease like malaria and diarrhea (cf. Table n°18).

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Season		Rani				Damina			Sanyi			
Under -Nutrition	Decreasing		Increasing of undernutrition cases				Improvement of the situation		Decreasing			
Agriculture			Preparation of crops			Crops			Harvest			
Food incomes	Food from crops		Buying food			Lack of food			Food from crops			
Diseases			Increasing of Rana cases (Diarrhea)			Increasing of Malaria cases						

Tab· 17· Local seasonal calendar, Nangere LGA

1.1.3.3 Understanding of nutritious food

During the Nutrition FGDs with women and men, we had asked what was the top 5 of nutritious food for them. It appears that men and women do not have the same representations. Men identify commonly more effective nutritious food than women do. Specifically in a rural context and among women, there is a lack of knowledge about nutritious food (cf. Table n°19).

	Garin Kadaï	Garin Gaye	Garin Kolo	Degubi Zakar	Dan Disa
Women	Beans Rice Local spaghetti Macaroni Yam	Beans Macaroni Spaghetti Rice Oil/spice	Yam Spaghetti Beans Meat Oil	Beans Groundnuts Egg Fish Meat	Beans Millet Sorghum Rice Yam
Men	0	Beans/Yam Meat Egg Fish Banana	Meat Beans Yam Fish Rice	Yam Beans Millet Vegetable Fish	Fish Egg Meat Beans Spaghetti

Tab· 18· Classification by village and gender of the top 5 nutritious food (Qualitative Survey, 2017)

Only beans are called nutritious food in every village and by every gender we noticed that animal proteins were frequently absent of the discussions with women, as well as vegetables and fruits. Indeed, during the exercise on nutritious food categorization, ability of men to talk about meats and vegetables is better than women.

All the participants have noticed that most of these nutritious foods are not affordable. For example, they used to eat rice once or twice a year. Meat or egg appears in the diet once every two month.

1.1.3.4 Meal organization and shared meal rules

Meal responsibility

During the Nutrition FGDs with men, it appeared that most of the time fathers are considered as in charge of the children education, health and mothers are considered as in charge of children diet. In fact, fathers are not always present during meals, he assures household food supply and ensure, by behavioral observations, how the child eats ("playing outside", "healthy", "energetic"). If they notice some issues they can also advice mothers on the diet but they declare that the household diet depend mostly on the financial strength.

Number of meal

During individual interviews with key informant and through the FGDs, it appears that the number of meal taken per day decreased in the past years. The first decreased starts about 30 years ago. Grandfather and grandmother said that before the food was more available in quantity and quality. The number of meal per day for each member of the family was superior and reaches three meals per day. Today, the number of meal taken is almost 2 meals per day for each member of the household[45].

A seasonal decrease can also be observed. Just after the harvest, meals are taken twice a day, but during the welding period, only one meal is taken in the evening.

The common meal usually eaten is the "*Tuwo*": Millet or sorghum powder plus water. This meal is served mostly at night and can be warmed up the next morning for breakfast. It is usually served with a green vegetable sauce ('Okra': Gumbo).

Shared meal rules

In the household, during the day, the men do not use to eat with the family. They use to eat outside with others men and neighbors. They come back home in the evening. Basically, co-wives and the youngest child (less than 3 years old) eat in the same plat and women will help them to eat. At the same time, plates will be distributed following the age of each child. Children between 3 to 7 years old will eat together, and the elder children also. However if there is lot of daughters and sons, the plates can be arranged by gender. Food portion will be adjusted by age and sometimes by health status. If the men eat at the house, he will have a plate for him-self and he will invite the younger male child to join him. Sometimes when he eats outside the wives can provide food for him. All the family eat exactly the same food, there is no special meal or food for children.

Shared meal in the household between co-wives and birth spacing

The qualitative survey made possible to update a very interesting fact; there is a link between how meals are shared in the household and birth spacing. Interviews with grandmothers and KI have revealed that "30 years ago" birth spacing between two children was longer than now. They talk about three years between each child whereas now it is one year and half or two. The first explanation given was about a longer period of the breastfeeding: 3 years in the past for one year, now. However, deeply it appears that birth spacing is related for them to the rule of sharing meals in the household. Thirty years ago the rules among the co-wives was different. Generally, each wife was in charge to cook for her children and the husband, as long he decided to stay with her. Then it was the turn of another wife to guest the husband. Because it was common for the husband to spend long period with each wife, the births were more spaced. Now, each wife is in charge of the meal for the entire household and to guest the husband every two days. Then, he will stay with other co-wives. This change of rules is

45 Men used to eat outside of the household. It was more difficult to collect data on the number of meal taken per day but it seems to be a little bit higher.

explained by the improvement of Islamic rules and the explicit none practice of wife favoritism[46]. It is also interesting to notice that despite the absence of desire of birth control (religious value); interviewed women mentioned that the increase of birth rate is a consequence of this practice, explaining food access or availability difficulties and augmentation of undernutrition cases.

1.2 CHILD CARE PRACTICES AND NUTRITION

1.2.1 Pregnancies (Hypothesis 3)

During FGDs most of women declared that they was not eating enough during their pregnancies because of a lack of food and money. This situation is happening since 3-4 years, more specifically when the conflict touched Yobe State. Some of them declared not eating enough due to pregnancies diseases like lack of blood, headache, heartburn, fever, fainting, loss of appetite or vomiting which is very common during the first trimester of pregnancy.

However the RFS results shows that 47.2% of interviewed women declared eating more during pregnancy or/and lactation and 52.8% eat less or the same than usual. Overall, the qualitative survey shows that all of them declare having the same diet diversity as usual (cf. Table n°20). They declare being unable to improve their diet even if they want to. And, in the majority of the cases, they will automatically explain that this difficulty to improve the diet is the first reason of low birth weight observed since 3-4 years (cf: Part I. 3.2.1. *Perceived Low Weight Birth*).

MOTHER FOOD INTAKE DURING PREGNANCY AND/OR LACTATION		N
MORE	47.2% (41.1-53.3 95%CI)	251
LESS	35.1% (28.2-42.1 95%CI)	187
SAME	17.7% (13.3-22.1 95%)	94

Tab. 19. Mother Food Intake during Pregnancy and/or lactation (RFS, 2017)

When we asked them what they think about the birth of small babies or big babies, they express lot of concern and anxiety regarding small babies. They also affirm that it was difficult to find support in such cases. The proximal social network is not really prepared for this situation and that health workers only give advises. Participants to the studied mentioned that

46 In Nigeria, the Shari'a question entered a new phase on the 27th October 1999 when the Governor Ahmed Sani Yerima of Zamfara state inaugurated the adoption of the Shari'a legal system, which took effect on the 27th January 2000. The Zamfara Law extended the application of Shari'a from personal law to criminal law. Following the Zamfara example, eleven other Muslim dominated states in the North also adopted similar laws.

health workers mostly advise to breastfeed and to wait the baby to be 6 months old to be involved in nutrition program.

Regarding the representation around the birth of big babies, the women do not express directly a fear regarding this kind of birth. They declare never changing their diet with the idea not to have big babies. Finally, they expect a normal baby, of an average size and no specific hope about gender. Nonetheless, the qualitative survey shows that recipes do exist to facilitate birth. All these recipes show that the women are afraid about giving birth and try to find a method to facilitate the delivery (cf: Annex n°7b: Food and medicinal recipes for pregnant woman).

Antenatal care (ANC)

During the last pregnancy happening before the Link NCA survey, 70.1% of the women assume having consulted more for ANC. More specifically 61.4% of the women attend antenatal care (ANC) in a health center and 37.9% of them did at least 4 visits (cf. Table n°21). According to NNHS (2015: 104), in Yobe State, 37.2% of the women went at least once to ANC and 19.8% at least 4 times. The prevalence ANC attendance in Nangere LGA is better than the state prevalence. Nevertheless, few women went for ANC visit at least 4 times, which is the minimal frequency for an adequate following. The decrease of attendance from 4 to one time will be interrogated several times in this report. For now, two factors appeared as important: the barrier to reach a health center/care (cf. Part II. 2.1.) and the self-health evaluation did by pregnant women. Most of the time, women declared that if the pregnancy is going well, they do not feel the necessity of going to the HC. Nevertheless if the pregnancy is difficult our participants assumed going to the health center more often to get treatment or/and advices (8-10 times).

NATAL ATTENDANCE		N
ANY ATTENDANCE (TBA, HW, OTHER)	70.1% (60.7-79.4 95% CI)	372
ANC ATTENDANCE (LAST PREGNANCY)	61.4% (51.8-70.9 95% CI)	327
ANC AT LEAST 4 TIMES	37.9% (31-44.8 95% CI)	202
PNC ATTENDANCE	28.9% (64.4-70.3 95% CI)	154

Tab. 20. Ante and post-natal care rate (RFS, 2017)

Among those women, the rate of multivitamin supplementation intake of 68.7% is not sufficient but interestingly little bit higher than the ANC percentage. Also 66.6% of the mothers have taken iron-folate supplementation during their last pregnancy. It supposes that among women there is knowledge about the necessity and beneficence of those supplementations. It can also explain the attractiveness of the first ANC attendance (cf. Table n°22).

VITAMIN SUPPLEMENTATION		N
VITAMIN A SUPPLEMENTATION	39.1% (35.8-42.3 95%CI)	338

MULTI-VITAMIN SUPPLEMENTATION (LAST PREGNANCY)	68.7% (59.3-78.2 95%CI)	365
IRON-FOLATE/FOLIC ACID SUPPLEMENTATION (LAST PREGNANCY)	66.6% (57.1-76 95%CI)	353

Tab· 21· Vitamin supplementation during the last pregnancy indicator (RFS, 2017)

Interestingly, according to Okoli, and al., 2014[47] the reason for low frequency of ANC attendance is not directly link to cash access. They demonstrated that the sponsor of ANC visits by cash transfer have a very low impact on the ANC attendance frequency. In fact, despite a better cash access, it remains difficult for women to do 4 ANC visits. These results confirm the presence of others strong decision-making processes like the one observed during the study: self-evaluation of health status by the pregnant women themselves.

1.2.2 Birth

First pregnancy: expectations and calendar of birth

Generally being pregnant is something well perceived by interviewed women. The number of child expected by woman during lifetime is around 11-12 but they will mostly say: "*We don't have expectation, God provides but we want as more children than we can have. It's a gift from God.*"

During the qualitative survey, we observed that two kinds of rules applies to women, if they are of childbearing age, they are not allowed to get out of the house and work out, for instance, they cannot farm but in certain case they can have a little business inside their house (groundnut, soja cakes). If the woman is no longer of childbearing age then she can farm, have her own crops and help her husband on his crop.

Expectations regarding the age of the first birth are homogenous on the study's zone. During FGDs women mainly said that the usual and optimal age to have a first child is around 17 years old, sometimes 16 or 15. The idea is that a young woman is getting married around 15 years old and gives birth the first year after her marriage[48]. Grandmothers mentioned that "*Thirty years ago*" the age to give birth to the first child used to be 17-18 years old sometimes 20. But now "(…) *it's just when a girl studies she will get married and give birth later around 20 years old and above*". This representation is particularly present in villages up to 2500 people where schools are more current.

During FGDs, when we discussed about early pregnancy, women mostly assumed that it was not happening often, and when it was the case that was not a good thing because "*The girl body is not ready*".

When we asked if there is a period during the year when more birth happened, we obtained the same answer in every villages. First, they declare that this year there was more birth than the other was. Second, there is always more birth between March and June.

[47] Ugo Okoli, Laura Morris, Adetokundo A Pate, Chidimma Aigbe and Ado Muhammad, *Cash transfer schemes in Nigeria: potential gains for maternal and child health service uptake in a national pilot program*, BMC Pregnancy Childbirth, 14, 408, 2014.

[48] Most of those marriages are love marriages. The parents of the young man have to contact the young woman's parents for their consent. If they agree they will all seat together and discuss about the price of the bride (Between 20 000 ₦ and 50 000 ₦). Then the young man starts to build a room close to his father's house.

Delivery: location and attendance

Through FGDs women had clearly expressed that they preferred giving birth at home. In Yobe State, the MICS (2011: 147) highlight a rate of 79% of interviewed women who gave birth at home and 17.2% in a HC. The quantitative survey shows that 90% of vulnerable women interrogated had given birth at home and 10% in a HC (cf. Part I.4.). This 10% was essentially in rural context.

Commonly, for them giving birth at home means that the birth comes in an easy way. If the labor takes time, become painful or when the baby does not come in a normal way (back or butt seat position), they will go to the health center. In this case, the decision is taking with the father, the birth attendant or the entourage like co-wives, mother-in-law, and grandmother if there are present. Still, proudness is associated to give birth at home without problem, to keep the "secret of the birth" at home. During one FGD, women told us that it could be difficult to give birth at a HC because "(…) *it's not a good place to respect the secret of birth*."

Going deeper during the discussions, women gave us some others explanations. First of all, giving birth in a HC is more expensive than giving birth with a traditional birth attendant (TBA). In HC women pay between 2000 Naira and 12 000 Naira in case of cesarean. For a TBA they just give a symbolic amount such as 50 Naira, millet/sorghum or *rappa* (tissue). Second, reaching a HC is not always easy. Lack of cars and mostly motorcycles[49], lacks of money and taxi cars are some of the limitations affecting decision-making.

Nevertheless, we observed during the qualitative survey that among vulnerable women there is a strong tendency to give birth alone (cf. Table 34). The reason of this isolation needs more investigations but it seems that those women do not have the reflex to involve a birth attendant. They do not have enough money to pay the HC and finally, when they are young and they do not have co-wives or a strong network (particularly in big village) they have a high probability to give birth alone.

Traditional birth attendance (TBA)

The qualitative survey highlights the central position played by the birth attendance in each locality. As a majority of birth happens "at home", it had emerged that in each village some women are less or more in charge of childbirth. MICS survey (2011: 144) demonstrated that in Yobe State 24.3% of the delivery was assisted by a traditional birth attendance, 31.6% by relatives or friends and 12.6% alone. Among our panel of vulnerable women (cf. Table 34) the proportion of giving birth with the attendance of relatives is the most important situation equally followed by TBA's support and giving birth alone.

We were able to conduct 7 interviews with traditional birth attendant (cf. Table n°23). All of them were aged of 50 years old and above. Two of them had certificate to prove their status as a governmental official birth attendant. However, despite the fact that they are still practicing, the government is no longer supportive (with gloves, soap and nylon) or training them because of their old age[50]. However, any women or birth attendant can go to the health center and ask for "Mama Kit" (cf. Annex n°3). Nevertheless, during the qualitative survey it appeared that the TBAs were not enough confident to go to the health center even if they were official TBA. We also noticed that the two official TBAs were in villages more than 2500 people. In parallel, we observed that one of the TBA in big village have a room to receive the women in labor. Two or three beds are in it and they used to receive women from other small villages too. In smaller villages, normally the TBA goes to the woman household. Regarding BAs not recognized by the government and whom just help to give birth for a few number of persons

[49] Since 2014, use of motorcycles is no longer allowed in Yobe State. They were the first travel option.

[50] Between 1990 and 2008, the Nigerian government decides to reduce the prevalence of mortality by supporting the TBA. However, the supervision of TBA decreased since 2009 when the government created the "Midwives Service Scheme". The idea was to encourage the professionalism, the professionalization and increase the number of birth in HC. Since the traditional scheme of birthing was disapproved but as we observed, it is still functional for the population. In our case, as they declared, the age of our participants was the first reason for stopping support and training by the government.

(family, neighbors, friends), it appears that they can be well known for specialties like being very competent with complementary food as cooking *pap*, twins birth or complicated birth.

In terms of cultural context, the qualitative survey highlight that becoming a TBA is done through the heritage of the mother, the grandmother or the mother-in-law (5 TBAs). The 2 others TBAs declared having learned by them-selves, by observation, due to the context and finally as a God's gift.

VILLAGE NAME	AGE TBA (YEAR)	OFFICIAL TBA	LEARN	NB CASE	INCREASE OF LBW	COLOSTRUM	FIRST PAP	FIRST WATER	UNDER-NUT. CAUSES
GARIN GAYE	70	No	Alone	++	Yes – 2 years	No	3-4 months	First day	Hunger, lack of breast milk
	65	No	Mother in law	+	Yes	No	3-4 months	First day	Hunger
GARIN KOLO	75	No	Gd. Mother	++	Yes - 3 years	No	2-3 months	First day	Money, dirty
DEGUBI ZAKAR	65	No	Alone	+	0	No	3 months	First day	Lack of breast milk
	75	Yes	Gd. Mother	++	Yes – 3 years	Yes	3 months	One month	Hunger
DAN DISA	60	Yes	Mother	++	Yes – 4 years	Yes	3-4 months	One month	Money
	50	No	Gd. Mother	+	Yes – 6 years	No	3-4 months	First day	Money, lack of breast milk

Tab· 22· Care practices and Birth Attendance (Qualitative Survey, 2017)

During individual interviews, most of the TBAs mentioned that undernutrition is caused by lack of food and/or money, which lead to a lack of breastmilk and low birth weight. All of them declared that since approximately 3-4 years there is an increase of low birth weight cases. We noticed that in a big village TBAs talked about 4-6 years.

All the TBAs not recognized by the government advice commonly not to give colostrum (advice to wait between one or two day, empty the breast and then start breastfeeding). They also

advised to give boil water from the first day until the fortieth day, and to give *Pap* for the first time around 3 months. However, even official TBAs do not advice to exclusively breastfeed, to give *Pap* for time at 3 months and one month for the first boil water. According to the NNHS survey (2015: 96) Yobe State have the lower level of skilled birth attendance for women of reproductive age in Nigeria: 9%.

1.2.3 Breastfeeding practices

1.2.3.1 Early and exclusive breastfeeding practices (Hypothesis 1)

Colostrum and early breastfeeding practices

Through the women FGDs and during the RFS we asked about the first hours after birth and colostrum intake. It appears that the colostrum is not always given "*Normally we wait the day after birth or the evening. Even two days. We put out of the breast the first milk*." This tendency seems to be more persistent in the rural context (small village). But, even in big village, lot of beliefs exists regarding the colostrum: "*The baby is not strong enough to suck*", "*Because it's an old milk, not nutritious*", "*It's a dirty milk*", "*If the child takes this milk he can be sick after*", "*(…) even the children can have undernutrition later*".

However, the women declared that a new tendency exist tending to change this practice, as shown by the RFS. In fact, although the rate of early initiation to breastfeeding (within one hour) is still low: 38.6% (33.6-43.6 95%CI) in Nangere, it remains higher that the rate of 22.6% in Yobe state as shown by the NHSN survey (2014: 55) and 13.7% by the MICS (2011: 23).

Exclusive breastfeeding practice

The RFS survey shows very clearly that in the communities the prevalence of exclusive breastfeeding remains low (cf. Table n°24). The prevalence for children between 0 and 5 months is 36.5% (26.8-46.1 95% CI). However, it seems that there is an improvement since the MICS where done: 11.3% in Yobe state (2010: 33) and 22.3% in NHHS for the Northeastern context (2014: 53).

REPORT	MICS 2011 (YOBE STATE)	NHSN 2014 (NORTH EAST ZONE)	RFS 2017
EXCLUSIVE BREASTFEEDING	11.3%	22.3%	36.5%

Tab· 23· Comparison of the exclusive breastfeeding rate between reports

In regard of the qualitative enquiry, exclusive breastfeeding prevalence is questionable; more over for the vulnerable women because we observe that majority of them gives water the first day of life (cf. table 34).

Even the indicator about the predominantly breastfeed captured during the NHSN (2014) do not considered the water as a source of nutrient and found a prevalence of 87.2% before 3 months. But, after 3 months this percentage fall at 49.7% (NHSN, 2014: 58). This result is corroborating by the Link NCA study where a majority of the women say starting complementary feeding around 3 months old.

1.2.3.2 Complementary feeding and continued breastfeeding practices (Hypothesis 2)

Complementary feeding

Complementary feeding practices

Cultural practices regarding the first water given can be noticed in the area. Mothers used to give the first water the first day of life. Basically, when we asked the reason of this practice they answered that the mother was too tired to breastfeed directly, but most of the time, they mentioned waiting 2 days before breastfeeding for the first time, as mothers used to empty their breast of the first milk, considered as bad milk. Then; they explain that they cannot let the baby without anything. In consequence, they used to give boiled water. Most of the time this practice occurs just after birth and continues for 40 days, alternating breastfeeding and water intakes. After this period, caregivers use to stop boiling water. When we asked why they were boiling water and why during 40 days, they answered that this practice is a heritage linked to the Islamic tradition. Islamic practice closest to the mentioned practice by the mothers is the respect 40 days of rest after birth by the mother ("*Locchies*"). In this context, it seems that this privileged time between mother and newborn leads to this practice where the mother boiled water. But, regarding the explanation about the sense of this practice, mothers mostly mentioned: "(…) *because it's a good water*, *it's a warm water like inside the mother*", "*We do like that, my mother did like that, we learned that*". We have asked if they observe a difference in the baby behavior or the health after 40 days, they mostly said that the babies become sick with diarrhea episodes.

After 3 months, sometime before, if mothers perceive having "breast milk issues", women declared giving '*Pap*'. *Pap* is a liquid recipe mostly cooked with millet. Some *Pap* recipes are also cooked with soja beans or groundnuts. Adults can also eat *pap*. But, despite the fact that women are witnesses of the illness increase during this period, they cannot avoid the first peak of diarrhea is around 5-8 months. In fact, mothers lower the frequency of breastfeeding in the advantage of giving *Pap* and normal diet (same adult and children). Even if they assumed that more the baby is breastfeed, healthier he/she is, in their point of view a problem persists regarding the quantity and sometimes the quality of the breast milk. Once this first vulnerable period is past, as we already saw and according to the women, the second period very difficult for the child is the weaning period around 15-20 months. As they said: "*The children can fall in undernutrition and become very sick".*

Among the source of complementary feeding, there are also some medicinal recipes (cf. Annex n°8). These can be mother medicinal recipes or traditional doctor ones. Despite the fact that hospitals give restrictive advices regarding such practices and even if mothers can consider those practices as old or less efficient, in reality, due to the existing difficult context and/or because mothers do not always have access to a HC or a pharmacist, they tried to give some decoctions when the child is having fever or diarrhea.

Introduction solid, semi-solid and soft food (6-8 months)

The prevalence of introduction of solid, semi-solid and soft food among children aged 6-8 months seems to indicate a tendency of an earlier introduction of complementary feeding 86.9% (78.4-95.4 95%CI; n: 53), as observed with the introduction of pap, than during the MICS survey done at North East level: 30.9% (2011: 35).

Minimum Meal Frequency (6-23 months)

However, the proportion of breastfed and non-breastfed children aged 6–23 months, who received solid, semi-solid, or soft foods the minimum number of times or more seems to increase (cf. Table n°25).

MINIMUM MEAL FREQUENCY (6-23 MONTHS)		N
CHILDREN 6-8 MONTHS RECEIVING ≥2 TIMES A DAY	57.4%(45.0-69.8 95% CI)	35
CHILDREN 9-23 MONTHS RECEIVING ≥3 TIMES A DAY	50.2%(44.2-56.2 95% CI)	133

Tab. 24. Minimum Meal frequency 6-23 months, (RFS, 2017)

Indeed, according to the NHSN (2014: 61) in Yobe 39.3% of the children aged 6-23 months and 22.3% for the MICS (2011: 36) received an acceptable meal frequency. A trend appears showing an improvement on child dietary.

However, if we put this result in perspective with the propensity to start complementary feeding earlier, it appears that caregivers have a tendency to improve young child dietary instead of improving breastfeeding practices after 3 months old. The qualitative enquiry allowed us to suppose that the lack of breast milk experienced recently by number of interviewed women can be the underlying cause of those tendencies.

Infant Minimum Diversity Diet Score (6-23 months)

Similarly to the Minimum Meal Frequency, the proportion of children aged 6–23 months who received foods from 4 or more food groups seems to increase. The RFS shows that 31,8% of the children who received food ate between 1 to 3 food groups (n: 134). Those food groups are: cereal, dark green leaves and dark green leafy vegetables, and other vegetables. This dietary is very poor but 68.2% consumed 4 food groups (Fruit) or more (n: 287). The NHSN (2014: 61) found that 23% of children had an acceptable minimum diversity score.

Nevertheless, a majority of Nangere children do not have access to meat and fruits. This situation reflects a bigger reality where at the household level the food consumption score and diet diversity are very low.

Continued breastfeeding practices

According to the RFS, prevalence of continued breastfeeding at one year remains very high: **93.5% (88.6-98.5 95% CI)**. The MICS survey found 96.4% for Yobe State (MICS, 2011: 23) and the NHSN survey results was 94.9% for the North East Zone (2014: 54).

Duration of breastfeeding

The MICS results (2011: 30) show that the average age of child weaning in Yobe is 23 months and the average age to stop the predominant breastfeeding is 9 months. In the same way, according to our participants, the average age to stop predominant breastfeed to the profit of complementary feeding is around 7-9 months if the quantity of breast milk is enough.

Regarding average breastfeeding duration, qualitative enquiry shows a similar and homogeneous duration between small and big villages. It can happen from 15-17 months to 22 months. Nonetheless, it appeared that breastfeeding duration for a boy is between 15-18 months and between 17-22 months for girls. The grandmothers said that 'before' the duration was longer for both gender, around 2 years and half or three years and more specially for girls.

In those communities, it appears clearly that breastfeeding culture involve different practices between baby girls and boys. Participants used to think that longer is the breastfeeding lower is the ability to be efficient as an adult: "*Breastfeeding impact the brain, if you breastfeed a lot, the brain not evolve well*", "*We want strong and smart boys, so we breastfeed them shorter*", "*The girls don't need to learn a lot like a boy or even to be good at school*". Women

participants used to say that these practices are old and have a tendency to disappear. However, during the qualitative survey (FGDs, Interviews OTP) data indicate that those practices still exist.

Finally, it appears those if the breastfeeding duration goes up to 20 months the father intervene and ask to stop it. But, most of the time the weaning can happen earlier because of a new pregnancy or a lack of breast milk.

Frequency of breastfeeding

During the qualitative enquiry, at the question "*How many times do you breastfed your baby per day*", participants usually answered, "*It depends of the cry*", "*Any time when the children wants*" or "*We don't have frequency*". It appears clearly that breastfeeding is the first lever to adjust the wellbeing of the baby. Actually, every interactions with the baby is regulating with the breast milk (cry, move, disease, agitation). Babies have a free access to the breast day and night because mothers used to sleep with them. But, around the age of one year, the practices evolve a little bit with the use of giving more frequently *pap*, water and food to calm the child. Nevertheless, before weaning period, breastfeeding remain the main practice to regulate interaction between mother and child.

Weaning

Usually the weaning is brutal because it can happen in one day. During FGDs and interviews rare were the women stating taking time like 10 days or one month to do it. Commonly, weaning happens when a new pregnancy starts. In fact, most of time women and TBAs believe that breastfeeding a baby while being pregnant can affect the fetus. They have given examples such as death, vomiting, diarrhea or undernutrition of the newborn. There is a strong believe that pregnancy affect breastmilk quality. Weaning can also happens if there is not enough breast milk despite the fact that after being weaned the child has no more access to source of milk.

Technics of weaning are more used in large village rather than small village. Normally there is no proper technic, they can use clothes, potash, *Kiwta* or *Demia* for their bitterness (local herbs), and less usually sand or flagyl (medicine, for big village). Through ours discussions, it appears very clearly that women observe that time of weaning can be the exact same period for child to fall in undernutrition or in a depressive mood. "*During weaning and just after, our children are very weak, sick, they have more risk to fall in undernutrition"* Woman in Garin Gaye.

Finally, the qualitative survey shows also that there is no practice of co-breastfeeding because of filiation link between breastfeeding and marriage in Islam. If a woman breastfeed another child then he became as her own and no marriage can happen between her child and this child.

Response feeding

The RFS shows that 40.38% (30.6-50.1 95%CI) of the caregivers help their children aged between 9-36 months to eat, but if the child refuse to eat 47,75% (38.2-57.3 95%CI) do not take action, 40.51% (33.6-47.38 95%CI) try to change food, play and 11.74% (6.9-16.6 95% CI) force them.

The figure n°5 summarizes the Link NCA results regarding breastfeeding practices. Main practices and steps are represented.

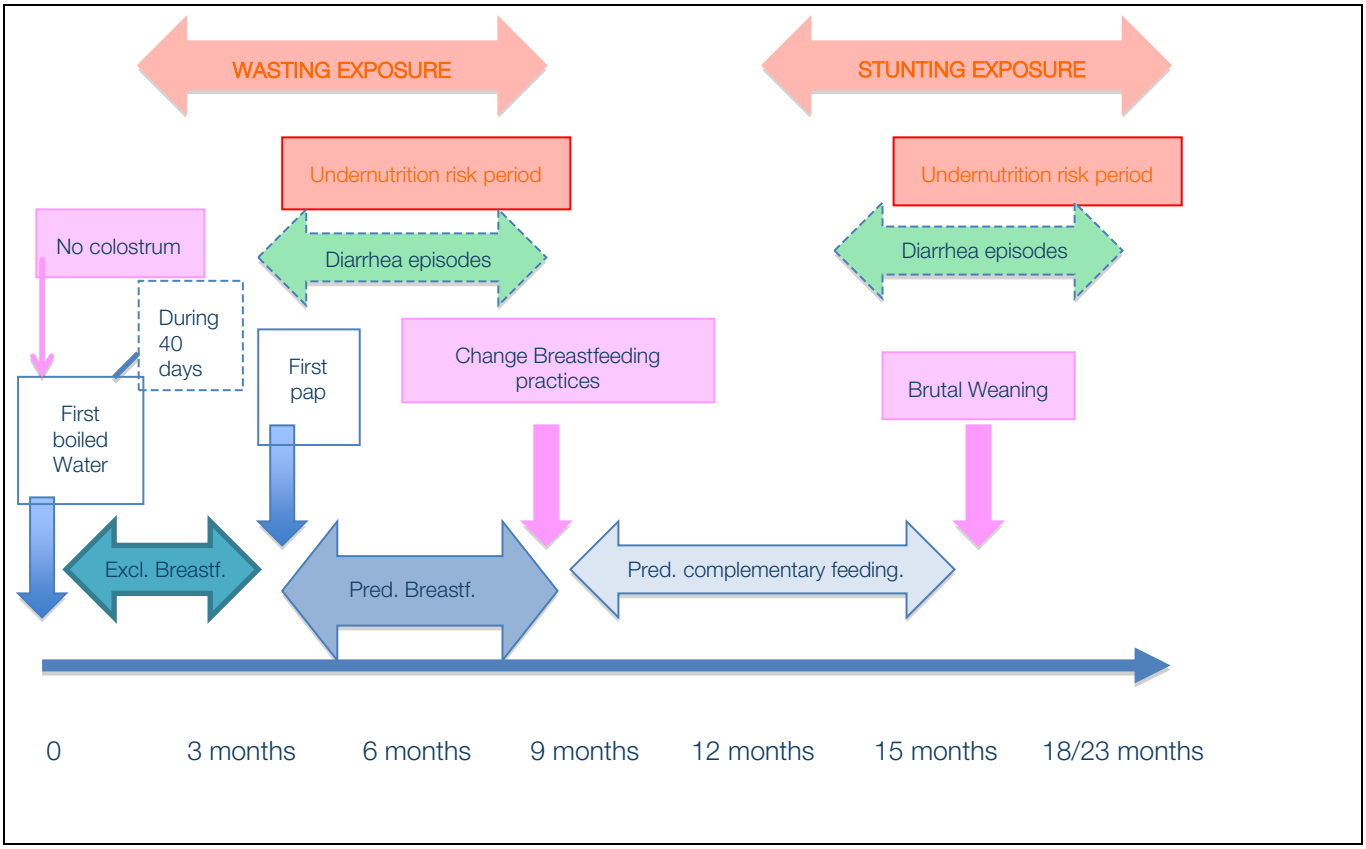


Fig. 10. Representation of the main care practices occurred during the first 23 months

1.3 CHILD CARE PRACTICES AND HEALTH

1.3.1 Psychosocial network (Hypothesis 5)

One of our hypotheses questioned the psychosocial network. We wanted to know if this network was impacted by the conflict, if it was evolving, and if the vulnerable women are suffering from a lack of support. It appears that generally the psychosocial network stay strong even if the social resilience is fatigued. In fact, Yobe state and Nangere LGA hosted numerous IDPs and solidarity mechanisms were pushed to their maximum: "*We have everything, clothes, food, house, crops. Now we don't have enough for us.*" (Degubi Zakar village) In addition, extended family resilience seems to be impacted "*Now when the family come in November for the harvest, when they leave we have nothing left.*" (Man at Garin Gaye) "*My mother-in-law can't be here because we don't have enough money to let her come*." (Woman at Dan Disa) But, even if the psychosocial network had been impacted by the conflict, it stays strong between neighbors and co-wives.

However, it appears that psychosocial network for vulnerable women can be weak. Sometimes, the first wife, being a young woman and far away from her own family, can be isolated (cf. Table 34; Part I. 2.2.; Part I. 4.).

Caregiver perceived social capital

Regarding the help or support received by the caregiver, RFS results show that a majority of women feel "extremely supported" by community and/or family (58.6%). During the qualitative enquiry, it appeared that co-wives, neighborhood and fathers play a big role in terms of food supply, advices and help. Mothers-in-law are still very important because when women get married, she moves to the man's family and depend on the mother-in-law for learning, support and advices. Nevertheless, mothers and grandmothers gave advices regarding care practices and birth (cf. Table n°26).

CAREGIVER FEELING OF SUPPORT: *PERCEIVED SOCIAL CAPITAL*		N
EXTREMELY SUPPORTED BY COMMUNITY/FAMILY	58.6% (50-67 95% CI)	312
SOMEWHAT SUPPORTED BY COMMUNITY/FAMILY	10.5% (6.6-14.4 95% CI)	56
FEEL NOT VERY SUPPORTED BY COMMUNITY/FAMILY	10.1% (7.2-13.1 95% CI)	54
NOT AT ALL SUPPORTED BY COMMUNITY/FAMILY	20.8% (13.1-28.6 95% CI)	111

Tab· 25· Caregiver feeling of support: perceived social capital indicator (RFS, 2017)

If the direct entourage is not present (mother, grandmother, mother-in-law), women will take advices from neighbors. If they do their ANC visits, they will take advice from health workers. But, mostly advices from health workers are not applicable due to lack of money, food incomes and sometimes due to lack of empathy regarding their situation[51].

WHO.5 indicator (*caregiver*)

WHO.5 this notice women

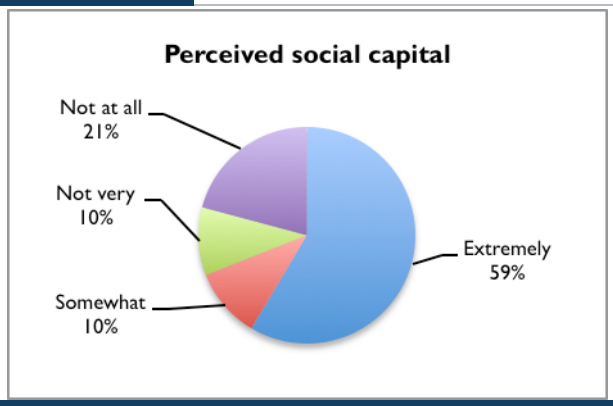
During survey,

explain desired but and became stress

SCORE	INTERPRETATION
TOTAL < 3	Inappropriate caregiver-child interactions
TOTAL 3-4	Medium caregiver-child interactions
TOTAL ≥ 5	Appropriate caregiver-child interactions

According to the indicator, despite support, we that 87.9% of the present a risk of depression.

the qualitative women have a tendency to that each birth is and welcomed physical tiredness money issues great sources of (cf. Table n°27).



WHO5		N
NO RISK OF DEPRESSION	12.1% (7.3-16.8 95%CI)	64
RISK OF DEPRESSION	87.9% (83.2-92.7 95%CI)	467

[51] For example, when a health worker advises to sell property to get money for a better diet or afford medicines, they are not considering the extremely poor situation of some of the participants. In the actual context these kind of advices can stigmatize vulnerable women. Women could be afraid to take an appointment to another hospital as they will think they might hear the same speeches. Instead, they will try some medicinal recipes to get healthier and assure an easy birth.

Tab· 26· WHO5 indicator (RFS, 2017)

Caregiver/child interaction scale

Caregiver interaction scale is an indicator made of questions and observations. The interpretation is done following this table n°28:

CAREGIVER-CHILD INTERACTION (STORY TELLING/PLAYING WITH HER/HIS CHILD)		N
INAPPROPRIATE INTERACTION	75.1% (71.8-78.2 95%CI)	626
MODERATE LEVEL OF INTERACTION	7.6% (5.7-9.6 95%CI)	64
APPROPRIATE INTERACTION	17.3% (14.2-20.3 95%CI)	144

Tab· 27· Mother/caregiver-child interaction scale (RFS, 2017)

"To see my children not growing well, not walking in time is very painful because he can't be free and do whatever he wants. Like the others children. I have to keep him with me all the time." (Mother in Garin Kadai) `

1.3.2 Health care: immunization, disease, development, small child birth (Hypothesis 4)

Small child birth

In every village, women and the TBA witness that the prevalence of newborn with a smaller size than average is increasing.

"Due to the conflict, we saw lot of children already undernourished since birth, they are small and skinny. As the mother don't eat enough nutritious food during pregnancy they give birth to small children" (Birth attendance at Dan Disa). "Since 3 or 4 years we gave birth to lot of small babies and we don't know what we can do in this case, that why sometimes we start to feed them earlier. We want that they get big quickly." (Woman in Garin Kadai)

CAREGIVER PERCEPTION OF CHILD WEIGHT AT BIRTH		N
NORMAL WEIGHT BIRTH	52% (46.6-57.4 95% CI)	443
LOW WEIGHT BIRTH	48% (42.6-53.4 95% CI)	409
KNOW THE EXACT WEIGHT AT BIRTH		

YES	1.7% (0.9-2.5 95% CI)	16
NO	98.3% (97.5-99.1 95% CI)	945

Tab· 28· Caregiver perception of child weight at birth indicator (RFS, 2017)

The RFS results show the same tendency, a large part of caregivers perceived that their infant was smaller the average (48%; cf Table n°29). Even if this result is confirmed by the qualitative survey it have to be balanced with the fact that most of those births happen at home and that 98.3% of the mother were not able to recall the exact weight at birth. Despite this fact, there is an increase of those cases in the past years as shown by the MICS survey (2011: 47) that present a prevalence of 19.5% of low birth weight.

Development of the young child

Through the qualitative enquiry, mothers declare that generally children are able to eat "normal food" between 6-7 months and at one year they are starting eating alone. A majority of women declared that children could walk around 1 year old; but lot of them declared that it usually happen later (around 2 years old). They also mentioned that a male child would eat and be breastfed more than a female child. Finally, if the caregivers start to teach hygiene practices around 3 years old, by imitation, for caregivers' children could handle their personal hygiene at 7 years old.

Immunization of the young child

Immunization prevalence is low even if the mothers declared that vaccination was a good thing and mentioned, for the majority of them, going to the health center for immunization. BGC prevalence at birth is 47.8% (43.4-52.2 95%CI). DPT3[52] prevalence is 41.1% (31.1-51.3 95%CI). Those results show very clearly, that only one mother on two immunizes their children. In the report Nigeria Demographic and Health survey, 2013 (183) 38% of children aged 12-23 months were fully immunized (DPT3) at the time of the survey. Immunization increased by 9% from 2008 and 81% from 2003 (Nigeria Demographic and Health survey, 2013: 183).

Deworming rate

Deworming rate (during the last year) is very low 16.2% (8.1-24.3 95%CI, n: 80) and frequency of deworming is even lower. Only 5.5% (2.4-8.5 95%CI, n: 27) of the total number of participants declared had taken deworming medicine twice. Those prevalences shows an improvement regarding the previous evaluation done the Northeast zone (8%) but less than the national level of 27% of children age 6-59 months who had received deworming medicine[53] (National Nutrition and Health Survey, 2015: 115). During the qualitative enquiry, we observed that distance with a health center can be a limit to access to treatment, but also many mothers do not have knowledge about deworming treatment. Mothers mostly talked about immunization like this case in Degubi Zakar where a HC is accessible inside the town. The

[52] Combined diphtheria, tetanus toxoid and pertussis vaccine.

[53] Variability is even more pronounced at state level, ranging from less than 1% in Yobe and Zamfara to 64% in Lagos. Deworming coverage over 50% was reported only in six states – Abia, Anambra, Edo, Imo, Lagos, and Ogun – but those results substantially differ from NHSN 2014 findings and should be taken with caution since they are based on mother's recall.

mothers told us: "*We do immunization every month with our children.*" Following an enquiry at the HC, it appeared that they were talking about deworming.

Child diseases

During the qualitative inquiry, mothers declared that children under 5 years old mostly suffer from *Rana*, malaria, measles, cough and diarrhea. Those diseases were mentioned in each surveyed village (cf. Table n°30 and Annex n°6).

VILLAGE	CHILDREN DISEASE	SEASONALITY	THERAPEUTIC PATHWAY	DISTANCE
GARIN GAYE	Rana Cough Measles Pneumonia Malaria Diarrhea	Any time Cold season Hit season Harmattan season Rainy season	Chemist/Medicinal recipes → Health center	3 km
GARIN KOLO	Fever Vomiting Diarrhea Rana Measles Cough Stomach pain	Any time Hit season Hit season Any time Hit season Cold season, dry season Any time	Medicinal recipes →Traditional doctor → Health center	8-10 km
GARIN KADAÏ	Malaria Rana Zigilla (rhesus disease) Measles Cough Eyes infection	Rainy season Any time Hit season Harmattan season Any time	Chemist/Medicinal recipes → Traditional doctor → Health center	5-7 km
DEGUBI ZAKAR	Malaria Eyes infection Measles Chicken pox Rana Typhoid	Rainy season Young children Hit season Hit season Any time Rainy season	Chemist/Medicinal recipes → Health center	0 km
DAN DISA	Vomiting Diarrhea Cough Typhoid Malaria Rana Eyes infection	Hit season Hit season Rainy and cold season Rainy season Rainy season Any time Any time	Chemist/Medicinal recipes → Health center	2 km

Tab· 29· Children diseases list, seasonal calendar, therapeutic pathway, distance from HC by village (QS[54], 2017)

[54] Qualitative Survey (QS)

According to this table retracing the data gathered among women and men during Health FGD, we noticed that eyes infection and typhoid were mostly named in the biggest village. In addition, we observed that *rana* disease could occur at anytime during the year even if there is an increase during the hot season; malaria is most common during rainy season; measles during hot season; cough during Harmattan season and typhoid during rainy season. Diarrhea and vomiting mostly occur during the hot season but also during rainy season.

The SMART survey shows that fever/malaria are the first diseases affecting child health, while less case of diarrhea and ARI/cough are reported. Those results can be explained by the fact that the SMART survey was done just after the rainy season what coincidence with the period when fever cases are increasing (cf. Table n°31).

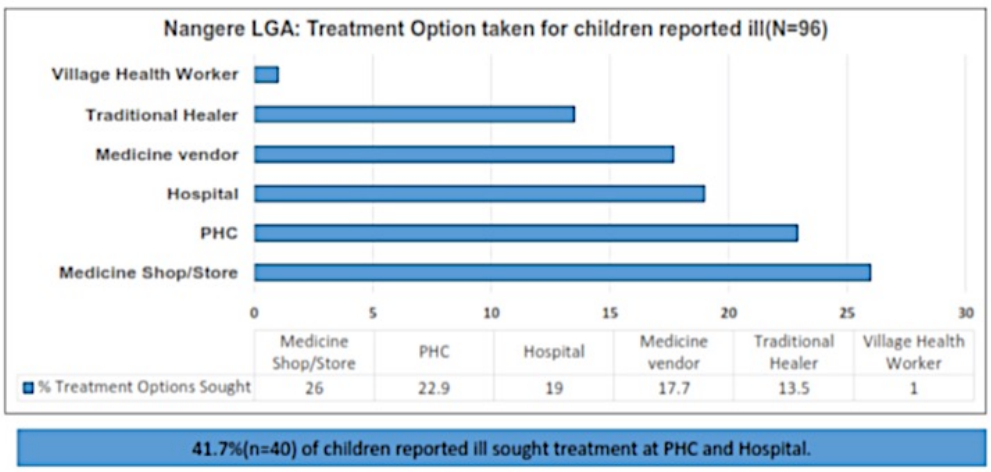
REPORTED MORBIDITY (TWO WEEK RECALL-SMART SURVEY. 2016)		N
ARI/COUGH	5.2% (1.5-9.0 95%CI)	7
DIARRHEA	3.7% (0.5-6.9 95%CI)	5
FEVER/MALARIA	48.5% (40.0-57.0 95%CI)	65

Tab. 30. Reported Morbidity (SMART, 2016)

1.3.3 Child health therapeutic pathway: Rana and malaria examples

SMART findings (2016) show that the first treatment option taken, when a child is ill, is self-medication (26%) while 17.7% of the caregivers went to medicine vendor (cf. Figure n°6). In total 43.7% of the caregivers sought treatment for their hill child from a medicine store or vendor. This is correlated with information collected in the field assuring that modern medicine is more efficient but more expensive than traditional medicine.

In fact, parents explained that they would always try to find a way to pay for health care for their children and that they will privilege the State health system.



Fig· 11· Treatment Option taken for children reported (SMART, 2016)

In fact, 41.7% of the caregivers reported seekingtreatment at HC and Hospital when their children fall sick. Thus, 85.4% of the chosen treatment options are seeked from "modern" medicine and 13.5% from traditional healers/doctors. Nevertheless, the SMART did asked the use of traditional medicine recipes as an option what might have introduce a bias in the result. Indeed, the SMART did not take in account existing caregivers' knowledge regarding self-medication. ,. The table 32 shows that medicinal recipes do as a part of the traditional health seeking behavior pathways. For instance therapeutic pathways regarding Rana or diarrhea showed that certain disease have specific therapeutic pathways that are not linked to official the health system.

Regarding treatment of child diseases, the caregiver supported by the father will first try medicinal recipes based on the knowledge of mothers (grandmother and mother-in-law). Table 30 shows that when the HC is far (more than 5 km), traditional doctors play a most important role within child health therapeutic pathways.

"We do go to the traditional doctor because our financial status is not good, the HC ask big amount while we give what we have to the traditional doctor." (Men, Dan Disa)

"They really assist us to treat ours diseases." (Men, Garin Kadai)

CHILDREN DISEASE	TREATMENT
RANA	Traditional powder + Pap (Gabaron, trya, sabara, dorawa)
COUGH	Leaves of baobab + Pap OR Syrup
MALARIA	Traditional powder + Pap (Dorawa, trya, sabara, Dorawa, turaw, Itaren) OR Anti-malaria medicine (hospital)
MEASLES	Without rash: Traditional powder + Pap (Deyi, lime, cassava leaves, onions, honey, black seed) With rash: Cream, leave, onion
FEVER	Traditional powder + Pap (Gasaya, garafum) OR Bath OR paracetamol
PNEUMONIA	Hospital
TYPHOID	Traditional powder + Pap (Dorawa, turawa, Itaren) OR paracetamol

Tab· 31· Treatment used to be done with children diseases (Qualitative Survey, 2017)

As the table n°32 reveals, medicinal recipes are present in every village. Mothers used first to try herbal treatments due to the lack of money and because it is a common inherited cultural practices. All medicinal recipes are based on powder made of leafs, vegetables, bark, which is possible to mix with *pap*. Mothers and traditional doctors used to make this kind of powder.

Only malaria and pneumonia are currently treated with the help of the HC but some medicinal recipes do exist. Self-medication is also common for cough, fever and typhoid. *Rana* is the only diseases never addressed by the HC. Finally, after investigations, it appears that mothers never mix self-medication with traditional medication.

Diarrhea and *Rana* diagnostic

Diarrhea:

Diarrhea is considered as a child and an adult disease (cf. part II) but the prevalence revealed by the quantitative survey are lower than what the qualitative survey information are suggesting.

According to the Nigeria Demographic and Health survey (2013: 183), 10% of children aged under 5 had diarrhea (2% had diarrhea with blood), according to the NNHS (2015: 71) 17% (7.6% received oral rehydration salt) and 3.7% according to the SMART (2016: 21).

Seasonality seems to affect the diarrhea prevalence. During the qualitative survey, the participants declared that diarrhea was always present but with an increase of number of cases starting from February and March. For the participants, the first cause of diarrhea is the lack of food, which implied weakness of the child body and the second, the beginning of the hot season. All of them assume that diarrhea is very common during the rainy season too. In both seasons, parents often question the impact of water quality regarding diarrhea prevalence, as vomiting is a symptom currently associated with the disease. For mothers, children will mostly experience 2 or 3 episodes of diarrhea per year, commonly one during the hot season and one during the rainy season.

Regarding treatment, caregivers try to change the food and to increase the quantity of water. However, they declared trying first equally medicinal recipes when the child is aged less than one year old and anti-diarrheic (self-medication) after one-year-old. If diarrhea persists, they will go to HC.

Nevertheless, qualitative survey suggests that medicinal recipes are mostly used. The reasons of this use are in one hand the repetition of episode of the disease, and on the other hand, the association of diarrhea with the local disease called *Rana*, which is never referred to the HC.

The last reason that allowed us to talk about the repetitiveness of diarrhea episodes is the caregiver declarations about one recurrent symptom: hemorrhoid. This symptom is also very frequent in the adult health list and local doctor (usually woman) can intervene on it (cut it).

Rana:

Rana is a local disease, which in Hausa language means sun, hot. The population explains commonly this term as a disease usually occurring during the hot season. Communities explained that today and since 5 years (since the conflict), the number of disease cases is increasing. Moreover, they declare that it is less seasonal and more frequent.

For the medical sector, Rana disease is related to perianal ulcer. This definition sustains the presence of hemorrhoid. For the population the main signs of the disease are red lips, red hand, swelling, loss of weight, and loss of appetite, diarrhea, vomiting.

According to this description, the qualitative survey allowed to question the link between rana disease and undernutrition through diarrhea symptom. It appears clearly that when a child suffers from rana, it will never be addressed to the HC (which can explain in part the low level of diarrhea addressed to HC). *Rana* therapeutic pathway includes the use of medicinal recipes and consultation of a traditional doctor.

In fact, locally diarrhea is not considered as a disease but a symptom of a disease: *rana*.

Fever and malaria diagnostic

As we saw in the table 32 "fever" is considered as a common 'symptom' but not a common 'disease' as shows the absence of table 30[55]. According to the SMART survey among the 20.1% of the young children reported sick in two last weeks, 48.5% of them were suffering from fever-malaria (SMART 2016: 21). In fact, as diarrhea, fever is very common and linked to other diseases or to physical weakness.

According to the population, fever is commonly associated to malaria although fever is not always related to malaria. In fact, the NDHS (2013: 229) shows that while advice or treatment was sought for 70% of children with a fever, only 4% had artemisinin-based combination therapy (ACT) the same or next day. In the NNHS (2015: 71), fever represents 14.5% of the recall disease and 32.7% of the respondents took anti-malaria medicine.

In terms of mosquito net availability, the RFS shows that 61% (55.4-66.4 95%CI) of the children under 5 slept under a mosquito net, while the NNHS survey gives a rate of 38.4% (2015: 80).

1.4 NUTRITIONAL STATUS AND CARE PRACTICES AMONG VULNERABLE WOMEN (HYPOTHESIS 3)

1.4.1 Women nutritional status

The SMART (2016: 21) found that 4.6% of the women between 15-49 years old were severely undernourished. This prevalence is a little bit lower than the 10.4% found in Yobe during the NNHS (2015: 94) but this variation can be explained by the timing of the survey (season) or/and the scale of survey.

1.4.2 Profile of vulnerable woman

According to the table n°33 and the Annex n°3, even if the age given by mother is approximate, among the 29 vulnerable women interviewed the average age is 24.5 years old. It appears also that in the majority of the cases the head of the household is a farmer, followed by owner of a small business. Most of those women have several children (4 to 5). We observe that up to 5 children, mothers have more chance to experience undernutrition with their last child (6) and more chance to have 2 undernourished children. We noticed that 23 of them declared experienced sickness during their pregnancy or just after birth, anemia or malaria (fever) being the most recurrent diseases.

After birth, 10 of them said that they experimented a lack of breastmilk. This lack of milk leads them directly to an early complementary feeding introduction (introduction of pap, around the age of 2 months). In addition, participants mentioned a tendency of experimenting a lack of breastmilk if the child is born with a low weight. In the 10 cases of perceived low birth weight mentioned, 5 caregivers declared not to have enough breastmilk. We noticed also that some women with undernourished child mentioned the loss of a previous child (3).

[55] This interpretation is the result of the comparison between the table 30 about diseases and the table 32 the treats symptoms.

1.4.3 Care practices

Among the 29 women interviewed during the qualitative enquiry, we notice that the average number of ANC visits was 2.5 times. This number seems to be related with the health status of the mother during her pregnancy.

We observed that almost all of them gave boil water the first day of birth, and as previously noticed the mother continue giving water for 40 days. In most of the cases, children experienced vomiting and diarrhea episodes. Diarrhea seems to be related with undernutrition (14). The average age for the introduction of *pap* is around 3 months.

We notice that 3 women gave birth at a HC and 26 at home. Among them 9 gave birth with the help of a TBA, 9 alone, 10 with the relatives (mostly Mothers-In-law and Mothers). Among the 9 women who gave birth alone, the average age is 24 years old. As demonstrated Part I. 2.2.3. Proportion of women who gave birth alone is more important in the vulnerable population.

1.4.4 Rural vs Semi-rural

In larger villages, head of household depend more on small businesses and shops, and experienced a loss of income due to the conflict. The average age of women with undernourished children is around 23 years old in the bigger village and 26 years old for small village. We observe that in small villages, women have a tendency of mentioning more experience of lack of breastmilk than in big villages.

We cannot clearly see tendencies in terms of place to give birth, support during giving birth or small birth weight. But in rural context it seems that health facility are more accessible: more delivery in HC, more ANC. Surprisingly, it seems that there is more delivery alone without help and that the network seems to be less strong (cf. Table n°33).

ZONE	SOURCE OF INCOME	SICK DURING PREGNANCY- LBM[56]	P-LBW[57]:	CHILD SICKNESS	ANC	BIRTH PLACE – SUPPORT	COLOSTRUM	FIRST WATER – FIRST PAP
SEMI-RURAL	10 farmers 4 business n: 14	Yes: 12 No: 2 Fever/ Malaria/ Anemia LBM: 4	4	Yes: 13 No: 1 Majority diarrhea and vomiting	12 Average: 2.3 times	Home: 14 BA: 4 Relatives: 6 Alone: 4	No: 11 Yes: 3	Water the first day: 14 Average: 3.8 months first pap

[56] There is no direct question on the LBM (Lack of breastmilk). The LBM declarations are spontaneous.

[57] There is no direct question on the LBW (Low weight birth perceived). The LBW declarations are spontaneous.

ZONE	SOURCE OF INCOME	SICK DURING PREGNANCY- LBM[56]	P-LBW[57]:	CHILD SICKNESS	ANC	BIRTH PLACE – SUPPORT	COLOSTRUM	FIRST WATER – FIRST PAP
RURAL	9 farmers 3 business 1 begging 1 fisher n:15	Yes: 11 No: 4 Fever/ Malaria/ Anemia LBM: 7	5	Yes: 13 No: 2 Majority diarrhea and vomiting	13 Average: 3.6 times	Home: 12 HC: 3 BA: 5 Relatives: 4 Alone: 5	No: 14 Yes: 1	Water the first day: 14 Average: 3 months first pap

Tab· 32· Resume of the interviews with vulnerable women (Qualitative Survey, 2017)

1.4.5 Conclusions

In the group of vulnerable women interviewed, it appears that most of them experienced a shock into their household (loss of incomes (head of household), diseases, death). Commonly, mothers of several children have their younger one suffering from experienced undernutrition.

Diseases during pregnancy and just after, child illness (malaria and diarrhea) are commonly related to undernutrition. Mothers also proposed lack of breast milk as a cause of undernutrition.

Finally, there are clearly two tendencies: in the studied population the prevalence of low birth weight and prevalence of giving birth without support seems to be higher than in the average population (cf. Causal model n°1).

1.4.6 SUMMARY of NUTRITION sector and CAUSAL PATHWAY

Nutrition sector's summary

Undernutrition

The conflict has drastically impacted the prevalence of wasting and stunting in Nangere LGA. After an improvement initiated at the beginning of 2010, the undernutrition situation started to be critical in 2014-2015. Perceived low birth weight or early introduction of complementary feeding is the signs that the nutrition situation will continue to deteriorate. Moreover, the fact that the lean period starts earlier and become stronger and the decreasing number of meal taken per day per person, indicate the seriousness of the situation.

Undernutrition becomes to be very common in Nangere LGA and mothers are now able to identify 2 periods when children are more exposed. The first period (around 4 to 8 months) coincide with the introduction of complementary feeding and exposed children to wasting. The second period starts around 15 months with the start of the weaning period. If before this age children are most likely exposed to wasting episode, this second period drive the children into a stunting situation.

The level of local knowledge about undernutrition is low but very pragmatic. Perceived causes of undernutrition by the caregivers are lack of food (or nutritious food), diseases (malaria and rana) and lack of hygiene.

Pregnancy and birth

The period of childbearing is between 15 and 49 years old. During pregnancy, most of the women will go once or twice to ANC consultation mostly to get vitamin supplementations. Some limitations to access a health center had already been discussed: lack of money and self-evaluation by the mother.

Regarding childbirth place home remains the favorite place. In addition, even if relatives support during childbirth remains important, in Nangere LGA traditional birth attendant seems to have an important role. However, among the population of vulnerable women, there is a strong tendency of giving birth alone.

Breastfeeding practices

Breastfeeding practices seem to improve since the MICS survey (2011). The prevalence of early and exclusive breastfeeding is higher but still insufficient. Moreover, the qualitative survey shows the existence of practices (early water) deeply installed. Also, despite this improvement, undernutrition rates start to be critical. In fact, some signs are worrisome, complementary feeding introduction seems to occur earlier and breastfeeding duration seems shorter.

Complementary feeding

Complementary feeding is introduced around the 3rd or 4th months with Pap (millet porridge). Around 6 or 8 months, children have access to normal food. After 9 months, complementary food becomes predominant. At one-year-old, children eat alone. Practices of optimal complementary feeding seem to exist despite a very low IDDS prevalence. The main emerging representation among the caregivers is to compensate a lack of breastmilk or lack of quality breastmilk.

Child health

Deworming and DTP coverages show an improvement of child immunization but remains very low. In fact, the Link NCA study demonstrates that child health seeking behaviors are mainly not related to the health system. Rana disease for instance, which is never addressed to a HC, indicates diarrhea impact on the nutrition child status.

Psychosocial practices and network

If the women felt supported and protected, the survey shows that the conflict affects seriously their level of stress and well-being. It seems that the conflict did not affect much the family network but it appeared that the solidarity become stronger between neighbors.

Hypothesis I	Non-optimal breastfeeding practices for children up to 6 months	Triangulation validation	Important
Hypothesis 2	Young child non-optimal feeding practices	Triangulation validation	Major
Hypothesis 3	Poor nutritional status among pregnant and lactating women	Triangulation validation	Important
Hypothesis 4	Inadequate child health care	Triangulation validation	Major
Hypothesis 5	Poor child psychosocial practices and lack of psychosocial network	Triangulation validation	Minor

Emerging hypothesis

Early complementary feeding, low food diversification are respectively the main causes of wasting and stunting.

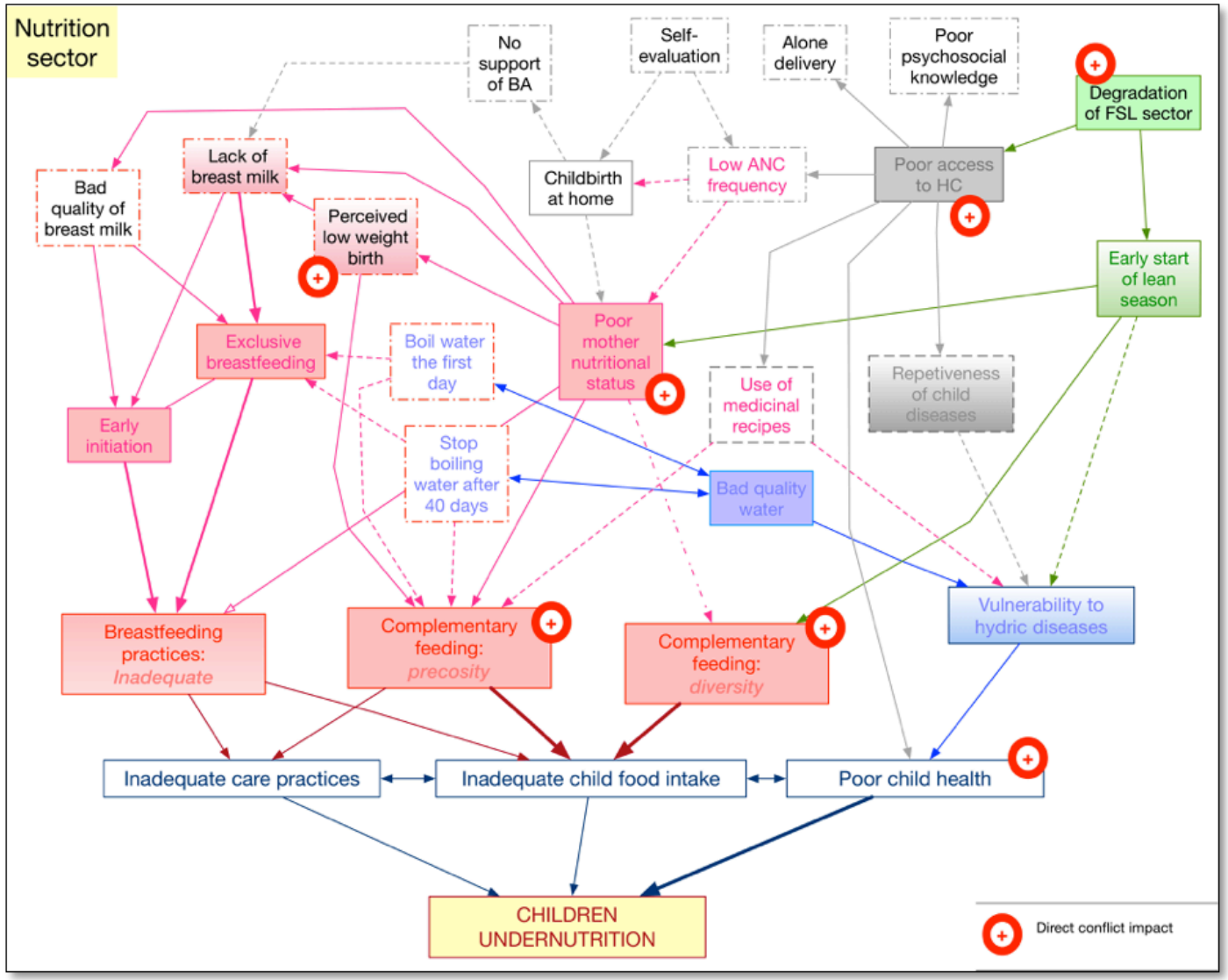
Perceived low birth weight and perceived lack of breastmilk have an impact on complementary feeding introduction.

The first 6 months of life is the most exposing period: the child can experience his/her first wasting episode and stunting situation start to root.

The non-recognition of the traditional/local health network, practices and diseases, is an important limiting access to health system but also in the transmission of optimal health care practices.

1.5 CAUSAL MODEL RELATED TO CHILDCARE PRACTICES AND HEALTH CARES

Fig. 12. Causal model 1: Nutrition and care practices



2/ UTILIZATION OF HEALTH SERVICES AND REPRODUCTIVE WOMAN HEALTH

Hypothesis 6	Weakness of the health system
Hypothesis 7	Poor access and utilization of health services
Hypothesis 8	Pregnancy bellow 18 years old
Hypothesis 9	Short birth interval

2.1 DESCRIPTION OF THE HEALTH SYSTEM IN NANGERE LGA (HYPOTHESIS 6)

The National Primary Health Care Development Agency (NPHCDA) provides support for the implementation of the National Health Policy in all matters related to *Primary Health Care (PHC)* in Nigeria. At Health Centre (HC) level, health promotion and education efforts are undertaken, and patients in need of more specialized services are directed to secondary health care (cf. Table n°34).

The introduction of the *Ward Health System* was an accumulation of efforts to provide an appropriate infrastructure resource for support and co-management of viable community-based integrated systems. Those efforts were principally done through the provision of a Minimum Package of Equipment, drugs and other supplies. This system requires smaller subgroups of *Health Facilities* to cater for areas that are far from the ward health center but within the same ward (MSFPHC in NIGERIA, 2015).

Health Facility Old Nomenclature	Health facility New Nomenclature	Levels of management	Expected numbers
Teaching/Tertiary hospitals	Teaching/Tertiary hospitals	Federal government	1 per State. Therefore in 36 States + FCT, 37
General hospitals	General hospitals	State government	1 per LGA, Therefore a minimum of 774 will be expected
Comprehensive Health Centre, Model PHC Center	Primary health center	Local government	1 per ward. With an average of 10 wards per LGA, a total of 7,740 will be expected
Maternity Center, Basic Health Center	Primary health clinics	Local government and ward development committee (WDC)	1 per group of villages/ neighbourhoods with about 2,000 – 5000 persons
Dispensary	Health posts	Village Development Committee (VDC)/ Community Development Committee (CDC)	1 per village or neighbourhood of about 500 persons As many as the number of villages

Tab. 33. Types of Health Facilities-Management and Expected Coverage, MSFPHC (2015: 13)

In Nangere LGA, there are 16 health facilities located in 11 Wards (8 Dispensary, 8 PHC). During the qualitative survey, we were able to visit 4 HCs during OTP days supervised by Action Against Hunger[58]. We were also able to see 2 dispensaries, one was visited and the other was closed during the fieldwork.

[58] Kukuri HC, Chukuriya HC, Dazigau HC, Degubi HC, Garin baba Dispensary. At Dan Disa it was not possible to reach the Nangere Hospital.

Fig. 13. Degubi HC (Laboratory) & Chukuriya HC (Medicine reserve)

The National Health Ministry agrees the health system presents some weakness, in particularly in the northeast zone where the Minimum Service Package (systems, staffing, equipment and service delivery) is at 0% and admits important difficulties regarding human resources sector. Indeed, only 13% of the needs are met (PHCUOR Implementation Scorecard III, 2015).

Nonetheless, a distance to health centre assessment shows that 20% of the northeast population lives within 30 minutes of a health facility (PHCUOR Implementation Scorecard III, 2015) and the RFS highlights that 79% (67.6-90.4 95%CI) of Nangere Population live less than 1 hour from the nearest HC.

As demonstrated in the nutrition part of this report, health proxies such as DPT3 and deworming coverage as well as ANC frequency rate reflect certain difficulties to access to basic health services. Also, as discussed, high prevalence of malaria-fever and diarrhea (locally combined under the term Rana) as a repetitive diseases show a need of progress in terms of diagnostic (Rana) and therapy to integrate such 'local diseases'.

If the conflict impact was especially important in Borno, where 40% of health facilities had been damaged or destroyed (OCHA-WHO, 2016), in Yobe state the consequences were multiples (Ager et al., 2015).

Low availability of trained health workers (due to displacement and fear of return), shortage of medicines, breaking of the cold chain and restocking system (MSFPHC, 2015), health worker workload, movement restrictions, lack of financial support represented a lot of pressures for health infrastructures. According to Ager et al. (2015) although some resilience processes were experienced within the State health system during the hardest periods, the situation within HCs remained difficult.

This problematic context was mentioned during the risk factor categorization exercise, where the communities considered the weakness of the health system as a major risk factor of undernutrition (lake of specialize health worker and lack of adequate medical material, increase of prescription or medicine costs).

2.2 HEALTH SERVICES: *PERCEPTION AND ACCESS* (HYPOTHESIS 7)

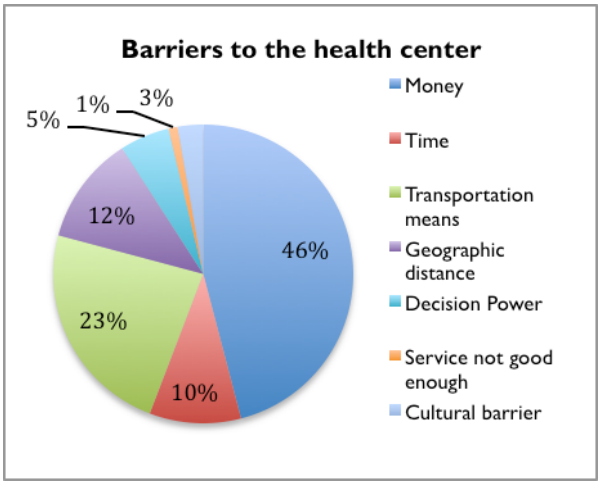
During the qualitative inquiry, population perception showed no opposition between practice of 'modern medicine' (i.e. allopathic medicine) and practice of the 'traditional medicine'. In fact, SMART survey findings (2016) highlight that 85.4% of treatment seeking behavior (children under

5) considered "modern medicine" while 13.5% considered traditional healer/doctor. Nonetheless, the qualitative inquiry demonstrate that use of traditional medicine remains important for men and women due to a lack of financial resources and a better psychosocial access to treatments. Actually, although the population considers that traditional medicines take more in account local diseases (physical or psychological) and are more able to offer resilience possibilities, its practice doesn't enter in concurrence with 'modern' medicine.

2.2.1 Poor access to health services

"The sickness usually comes at the time where we don't have money and barely eat." Men in Garin Kadaï

As declared during FGDs, the main challenge for head of household and mothers is to find money to access to the health services. In fact, the analysis of access barriers to HC (cf. Figure n°7) underlines that for 46% of the caregivers 'money' is the principal limitation, followed by the 'transportation means' (23%), geographical distance (12%),time (10%) and decision power (5%). Cultural barrier does not have a real impact (3%).



Barriers to health center are mainly related to money and distance (no access to health services and transportation means). In fact, the majority of people in visited communities reach the health center by walking. During the qualitative survey, it emerges that a walking distance of approx. 5 km starts to be prohibitive.

Moreover, despite multiple complains about lack of health worker, medicine and material, the population expressed mainly that for them "lack of money" and "distance" are the two first causes of a poor access to the health services.

Fig. 14. Barriers to the health center (RFS, 2017)

Indeed, inflation of prices has an impact on different parts of the population lifeway; monetary access to health services is one of the most important[59]. Regarding this issue, qualitative survey shows that traditional health system remains functional. Resilience allowed by this system remains essential for the population. Possibility to access without money or knowledge/social status

[59] During the qualitative survey, we tried to collect data about price practiced by HCs and they declared price's inflation (For ANC, delivery, treatment of diseases as diarrhea, malaria, cough). If for the delivery the results was exploited, it remained impossible to used others data due to answers and practices variability. Generally, qualitative information shows that prices have often doubled or tripled

traditional health cares and medicines is a daily resource. This system is particularly functional regarding men health (cf. Table n°35); it is regularly used by women and sometimes for children (depends on how far is the HC, if the disease is local or on money availability). But, as demonstrated therapeutic pathway regarding child health commonly includes the use of medicinal recipes (cf. Table n°32).

Another tradition coping mechanism considers intrahousehold money management toward health cares. Traditionally, men are in charge of all the decisions and expenditure regarding health care (sell crops and livestock)[60], but also women own some livestock such as chicken, goat, and cheep that they used to sell to access to HC services. Thus, commonly those belongings allowed women to participate to marriage and to meet health needs for their children. In addition, if the woman has a little business, the money generated can be used for health care. Nevertheless, most of the time, for 'little diseases', borrowing between relatives and neighbors is constantly functioning.

"They (women) have great roles like getting money or changing the foods diets, the recipes for the sick children or husband." Men at Garin Kadaï

Qualitative enquiry made emerged that due to money constraints to access health care, self-evaluation is always practice when someone get sick. Sickness evaluation regarding signs (identification) and symptoms (strength) is commonly performed by caregivers, which in this context can lead to dramatic symptoms aggravation until appropriate actions are undertaken. If some diseases are constantly self-evaluated such as diarrhea or cough, malaria appears to have a specific status. When constant fever and signs related to malaria diagnostic are visible, actions are taken to afford health care although few medicinal recipes do exist as well as traditional practices performed by traditional healers. Nevertheless, assessment of health care needs can be shown in several health sectors. As example, it is the case for ANC visits. Indeed, pregnant women evaluate their wellbeing status, which is the first factor to assess to decide to go to an ANC visit.

"If my pregnancy goes well I just go once, if I suffer I can go more often." Women in Garin Gaye

2.2.2 Poor utilization of the health services

"It is not all the diseases that we start treating with traditional medicine but we usually start by that because it is the one we can access easily with little or no money." Men in Garin Kadaï; "They (traditional healers) really assist us for the treatment of our diseases." Men at Garin Kolo.

Adults treatment seeking mechanism

Health seeking behaviors are not the same for children and adults. For children, after using self-medication practices (medicine and/or medical recipes) some actions will be taken to reach the HC. Due to limited monetary access for men and women, self-medication and traditional healer consultations are more common, especially for vulnerable people, as mentioned by 4 THs during the qualitative survey (cf. Table n°35).

[60] As demonstrated in table n°48.

WOMEN	SM-MR→TH→HC[61]	SM-MR→HC	SM→HC→TH	SM-MR→HC	SM-MR→HC→TH
MEN	SM→TH→HC	SM-MR→HC	SM/TH→HC	SM→TH→HC	SM→TH→HC

Tab. 34. Adult (women and men) health-seeking behaviors (Qualitative Survey, 2017)

The table n°35 about men and women health seeking behaviors illustrates that self-medication is the first health practice and that going to a HC is the ultimate alternative.

Generally, men seems to seek treatment to traditional doctor while women seems to use recipes.

Qualitative information compiled in the table n°35 did not show clear correlation between HC distance and use of traditional practices. Nonetheless, when vulnerable people have no monetary access to Nangere General Hospital (Dan Disa)[62], or the distance is superior to 5 km (Garin Kolo and Garin Kadaï), use of traditional practices and consultation of traditional healers are more frequent for adults. This phenomenon was also observed for treatment seeking behavior for children (cf. Table n°30).

To confirm the fact that there was no competition between traditional and allopathic medicine, it should be taken in account that many participants explained using both kind of medicine as co-practices. Nevertheless, they are classifying health-seeking behaviors between traditional and modern treatments. Most of the time, and oftener when health cares are less accessible, use of traditional medicine is favored (cf. Table n° 36).

	GARIN KOLO	GARIN GAYE	GARIN KADAÏ	DEGUBI ZAKAR	DAN DISA
WOMEN	Olsa, pile (TH), onguria (TH), stomach pain (TH), back pain (SM), manda, diarrhea (MR)	Back pain (SM), stomach pain, diarrhea (SM), liver pain, malaria (SM), pile	Liver pain, olsa (TH), high blood pressure (TH), typhoid (TH), malaria (SM), back pain (SM), stomach pain (TH)	Typhoid (SM), malaria (HC), olsa (TH), high blood pressure (SM), liver pain, fever (SM), stomach pain, headache	Fever (SM), headache (SM), stomach pain (TH), typhoid (TH), anemia (HC), high blood pressure (TH), olsa (TH), diarrhea (SM)

[61] SM: Self-Medication; MR: Medicinal Recipes; TH: Traditional Healer; HC: Health Center.

[62] The qualitative survey highlights that Nangere General Hospital practices the most expensive cares costs among all the Ward Health Centers in Nangere LGA.

				(SM)	
MEN	Fever (SM), malaria (SM-TH-HC), pile[63] (TH), ulcer, typhoid (TH), cough (SM), olsa (TH), stomach pain (TH)	Cough (SM-HC), malaria (TH), fever (SM), cancer (TH), ulcer, pile (TH)	Fever (SM-HC), malaria (HC), typhoid (HC), ulcer (TH), kidney/liver pain, high blood pressure (HC)	Typhoid (TH), high blood pressure, malaria (TH), ulcer, stomach pain (TH), pile (TH), spirits (TH)	Stomach pain (TH-MR), high blood pressure (TH), typhoid, ulcer, cancer (TH), pile (TH), olsa (TH-MR)

Tab. 35. Adult diseases (women and men) and associated health-seeking behavior (Qualitative Survey, 2017)

First, table n°36 shows a certain homogeneity in the diseases repertory affecting both genders. Typhoid, malaria, cough, fever, stomach pain, high blood pressure, and olsa, are very common. Nevertheless, some gender tendencies appears genital diseases for women and hemorrhoid (*'pile/bacire'*) or high blood pressure for men. If women express more back, liver or abdominal pains, ulcer seems to be more related to men disease. The analysis of therapeutic pathways highlights that malaria, cancer, typhoid, pile, olsa and stomach pain are mostly treated by traditional healer, while self-medication is mainly used to treat fever and headache.

Like for the analysis of children diseases at village level, a local disease called 'olsa' was identified regarding diseases affecting adults. The local meaning differs for its translation in allopathic terms as 'ulcer'. For the participants, signs of olsa are heartburn, hunger, being skinny, shaking, vomiting, lack of appetite, lack of blood, stomach pain, and diarrhea. Similarly to *rana* diseases for children, the qualitative survey and this report suggests a hypothesis that *olsa* refers to a local description of adult undernutrition. This description also point the fact that diarrhea is common in adult population.

Regarding diseases affecting women, FGDs revealed two specific diseases: *onguria* and *manda.*

'*Onguria*': dark ball located in front of female genital organs.

'*Manda*': white ball located in the uterus zone, which obstruct the delivery or the sexual act.

In both cases women can go to female local healer "who cut these kind of balls and pile" (Women in Garin Kolo)[64].

Self-medication

"We normally go to the shop to explain them and take medicine they advice, but sometimes we tell them what we need" Men at Dan Disa.

[63] Haemorrhoid.

[64] In fact, there is several kind of local healer such as Birth attendant, Traditional healer, Traditional Islamic doctor, Wazami (Excision and first head shaving).

The effectiveness of allopathic medicine is an explicit motivation of its use. But, as the previous citation expressed, the first actor within the health system met by the population is the 'pharmacist'. Local-street vendors and pharmacists in medicine shop are also the first person trying to diagnose and advice on the type of medication or the actions to undertake.

During health FGDs and through the interviews with pharmacists, we had asked what the main medicine was sold or bought (cf. Table n°36):

	GARIN KOLO	GARIN GAYE	GARIN KADAÏ	DEGUBI ZAKAR	DAN DISA
WOMEN	Anti-diarrheic Paracetamol Boska Flagyl Drugs for children	Pain relievers Flagyl Anti-diarrheic Gelocine Paracetamol	Paracetamol Boska Flagyl Drugs for children	Paracetamol Ampilicine Flagyl Boska Syrups for children	Paracetamol Boska Flagyl Ampilicine Syrups for children

Tab. 36. List of medicines buy or sell by village (Qualitative Survey, 2017)

The pain and fever relievers (boska, paracetamol), anti-diarrheic and anti-biotics (flagyl) are the most commonly used medicine in the villages visited for the study.

Even if there is an increase of medicine prices, which was not possible to capture during the qualitative survey, self-medication remains the main common health practices shown by therapeutic pathways (adults and children). It only appeared that the population could choose the place where they by their medicine and therefore look for better price: "*The price differs from drugs to drugs, also differs from hand vendors to medicine shop. Vendors always practice higher prices*" Men at Garin Gaye. They can also buy medicine of lower quality: "*The price depends of the quality and the quantity. There is different quality of medicine and since the conflict, the quality of medicine is decreasing*" Men at Degubi Zakar.

In fact, since the conflict most of the people interrogated declared buying less medicine and with lower quality.

2.2.3 Therapeutic pathway scheme

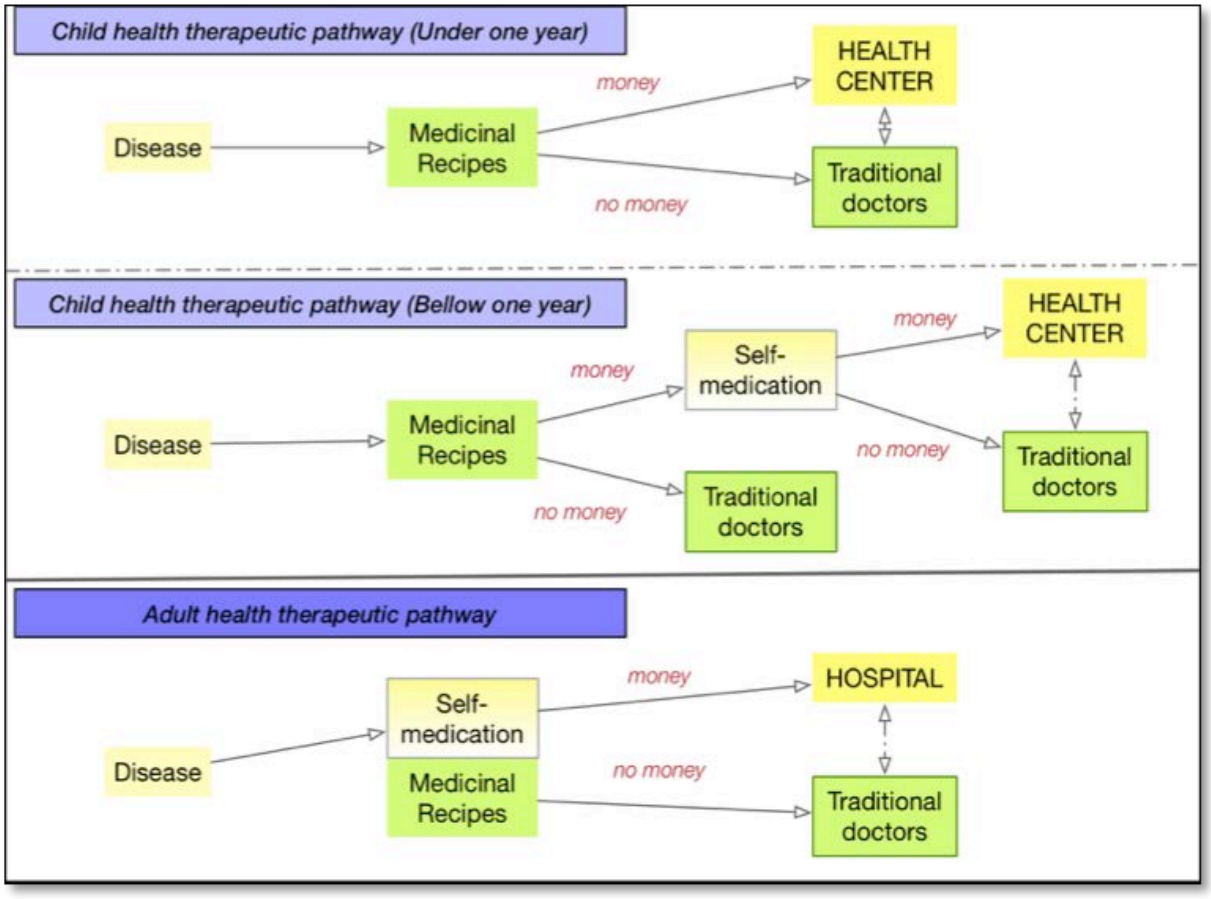


Fig. 15. Child and adult therapeutic pathways

2.3 REPRODUCTIVE HEALTH – WOMAN (HYPOTHESIS 8 AND 9)

- The procreative woman

It is impossible to start presenting this part of the analysis without explaining the long process surrounding the foundlings related to the two following hypotheses 'Pregnancy bellow 18 years old' and 'Short birth interval'. During the preliminary workshop, it was difficult to find a consensus with local experts particularly on the hypothesis: 'Pregnancy bellow 18'. In fact, initially, the Link NCA analyst wanted to question 'Early pregnancy' and "Poor child spacing". If the second hypothesis was revised in term of wording, the first one was subject to a one-hour debate. Lot of resistances appeared. For the experts, the discussion needed to be centered on "young women" being pregnant instead of "girls" being pregnant. The 15 years old limit was discussed and we concluded to use 18 years old as of the official limit in the State. The status of women and in consequences the status of girls appeared strongly protected despite the fact that the MICS report

noticed in Yobe state (2011: 200) that 37.4% of the woman between 15-49 years old entered in marital union before 15 years old.

In a certain way, the debate continued during the final workshop focusing on the birth interval rate.

- Marriage

Regarding the age of marriage, if the median age at first marriage among women aged 25-49 is 18.1 years old in Nigeria Demographic and Health survey (2013: 81); it appears in the MICS survey (2011: 200) that the rate of marriage before 18 in Nigeria was 40% for 81.5% in Yobe state. This last fact is correlated by the qualitative survey as discussed previously (cf. Part I. *2.2.1.*).

Furthermore, 33.6% of married woman (15-49 years old) in Nigeria is engaged in a polygynous union (MICS, 2011: 200) for 44.5% in Yobe State. In the field, this practice seems to be more frequent.

2.3.1 Pregnancy bellow 18 years old

There is a contrast between national level and state level in terms of childbearing. According to the MICS survey (2011: 200-201) the rate of woman childbearing between 15-19 years old was 18.7% at National level while at Yobe state level the rate was 44.4%. The same difference is observable regarding live birth rate before 15 years old: 2.6% (National Level) and 5.6% for Yobe State (2011: 126).

In one hand, those observations confirmed our hypothesis. Indeed, the rate of childbirth bellow 19 years old is high, but on the other hand, it helps understanding the workshop debate. In Yobe State, after 15 years old, girls are considered as “functional reproductive women” while childbirth rate before 15 years old remains low.

EARLY CHILDBEARING	TOTAL
BEFORE 18 YEARS OLD	35.7% (24.9-46.5 95%CI)
	n:188
AFTER 18 YEARS OLD	64.3% (53.5-75.1 95%CI)
	n:339

Tab. 37. Pregnancy bellow 18 years old at Nangere (RFS, 2017)

The pregnancy bellow 18 years rate (35.7%) remains consequent but lower than the State level rate (cf. Table n°38). Nevertheless, during the qualitative inquiry we have observed the followings:

- Firstly, marriage at 15 years old is a symbolic moment. The majority of young girls or young women interviewed declared wishing having their wedding just after 15 years old. This practice seems to be equally present in small villages or larger villages.

- Secondly, marriage or the pregnancy bellows 15 years old are not tolerated. Social or physical unacceptance of those practices were clearly expressed during FDGs and interviews. -Finally, studying vulnerable women profiles did not permit us to conclude about a clear link between precocious pregnancy and undernutrition in Nangere LGA.

2.3.2 Birth interval

The RFS survey highlights short birth interval. In fact, 76.2% of the interviewed caregivers with at least 2 children declared an interval lower than 24 months between the last two births (cf. Table n°39). This figure needs to be taken with caution giving the small sample size and the difficulties to assess the real age of the children in absence of birth record, what might lead to bias the results (although event calendars were used). Indeed, the majority of caregivers do not have a birth certificate for their children.

BIRTH SPACING	TOTAL
Less than 24 months between the last two births	76.2% (68.8-83.6 95%CI)
	n:141

Tab. 38. Caregiver birth spacing indicator (RFS, 2017)

This result was debated during the final workshop. For local experts space between two births is higher. During the qualitative survey, through personal interviews and FGDs, average age declared for weaning was between 15 or 18 months (mostly when the caregiver learns about a new pregnancy). Caregivers will give birth approximately when the younger child is around 21-24 months. Although those results do not infirmed the RFS survey, they capture the arguments developed by the local experts.

During the qualitative survey, another fact emerged: birth interval seems to be shorter than before (30-20 years ago). If it remains difficult to confirm this fact, it makes us understanding that caregivers take in account short birth spacing despite undesired reproductive planning.

2.4 REPRODUCTIVE HEALTH

In terms of contraceptive use prevalence, 14.5% (6.8-22.1 95%CI; n: 77) of interviewed caregivers i declared using family planning methods. The female or male sterilization is the first chosen strategy followed by lactation amenorrhea, traditional belt and calendar method. During FGDs, it was not possible to collect such data because as the predominant speech was: “We don’t use contraception it’s against the God’s rules.”

MAIN METHODS EMBRACED IN TERMS OF CONTRACEPTION		N
FEMALE/MALE STERILIZATION	28.6% (18.5-38.7 95% CI)	22
LACTATION AMENORRHEA	23.4% (13.9-32.8 95% CI)	18
OTHER (TRADITIONAL BELT TIED TO THE WAIST (*GURU*)/CHARM (*LAYA*)	14.3% (6.5-22.1 95% CI)	11
CALENDAR METHOD	10.4% (3.6-7.2 95% CI)	8

Tab. 39. Family planning (RFS, 2017)

Those figures are higher than MICS outcomes. In 2011, 5.1% of women aged 15-49 years old currently married or in union were using (or whose partner is using) a contraceptive method (p.129.) in Yobe State. 3% used traditional methods and 2.1% modern methods (Lactation amenorrhea and pill). They are also higher than the NNHS figures - 7.6% (2015: 99) -, which similarly suggests that traditional methods are mostly used.

2.5 SUMMARY OF HEALTH SECTOR AND CAUSAL PATHWAY

Health sector summary

Weakness of health services

The conflict had affected the ward health system, which was already weak. Nangere LGA population felt the consequences. Firstly, availability and quality of existing health services decreased, mainly for adult treatment. In fact, support of international organization (UNICEF, iNGOs) and national health policy facilitate support for child diseases treatments, as shown by health proxies such as DPT and deworming coverage. But, repetitiveness of child diseases episodes, low level of immunization coverage, low rate of ANC follow-up visits, discovery of local diseases that are not managed by the health system (such as *rana, olsa*) indicate persisting weaknesses of the health system.

Secondly, monetary access to health care and medicine became problematic, mainly regarding adults treatment. Mostly for children or in case of serious adult illness, even if the household does not have budget for health care, parents will sell belongings (cereals, chicken) to afford treatments. In consequence, child and adult therapeutic pathways show that traditional medicine, traditional healers and the self-medication are common, which makes pharmacists the first actor of health system.

In case of 'small' (i.e. considered as not serious) disease the first health care action taken is self-medication simultaneously or not with traditional medicine. However, use of traditional medicine differs for child and adult. Use of medicinal recipes concerns child health therapeutic pathway while traditional healers consultation concerns adult health therapeutic pathway. In addition, caregivers due spend for health care for their children.

Monetary access has also an impact on the use of transportation means needed to reach HC. The motorcycle ban in Yobe State, as security measures in regard of the Boko Haram insurgency, had impacted access and use of ward health services.

Nonetheless, health system weakness and poor access leads to a poor utilization of services and heavy consequences, especially regarding adults health. Indeed, the RFS shows that caregivers health issues appeared as the second shock experienced by households of Nangere (rCSI indicator).

Reproductive health

Rate of childbirth below 18 years old is 35.7%. Despite this high level, it remains difficult in this context to link early pregnancy to undernutrition. Also, 76.2% of interviewed caregivers declared short birth spacing issues (less than 24 months between two pregnancies), which is very short and can have an impact on women health. Nevertheless, birth spacing remains a preoccupation for the interrogated women. In fact, it seems that those preoccupations were captured by contraceptive prevalence showing a higher rate than the state level and an increase of use.

Hypothesis 6	Weakness of the health system	Triangulation validation	Important
Hypothesis 7	Poor access and utilization of health services	Triangulation validation	Major
Hypothesis 8	Pregnancy bellow 18 years old	Triangulation validation	Minor

Hypothesis 9	Short birth interval	Triangulation validation	Important

Link with other sectors

NUTRITION: Repetition of child disease episodes, poor women health status

WASH: Medicinal recipes, unhealthy environment

FSL: Women livestock

Emerging hypotheses

Lack of traditional health system recognition (BA, pharmacists) lowers the effectiveness of the health services.

Rana disease for children and *olsa* disease for adults are local transcriptions for undernutrition

Increase of health care prices and bad quality of medicine available impact the health of Nangere's population.

Weakness of women and adult health services contribute to household insecurity.

2.6 CAUSAL MODEL RELATED TO HEALTH SECTOR

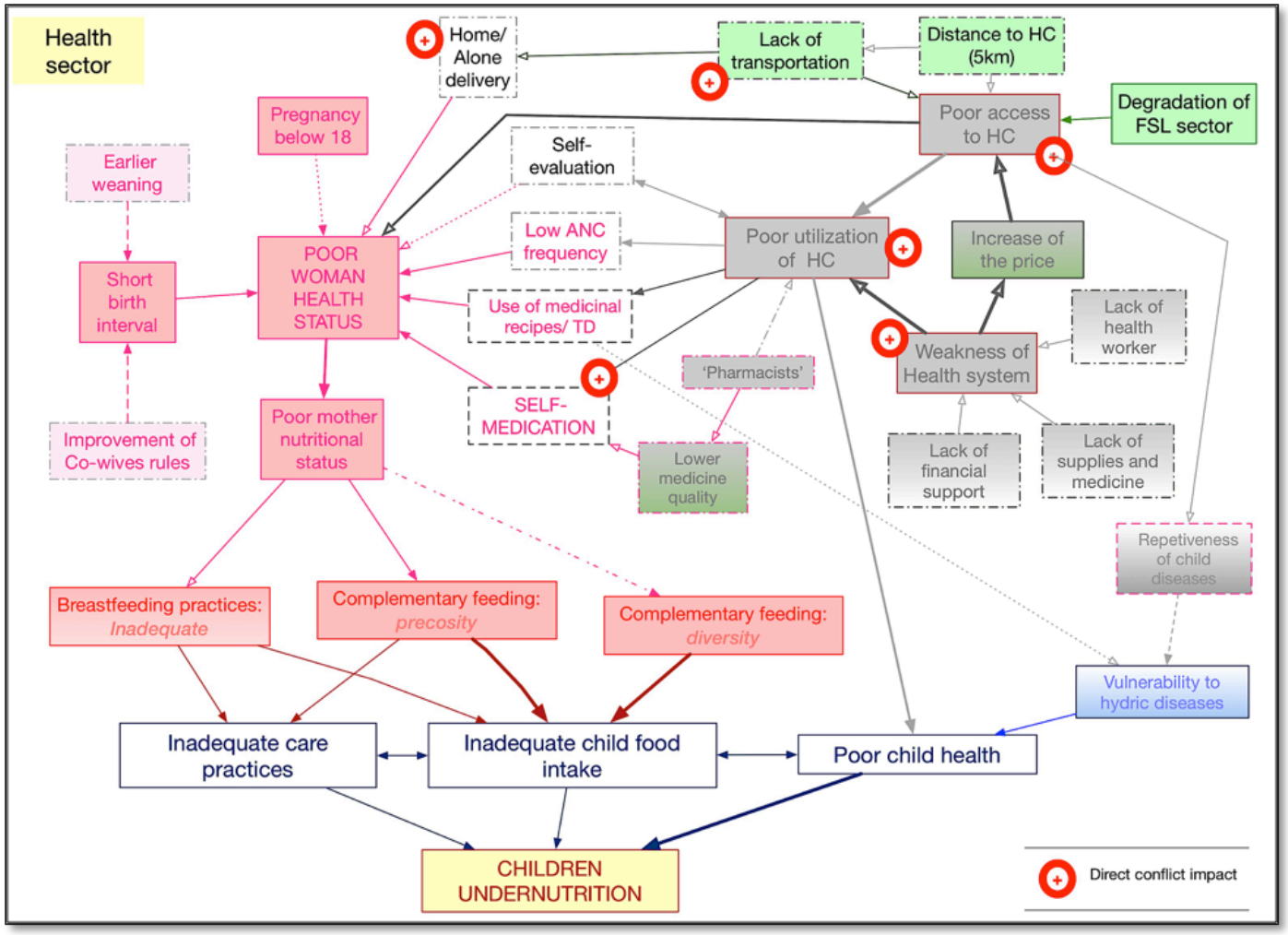


Fig. 16. Causal model 2: Health sector

3/ WASH AND CARE PRACTICES

Hypothesis 10	Inadequate access to water in quality and quantity
Hypothesis 11	Non optimal water management/water chain
Hypothesis 12	Poor hygiene practices
Hypothesis 13	Inadequate management of human and animal excreta
Hypothesis 14	Difficulties to manage water for crops and livestock

3.1 DESCRIPTION OF WASH CONTEXT IN NANGERE LGA

Northern part of Nigeria, considered as a part of the Sahel area, is characterized by an arid climate. Nangere LGA have an average level of rain precipitation around 600 mm by year[65]. A river crosses the northern part of the LGA, called Komadogu Gana or Misau, but since 2011 the water no longer reaches Yobe State[66].

Traditionally, in Nangere LGA construction of a well is the start of a village life (cf: Villages presentation *Chapter 1, Part 3.2.4.2.*). Groundwater can be found around 30 meters in the northern part of Nangere, close to the river (Garin Kolo village) and around 80-100 meters in the southern part (Degubi Zakar village)[67]. According to MICS (2011) and SMART surveys (2016: 26), 81% of the Nangere population have access to water within 30 minutes.

Aware about the low availability of water in Nangere LGA and Yobe state since several years, the RUWASA ministry took action to increase and sustain provision of safe water and adequate sanitation services to the rural population[68]. Recently, motorized and solar powered boreholes have been built in Nangere LGA in association with the local government.

[65] Oguntunde et al. (2011) analysed rainfall trends over Nigeria using 1901–2002 rainfall data from Global Gridded Climatology of Climate Research Unit Time series (CRU TS.2.1). They concluded that annual rainfalls had been reduced significantly over 20% of the landscape and that the amount of annual rainfalls reduced by 50–350 mm in 64% portion of Nigeria. In the Sahel area of Nigeria, according to Ogungbenro and Morakinyo (2014), rainfalls decreased and the dry season is dryer since 1969-70 when the average rainfall fall from 700mm to 600mm by year. Moreover, the authors noticed since 2000 a volatile rainfalls distribution all over the zone.

[66] *Komadugu Yobe Basin, upstream of Lake Chad, Nigeria*, WANI Case Study, IUCN (2011)

[67] The country has about 79 million ha of arable land, 214 billion m^3 of surface water and 87 km^3 groundwater, both of which can be partly used for irrigation (AQUASTAT-FAO).

[68] "The goal of Yobe State Water and Sanitation Policy is to make adequate safe water and basic sanitation available to the people at an affordable cost in a sustainable manner", Water Sector Medium Term Sector Strategy (2015-2017: 52).

MAIN SOURCES OF DRINKING WATER AT HOUSEHOLD LEVEL	PROPORTION	N
Ground water (open well; motorized/solar powered borehole; hand-dug well)	99.1%	536
Rain water harvested from the roof	0.2%	1
Water trucking	0.4%	2
Piped supply	0.2%	1

Tab. 40. Main sources of drinking water at household level (RFS, 2017)

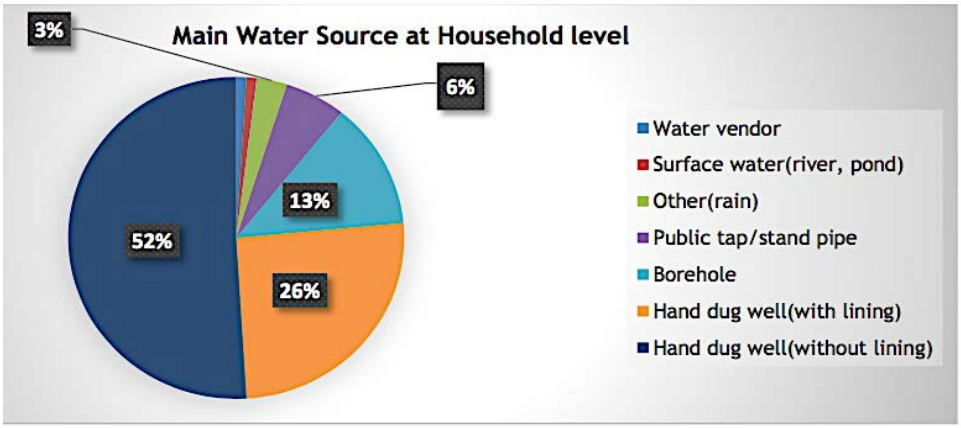


Fig. 17. Main water sources at household level (SMART, 2016: 22)

The RFS survey shows that the main source of drinking water at household level is groundwater (99.1%, cf. Figure n°9). This confirms the tendency observed during Nangere SMART survey (2016). Nevertheless, SMART figures inform us on the water sources: 52% from hand-dug well with individual line; 26% from hand-dug well with collective lines; 13% from powered borehole; 6% stand pipe and 3% others sources of water.

The Link NCA questioned if WASH issues are more a water quantity or a quality issue, the strength of the link between water chains/handling management, hygiene practices and undernutrition and the level of understanding regarding sanitation and waste management. As we saw, regarding diarrhea rate, the water management question is central.

The main challenge experienced during the survey was the poor level of knowledge regarding water management in the communities. Our results might be lower than the reality due to existence of potential biases.

3.2 ACCESS TO WATER IN QUANTITY AND QUALITY INTO THE HOUSEHOLD (HYPOTHESIS 10)

3.2.1 Water quantity

QUANTITY OF WATER	SPHERE	FANTA
27.7 LITER/CAPITA/DAY (24.6-30.8 95%CL) N: 540	73.7% (61.8-79.6 95%CI) n: 398	13.2% (9.1-17.2 95%CI) n: 71

Tab. 41. Quantity of water interpreted with FANTA and SPHERE norms (RFS, 2017)

Quantity of water per capita for personal use is not critical for majority of Nangere's population: 27.7 L/p/d. Even with limitations, this number accentuates the fact that there are water points and there is an acceptable access to water in sufficient quantity to meet household basic needs according to SPHERE standards. Nevertheless, the water quantity is not enough to meet all the HH needs according to FANTA standards (cf. Table n°42).

SPHERE considers that 15L per person and per day is sufficient to meet daily basic needs, which is the case for 73.7% of the Nangere population. But using FANTA standards (50L/c/d) only 13% of the population reaches basic needs. However, FANTA standards are not commonly used in arid context. Thus, using SPHERE standards, 26.3% of Nangere population is living with less than 15L/c/d and 3.5% reported living with dangerously small amount of water (less than 7.5L/c/d).

During the qualitative survey, it appeared that it was easier for the participants to calculate the water quantity at HH level[69]. With using a scale, we obtained between 60-100L/HH/day in rural context and 100L-150L/HH/day in semi-rural context. The main reasons for this difference are firstly, the presence of improved water points in semi-rural context (Solar borehole, Hand-dug well with multiple lining), which depend of money management. Commonly, the gallon (25L) costs 10-20 Naira and the money goes to a community fund management. Secondly, we observed more individuals or shared wells in semi-rural context than rural context, which, reduce the time needed daily for water collection?

However, none of the 3 mechanic boreholes seen during our visit was functioning. The solar borehole was providing water and managed by 3 men. Main problems remain fuel procurement and management capacity.

At Dan Disa, there is a fee for using the multiple lining hand-dug well. Ten men and young men have for main activity collecting the water. Water cost is similar to water collected from the borehole, but fees goes to individuals. A charitable neighbor, due the severe water access issues, built this well for the community. Indeed, in semi-rural area, management of the water

[69] Containers used for and person in charge of data collection are not always the same. The daily needs are not always the same. For example, it is not rare to give water to livestock (goat or cattle) at HH level.

collection points can become a problem when boreholes are not effective; demand is too high and water availability at household level decrease.

Two periods of the day are very exigent in water: the morning and the end of the afternoon (Body washing, clothes washing, kitchen tools washing, drinking). According to the participants, men and young men are in charge of water supply at those times. But, during daytime, adults or children also collect water to cover the others needs (animals water, cleaning the house, praying).

Common use of dirty water can be shown as an evidence of water shortage. For instance, after washing the child, it is very common to use the same water to wash clothes. Also some women mentioned washing dishes once instead of twice, and using this water to wash the floor or the latrine. Drinking[70] and cooking water is stored in a specific and traditional recipient, close by the house (cf. Picture n°8).

Quantity of water is shown as not enough to meet essential needs such as regular hand washing, but during FGDs the quantity of water was rarely declared as a major problem. In fact, during the categorization exercise with communities, only 'hygiene practices' or 'quality of water' were considered as risk factors of undernutrition.

3.3 WATER QUALITY

To discuss water quality, we have chosen to observe the water management from the first steps (water collection: risk of contamination roof the water point) to the final steps (water storage and treatment at the household).

Risk contamination of the water point

CONTAMINATION RISK OF WATER POINT				
LEVEL	Severe risk	Moderate risk	Acceptable risk	Safe water point
PERCENTAGE	22.6%	51.8%	21.9%	0.75%
N: 535	137	277	117	4

Tab. 42. Water point risk of contamination (RFS, 2017)

[70] No access to bottle water.

The RFS survey highlights that most of water sources are not protected and are likely prone to contamination. Indeed 74.3% of the water points in Nangere LGA have moderate or severe risk of contamination (cf. Table n°43). The qualitative survey corroborates this fact. The observations taken showed that most of the wells are not protected and, in semi-rural context there is latrine less than 30 meters away (safe latrine coverage is only 14% in Nangere LGA), presence of animals or animals excreta is constant (share the same water point as illustrated in picture n°3). Participants to the study reported the same fact.

Fig. 18. Collective hand-dug well at Garin Kolo (Qualitative Survey, 2017)

Perception of good water and water treatment

For the participants, perception of what is considered as "good water" is driven by its aspect, its smell and its taste. If the water is cloudy as the associated picture n°4, people will let it stand and settle to collect what will be considered as 'clean water'. Or they will use a *rappa* or clothes to filter it. If the water "smell strong or taste strong/bitter", they will say "it's an old water", "it can bring diseases as vomiting or diarrhea". Commonly the population will consider water from borehole as safer than water from wells.

Once water is stored at the HH, no action is taken to treat the water. Water treatment is very limited 6.4% (n=535). Main water treatment method will be through ceramic filters, while only few participants reported boiling or chlorinating the water. These results are confirmed by the qualitative study, reporting the absence of specific knowledge about water treatment into communities, and by the MICS results (2011: 95) mentioning a water treatment rate of 4.8% (most of the cases are filter the water with clothes).

Fig. 19. Water from the collective hand-dug well of Garin Kolo (QS, 2017)

3.4 WATER MANAGEMENT -INSIDE AND OUTSIDE OF THE HOUSEHOLD- (HYPOTHESIS 11)

Fig. 20. Solar Borehole waiting queue, Degubi Zakar (QS, 2017)

3.4.1 Water chain management outside of the household (roles, material)

Roles

Traditionally men and young men oversee water collection, and if there is money involved. In fact, women and children between 8 to 15 years old fetch water (as shown in picture n°5). According to MICS (2011: 100) 49.3% of men are in charge, 25.9% of women, 12.9% of female children under 15 and 22.1% male children under 15. These results are showing that women and girls are collecting water, but lesser than men and boys.

During the qualitative survey, which happened between 8:30am to 16:30pm, we have exclusively saw young girls in charge of water collection. But, it should be notified that during those hours, men and young men are busy with crops, market and by going to school.

Materials

Usually the population is collecting water with a bag (black, in rubber) and a rope (as shown in picture n°4). In rural context, each household has this minimal material. In semi-rural context, water vendors have their own.

Most of the time, as illustrated by the picture n°6 and n°7, a branch of tree help as lever. In best scenario, a pulley is available to facilitate water collection.

Fig· 21· Hand-dug well with multiple lining, Dan Disa, semi-rural (QS, 2017)

Fig· 22· Hand-dug well with lining, Garin Gaye, rural (QS 2017)

Fig· 23· Public water containers, Garin Kadaï (QS, 2017)

Once the water is collected from the well, it is settled in containers. Water management observations from the RFS indicate that 77.2% (73.7-80.8, 95% CI) of the containers are left uncovered during water transportation.

The containers have a capacity between 10L and 25L. The pictures show white buckets or yellow gallon normally used (cf. Annex n°4 'Operatory chain water collection'). Then porters bring water to the household where it will be immediately store in traditional container.

In Degubi Zakar and Dan Disa (in big villages), there are water vendors able to transport big quantity of water with little cart (cf. Background of the picture n°6).

3.4.2 Water chain management into household

Once in the household, drinking water is stored in traditional ceramic containers. The picture n°8 shows several containers for public access in front of the Alunguru house. In the better cases, container is cover and - as shown in the picture - a cup is available to drink water.

Those traditional recipients are rarely empty before refilling. Recipients used for water transportation are rarely washed due to the low water availability. The RFS observations highlights that 81.9% (78.6-85.1 95% CI) of water container were dirty.

The qualitative survey and the RFS underline that most of the time containers are not covered and left open: 53.3%(49.1-57.5 95% CI). No specific cups are used. Young children and animals can access the same containers. Nevertheless, those practices seemed to lower in semi-rural context.

To corroborate those first observations, the RFS shows that 81.3% (79.8-86.1 95%CI) of participants have risky practices in term of water management such as the use of dirty containers and direct human/animal contact[71]. Therefore, Water management at household level is very poor.

3.4.3 Water management for crops and animals

Drinking water contamination by animal excreta is mostly linked to the fact that human and animals depend of the same water point.

As shown by the picture n°9n some containers are available for animals around wells. Actually, it was observed that animals used to come around wells in the middle of the afternoon to have water. Then, in most of the cases, a young boy will serve some to them. Sometimes animals can drink inside households, but most of the time there is specific containers for them.

Regarding water availability for crops, the RFS confirms that 98.4% (96.43-100.4295%CI) of the cases there is no irrigation system. During the qualitative survey, participants were very concerned by the possibility of irrigation and expressed the impossibility to meet the necessary water quantity needed to crop, even for gardening.

Fig. 24. Water of animals, Garin Gaye (QS, 2017)

[71] Animal contact could more likely have impact when containers are left open, but this is difficult to conclude, as open containers might be elevated to prevent access by animals.

3.5 HYGIENE PRACTICES AT HOUSEHOLD LEVEL (HYPOTHESIS 12)

3.5.1 Hygiene practice education

Aware about the impact of inadequate hygiene practices on child health, parents give hygiene education to their children. The father is in charge of the hygiene practices regarding food and the mother regarding body and food.

Around 3 years old, children learn to wash themselves and learn hygiene practices by imitation. From 3 to 7 years old, the mother and elder children will teach body hygiene practices, clothes hygiene practices, and practices regarding defecation. The father will teach practices regarding meal and hand washing. After 7 years old, children are considered as independent and will be let under the supervision of elder children. They will also learn how to fetch water.

3.5.2 Hand washing and use of soap

The RFS survey shows that hygiene practices are very low. Participants mostly explain difficulties on how practicing good hygiene with small quantity of water and without soap.

In term of hand washing practices, the RFS allowed three analyses: critical handwashing times indicator, 5 key handwashing times indicator and hygiene practice observation.

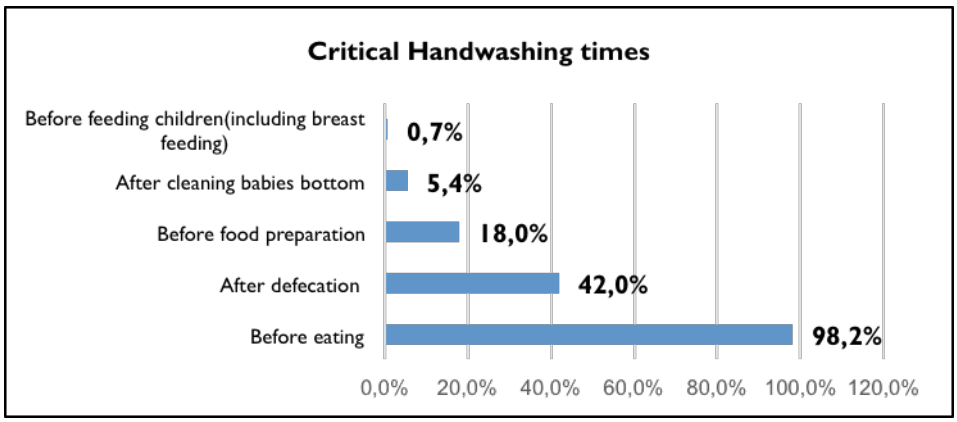


Fig. 25. Critical hand washing times (RFS survey. 2017)

Critical handwashing times indicator indicates that most of the participants are very concerned by handwashing before eating (98.2%) or after defecation (42%). However, handwashing before food preparation practice is very low (18%) and no other practices appeared.

Analysis of the 5 key times for handwashing indicator shows that 11.3% of the participants are able to cite at least 3 of the 5 key times.

Observation of hygiene practice shows that 18% of the participants declared using both water and soap to wash their hands, but only 39% of them actually demonstrated washing both hands (7% of the total respondents).

Those results illustrate a very low level of hygiene practices. Level of knowledge on those practices and their justifications appear also very problematic. For example, it was not possible to find proper knowledge about the use of ash to wash hands.

Fig. 26. Kitchen, Garin Kadaï (QS, 2017)

This low rate can be explaining by the fact that those practices are constrained by an unhealthy environment. For instance, the presence of soap[72] is clearly problematic - 11.8% (7.7-16 95%CI) (n: 540). In fact, soap availability decreased since the period of the MICS survey - 19.8% (2011: 119). The study showed that availability of soap was a direct consequence of the impact of the conflict.

3.5.3 Kitchen cleanliness management

Commonly, one wife is in charge of one kitchen within the household. If there are 3 co-wives, three kitchens will be settled. In the associated picture n°10, we can observe one kitchen settlement (traditional water container is missing from the picture). All those kitchen items (ceramics or metals) are given at the wedding ceremony.

Most of the time, kitchen items will be stored inside the house. During women mini-FGDs about hygiene practices, they declared putting some nylon (plastic bag) on clean plates, or, washing again plates before cooking or eating. Some of the women told us using fire to assure the cleanliness of the items.

Although the FGD shown the participants concerns regarding kitchen cleanliness management, the RFS shown that 77% (60.8-93.2 95%CI) of the household visited store their kitchen utensils in bad condition (on the floor, close to source of contamination).

Moreover, the RFS results indicate that in 78.3% (70.3-86.3 95%CI) of the household animal or human excreta can be seen. It is mostly animal excreta from women livestock.

The associated picture n°11 illustrates the proximity between animals and kitchen.

When we asked about the health dangerousness of animal excreta, it appeared that the level of knowledge was very low.

[72] Soap or *Omo* product

3.6 SANITATION AND WASTE MANAGEMENT (HYPOTHESIS 12)

3.6.1 Sanitation

Collection of data related to sanitation was complicated. The use of the term “latrine” introduce a bias. Indeed, during the qualitative survey we observed that participants are calling latrine or toilet a place without whole. This observation shows the low level of sanitation in Nangere LGA.

The RFS confirms that 42.6%[73] of the population have latrines. This level is lower than the state level of 60.5% (MICS, 2011: 104). However, this finding should be considered with caution as owning a latrine does not prevent members of the household to practice open defecation, as shown during qualitative interviews (RFS: 90.8% declare using latrines). It is expected that despite latrines coverage, open defecation ratio is much higher. In fact, the RFS demonstrates that of the 58.4% of the household without latrines, 95.7% declared practicing open defecation. During the qualitative survey, participants suggest that men are more practicing open defecation than women are.

In terms of quality, only 48% of the latrines seem constructed with sufficient quality to isolate safely the feces from water/rain run-off (no leaks or cracks), although 70% of those latrines do not stop the spread of contamination via flies. Finally, just 14.4% of latrines can be considered as safely separating the excreta from the environment, which represents 6% of the total number of surveyed households.

Regarding handwashing practices, only 10.7% of the latrines have a handwashing station nearby and 6% have soap visible at the time of the survey, which confirms the very poor awareness and practices in regards to contamination via handwashing.

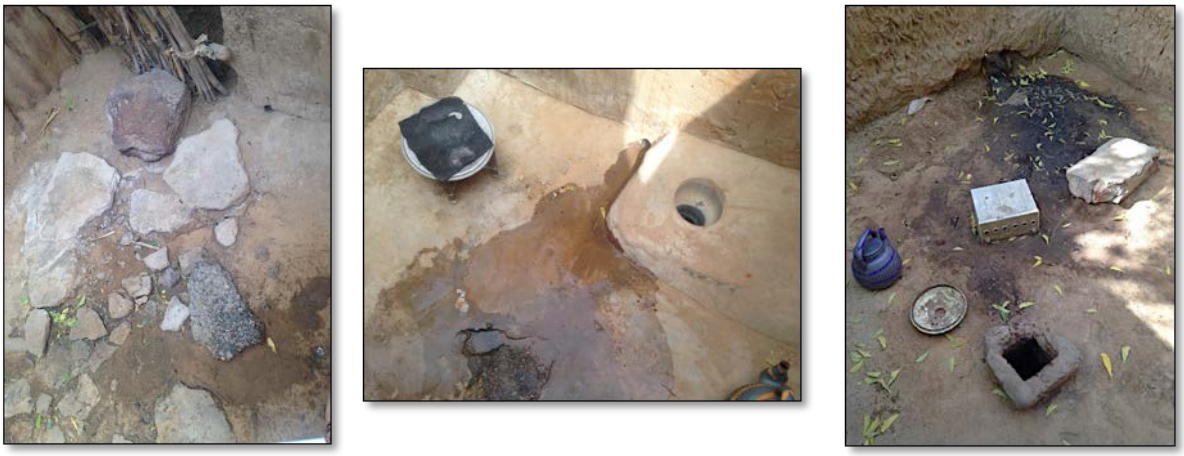


Fig. 27. Latrines with, without whole and with grout (QS, 2017)

[73] 233 out of 540 HHs own latrine, although only 230 respondents use them.

3.6.2 Waste management

If there are rules regarding waste management inside the household such as sweeping the floor once or twice per day, wastes as the animal excreta can still easily be seen.

Animal excreta can be used as local fertilizer but wastes remain present inside and outside the household. Public places are cleaned but household wastes are mostly thrown away just behind walls. The picture n°13 illustrates this reality. In addition, sometimes we observed that house walls could be built with some waste inside. As illustrated by the picture n°14, local fertilizer can also contain some of garbage. After multiple interviews, it appeared that solid wastes such as plastic bag or packaging fabrics are considered as fertilizer.

In fact, there is no dedicated space for waste storage at community level, no knowledge about waste management in communities and there is no functional recycling system.

Fig. 28. remise of village (QS, 2017)

Fig. 29. View on local fertilizer (QS 2017)

3.7 SUMMARY OF WASH SECTOR AND CAUSAL PATHWAY

WASH sector - summary

Water quantity

Nangere LGA received 600mm of rainfall by year and is considered as located in the Sahel region. In fact, since 1970, yearly rainfalls are decreasing (700mm→600mm) and according to the population, stronger gaps of rainfalls are experienced since 3 years. Ogungbenro and Morakinyo (2014) suggested that since 2010 there is a disparity and variability of rainfalls in the Northern part of Nigeria. Despite this semi-arid context, Nangere's population is agriculture-dependent and ground water represent the only source of water (99.1%). If the local government had built mechanic boreholes to improve access to water, most of the population still depends on hand-dug wells (78%). Found at household, neighborhood, area or village level; those wells give a free access to water and allowed the population to meet their basic water needs (27.7 L/c/d). Although basic water needs are met, the quantity of water collected is not enough to cover all water needs.

Water management

Elder children are commonly in charge of water collection. Usually the water collection point is not protected, collection conditions are not hygienic, containers are not frequently washed (81.9% dirty) and during water is left uncovered during its transportation (77.2%).

Once into the household, drinking water will be commonly stored in traditional recipient, which is rarely empty before refilling and left uncovered (53.3%).

Water quality

From its collection at the source, the quality of the water is questionable. 74.3% of Nangere LGA water points are considered at moderate or severe risk of contamination. Despite the fact that water management during transportation and storage into household are inadequate, only 6.4% of the households treat their drinking water. For instance, knowledge about water treatment is very low: there is no knowledge on boiling or ash utilization benefices.

Hygiene practices

Hygiene practices are very low due to weak water availability, a lack of knowledge about keys techniques, and a lack of soap availability aggravated since the conflict. For example, the population is fully aware about the necessity of washing hands before eating but not before food preparation. Moreover, the presence of animal excreta and waste inside the living space contribute predominantly to an unhealthy environment (78.3%).

Sanitation

Latrine coverage is very low (42.6%). Low availability of safe latrines14.4%) lead the population to have open defecation practices. Only 6% of the surveyed households have soap available.

Hypothesis 10	Inadequate access to water in quality and quantity	Triangulation validation	Major
Hypothesis 11	Non optimal water management/water chain	Triangulation validation	Major
Hypothesis 12	Poor hygiene practices	Triangulation validation	Major
Hypothesis 13	Inadequate management of human and animal excreta	Triangulation validation	Major
Hypothesis 14	Difficulties to manage water for crops and livestock	Triangulation validation	Minor

Link with other sectors

NUTRITION: Water contamination (early complementary feeding), hygiene practice about food/ food preparation

HEALTH: Vulnerability to hydric disease (diarrhea), poor child health status, poor maternal health status

FSL: Unhealthy environment, sub-optimal household incomes and livestock management, gardening

Emerging hypothesis

In Nangere LGA water quality is a bigger problem than water quantity.

The level of knowledge is the main issue regarding hygiene practices.

Mains difficulties to maintain good hygiene practices are related to water management and soap access.

Management of animal excreta by women (owner) will improve the household environment and incomes.

Water availability is sufficient to allow household gardening.

3.8 CAUSAL MODEL RELATED TO WASH SECTOR

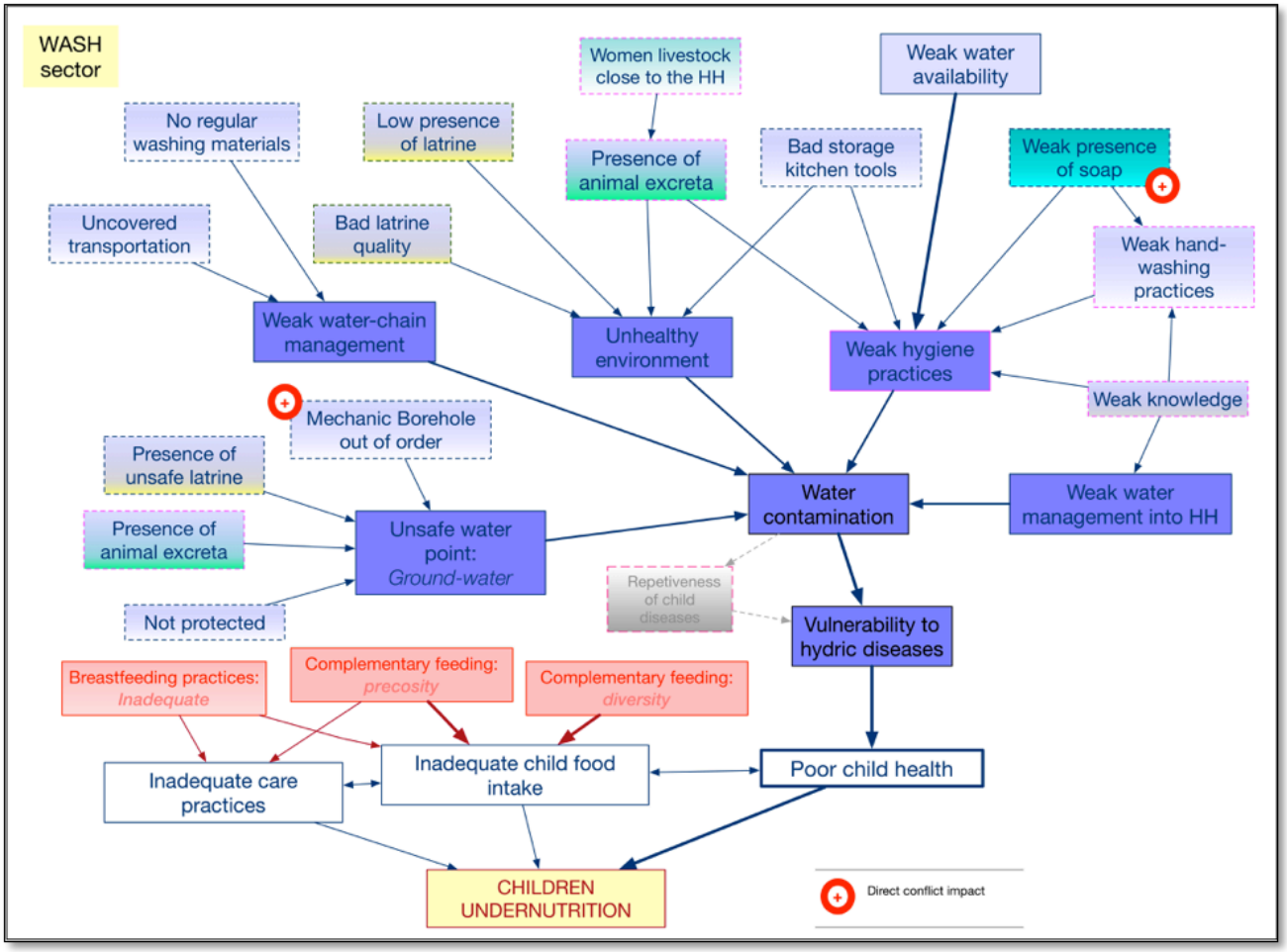


Fig. 30. Causal model 3: WASH sector

4/ FOOD SECURITY AND LIVELIHOODS

Hypothesis 16	Limited access to food (quality/quantity)
Hypothesis 17	Limited food availability (quality and quantity)
Hypothesis 18	Sub-optimal food & other sources of incomes management
Hypothesis 19	Emergency coping strategies

4.1 DESCRIPTION OF FSL SECTOR IN NANGERE LGA

4.1.1 Gender activities and ownership

The agricultural sector employs about 60% of the labor force and contributes to over 40% of the GDP, but has the highest poverty incidence in the country (Phillip et al., 2009). Smallholder farmers who operate at the subsistence level mostly compose this sector.

Farmers residing in Nangere LGA depend on rain-fed crop cultivation. Major crops cultivated include single culture of Millet, Sorghum, Beans, Cowpeas and Groundnuts[74]. The average mean number of crops is 1 in Northern part of Yobe and the average fields size was 4.5 hectares in 2015 and 5.35 in 2016 (NFSVS, 2016: 48)[75]. The RFS shows that 67% (60.8-73.1 95%CI) of the farmers own their land and 8.9% (6.5-11.3 95%CI) of them harvest cash crops. This percentage is lower than Northern Yobe level - 77.9% (NFSVS, 2016: 59).

In Nangere LGA, pastoralism activities are led by communities as *Fulani* and *Karaï-karaï* who rear cows, sheeps and goats. The RFS survey indicates that 74% (67.6-80.2 95%CI) of Nangere's population own animals (73% of goats, 21% of working cows and 5% of milk cows). According to NFSVS (2016: 51) in the northern part of Yobe there is 74.7% of livestock producing households, and among them 4.2% are purely raisers (2016: 46). This study also demonstrates that 44.4% of

[74] According to NFSVS (2016: 46) the northern part of Yobe include 62.1% of population have products from crop farming and gardening. Among them 50% have one source of income (Farm) and 23.7% 2 sources of incomes. 74.7 % farm sorghum, 48.9% millet, 54.2% maize, 3.2% rice, 5.3% groundnut, and 2.1% cowpeas. In Nangere LGA the maize production seems to be less than northern part of Yobe.

[75] According to Tijani and al. (2010: 40) close to the study area "The result shows that majority 60% of the farming household members cultivates less than 1 hectare of land, 29% cultivates between 2 – 3 hectares while, 11% cultivates 4 hectares and above (…) »

household is rearing cows/cattle, 63.3% sheeps, 67.2% goats and 44.4% poultry/chickens (2016: 51), which shows that the presence of goat is higher in Nangere LGA.

The qualitative survey highlights that women are not involved into commercial or agricultural activities outside of their household[76]. In consequence, agriculture activities are the role of men[77]. Nevertheless, most of the time, women can have a commercial activity at home (small food or clothes business, henna tattoo) but specially, women are allowed to raise little animals as goats, sheep or chickens (and local chickens)[78]. Most of the time women own chickens and goats. This livestock is independent from men activities, socially very important (marriage and health care depend on it) and brings some incomes into the household. Indeed in Nangere LGA we can almost say that men are mostly farmer and women mostly raiser.

Moreover a part of Nangere population own small businesses as added incomes sources. Tailors, street vendors, mechanic shops, carpenters, smiths are common activities. But, since the conflict, lot of shops and little businesses were no longer able to generate incomes as shown by the interviews with vulnerable woman (cf. Table 33).

4.1.2 Decrease of agropastoral production

In their review of constraints to agricultural productivity, Philip et al. (2009) attributed low levels of input use to high transport costs, poor distribution channels, absence of private sector participation, significant import risk, and inconsistent government policies. To those constraints can also be added low rates of input use, particularly fertilizer which is also commonly of poor quality due to adulteration[79] (FAO, 2013).

Conflict affects this already fragile agricultural situation and other income activities in Yobe State and Nangere LGA. The *Nigeria Food Security and Vulnerability Survey* (2016) led by FAO helps to understand the local context. It explained that the hikes in prices of food commodities in markets of Borno and Yobe States, as well as other parts of the country, had been worsened by the ongoing economic recession, depreciation of the Naira, increased cost of transportation and rising inflationary trends. For instance, in Yobe and Nangere LGA, the prices of staple food (cowpeas, sorghum and millet) have sharply increased compared to same season last year (UNOCHA, 2016). Indeed, the *Market Assessment in Borno and Yobe States as part of multi-sectorial capacity assessment for Cash-Based Transfer programming* Report (March 2017: 15), performed by WFP and based on a survey done in November 2016, demonstrated clearly that for most of food basics items (maize, local rice, rice) prices increased between January and August 2016, in Maiduguri, Biu, Damaturu and Potiskum (177%, 141%, 81% and 184% respectively).

[76] Certain studies suggest that women can be involved in planting and harvesting activities but during this Link NCA study it was not possible to confirm this fact through observations or discussions. It was possible to observe at Degubi Zakar, where there is catholic community, that catholic women do farm.

[77] 2012, *Gender in Nigeria* report by the British Council, women own 4% of land in the Northeast.

[78] According to Economic Opportunities and Obstacles for Women and Girls in Northern Nigeria report (2014: 23) in the studied area only 15% of women own land crops by themselves. Their qualitative study shows also that 3% of cattle are owned at by women and 10% by men; 30% of goats are owned by women and 44% by Men. 9% of sheeps are owned by women and 28% by men.30% of poultry are owned by women and 25% by men (2014: 23).

[79] See Liverpool, Tessie and al., 2010, for an assessment of fertilizer quality regulation in Nigeria.

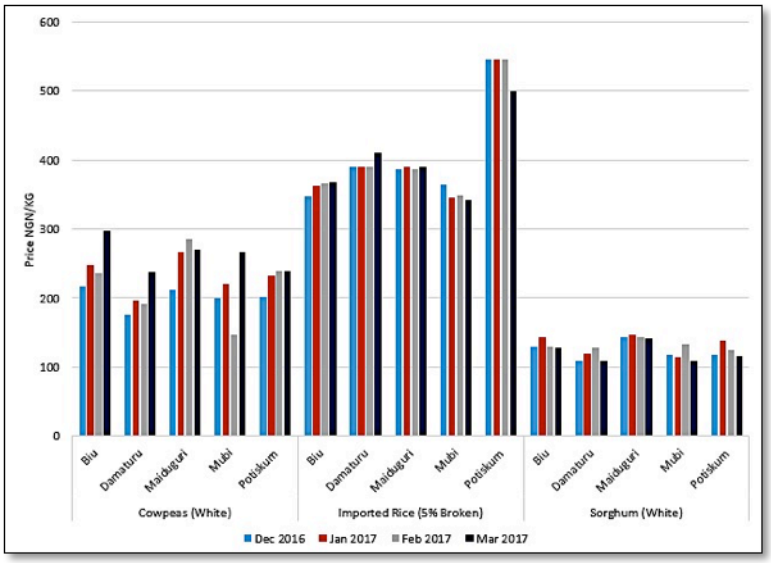


Fig. 31. Trends in staple prices across Nigeria, Dec 2016 to March 2017 (Fewsnet, June 2017)

However, according to the *NIGERIA Market Monitoring Bulletin (June 2017)* published by Fewsnet[80], as the figure n°9 shows, since January 2017 market prices in Damaturu and Potiskum seems to be stabilized and to decrease for local food items. Potiskum market is near to Nangere LGA and supply Dawasa market, Daganda market and Kukuri market, which are some of the most important markets in Nangere LGA.

Added to this context of inflation, agricultural productivity of Nangere LGA, usually considered as the 'granary of Yobe', had been impacted. This context is contributing to the increase of undernutrition prevalence. Nutrition security of households in Nangere LGA depends directly on their crops production and according the Nangere farmers the production is decreasing.

If there is no data available for agricultural production in Nangere LGA or Yobe State Level, agricultural production since 1976 by items can be found on indexmundi.com. Sorghum and millet production are good indicators of Yobe agricultural production; as they are the main basis of northeast livelihoods. Millet production shows a regular increase from 2005 (7168 MT). Then, production decreased with a big drop in 2011 (1271 MT). Since 2012, millet production remains stable (5000 MT). Sorghum productions have similar trends. First, constant increase until 2008 (11 000 MT), dropping from 2009 to 2012 (5943 MT) and finally stabilization period (6500 MT) in in 2016.

Those trends shows clearly that Northern Nigeria agricultural production is decreasing due to the impact of the conflict, and has still not recovered. The actual production correspond to the 1993-96 production and in the last five years agricultural growth had remained steady at 6% despite overall economy growth.

[80] http://www.fews.net/sites/default/files/documents/reports/NIGERIA_MMB_20170611_1.pdf

For those main reasons, FewsNet reports that a substantial proportion of the population in Borno, Yobe, and Adamawa States in the northeast of Nigeria continues to face Crisis (IPC Phase 3) or Emergency (IPC Phase 4) acute food insecurity, with an increased risk of high levels of acute malnutrition and mortality. (FewsNet, May 2017).

4.1.3 Community rating

For Nangere population, there is no doubt about decrease of agricultural production: crops production is no longer enough to sustain their family needs throughout the year.

In their declarations, in their memories, an historical calendar appeared:

Thirty years ago, they had good harvest, soil was fertile and there was less member by family.

Twenty years ago, they start to have more children, to farm more and to use more fertilizer.

Fifteen years ago, soil became sterile, use of chemical/'modern' fertilizer increased and harvest production decreased.

Five years ago, agricultural production dropped. Lands are no longer fertile and economic situation, in part due to the conflict, no longer permit Nangere's households to afford fertilizer. Harvest fall and quantity harvested are enough only to feed the family between October and February/March (conflict).

Since 3 years, there is a lack of rainfall, which also affects crops.

In fact, numerous examples of bad harvest were mentioned during the qualitative survey:

"Twenty years ago, when my children were small, my field gave 30 bags of crops. Now, with my grand-children I can barely get 8 bags" Farmer at Dan Disa. "Only 5% of us harvest enough for the year, usually harvest is enough for 3-4 months because the family is big and we have no access to fertilizer" Farmer at Garin Gaye. "We used to sell a part of our production but since 5 years it is almost impossible to product enough for the family" Farmer at Degubi Zakar. "We mostly used traditional fertilizer because it's available, modern one is too expensive, we cannot spend money for that. It was 4000~~₦,~~ now it's 9000~~₦~~. Also we don't have anymore money for insecticides" Farmer in Degubi Zakar. "We tried to keep seeds for next year, but now most of us eat it or sell it before and then borrow money or seeds during the rainy season" Woman at Garin Kadaï. "Since 3 years we face a lack of rainfall, it's almost impossible to have good crops" Farmer at Garin Kolo. "Lot of people rent their land, 7000-10 000~~₦~~ per year" Woman in Dan Disa. "If we rent land it's difficult to put local fertilizer which can help the land during 5 years. If we do that the owner will take back the land the next year" Men in Degubi Zakar.

For all those reasons, 'food availability' and 'food access' were rated by the participants as major risk factors explaining increase of undernutrition cases. Interestingly, women choose preferentially 'food availability' hypothesis and men choose preferentially 'food access' one. Indeed, for women impossibility to product enough food for the entire year was a major concern. They directly link this fact with the impossibility to access modern fertilizers. For men, access to fertilizer and more particularly impossibility to sell a part of their agricultural production to buy other food items or goods was a major concern.

Impossibility to do small business due to lack of money is also strongly declaimed by men and women.

Regarding the access to fertilizer, it was not possible to collect quantitative data accurate for the study zone or the northern part of Nigeria. Nonetheless, our qualitative survey is clear about it. All our participants declaimed the monetary inaccessibility of fertilizer, which is lead by the Naira rise.

Regarding lack of rainfall declarations, as the figure n°10 shows, the analysis of the last 15 years of rainfall at Yobe State (done by the DDRD[81]) indicates that during the 10 years only 2012 quantity of rainfall was superior to the average limit of 600 millimeters of water by year. Corroborating the qualitative survey, 2013 and 2014 were particularly lower in terms of rainfall but data show only slight variation (+- 10% variation from average) since 2001. Two explanations provide understanding of farmer declarations about this perceived drought:

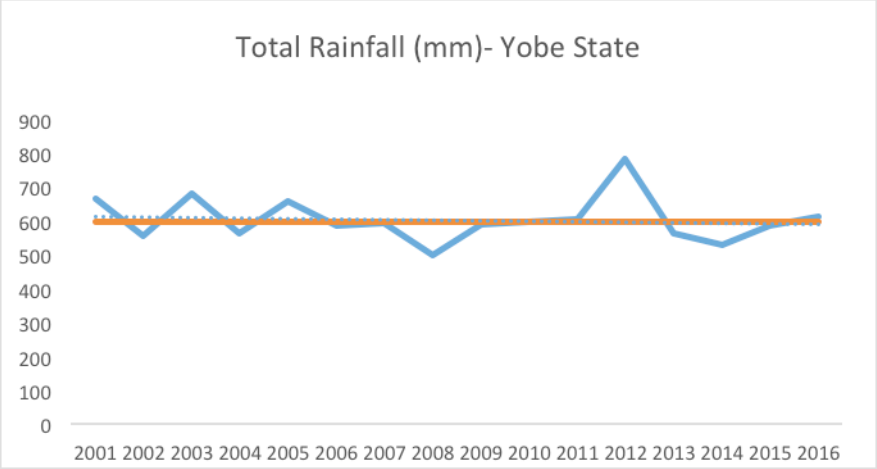


Fig. 32. Analysis 15 years of rainfall at Nangere LGA by DDRD

Volatility and disparity of rainfall: rainfalls are not constant during the rainy season and can happen brutally and irregularly (flooding)[82].

Or perceived drought might be more due to a problem of lack of soil moisture during growing period and due to overexploitation or high temperature (evaporation)[83].

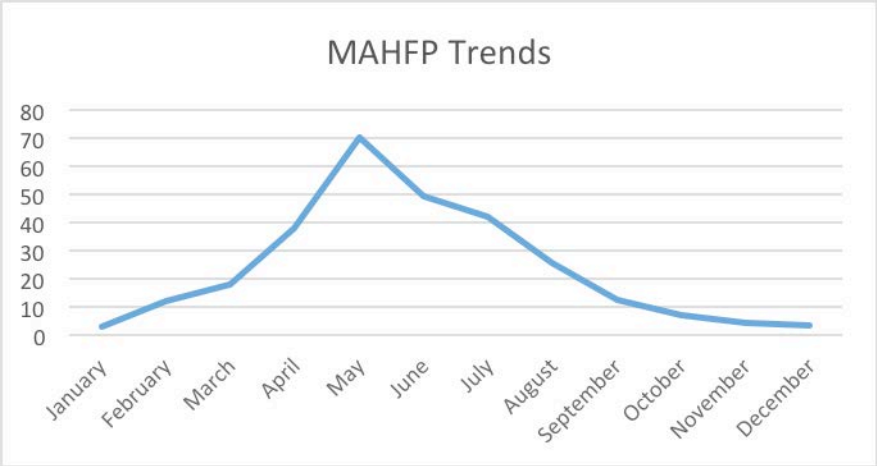
[81] Department of Disaster Risk Reduction of Action Against Hunger West-Africa Regional Office. Analyze done by Alex Merkovic-Orenstein, analyst Regional SIG and Systems of Surveillance

[82] Damisa and al. (2011) and Action Against Hunger (2012).

[83] Drought is not only related to rainfalls, but it seems Yobe might be facing an agricultural drought (referring to reduce yield in 2013 and 2014 due to lack of soil moisture) or socio-economic drought (impact not only on agriculture but also on all aspect of livelihood).

4.2 FOOD AVAILABILITY AND ACCESS (HYPOTHESIS 16 AND 17)

Month Adequate Household Provisioning indicator (MAHFP)



	NO. HH	%
JANUARY	16	3%
FEBRUARY	66	12,3%
MARCH	98	18,3%
APRIL	205	38,2%
MAY	378	70,5%
JUNE	265	49,4%
JULY	226	42,2%

AUGUST	139	25,9%
SEPTEMBER	68	12,7%
OCTOBER	38	7,1%
NOVEMBER	25	4,7%
DECEMBER	19	3,5%

Fig. 33. MAHFP Trends, Nangere LGA (RFS, 2017)

As the Month of Adequate Household Food Provisioning (MAHFP) indicator captures (cf. Figure n°11) households in Nangere LGA start missing food from March with a peak in May. Seeding period remains difficult (June-July-August) and when harvesting starts (September) less than 15% of the households have access to enough food (quality and quantity) to meet all household members' nutritional needs.

Those results corroborating perfectly the speeches collected during the qualitative survey and the NFSVS (2016: 48), which found that in North part of Yobe the average household can product food for 6.08 months. According to Melissa Reichwage on her thesis report *Food Security among Households in Northern Nigeria: Descriptive Analysis* (2010: 60), since 2009-2010 households started to miss food from March, which was not the case before where the lean season started around May.

4.2.1 Food consumption score (FCS)

The Food Consumption Score (FCS) is a composite score based on dietary diversity, food frequency, and the relative nutritional importance of different food groups. The FCS is calculated using the frequency of consumption of different food groups consumed by a household during with a 7 days recall period.

	THRESHOLD	NUMBER DE HH	PERCENTAGE	LOWER	HIGHER
POOR FOOD CONSUMPTION SCORE	0-21	120	22.2% (15.6-28.9 95%CI)	15.6	29
BORDERLINE FOOD CONSUMPTION SCORE	21.5-35	168	31.1% (26.1-36.1 95%CI)	26.1	36.1
ACCEPTABLE FOOD CONSUMPTION SCORE	>35	252	46.7% (15.6-28.9 95%CI)	37.2	56.1

Tab. 43. Food score consumption indicator (RFS, 2017)

The percentage of poor and borderline food consumption score is 53.3% v/s 46.7% with an acceptable FCS. Those levels are similar but a little higher than those showed by the NFSVS (2016: 15) in Yobe -18% poor FCS, 24,1% borderline FCS and 57,9% acceptable FCS.

4.2.2 Household and Woman Diversity Diet Score

Household Diversity Diet Score

FOOD GROUP	HH	%
GROUP 1 HDDS<3	18	3%
GROUP 2 HDDS 3-4	232	43%
GROUP 3 HDDS 5-6	151	28%
GROUP 4 HDDS>6	139	26%

GROUP 1 HDDS<3	GROUP 2 HDDS 3-4	GROUP 3 HDDS 5-6	GROUP 4 HDDS>6
Grain, cereals	Grain, cereals	Grain, cereals	Grain, cereals
	Vegetables	Vegetables	Vegetables
	Coffee, tea, condiments	Coffee, tea, condiments	Coffee, tea, condiments
		Pulses	Pulses
		Oil, fat, butter	Oil, fat, butter
			Sugar
			Fruits
Include in the table food categories eaten by at least 50% of the HH in each group			

Tab. 44. HDDS (RFS, 2017)

The Household Diversity Diet Score (HDDS) highlights that almost half of the household in Nangere LGA (46%) consume four food groups (without fruit group) and 74% of households consume 6 food groups (without meat group, cf. Table n°45). Also, those results are corroborated by the NFSVS that found similar results (NFSVS, 2016: 17).

However, according to Reichwage (2010: 67) in 2010 in Northern part of Nigeria, 4.9% of population ate less than 5 food groups, 65.10% ate less than 9 food groups and 23.00% more than 9 food groups.

Definitely, the HDDS have drastically dropped to reach a critical level.

Woman Diversity Diet Score

The RFS (2016) indicates that 37.5% (28.6-46.4 95%CI) of the woman between 15-49 years old eats at least 5 food groups.

4.2.3 Expenditure and borrowing (Hypothesis 18)

During the qualitative survey (FGDs) a list of main source of expenditures was built with the participants. Two patterns appeared, one in rural context and another one in semi-rural context:

RURAL: FOOD>HEALTH>CLOTHES=SOAP>FARMING> phone charging (rural)

SEMI-RURAL: FOOD>FARMING>School>Health>CLOTHES=SOAP (urban)

Those results are confirmed by the NFSVS that found that in Yobe 40% of the household expenditure are related to food items (2016: 26).

When money is not available, caregivers borrow food from relatives or borrow money. During the FGDs, the participants declared that food and health are the two reasons main reasons for borrowing money. This fact is confirmed by the NFSVS that shows that in Yobe 19.2% of the households borrow money, with 69.6% used for food and 30.4% for Health (NFSVS, 2016: 32).

Traditionally small livestock belongings to the women will provide incomes for wedding ceremony and important health issues. Some form of saving are also used to access education.

4.2.4 Provisioning Food Source (AFS)

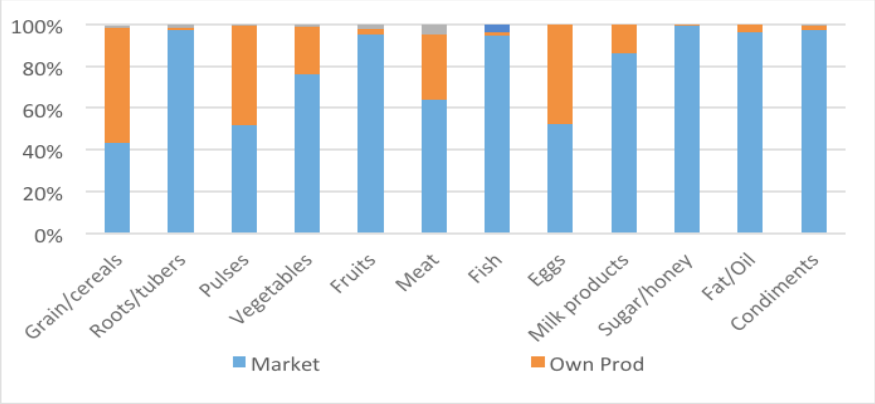
The figure n°12 resumes the source of food consumed by the households in Nangere LGA. It appears that majority of food items are bought. Only 'grain/cereals' are product more than 50% by households.

Beans and vegetables are also in majority bought at the market.

	MARKET	OWN PROD	SOCIAL NETWORK /GIFT	EXCH/BARTER	GATHERING WILD FOODS/HUNTING	TOTAL HH
GRAIN/CEREALS	233	299	5	1	0	538
ROOTS/TUBERS	76	1	1	0	0	78
PULSES	170	156	1	0	0	327

	MARKET	OWN PROD	SOCIAL NETWORK /GIFT	EXCH/B ARTER	GATHERING WILD FOODS/HUNTING	TOTAL HH
VEGETABLES	393	118	4	0	0	515
FRUITS	101	3	2	0	0	106
MEAT	44	22	3	0	0	69
FISH	75	1	0	0	3	79
EGGS	12	11	0	0	0	23
MILK PRODUCTS	56	9	0	0	0	65
SUGAR/HONEY	180	1	0	0	0	181
FAT/OIL	252	9	0	0	0	261
CONDIMENTS	514	11	2	0	0	527

Fig. 34. AFS indicator (RFS, 2017) / AFS Table (RFS, 2017)



4.2.5 Shocks

SHOCK	percentage of HHs
Staple price fluctuation	87.5%
Disease or death of household head or member	63.6%
Pest infestation	49.8%
Low rainfall/drought	48.8%
Crop diseases	47.5%
Livestock diseases/ loss	43.4%
Crop loss	38.4%
Farms destroyed by animals	33.0%
Livestock loss	17.9%

Tab· 45· Shock experienced by Nangere households during the last year (RFS, 2017)

The list of shocks experienced by households during the last year shows that main issues are: Staple price fluctuation; Disease or death of the household head/member; Pest infestation and crops diseases; Low rainfall.

87.5% mention 'Staple price fluctuation', as described in the introduction of this section.

48.8% mention 'Lack of rainfall/drought' during the last year. But precipitations were normal in 2016. Drought is not only linked with precipitation, but could be an agricultural drought (due to lack of soil moisture) or socio-economic drought (impact not only agriculture but all aspect of livelihood) or hydrological drought. This result confirms nevertheless the intensity of this perceived phenomenon in Nangere LGA.

49.8% mention 'Pest and crops diseases' which can also be correlated with the volatility of the rainfall. However, more research needs to be done to capture the causes those shocks.

Disease or death of one of the household members shows the health fragility of the household, this fact had been described in the Chapter II, part II of this report.

According to the NFSVS (2016: 27), it is interesting to notice that in Yobe state 4.8% of households declaimed having experimented as a shock low rainfall and 5.5% floods, (which confirm the volatility of the weather); 52.4% a shock due to high price market and 30.6% due to insecurity.

4.2.6 Reduced Coping strategy index (Hypothesis 19)

The reduced coping strategy index indicates the strategy preferentially chosen to cope. The RFS shows that the rCSI is 15.25%. The NFSVS (2016: 20) found that 32.6% of HHs in Yobe is in emergency livelihood coping strategy. The baseline done in Potiskum, Damaturu and Fune in 2015, found an average rCSI of, respectively, 26.8%, 20.4%, and 21%. The fact that the RFS survey was done in February, just before the beginning of the lean season, impacts our result.

Reduced Coping Strategy Index	n=HHs	Severity Weight	Av. Days/ week	Total rCSI
Eating less preferred and less expensive foods	486	1	5.5	5.5
Borrowing foods from relatives or friends	263	2	2	4
Limiting portion sizes at meal time	308	1	4	4
Restriction of consumption of adults in order for children to eat	278	3	4	12
Reduce number of meals per day	299	1	3.5	3.5
				29

Tab. 46. Reduced coping strategy index (RFS, 2017)

A second analyze of the data shows a positive relation between having experienced a shock and the probability of entering in reduced coping strategy. The probability is significant higher to have rCSI for HH which report shock.

The main two strategies reported were: 1. “Restriction of consumption of adult in order for children to eat”. 2. “Borrowing foods from relatives or friends”. Finally, 278 out of 529 respondents are using the most sever coping strategy (level 3, reducing adult consumption).

4.3 SUMMARY OF FSL SECTOR AND CAUSAL PATHWAY

FSL sector's summary

Food availability:

Agricultural production started to decrease in 2005 and to be effective since 2011-12. The impact is particularly strong for the livelihood of northeast zone where the production of Millet and Sorghum had decreased from half of their higher levels.

Reasons of this drop are multiples but the Link NCA studies showed that since the conflict, the agricultural production has still not recover. Beyond the insecurity context in Nangere LGA, climate volatility, ownership, fertilizer access, pest disease, head of household health influence this production.

Household diet diversity score, as woman and infant diet diversity scores, has drastically drop since 2010 and duration of the lean season is longer and stronger. Nangere LGA' households mentioned having consumed their harvest by March. Following what, they start using coping strategy such as borrowing and restricting adult food consumption.

Also, the study highlights that surface for cropping had been increased in 2016 in Yobe State. But, land ownership situation in Nangere LGA remains lower than the state level and women land ownership remains problematic. Contrariwise, women own livestock as chicken, goat and sheep, which have a real role in household income management.

Food access:

Food access in Nangere LGA also appeared limited. First, as crops harvested are no longer in sufficient quantity to support the family needs throughout the year, it becomes difficult to use a part of the production as cash crops. Household purchasing power to access other food items is low. Moreover, increase of market price during 2015-2016 had drastically impacted the population access to basic food items (rice) and basics needs (health, education). Thus, during the lean season, it is more difficult for households to be able to meet those needs.

Monetary inflation had also impacted access to fertilize. Increase of fertilizer price put most of Nangere farmers out of the supply chain.

Indeed, transportation means had also been impacted by the conflict. The interdiction of using motorcycle to circulate in Yobe State and reduction of road circulation had impacted market access for traders and for customers.

Sub-optimal food & other sources of incomes management and coping strategy:

Since the conflict, food security in Nangere LGA is deteriorating and seems to be stabilized since one year. But, drop of food availability and food access at the same time and during the last 4 years increased poverty level, nutrition insecurity and impacted undernutrition situation.

To cope with this unfavorable context, Nangere population try to increase the size of their yield, use of local fertilizer, and start borrowing during the lean season and reducing adult food consumption.

This situation is serious for Nangere farmers and the study made clear that the business sector was, facing an increase of unemployment.

In all those cases, women try to help their husband and to increase household incomes, mainly by raising

livestock and starting small businesses. But, for women and men lack of money inhibits all business possibilities.

Hypothesis 16	Limited access to food (quality/quantity)	Triangulation validation	Major
Hypothesis 17	Limited food availability (quality and quantity)	Triangulation validation	Major
Hypothesis 18	Sub-optimal food & other sources of incomes management	Triangulation validation	Important
Hypothesis 19	Emergency coping strategies	Triangulation validation	Important

Link with other sectors

Women livestock: Nutrition, WASH (hygiene practice, unhealthy environment), protection (woman empowerment), Health (monetary access)

WASH: water for animals, irrigation, water management, gardening

Emerging hypothesis

Agriculture means are insufficient: tools, yields optimization, gardening, insecticides, fertilizer, diversity, knowledge.

Stronger lean season impact increased of acute malnutrition prevalence and mortality rate under 5.

Transportation means are the main reason of low monetary access.

Climate volatility affects agricultural production in this fragile semi-arid context: *drought, food.*

Non-optimization of livestock production reduces purchasing power and nutritional status: *Animal protein animal, fertilizer, and incomes.*

4.4 CAUSAL MODEL RELATED TO FSL SECTOR

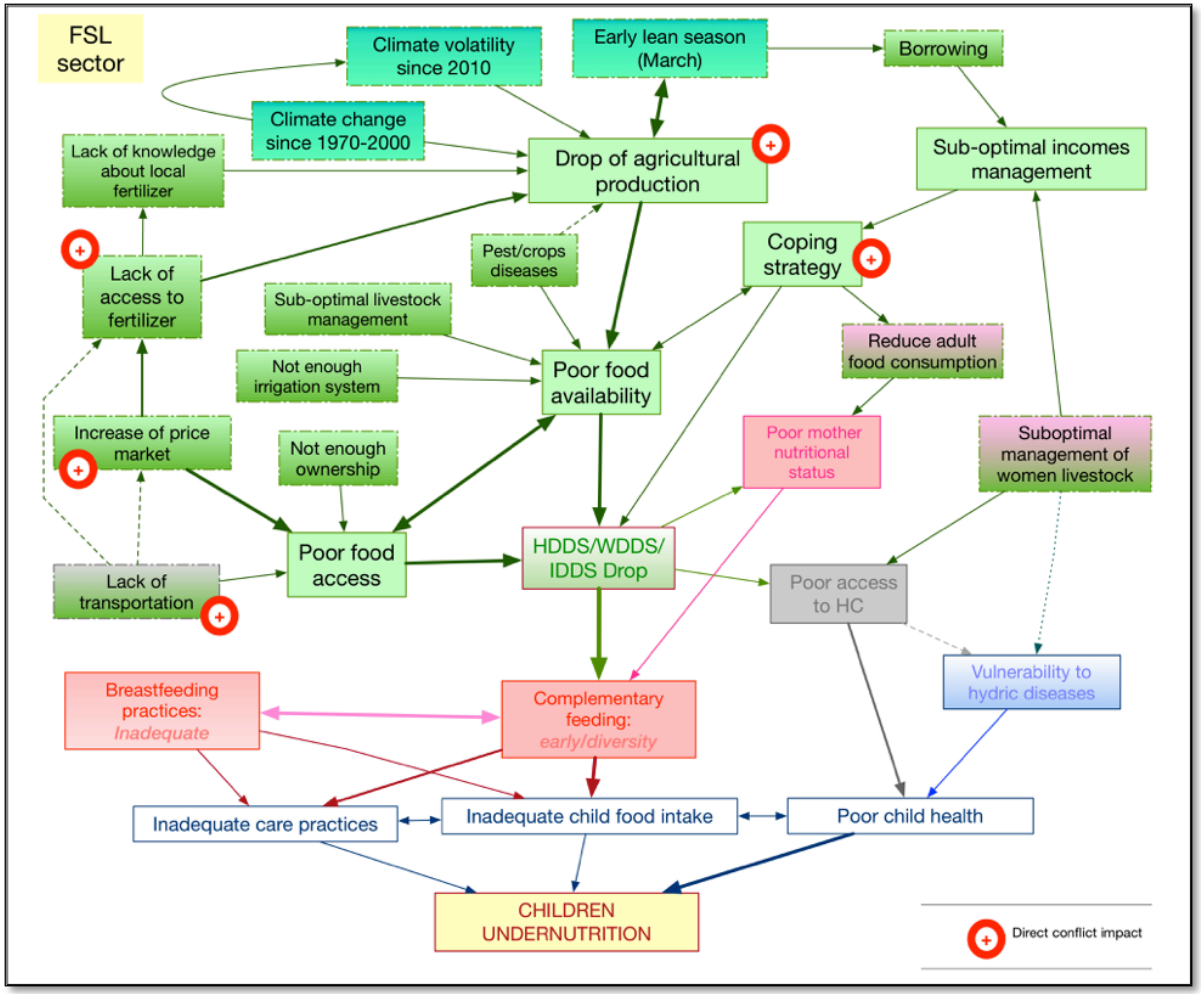


Fig. 35. Causal model 4: FSL sector

5/ PROTECTION

Hypothesis 20	High maternal household workload
Hypothesis 21	Poor women empowerment
Hypothesis 22	High illiteracy rates among parents

5.1 DESCRIPTION OF PROTECTION CONTEXT IN YOBE STATE

In 2008, the Ministry of Social Development initiated the first Social Policy in Nigeria comprising, for instance, a Minimum Package of Social Protection. The following year, the National planning Commission (NPC) started to work on the Social Protection strategy "Vision 20: 2010". In December 2016, in Abuja, the RPCA congress[84] announced that Nigeria was working on a new National Policy on Social Protection.

The aim of these social policies is to reduce the level of poverty and inequality in Nigeria. Indeed, half of the Nigerian Population lives in poverty and the gap between the richest and the poorest part of the population is increasing (Aiyede and al., 2015)[85]. But, there are also inequalities between urban and rural contexts, South and North, men and women. Finally, one of the major challenges of faced by the social policy in Nigeria is to apprehend all the different cultural and social organizations existing in the country. For all those reasons, the social protection is almost not working in Yobe State and Nangere LGA.

This report proposes to characterize the protection context in Nangere LGA. To do this, questioning family relationships and access to education structured our approach.

In Yobe State, households are polygynous households. MICS survey (2011: 200) found that 44.5% of the women between 15-49 years old are in a polygynous union or marriage while the national average is 33.6%. Based on the Islamic union model, each man can marry a maximum of 4 wives. During the qualitative survey, 2 to 3 co-wives where living in most of the household visited. Unfortunately, quantitative data representing such family organization are missing.

[84] Réseau de Prévention des Crises Alimentaires. www.food-security.net.

[85] "One of the major challenges confronting Nigeria is how to provide jobs for the well over 60 per cent of Nigeria's youth population. The number of unemployed members of the labour force continued to grow from 12.3 per cent in 2006 to 23.9 per cent in 2011. Thus, despite its growing economy, the proportion of Nigerians living in poverty is increasing." (Aiyede & al., 2015: 10)

Islamic family structure follows rules and values. The father, as head of the household, is in charge of all his wives and children. He has to provide for accommodation, health, clothing, social welfare, nutritional and education needs. He has to be equal and fair in his relationship with each wives, (this practice increased since 1999 with Sharia instauration in Northern part of Nigeria). If a conflict happens between him and one of his wives, he has to resolve it fairly, he can ask for help from his father or the heads of the village (Elders[86]). One of the main values attached to this organization is women protection. As discussed earlier, this organization defends the idea of protecting procreative women (cf. Part I. 3.). Women of reproductive age are not allowed to crop and to do activities out of the household (collecting water, livelihoods). Despite this fact, women have a significant role in production, processing and marketing of food crops (Rural Poverty Portal, 2010), but their potential is also restricted by low ownership of land (38.1% of men compared to 7.2% of women) and credit (11.6% of men and 9.8% of women) (NBS, 2009). Men continue to have decision power regarding farm and productive resources (Ajani, 2008).

Regarding the level of and access to education, the situation in Yobe state, and more particularly in Nangere LGA, is appalling. In the best case, one child on four reaches secondary school and this reality is worst for girls. In addition, less than one caregiver among 5 is literate (MICS, 2011). There are enormous needs in term of education and parents are the first to declaim this problem. In fact, illiteracy rate among parents was the fifth most important risk factor as per communities' ranking. For the moment, in Nangere LGA, only Quranic schools, called Islamia School, try to answer to this huge need of knowledge.

The main consequence of all these social and cultural factors is that the women do not have a sufficient impact on household economy.

5.2 FAMILY RELATIONS: *GENDER, FILIAL*

5.2.1 Gender relations

Despite values defended by the family organization, they are often characterized as unequal. The facts that food insecurity is higher for female than for male (HDDS>WDDS) or poor nutritional status of women are interpreted as derive of the union system. The reality is more complex, for instance, women improve household food and nutrition security by spending more of their incomes on food (Ajani, 2008). Thus, the exact examination of household resilience in terms of gender relationship is context specific.

During the Link NCA study, our sub-hypothesis was to question the conflict impact on gender relations as a risk factor of undernutrition.

Regarding domestic violence, it appears that there is usually less divorce and conflict in rural context (MICS, 2011) but during the FDGs on protection, women expressed that lack of food and money impacts their marital relation and leads to more conflict happened. In the same way, although participants stay rare conflicts happening between co-wives and with the teenagers, more happen related to those topics.

[86] If a conflict happens in a village, usually the elders of the village intervene followed by the local authorities: First Lamba, then Hakimi, finally the Emir of the Ward. The next steps are Local Authorities (Emirate of Nangere; Chairman) and police.

Decision making power (Hypothesis 21)

SECTOR OF DECISION	PROPORTION	N
WHETHER CHILDREN SHOULD GO TO SCHOOL?		
FATHER	76.0%(72.4-79.6 95% CI)	405
MOTHER	0.8%(0.0-1.5 95% CI)	4
BOTH PARENTS	23.3%(19.7-26.9 95% CI)	124
WHEN CHILD HAS TO CONSULT MEDICAL SERVICES?		
FATHER	74.9%(71.2-78.5 95% CI)	399
MOTHER	1.1%(0.2-2.0 95% CI)	6
BOTH	24.0%(20.4-27/6 95% CI)	128
HOW TO SPEND HOUSEHOLD MONEY/INCOME?		
FATHER	76.5%(73.0-80.1 95% CI)	408
MOTHER	0.8%(0.0-1.5 95% CI)	4
BOTH	22.7%(19.1-26.3 95% CI)	121

Tab. 47. Decision making power indicator (RFS, 2017)

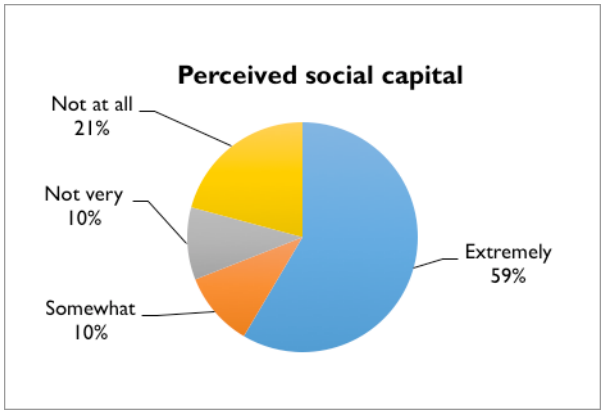
As the table n°48 indicates, decision-making power regarding education (76%), health (74.9%) and money (76.5%) is in a father concern. It is interesting to notice that in 23.3%, 24%, and 22.7% of the cases both parents are considered as decision-makers. However, in none of the domain, mother is considered as a decision-maker on her own; except for health (1.1% of the mothers can takes decisions alone).

Those results show the stability and the deepness of the social organization, with the father as the head of the household and the family. Consequently, fathers need to be implicated in all decisions concerning education, health status and income management taken at household level.

Perceived social capital (Hypothesis 21)

As discussed earlier (cf. Chapter II. Part 1), 59% of the caregivers express the feeling of being extremely supported by their entourage (father, co-wives, relatives or neighbours). Contrariwise, 31% of the caregivers felt not very or not all supported by the entourage.

The proportion of women who felt not enough supported is alarming. However, we noticed that in the majority of the cases the fact that women are not decision markers do not impact their perceived social capital.



5.2.2 Parents-children relationship

As we saw, the family system is revolved around a decisional father and supported mothers. Nevertheless, the study showed that mothers are mostly in charge of child care practices (cf. Chapter I. Part I.).

Perceived workload (Hypothesis 20)

CAREGIVER PERCEIVED WORKLOAD	TOTAL (528)
ENOUGH TIME TO TAKE OF THE CHILDREN	79.7% (73.8-85.7 95%CI)
	421
NOT ENOUGH TIME/TOO MUCH WORK	20.3% (14.3-26.2 95%CI)
	107

Tab. 48. Caregiver perceived workload indicator (RFS, 2017)

The table n°49 indicates that most of the women declared having enough time to take care of their children (79.7%). Obviously, there is a seasonal effect regarding perceived workload rate as the survey was done in February and the cropping season is always more exigent for all the household members.

It should be interesting as to collect father perceived workload, as such information might be of use for adjusting awareness campaign.

Day of rest (Hypothesis 20)

REST AFTER DELIVER	TOTAL (733)
NOT ENOUGH REST AFTER BIRTH	68.2% (63.3- 73.1 95%CI)
	500
ENOUGH REST AFTER BIRTH	31,8% (26.9-36.7 95%CI)
	233

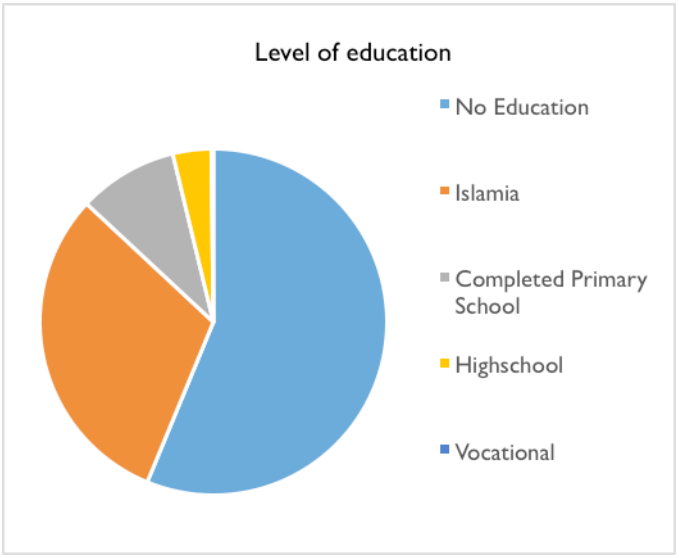
Tab. 49. Perceived rest after deliver (RFS, 2017)

Despite the fact that perceived workload indicates that women have enough time to take care of their children, that most of them felt supported by their entourage, and that some cultural artifacts regarding the "40 days of rest after birth" are defended by Islam (Local context: boiled water for baby during 40 days), it appears very clearly that women do not perceived having enough rest after birth (68.2%).

This indicates that, beside perceived workload rate, children and household work represent a lot of work for women. Moreover, as the WHO5 indicators showed, stress caused by to lack of food and incomes (as directly related to the conflict) contribute largely to the deterioration of mother wellbeing and finally, has an impact on the relationship between caregivers and their children. Thus, despite existing cultural ways of resilience (day of rest, support) and traditional women's role (taking care of the house and the children), women are impacted by the consequences of the conflict (lack of food and incomes).

5.3 EDUCATION: CAREGIVER AND CHILDREN

CAREGIVER LEVEL OF EDUCATION	TOTAL (530)
NO EDUCATION	56.2% (46.3- 66.1 95%CI)
	298
EDUCATION	43.8% (33.9-53.7 95%CI)
	232



Tab. 50. Caregiver's education (RFS, 2017)

5.3.1 Caregiver education (Hypothesis 22)

As the table n°51 highlights, 56.2% of the caregivers did not have access to education. Among the 43.8% of women who had access to education, most of them went to Islamia (31%). Few of them completed Primary school (9%) and a very small proportion went to high school 4%. Those results corroborate the findings of the MICS (2011: 172) that found that in Yobe State 19.7% of women (15-24) were literate.

During FGDs parents declared that two types of school were available: "Quranic School" or 'Western school". Both start around 5 to 6 years old. The Quranic School lengths 3 to 4 years and primary school length 5 to 6 years.

Most of Islamia schools or primary schools are free and it is up to the parents to afford for school materials (clothes, books, pens) while in semi-rural context, some registrations and trimestral fees can be asked (Around 200 or 300 ₦). But, field visits showed that most of the schools were not functional. Buildings, school materials (books, desks, seats and blackboards) were missing. Sometimes, teachers do not make class.

5.3.2 Children education

Overall, in Nigeria, 45% of children who are currently attending first grade of primary school attended pre-school the previous year. Rural-urban disparity is strong, as more than half of children in urban areas (54%) had attended pre-school the previous year compared to around 40% in rural areas. About 44% of children, who are of primary school entry age (age 6) in Nigeria, are attending the first grade of primary school. The net intake rate for male is 46% and for female is 42%. The rate is 57% in urban against 38% in rural areas. (MICS, 2011: xxi).

In Yobe, 24.8% of children of primary school entry age are entering age grade (MICS, 2011: 175) and 27% secondary school (31.8% male, 22.6% female) (MICS, 2011: 178).

During FGDs, parents have expressed clearly that there is no gender favoritism in terms of access to school. Girls and boys are equally motivated by the parents to reach education. But, they explained also that after first Islamia and Primary School, education become very expensive. Lack of transportation to reach high school or lack of money to pay school fees, clothes and materials stop most of the children to reach this level of education. Moreover, according to our participants, after the conflict school fees had increased (6000 to15 000 ₦.). Thus, after 12 or 14 years old, for most of children education stops. The only solution is for a boy to find a job or a small business to pay the school and for a girl to get married and to continue *Islamia* (Dan Disa).

5.4 SUMMARY OF PROTECTION SECTOR AND CAUSAL MODEL

PROTECTION sector summary

Family relations and woman empowerment

The traditional family structure, as existing in Nangere LGA, is challenged by the choice of the Nigerian post-independence of opening the country to contemporary world. If the traditional social system adjusted to this new world, the family structure was affected. Moreover, consequently to the degradation of agricultural production (main livelihood) since 2005 and to the economical degradation since the conflict, family resilience is exhausted.

Resilience of traditional systems are pushed at their maximum and they are no longer sufficient to provide nutritional security to household members during the lean season. Long period of lack of money and food are degrading relationship between wives and husband, but also between adults and children because. Indeed, for the average Nangere household, it remains extremely difficult to provide food for their children and support for the teenagers through the year.

Co-wives relationship and neighborhood network appeared, during the qualitative survey, as the strongest and most resilient level of cooperation.

Traditional family is structured to provide support to women. Their perceived workload shows a real availability to take care of their children, and most of them felt supported, although well-being and caregiver-children interaction indicators highlight a problematic situation. Indeed, despite the existing traditional resilience system, in this post-conflict context, women are stressed and poorly nourished, which participate to the impossibility to provide adequate childcare.

The resilience of household nutritional security can be improved. Sub-optimal management of women livestock impact healthiness of household environment, purchasing power of household and access to health care.

Education

Illiteracy rates among parents, and particularly among women, affect definitely women empowerment and nutritional security of Nangere households. Less educated and confident women do not have access to competences needed in terms of care and health practices and economic management.

Children education is also extremely problematic in Nangere LGA. Lack of building maintenance, of teachers, of materials involve that majority of Nangere children have no access to academic school (particularly in rural context). Among children having access to formal education, girls have a lower access to secondary school and high school. The qualitative survey highlights that after primary school girls usually prefer to get married instead of continuing school.

Hypothesis 20	High maternal household workload	Double validation	Minor
Hypothesis 21	Poor women empowerment	Double validation	Important
Hypothesis 22	High illiteracy rates among parents	Double validation	Major

Link with other sectors

FSL: woman livestock, gardening

NUT: poor nutritional status among women, inadequate care practices

WASH: unhealthy environment

HEALTH: low access to health care

Emerging hypothesis

Decreasing of access to school for girl negatively impact pregnancies bellow 18 rate.

5.5 CAUSAL MODEL RELATED TO PROTECTION SECTOR

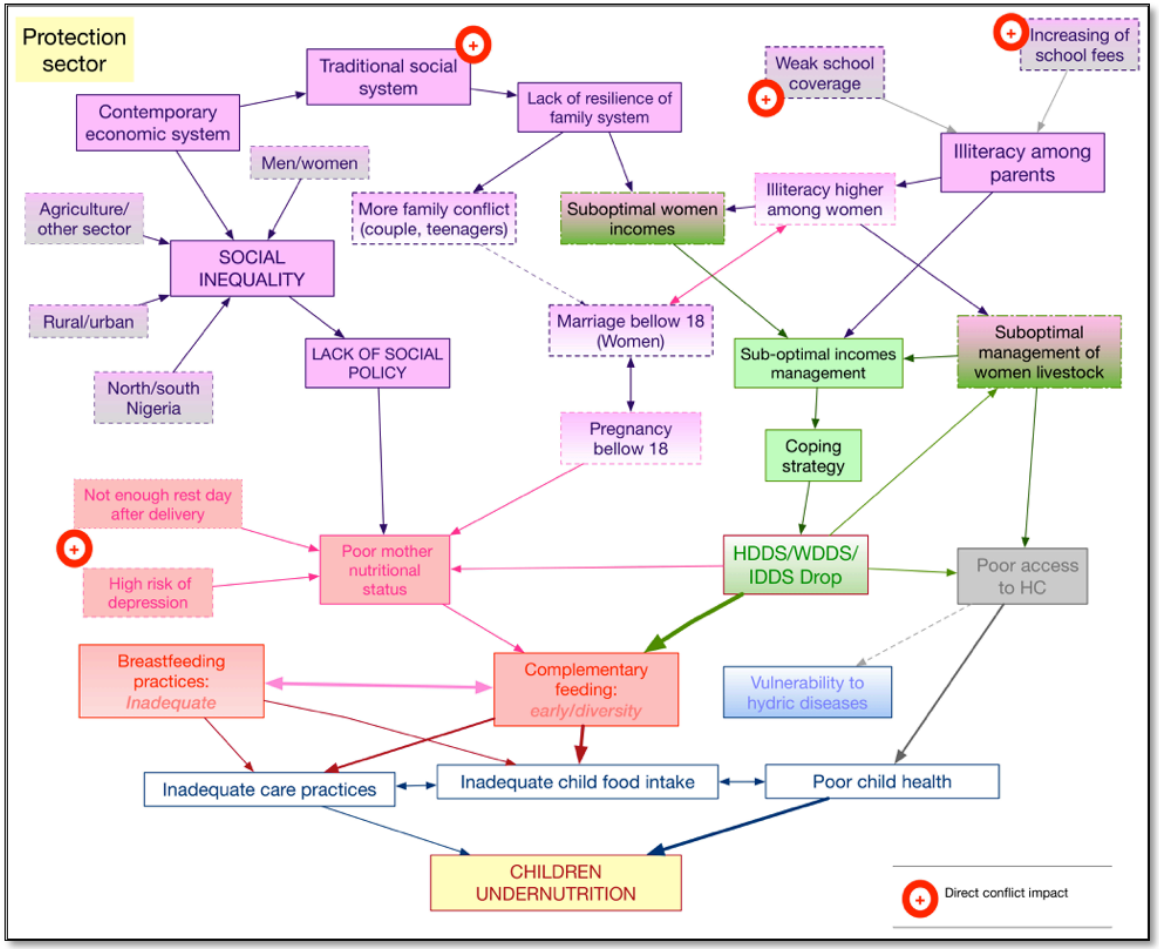


Fig. 36. Causal model 5: Protection sector

6/ CALENDAR

6.1 SEASONALITY AND MEDIUM TERM TRENDS OF UNDER-NUTRITION AND RISK FACTORS

Seasonal variation	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal variation of the undernutrition												
Weakness of food availability						Lean season						
Seasonal characteristics												
Rain season												
Cold season												
Hit season												
Wind season												
Seasonal disasters		Drought				Floods						
Seasonal increased of market prices												
Market price												
Seasonal disease factor												
Diarrhea												
Malaria												
IRA												
Typhoid												
Seasonal calendar of the activities												
Agriculture			Land preparation		Planting	Weeding			Harvest			
Millet												

Seasonal variation	J	F	M	A	M	J	J	A	S	O	N	D
Sorghum												
Groundnut												
Livestock			Calving season for ovine								Ovine reproduction	
Divers												
Festivity			Weddings period									
School [87]												

Tab. 51. Seasonal calendar, Nangere LGA (Qualitative Survey)

Nangere LGA seasonal calendar of Nangere LGA was built by synthesising 5 seasonal calendars collected built the qualitative survey with the participants to the studies in each village. Personal interviews and mini-FGDs methods were used.

The seasonal calendar highlights that starting in March many households do not have any remaining food from their harvest. The population starts to buy food in the market or borrowing money to buy food. During the months of June, July and August the lean period is stronger as food is missing for most of the households, crops workload is high and market price increased a little bit. Indeed, market prices peak twice a year. One in December-January due to the celebrations and second one in June, July and August because of high level of borrowing and low access to product due to the rainy season. Then, in September and October most of the harvesting is done and food is available for the households. There is a season of planting and weeding. Farmers start preparing their land in March and start planting in May. Weeding is done in June July and August and harvesting in September and October.

The calving period for ovine is from March to May. Reproduction period is in December and January for ovine and bovine.

Regarding weather, initially the rainy season started in May until august. Nowadays, rainfalls are less during May and June and it can have floods during July and August. The participants described also a longer and stronger hot season with lot of winds. The hot season start around March and can length until July while the rainy season is related the malaria cases increase.

The rainy season coincides with the peak of malaria cases; however, fever occurs at any time of the year, associated with typhoid during hot season, or Yellow fever during cold season. Although diarrhoea can happen at any time of the year, two peaks of diarrhoea cases are described: one during the hot season and a second one during the rainy season. For IRA, two peaks are described: one related to the hot and windy season, another one with cough during rainy season. *Rana* disease can occur through the year as diarrhoea, but it one major peak is noticed during the hot season and continue during the lean season.

[87] Official Holydays: New Year's Day: 1st January; Good Friday: 14th April; Easter Monday: 17th April; Workers' Day: 1st May; Democracy Day: 29th May; Eid el Fitr (End of Ramadan); Independence Day: 1st October; Eid el Kabir (Feast of Sacrifice); Eid el Maulud (Birth of the Prophet Muhammad); Christmas Day: 25th December 2017; Boxing Day: 26th December 2017

6.2 HISTORICAL TRENDS OF RISK FACTORS AND UNDERNUTRITION

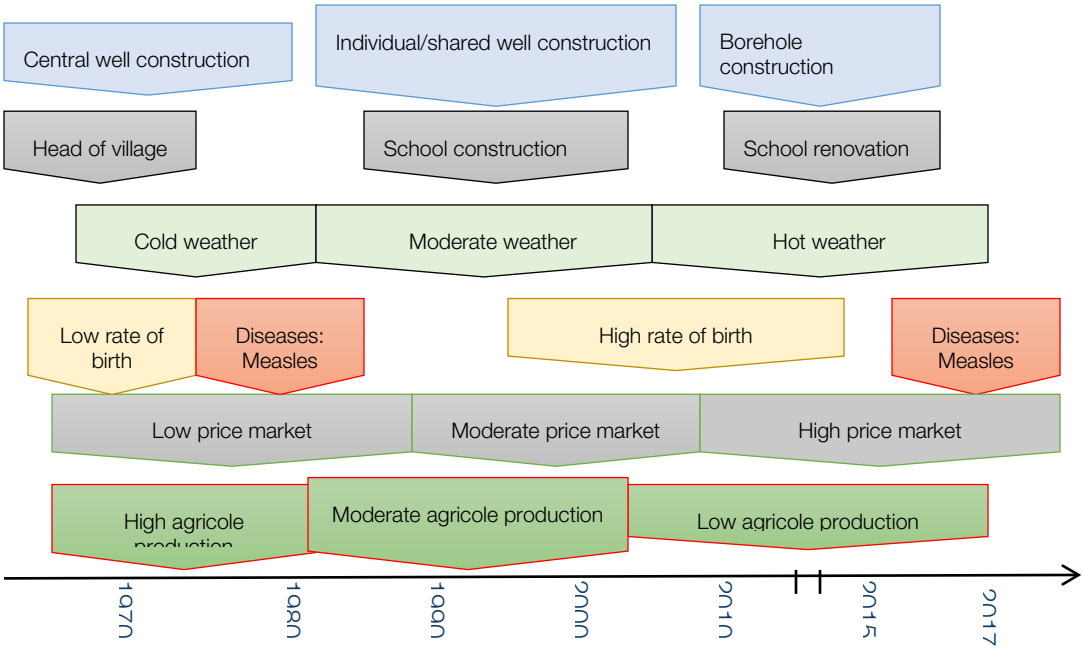


Fig. 37. Representation of historical calendar of Nangere LGA (Qualitative Survey)

Nangere LGA historical calendar was built by synthesis 5 historical calendars collected during the qualitative survey (one per surveyed village). Personal interviews and mini-FGDs methods were used.

Historical calendar shows:

Head of village: Most of them are present since 40 or 50 years and most of them inherit the authority.

WASH: Every story of village settlement starts by the construction of a central well. The presence and accessibility of water is the centre of the settlement of most of communities in Nangere LGA. After a certain period, each household or neighbourhood had built his or her own well. Recently, approximately since 10 years, the local government built boreholes in the communities. However, due to the lack of money and resources most of the mechanical boreholes working with gasoil are out of use.

Education: Most of the school visited during the study were built between 1970 and 1990. Two of them, in large village, were renovated in the past 10 years. However, for all small villages, schools were not safe enough to received student.

Birth: All the participants described an increase of the birth rate since the end of 1990.

Disease: The only disease that captures collective memories is measles and it appears very clearly that two peaks happened: one around 1970 and one currently.

FSL: Variation of crops production and price market were very homogenous within Nangere LGA. Before 1980, crop production was good and sufficient for each household. Market prices were low. Then, crop production started to decrease and market prices to increase, but the effect were moderate until 2000. Later, crop production started to be an issue for the majority of the households and market prices started to be high until 2011-12, when prices were very high.

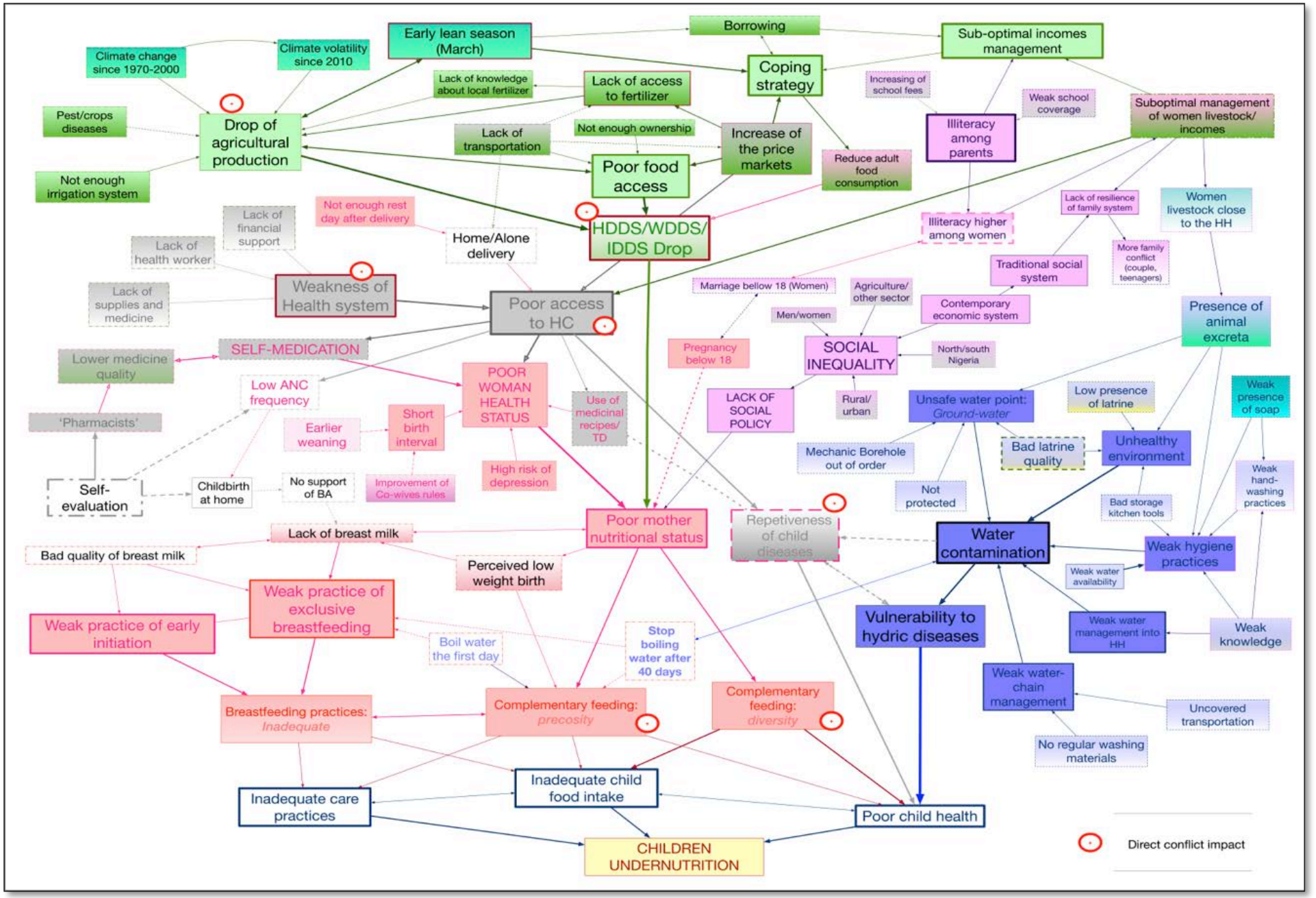
Weather: All the participants declared that since 1980 the temperature increased. They described three phases: Cold weather (before 1980), moderate weather (between 1980 and 2000) and hot weather (2000 until now). They also observed a shortening of the rainy season until 2000 (which is correlated by scientific data).

7/ LOCAL CAUSAL MODEL

The nutritional security's degradation of average households in Nangere LGA is directly related to the degradation of Food Security and Livelihood sector. Since 2010 and the conflict, decrease of agricultural production and increase of market prices made difficult for the households to meet their nutritional needs throughout the year. The lean season is longer and stronger. Despite of a sort of stabilization in the FSL degradation, nutrition and health practices are too weak to protect young child.

Moreover, caregivers show a tendency to start complementary feeding to prevent first signs of undernutrition (low breastfeeding practices, low weight birth, lack of breast milk). But, into an unhealthy environment and with a big risk of water contamination the child health is deteriorating. Also, since the conflict, the deterioration of access to health system a makes children and adults more vulnerable.

Fig. 38. Causal model 6: General model



SECTION III: CONCLUSION AND RECOMMENDATION

1/ CONCLUSION

Giant of Africa, Nigeria continue is journey towards a contemporary world with success and determination. Nonetheless, for a part of the country it remains difficult to have the same perspective. The northern part of Nigeria meets lot of issues since the beginning of the second millennium. Economic instability, decrease of agricultural production, climate change and more recently armed conflict against Boko Haram excluded a part of this population from the benefit of Nigeria growth. Moreover, since 2011-2012, the nutritional insecurity is alarming and Yobe State is a good example of conflict impact in terms of nutritional degradation through the following years of a conflict. Indeed, until 2013-2014, Yobe State, and Nangere LGA as well, had been impacted and more very drastically during 2014-2015. The Link NCA study highlights signs of stabilization (agricultural production, market prices), which will be in favor of agro-pastoral population. Nevertheless, monetary inflation and low agricultural production still put Nangere LGA population in food insecurity situation with a stronger lean season. The situation remains alarming and the social resilience is tired. Undernutrition prevalences in the studied area (14.6% wasting, 68.3% stunting), captured in November 2016, not during the lean season, invited Action Against Hunger to question the causes of this situation and their mechanisms.

The purpose of this Link NCA study is to identify the most important causes of child undernutrition, in particular wasting of children age 0-59 months and to question the links between them, in order to propose adequate solutions. In Nangere LGA context, the Link NCA problematic was to question the mechanisms of a long situation of chronic malnutrition and a more recent acute malnutrition, and how they were interlinked.

*

The study highlights very clearly that a child is more vulnerable between 3 months old and 24, which shows the violence of this nutritional crisis. During this period, she/he will be exposed to wasting between 3 months to 9 months, and to stunting from 15 months and above.

Wasting is mainly related to weak breastfeeding practices and early introduction of complementary feeding. The vulnerability to hydric disease is also highly related to unhealthy environment and weak hygiene practices. Then, the repetitiveness of child diseases devitalise the child who will be more vulnerable to hydric diseases in a context of weak health care practices (medicinal recipes).

Stunting seems related to drastic decrease of HDDS since 2010, which affects WDDS and IDDS. Availability of food items in the household is problematic and the children do not have access to sufficient nutritional supply. Nutritional insecurity affects women who started to be more undernourished and expressed some difficulties to practices good breastfeeding practices. Lack of breast milk, fear of producing low nutritious breastmilk, low weight birth, led the mother to start introducing complementary feeding too early (around 3 months for 5

months in 2011). This complementary feeding is nutritionally poor and remains a door open to hydric diseases. Looking at this global picture, it seems that after suffering from wasting, the child nutritional and health status drives her/him to stunting.

Degradation in accessing health system contributes also to the nutritional situation. Not prepared to face the surge of low weight birth cases or undernutrition peak, the main problem for Nangere household is the sudden lack of monetary access to health care. This fact reinforce the existence of local diseases (rana, olsa), which are not taken in consideration by the actual health system and drastically impact the nutritional status of children. The traditional health system try to adjust to this undernutrition situation but if the traditional doctors seems to encourage women to reach health centre with their undernourished child, the use of medicinal recipes into an unhealthy environment appeared problematic. Moreover, adults suffered from the degradation of access to health centre what impact household management.

*

The unhealthy environment and hydric diseases are important causes of undernutrition in this context. Indeed, despite governmental efforts, the study of water access teaches us that quantity of water is less problematic than quality of water. Condition of water management outside and inside the household, weak presence of soap, weak practice of water treatment, all sources of contamination (water point or household: animal excreta) appeared challenging. Level of hygiene practices is low and levers to maintain some of them are absent. The sanitation situation is also extremely concerning. The extremely weak presence of safe latrine is a major cause of contamination inside and outside household (water point). Nonetheless an important sink appeared. The sub-optimal management of women livestock into the household contribute mainly to the unhealthy environment and the low level of incomes.

*

The terrible degradation of the food security in the northern part of Nigeria appeared in this study as the major cause of undernutrition. If low level of care and health practices, or problematic access and water management can explain chronic malnutrition, high prevalence of acute malnutrition seems more linked to the drop of agricultural production. This decrease is caused by an unfavourable economic context, climate change context and conflict context. The problem is that actual agricultural production is twice less than in 2005 and in Nangere LGA, well known to be Yobe's granary, the average household can no longer product food for 6 months. Infertility of soil, modern fertilizer price increase, rudimentary agricultural tools and knowledge affects agricultural resilience.

The best way to have a quick impact on this undernutrition situation will be to improve livelihoods such as crop production or women livestock.

*

Lack of knowledge is also an important cause of this situation according to our participants. Illiteracy rates among parents and particularly among mother is alarming and this situation is deteriorating. School coverage and school monetary access are the main issues for the average household of Nangere. In front of this situation, girls are more exposed than boys to illiteracy.

Women empowerment and recent drop of self-confidence due to the conflict context have to be supported by a strong social policy. It should be the best way to start a new humanitarian program in collaboration with the national, state and local authorities. Indeed the social structure of each family, village, ward, LGA, State has to be considered as the first pattern in the fight against undernutrition.

***

As explained previously, the purpose of the Link NCA is not to design programs, though the results can be used to inform program design and adjustments. Moreover, the results and recommendations can constitute a basis for advocacy. Indeed, a number of recommendations require specific effort from the government and local actors present in the same area.

As a part of the final technical workshop, the NCA analyst presented a list of draft recommendations (FSL, WASH, Nutrition, Health, MHCP/PCP). A working session allowed the

experts to give their opinion on those recommendations and to validate them. Final recommendations had been defined and validated together with the experts.

Therefore and based on the results of the Link NCA, the following recommendations should be taken into account to tackle the major causes of undernutrition.

Recommendations are arranged by sector and classified according to the "weight" of the associated causal factor but must interact for a better improvement of the situation in Nangere LGA.

2/ RECOMMENDATION

MAJOR HYPOTHESIS RISK FACTORS	IMPORTANT HYPOTHESIS RISK FACTORS
NUTRITION - Young child non-optimal feeding practices - Inadequate child health care HEALTH - Poor access and utilization of health services WASH - Inadequate water access - Non-optimal of water management (water chain) - Poor hygiene practices - Inadequate management of human and animal excreta FSL - Limited access to food - Limited food availability PROTECTION - High illiteracy rates among parents	NUTRITION - Non-optimal breastfeeding practices for children up to 6 months old - Poor nutritional status among pregnant and lactating women HEALTH - Weakness of health system - Short birth interval FSL - Sub-optimal food & other sources of incomes management - Emerging coping strategies PROTECTION - Women empowerment

Humanitarian interventions or programs at Yobe State, in Nangere LGA, have to be design with the collaboration of State, local authorities and communities. This cooperation is the base of humanitarian programs implementation. Through it a local and contextual approach can be built and assure the intervention success and sustainability.

The challenge is the volatility of the context. The conflict and climate change need to be considered in the design of future interventions. Community resilience has to be improved and nutritional security programs for the next years need to be built according to the volatility of the context.

A multisectorial approach will contribute to assure the impact of intervention in a short time. Nevertheless, this integration has to be done on specific objective. Harmonization between

donors regarding those objectives will improve the humanitarian interventions impact in the Nigerian context.

Recommendations associated to risk factors classified as "major"

NUTRITION

Increase the age of complementary feeding introduction

Increase IDDS

Reinforcement of awareness on IYCF

Create protocol for women support when facing lack of breast milk situation

Add a psychosocial support for women with undernourished child

CHILD HEALTH

Free access to basic medicines for child health (diarrhea)

Create campaign on child health

Training of health workers on child diseases and treatments

Improve the monetary access to health services at the household level (incomes management)

Improvement of transportation means to reach health centre (ambulance)

Support integration of traditional health system and workers in the academic one: Pharmacists, Birth attendance, medicinal recipes

WASH

It is recommended to support a community approach including the development of employment within the community and with the support of state government.

Support awareness on hygiene practices

Support awareness on water management (water chain management, water treatment)

Support rehabilitation and improvement of water sources according to the local context (water for animals, contamination, pomp well, solar borehole)

Improve availability of soap

Promote waste management (recycling system) and excreta management (fertilizer)

Support implementation of dry latrine/ safe latrine at household level in collaboration with a local network

FSL

Improving of food availability at household level will have a large impact on the nutritional security of the household.

Improvement of agricultural production at household level (more constant, diversify, pest diseases)

Improvement of HDDS: Gardening

Improvement of livestock management (woman livestock, excreta)

Improving availability of local (safe) fertilizer

Improving water management for gardening

Material and technical support for farmers

Support farmers to cope with climate change

Support credit, micro-credit access to women and men for farming, raising and little business

Support women on incomes activities

PROTECTION

Create structures to support adults learning (short and specific learning: farm, raising, incomes activities, water, health)

Support ministry of education and Ministry of women affairs

Recommendations associated to risk factors classified as "important"

NUTRITION

Reinforcement of awareness on IYCF

Create awareness on the inconvenient of early complementary feeding

Create protocol to support undernutrition case before 6 months old: protocol low weight birth

Create protocol for support to women facing lack of breastmilk

Increase WDDS

HEALTH

Support of state health system (health workers recruitment, trainings and management, structures, medicine) for child and adult health

Empowerment of nutrition programs

Support of breastfeeding practices to reduce short birth interval

Awareness on the inconvenient of short birth interval

FSL

Support coping strategies with more resilience power

Support management of food and monetary incomes at household level

Support micro-credit, agriculture and livestock with on-going training on incomes management

PROTECTION

- Support access to school for girls
- Support access to credit for women
- Support awareness campaign with men on women empowerment within households

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ANNEXES

1/ ANNEX N°1: RISK FACTOR SURVEY QUESTIONNAIRE

ANNEX 1A. IDENTIFICATION

1.IDENTIFICATION 1.1 Enumerator_____1.2 Team Leader_____ 1.3 Supervisor……..ID.10 Survey date (dd/mm/yy)---------						
1.5 State……..	1.5.1 LGA…… ……	1.5.2 Ward…… ……	1.5.3 Village/ Cluster name…….	ID.20 Village number…… ……	ID.30 Team number…… ……	ID.40 Household Number…… …… …..
ID.50 Starting time ID.60 Ending time						

Read and administer the consent form

ID.60 – Does the household understood clearly and accepted the consent form?

1=Yes

0=No

ID.70 -Does the household accept the interview?

1=Yes

0=No

ID.80 – If no, what is the reason? (kindly specify)

ANNEX 1B. INTRODUCTION

Code	Question	Answer
IN.10	Size of the Household (number of members currently residing in the household, cook and eat together)	|_||_|
IN.20	Does a child from 0 to 59 months is present in the household? (to confirm the age of child by events calendar or birth certificate) If no, go to the next household	1=Yes 0=No

IN.30	Is the head of household present?	1=Yes 0=No
IN.40	Is the mother or caregiver of the child aged 0-59 months present at the household?	1=Yes 0=No
IN.50	If no to IN.40 I would like to ask few questions to the caregiver of the child, at what time could we come back? (kindly indicate in the cluster control form for consideration of revisiting the household)	_ _ : _ _ AM/PM

ANNEXE1C. FOOD SECURITY AND LIVELIHOOD (FSL)

Household Dietary Diversity Score (HDDS) and HDDS-associated food sources (AFS)

If the participant mentioned "mixed-dishes" as stew/sauce/etc, ask **"what was the food items used for cooking this dish? Anything else?"**. Record each food categories representing more than 15g/1 soup spoon.

Food sources:

Purchase = 1

Own production = 2

Social networks/gift from relatives = 3

Exchange/barter = 4

Gathering wild foods and hunting = 5

Humanitarian aid/Food assistance = 6

Loan = 7

Other (specify) = 8

Now I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and at night. Since yesterday morning till this morning what are the food eaten in your household?		Yes	No
HDDS.10	Any cereals or cereal products (e.g. millet/sorghum porridge), bread made from wheat, rice, semovitta (made from wheat and maize) noodles, biscuits, or any other foods made from millet, sorghum, maize, rice, wheat?	1	0
AFS.10	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.20	Any potatoes (white “irish” potatoes), coco yams/yams, cassava, sweet potatoes or any other foods made from roots or tubers?	1	0
AFS.20	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.30	Any vegetables?	1	0
AFS.30	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.40	Any fruits?	1	0
AFS.40	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.50	Any beef, goat, sheep, chicken, guinea fowl, or other birds, liver, kidney, heart, or other organ meats?	1	0
AFS.50	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.60	Any eggs?	1	0
AFS.60	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.70	Any fresh or dried fish or shellfish?	1	0
AFS.70	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.80	Any foods made from beans, soya beans, baobab nuts, “banbara” nuts, peas, lentils or nuts?	1	0
AFS.80	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.90	Any cheese, yogurt, milk or other milk products?	1	0
AFS.90	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.100	Any foods made with oil, fat, margarine or butter?	1	0

AFS.100	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.110	Any sugar or honey?	1	0
AFS.110	Where did you find this food? (refer 1 to 7 according to the food sources code)		
HDDS.120	Any other foods, such as condiments (spices, herbs, fish powder less than 15g) coffee, tea?	1	0
AFS.120	Where did you find this food? (refer 1 to 7 according to the food sources code)		

Food Consumption Score (FCS)

Now I would like to ask you about how many time that you or anyone else in your household ate during the last 7 days: Code the consumption from 0 to 7 according to the answer. Any consumption frequency greater than 7 should be coded as 7. Example: "Fruits was eaten 3 times in the last 7 days", code 3. " Milk was drunk 12 times in the last 7 days", code 7.		0-7	>7
FCS.10	Millet, sorghum, bread made from wheat, rice, "semovitta", other cereals, potatoes, sweet potatoes, cassava, other tubers, plantains		
FCS.20	Beans, soya beans, "banbara" nuts, lentils, groundnuts, seeds, any nuts		
FCS.30	Vegetables, leaves (cucumber, onions, eggplant, cabbage, lettuce, Okra, Baobao leaf "Kuka", "Moringa" leaf "Zogare", green bean pod)		
FCS.40	Fruits (Ripe mangoes, ripe paw-paw" *Guanda*", oranges, watermelon, pineapple, lemon, tomatoes)		
FCS.50	Meat (goat/cattle/ sheep meat/beef), poultry (chicken/ guinea fowl), offal (intestines), fish seashell and other meat/fish		
FCS.60	Milk, yogurt and other dairy		
FCS.70	Sugar and sugar products, honey		
FCS.80	Oil, fat or butter		
FCS.90	Condiments for flavour such as pepper/chilies, spices, herbs, or fish powder, salt, flavoured tea, ginger, small amount of milk for coffee/tea, tea, coffee		

Reduced Copping strategy index (rCSI)

In the past 7 days, if there have been times when you did not have enough food or money to buy food, how many days has your household had to: Number of days out of the past 7: code the consumption from 0 to 7 according to the answer.		0-7
rCSI.10	Rely on less preferred and less expensive foods?	
rCSI.20	Borrow food, or rely on help from a friend or relative?	

rCSI.30	Limit portion size at mealtimes	
rCSI.40	Restrict consumption by adults in order for small children to eat	
rCSI.50	Reduce number of meals eaten in a day?	

Number of shocks

In the past 1 year, does your household suffered from a sudden shock that has impacted your diet or your household income sources? If yes, what were those shocks? If no, skip to MAHFP.10 If yes, ask SH.10		Yes 1	No 0
SH.10	Disease or death of the household head or any important household member	1	0
SH.20	Pest infestation	1	0
SH.30	Livestock loss (epizootic/endemic diseases)	1	0
SH.40	Livestock loss (robbery)	1	0
SH.50	Crops loss	1	0
SH.60	Drought/low rainfall	1	0
SH.70	Field destroyed by animals	1	0
SH.80	Staple food price fluctuation	1	0
SH.90	Crop diseases	1	0

Months of Adequate Food Provisioning (MAHFP)

DO NOT READ THE LIST OF MONTHS ALOUD.

Use a seasonal calendar if needed to help respondent remember the different months.

Probe to make sure the respondent has thought about the entire past 12 months.

If MAHFP.10 answer is No, then No to MAHFP.20 to MAHFP.130

MAHFP.10	Now I would like to ask you about your household's food supply during different months of the year. When responding to these questions, please think back over the last 12 months, from now to the same time last year. Were there months, in the past 12 months, in which you did not have enough food to meet your family's needs?	Yes 1	No 0
If yes, which were the months in the past 12 months during which you did not have enough food to meet your family's needs? This includes any kind of food from any source, such as own production, purchase or exchange, food aid or borrowing.			
MAHFP.20	January	1	0

MAHFP.30	December	1	0
MAHFP.40	November	1	0
MAHFP.50	October	1	0
MAHFP.60	September	1	0
MAHFP.70	August	1	0
MAHFP.80	July	1	0
MAHFP.90	June	1	0
MAHFP.100	May	1	0
MAHFP.110	April	1	0
MAHFP.120	March	1	0
MAHFP.130	February	1	0

Assets, land and livestock

Now, I would like to ask you which livestock/land do you own and how many of each		Number
ALL.10	Work cows/ bulls	_ _
ALL.20	Milk cows/bulls for food consumption (milk or beef production)	_ _
ALL.30	Camel	_ _
ALL.40	Work horses/donkeys	
ALL.50	Goats/sheep	_ _
ALL.60	Small plot garden (square metres)	_ _
ALL.70	Subsistence crops (hectares) (crops grown for food consumption at household level)	_ _
ALL.80	Cash crops (hectares) (crops grown for sale at the market/export)	_ _

If more than 0 to ALL.60/70, then LAND.20, otherwise skip to SA.50			
LAND.20	Do use an irrigation system as drip irrigation for crop production?	Yes 1	No 0
LAND.21	If yes, what is the total surface area using this system? (in hectares)	_____ (hectares)	

Access to land

As part of our study, we would like to ask a few questions about access to land. These questions are strictly anonymous. Answers recorded are not shared with anyone and do not affect participation in a program in the future. Do not hesitate to ask me for details.		Yes	No
SA.50	Are you aware of the land laws of your country?	1	0

SA.60	Do you have access to a land for your livelihood?	1	0
SA.70	Are you a land owner?	1	0
SA.80	If you are an owner, do you have a certificate or land title?	1	0

How did you get your land (s)?			
SA.90	Donation (relatives)/inheritance	1	0
SA.91	Rental/tenancy	1	0
SA.92	Communal ownership of land	1	0
SA.93	Purchase	1	0
SA.94	Government allocation	1	0
SA.95	Other	1	0

ANNEX 1D. UNHEALTHY ENVIRONMENT

All these questions are for domestic use of water and do not include water for animals

UE.10	What is the main source of drinking water for members of your household? (Present a map with the different water points that have been assessed) Coding key: to be determined according to the setting and map. Circle 1 to 5 and write the letter code	1 = Groundwater: open well, well/borehole with hand-pump, well/borehole with motorized pump system 2 = Protected spring 3 = Roof rainwater 4 = Water trucking 5 = Piped supply 6 = Sealed bottled water/water sachet 7 = Surface water as river For answer 1 to 5, letter code of the source _

What do you usually do to make the water safer to drink? Probe: Anything else? (record all items mentioned)		Quoted	Not quoted
UE.20	Boil	1	0
UE.21	Add bleach/chlorine/Aqua tab/Pur	1	0
UE.22	Use water filter (ceramic, sand, composite etc.)	1	0
UE.23	Solar disinfection	1	0

UE.24	Strain it through a cloth	1	0
UE.25	Let it stand and settle	1	0
UE.26	Other	1	0

UE.30	How many litre of water do you collect every day? If not able to answer write 00 and ask UE.31, UE.32 and UE.33. Otherwise, go to UE.40	Number of litre |_||_|
UE.31	How many Jerrican like this do you collect every day? (observe and show the Jerrican, usually it is a 25L Jerrican)	Number of Jerrican|_||_|
UE.32	Capacity of the Jerrican	_ _ Litres
UE.33	Secondary recipient (if any do not fill) How many pots/recipients like this do you collect every day?	Number of big pot |_||_|
UE.34	Capacity of the recipient/pot	_ _ Litres
UE.35	Third recipient (if any do not fill) How many pots/recipients like this do you collect every day?	Number of small pot |_||_|
UE.36	Capacity of the recipient/pot	_ _ Litres

Now I would like to ask some questions about sanitation.			
UE.50	Is there a toilet or latrine in the household? If no, skip to UE.52	Yes = 1	No = 0
UE.51	Do you use this toilet/latrine? If yes: May I see it please? (refer to the observation part) and skip to UE.60	Yes = 1	No = 0
UE.52	Where do you usually relieve yourself? If answer is 1 or 2: May I see it please? (refer to the observation part)	1 = Relatives' latrines/toilets 2 = Public latrines/toilets 3 = No facilities/bush/trees	
UE.60	How many people, aged more than 12 months, of your HoH are using the toilet/latrine?	_ _	
UE.61	How many people are aged more than 12 months in your HoH?	_ _	

Now I would like to know when and how you usually wash your hands. When do you wash your hands? (DO NOT PROBE)	Quoted	Not quoted

UE.100	After defecation	1	0
UE.110	After cleaning babies' bottom	1	0
UE.120	Before food preparation	1	0
UE.130	Before eating	1	0
UE.140	Before feeding children (including breastfeeding)	1	0

Would you explain and show me what you do when you wash your hands? Ask the participant to show how he/she wash his/her hands.		Do	Don't
UE.200	Uses water	1	0
UE.210	Uses soap or ashes	1	0
UE.220	Washes both hands	1	0
UE.230	Rubs hands together at least three times	1	0
UE.240	Dries hands hygienically by air-drying or using a clean cloth	1	0

UE.300	Do you have any soap in your household for washing hands?	Yes = 1	No = 0
UE.400	If yes: Can you please show it to me?	Not able to show = 1 Bar soap = 2 Detergent (powder/liquid/paste) = 3 Liquid soap = 4	

ANNEX 1E. CHILD QUESTIONNAIRE

Always start by the eldest child, address this questionnaire for each child aged 0 to 59 months

Fill this part for each child under 59 months old in the HoH. To find the age, use the event calendar.

Fill part A and B for child 0-23 months. Fill part B for child 0-59 months.

Code	Questions	Answers
ID.100	First Name of selected child	

ID.101	Cluster name	
ID.120	Number of the cluster (1 to 30)	
ID.130	Team ID number (N° 1 to 6)	
ID.140	Household number	
ID.141	Identification number of the children	
ID.200	Birth date (confirm from birth certificate/MNCH booklet) If the birth date is not known, ask question ID.210	Birth date __/__/____ Don't know X
ID.210	Calculate immediately in months, if the birth date is known Otherwise use the event calendar to define the age	___ Months
ID.220	Source for obtaining age	Birth certificate = 1 Event Calendar = 2
ID.230	Sex of selected child	Male = 1 Female = 2
ID.231	Relationship of the respondent with the child	Mother = 1 Father = 2 Grandparent = 3 Sibling (older than 15y old) = 4 Other (specify) = 5

Child 0-23 months

Now I would like to ask some question about your child.				
CP.10	Has (**name**) ever been breastfed at any time since birth? If don't know, skip to question CP.20	Yes 1	No 0	Don't know X
CP.11	How long after birth did you first put (**name**) to the breast? (Probe) If respondent reports she put the infant to the breast immediately after birth, circle '000' for 'immediately'. If less than one hour, circle '1' for hours and record '00' hours. If less than 24 hours, circle '1' and record number of completed hours, from 1 to 23. Otherwise, circle '2' and record number of completed days.	Immediately……000 Or: Hours:……1 |_||_| Or: Days……2 |_||_|		
CP.20	Was (**name**) breastfed yesterday during the day or at night?	Yes 1	No 0	Don't know X
CP.21	Sometimes babies are fed breast milk in different ways, for example by spoon, cup or bottle. This can happen when the mother cannot always be with her baby. Sometimes babies are breastfed by another woman, or given breast milk from another woman by spoon, cup or bottle or some other way. This can happen if a mother cannot breastfeed her own baby. Did (**name**) consume breast milk in any of these ways	Yes 1	No 0	Don't know X

	yesterday during the day or at night?			

Next, I would like to ask you about some liquids that (name) may have had yesterday during the day or at night. Did (name) have any:		Yes	No	Don't know
CP.50	Plain water?	1	0	X
CP.51	Infant formula milk such as similac?	1	0	X
CP.52	Milk such as tinned, powdered, or fresh animal milk?	1	0	X
CP.53	Juice or juice drinks?	1	0	X
CP.54	Clear broth?	1	0	X
CP.55	Yogurt?	1	0	X
CP.56	Thin porridge?	1	0	X
CP.57	Any other liquids such as sugar/glucose water/water with honey?	1	0	X
CP.58	Any other liquids such as milo, tea?	1	0	X

How many times yesterday during the day or at night did (*name*) consume any (item from list)?		
CP.60	Infant formula milk such as similac?	Times B: |_||_|
CP.61	Milk such as tinned, powdered, or fresh animal milk?	Times C: |_||_|
CP.62	Thin porridge?	Times F: |_||_|

CP.70	Did (name) eat any solid, semi-solid, or soft foods yesterday during the day or at night?	Yes 1	No 0	Don't know X
CP.71	How many times did (**name**) eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night?	Number of times: |_||_| Don't know = X		

Please describe everything that (name) ate yesterday during the day or at night, whether at home or outside the home. Please, think about when (name) eat yesterday from the time he/she woke up yesterday morning, till the time he/she woke up that morning, at home or outside.

Think about the time he/she woke up yesterday. Did (name) eat anything when he/she woke up?

IF YES: Tell me everything (name) ate at that time.

Continue till the person answers "nothing else".

What did (name) do after that? Did he/she eat something at that time?

IF YES: What did (name) eat at that time? Anything else?

Continue till the person answers "nothing else". Repeat the question until the respondent says the child went to sleep until the next day (this morning weak up).

If the participant mentions mix dishes, like porridge, sauce, stew…, **ask: "what ingredients were in that (mixed dish)? Anything else?"** Tick all the food category related to the mix dishes when the amount is greater than **15g/1 soup spoon**. If the food is not listed in any of the food groups below, write the food in the bow labelled "other foods". If foods are used in small amounts for seasoning or as a condiment, include them under the condiment food group.

Once the respondent finishes recalling foods eaten, read each food group where "1" was not circled, ask the following question and circle "1" if respondent says yes, "0" if no and "X" if don't know.

Yesterday, during the day or night, did (name) drink/eat any (food group items)?		Yes	No	Don't know
IDDS.210	Porridge (millet/Sorghum), bread made from wheat, rice, "semovitta" (made from wheat and maize), noodles, or other foods made from grains	1	0	X
IDDS.220	Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside	1	0	X
IDDS.230	White(Irish) potatoes, Coco yams/Yams, Cassava, or any food made from root tubers,	1	0	X
IDDS.240	Any dark green leafy vegetables such as Baobab greens, bean greens, lettuce, okra greens, baobab greens "Kuka", moringa "Zogare", been greens, spinach "sorrel"?	1	0	X
IDDS.250	Ripe mangoes, ripe paw-paw "Guanda"	1	0	X
IDDS.260	Any other fruits or vegetables?	1	0	X
IDDS.270	Liver, kidney, heart or other organ meats?	1	0	X
IDDS.280	Meat/beef (goat/cattle/sheep), poultry (chicken/ guinea fowl), offal (intestines)	1	0	X
IDDS.290	Eggs	1	0	X
IDDS.300	Fresh or dried fish, shellfish, or seafood	1	0	X
IDDS.310	Any foods made from beans, soya beans, lentils, "banbara" nuts, or seeds	1	0	X
IDDS.320	Cheese, yogurt or other milk products	1	0	X
IDDS.330	Any oil, fats, butter, ground nut oil or foods made with any of these	1	0	X
IDDS.340	Any sugary foods such as chocolates, sweets, candies, masa, cakes, or biscuits?	1	0	X
IDDS.350	Condiments for flavour such as pepper/chilies, spices, herbs, or fish powder, salt, flavoured tea, ginger	1	0	X
IDDS.360	Any grubs, snails or insects?	1	0	X
IDDS.370	Foods made with red palm nut or red palm nut pulp sauce	1	0	X

H.10	Has (*name*) received Pentavalent 3 immunization before his/her first birthday?	1	0	X
H.11	Specify the source	On statement (recall) = 1	Checked on health record = 2	

H.20	Has (*name*) received measle immunization before his/her first birthday?	1	0	X
H.21	Specify the source	On statement (recall) = 1	Checked on health record = 2	

B. Child 0-59 months

Now, I would like to ask you some question about (name) when she/he born		
LBW.10	What was the weight of (name of the child) at birth? If don't know, ask LBW.20	_____ kg X = Don't know
LBW.11	Specify the source	1 = Caregiver's statement only (recall) 2 = Health record
LBW.20	When (name) was born, was he/she very large, larger than average, average, smaller than average, or very small?	1 – Very Large 2 – Larger than average 3 – Smaller than average 4 – Very Small 5 – Average size 6 – Don't remember X – Don't know

CP.100	Does anyone help (name) to eat?	Yes 1	No 0	Don't know X
CP.110	What do you do when (name) refuses to eat? Categorize answer into the positive, negative or no reaction	1 = Nothing (the child is left alone) 2 = Other (coax, play with, change food) 3 = Force		

UE.80	The last time (name) passed stool, where did he/she defecate? If UE.80 answer is 7, 8, or X skip to H.30	1 = Used potty 2 = Used washable diaper 3 = Used disposable diapers 4 = Went in his/her clothes 5 = Went in house/yard

		6 = Went outside the premises 7 = Used own sanitation facility 8 = Used public latrine 9 = Other X = Don't know
UE.90	The last time *(name)* passed stool, where were his/her faeces disposed?	1 = Dropped into toilet facility 2 = Buried 3 = Solid waste/trash 4 = In yard 5 = Outside premises 6 = Public latrine 7 = Into sink or tub 8 = Thrown into waterway 9 = At the well 10 = Thrown elsewhere (ask to specify) 11 = Washed/rinsed away (ask to specify) X = Not applicable

Now I would like to ask you some question regarding your relation with (name)				
MC.10	In the past 3 days, did you or any household member over 15 years of age engage in story telling, singing or playing with (name)?	Yes 1	No 0	Don't know X
MC.20	Do you leave (name) alone or in the care of other children younger than 12 ?	Yes 1	No 0	
MC.30	If yes, how often?	1 = Every day 2 = Several times a week 3 = Less than once a week X = Not applicable		

Ask this question, only if the children is aged more than 6 months (Show Vitamin A tablet)				
VIT.10	Did your child take any vitamin A in the past six months?	Yes 1	No 0	Don't know

Ask this question, only if the children is aged more than 11 months (Show deworming medicine)				
WORM.10	Did your child take any deworming in the past year?	Yes 1	No 0	Don't know

WORM.20	How many times did (*name*) take deworming in the past year?	_ _

RH.60	Does (name) have a younger sibling?	Yes 1	No 0
RH.61	If yes, what is the age difference between (**name**) and his/her direct younger sibling? Use the event calendar If don't know, ask RH.62 If answered, ask next questionnaire	_ _ months X Don't know	
RH.62	If don't know, what is the age of his/her direct younger sibling? Use the event calendar Calculate immediately his/her age, then fill RH.61	_ _ months	

ANNEX 1F. OBSERVATIONS CHILD 0-59 MONTHS

To be filled at the end of the questionnaire

Presence of mosquito net		Yes	No
MO.10	If a mosquito net is placed above the bed of the child, then record "yes" If no mosquito net placed above the bed of the child, then record "no"	0	1

Child body cleanliness		Yes	No
CL.10	Clean (relatively recently changed and washed)	0	1
CL.20	Intermediate cleanliness (child's hands and/or clothes are dirty, but no feces are visible)	0	1
CL.30	Very dirty (stools are visible on the child's body or clothes)	0	1

Caregiver-child interaction observation:		Yes	No
OC.10	Caregiver tends to keep the child within visual range and looks at the child quite often	0	1
OC.20	Caregiver talks to the child during the course of the visit	0	1
OC.30	Caregiver interacts with child to promote development and learning	0	1

OC.40	Caregiver smiles at the child, laughs with the child, caresses, kisses or hugs the child	0	1
OC.50	Caregiver spanked or hit the child during the visit, or shouted or yelled at him/her.	1	0

ANNEX 1E. MAIN CAREGIVER QUESTIONNAIRE

1.IDENTIFICATION 1.1 Enumerator_____1.2 Team Leader_____ 1.3 Supervisor……..1.4 Survey date (dd/mm/yy)---------				
1.5.2 Ward……	1.5.3 Village/ Cluster name…….	ID.230 Cluster/Village number……	ID.230 Team number……	ID.240 Household Number……..

Minimum Diet Diversity for Women (MDDW)

If the participant mentioned "mixed-dishes" as stew/sauce/etc, ask **"what was the food items used for cooking this dish? Anything else?"**. Record each food categories representing more than 15g/1 soup spoon.

Now I would like to ask you about the types of foods that you ate yesterday during the day and at night. Since yesterday morning till this morning what are the food eaten in your household?		Yes	No
MDDW.10	Any porridge made from millet/Sorghum, bread made from wheat, rice, "semovitta" (made from wheat and maize), noodles, or other foods made from grains/cereals? Any food made from white tubers, white roots or plantain?	1	0
MDDW.20	Any food made from beans, peas, lentils (soya beans…)?	1	0
MDDW.30	Any food made from nuts or seeds?	1	0
MDDW.40	Any food made from cheese, yogurt, milk or other milk products?	1	0
MDDW.50	Any meet, chicken, fresh or dried fish, shellfish?	1	0
MDDW.60	Any eggs?	1	0
MDDW.70	Any dark green leafy vegetables such as Baobab greens, bean greens, lettuce, okra greens, baobab greens "Kuka", moringa "Zogare", been greens, spinach "sorrel"?	1	0
MDDW.80	Any other vegetable or fruits rich in Vitamin A such as carrot, squash, pumpkin, orange/dark yellow sweet potatoes, apricot, melon, ripe mango, ripe papaya?	1	0
MDDW.90	Any other vegetables?	1	0

MDDW.100	Any other fruits?	1	0

CG.20	Did you eat more/less/same amount as usual when you were pregnant or breastfeeding?	1 = More 2 = Less 3 = Same

NUT.10	Did you take any nutrient supplementation during your last pregnancy, such as multivitamin? Show multivitamin tablets	Yes 1	No 0
NUT.20	Did you take any nutrient supplementation during your last pregnancy, such as iron and folic acid? Show the iron-folate supplement tablets	Yes 1	No 0

HH.30	Did the household head go to school? If no, ask question CG.30	Yes 1	No 0
HH.40	What was the highest level of education he completed?	Grade: |_||_| Vocational = 14 Bachelor = 15 Master = 17 Doctorate= 19	

CG.30	Did you go to school? (caregiver) If no, ask question CG.50	Yes 1	No 0
CG.40	What was the highest level of education you completed?	Grade: |_||_| Vocational = 14 Bachelor = 15 Master = 17 Doctorate= 19	

CG.50	Do you feel supported? Include all kind of support such as financial, social etc. Do not probe, this question is left to the understanding of the mother	Extremely……1 Somewhat……2 Not very……3 Not at all……4

CG.60	Do you feel you have too much work to take care of your child?	Yes 1	No 0

Please indicate for each of the five statements, which is closest to how you have been feeling over the last two weeks.

Example: If the respondent has felt cheerful and in good spirits more than half of the time during the last two weeks, put a tick in the box with the number 3.

Over the last two weeks:		All of the time	Most of the time	More than half of the time	Less than half of the time	Some of the time	At no time
WHO5.10	I have felt cheerful and in good spirits	5	4	3	2	1	0
WHO5.20	I have felt calm and relaxed	5	4	3	2	1	0
WHO5.30	I have felt active and vigorous	5	4	3	2	1	0
WHO5.40	I woke up feeling fresh and rested	5	4	3	2	1	0
WHO5.50	My daily life has been filled with things that interest me	5	4	3	2	1	0

RH.40	How old were you when you gave birth for the first time?	_ _ years

H.60	Did you see anyone for Antenatal care for your last pregnancy? If no, tick 5 “no one”, then ask H.80 If yes, “Whom did you see?” Probe “Anyone else?” till the respondent answer “no one else” Probe for the type of person seen and tick all answers given.	1 = Health professional (Doctor, nurse/midwife) 2 = Traditional birth attendant such as “Ungozama”, traditional healer, Community health worker 3 = Relative/friend 4 = Other (specify) 5 = No one
H.70	How many times did you see someone for Antenatal care?	Number of times: |_||_|

H.61	Did you see anyone for postnatal care for your last pregnancy? If no, tick 5 “no one”, then ask H.80 If yes, “Whom did you see?” Probe “Anyone else?” till the respondent answer “no one else” Probe for the type of person seen and tick all	1 = Health professional (Doctor, nurse/midwife) 2 = Traditional birth attendant such as “Ungozama”, traditional healer, Community health worker 3 = Relative/friend

	answers given.	4 = Other (specify) 5 = No one
H.71	How many times did you see someone for postnatal care?	Number of times: |_||_|

RH.50	Did you take some time to rest after your most recent delivery?	Yes 1	No 2
RH.51	If yes, how many days? Use the event calendar	_ _ days	

	Now, I would like to ask you some questions related to family planning For women from 15 to 49 years old married or in an union			
RH.10	Couples use various ways or methods to delay or avoid a pregnancy. Are you currently doing something or using any method, including sterilization, to delay or avoid getting pregnant? If no, ask RH.40	Yes 1	No 0	Not Applicable X
RH.20	If yes, What are you doing to delay or avoid a pregnancy? Do not probe Multiple answers can be accepted	1 = Female/male sterilization 2 = IUD 3 = Injectable 4 = Implants 5 = Contraceptive Pill 6 = Male/female condom 7 = Diaphragm 8 = Lactational amenorrhea method 9 = Withdrawal method 10 = Calendar method/traditional counting method 11 = Other (specify)		

H.90	How long does it take you to go to the nearest health center?	_ _ minutes

What are your main barriers from going to the health centre when someone is sick? Do not probe, multiple answers accepted		Yes	No
H.81	Money/cost	1	0
H.82	Time	1	0
H.83	Transportation means	1	0
H.84	Geographical distance	1	0
H.85	Decision power	1	0

H.86	The service is not good enough	1	0
H.87	Culture (specify)	1	0
H.88	Other (specify)	1	0
H.89	No barriers	1	0

Now I would like to ask you some questions on who is taking some of the family's decision		Mother	Father	Both	Other
DP.10	Who decides whether children should go to school?	1	2	3	4
DP.20	Who decides when the child has to consult medical services?	1	2	3	4
DP.30	Who decides how to spend the household's money?	1	2	3	4
DP.40	Do you discuss together with your husband/companion if or when to have other children?	1	2	3	4

ANNEX 1G WATER POINT OBSERVATION

3. Roof rainwater harvesting sanitary inspection form		No	Yes
RW.10	Is the roof area dirty?	0	1
RW.20	Are the gutters that collect water dirty?	0	1
RW.30	Is there absence of a filter box at the tank inlet or is it not working well?	0	1
RW.40	Is there any other point of entry to the tank that is not properly covered?	0	1
RW.50	Are there cracks in the wall of the tank?	0	1
RW.60	Is the inside of the tank dirty or not periodically cleaned and disinfected?	0	1
RW.70	Are the taps leaking?	0	1
RW.80	Is the concrete apron near the tank absent or broken or dirty?	0	1
RW.90	Is the drainage in bad condition and the water inadequately drained?	0	1
RW.100	Is there any source of contamination around the tank	0	1

	or water collection area?		

Refer to question UE.10 "What is the main source of drinking water for members of your household?" and fill accordingly (1 to 5).

According to question UE.10, go to the correspondent water point and answer to the correct questionnaire (if UE.10 answer is 1, then fill the questionnaire 1, if answer is 2 fill questionnaire 2, if answer is 3 fill questionnaire 3, if answer is 4 fill questionnaire 4, if answer is 5, fill questionnaire 5)

1. Groundwater: open well, well/borehole with hand pump, well/borehole with motorized pump system:		No	Yes
G.10	Is there a latrine or any source of pollution within 30 m of the well?	0	1
G.20	Does the fence around the well allow animals in? If there is no fence, answer is yes	0	1
G.30	Is the drainage channel less than 2 m long, broken or dirty?	0	1
G.40	Is there stagnant water close to the well?	0	1
G.50	Is the apron less than 1 m wide all around the well?	0	1
G.60	Are there any cracks in the well apron and headwall?	0	1
G.70	Is the cover of the well unsanitary and closed?	0	1
G.80	Is the well poorly sealed for 3 m below ground level?	0	1
G.90	Is the water point dirty?	0	1
G.100	Is the lift system in a bad condition / are ropes and buckets dirty? If it is a borehole, then no	0	1

2. Protected spring		No	Yes
S.10	Is there a latrine or any source of contamination within 30m uphill of the spring?	0	1
S.20	Does the fence around the spring allow animals in?	0	1
S.30	Is the drainage channel blocking the flow and allowing stagnant water?	0	1
S.40	Is the spring open to surface water contamination?	0	1
S.50	Is the spring box cracked?	0	1
S.60	Is the inspection cover cracked or unsanitary?	0	1
S.70	Is the cut-off ditch above the spring blocked or non-existent?	0	1
S.80	Is the water point dirty?	0	1
S.90	Is there standing water at the collection point?	0	1
S.100	Is the gutter disposed upstream of the site is missing or improperly maintained?	0	1

4. Water trucking sanitary inspection form		No	Yes
WT.10	Is the water point where the truck collects the water unsanitary?	0	1
WT.20	Is there no, or inadequate, chlorination of the water during the trucking process?	0	1
WT.30	Is the pipe used to fill and empty the water in the truck unsanitary or dirty?	0	1
WT.40	Is the tanker ever used for transporting other liquids besides drinking water?	0	1
WT.50	In the filler hole of the truck unsanitary or is the lid missing?	0	1
WT.60	Are any parts of the system (water tank of the truck, storage tank in the community, distribution point) not periodically cleaned and disinfected?	0	1
WT.70	Is the storage tank / distribution point unsanitary and dirty?	0	1
WT.80	Is there no chlorination of the water at the storage tank / distribution point?	0	1
WT.90	Is the storage tank at the distribution point badly covered?	0	1
WT.100	Is there stagnant water around the water tank / distribution point?	0	1

5. Piped supply sanitary inspection form		No	Yes
PS.10	Is the source badly protected, or not protected?	0	1
PS.20	Is there any point of leakage between the source and the reservoir?	0	1
PS.30	If break-pressure tanks, are they covers unsanitary? (If no break-pressure tanks, answer is no)	0	1
PS.40	Is the storage tank cracked or leaking and the inspection cover or the air vent unsanitary?	0	1
PS.50	Is the storage tank dirty or not regularly cleaned?	0	1
PS.60	Are there any leaks in the distribution lines of the system?	0	1
PS.70	Are the areas around the taps unfenced or allowing access to animals?	0	1
PS.80	Is there inadequate drainage and standing water around the taps?	0	1
PS.90	Are the surroundings of the taps dirty and with possible contamination source (excreta, refuse, etc.)?	0	1
PS.100	Is the water not chlorinated?	0	1

ANNEX 1H. OBSERVATIONS HYGIENE/SANITATION FACILITIES

Individual sanitation Observation		Yes	No
SAN.10	Are the faeces well isolated from the environment? (No leaks, cracks) *	1	0
SAN.20	Is the outlet safe? (Not leading to open sewer, river, sea water…) *	1	0
SAN.30	Presence of any anal cleaning item/material (paper, water…)	1	0
SAN.40	Is there a hand washing station inside the latrine or within 10 paces of the latrine?	1	0
SAN.50	Is there a cleansing agent at this hand washing station inside/near the latrine? Yes includes soap, detergent and ash, whereas no include mud, sand and other	1	0
SAN.60	Presence of flies or other insects entering or exiting the pit	0	1
SAN.70	Presence of excreta on the ground or around the pit or seat	0	1

Water management Observation		Yes	No
WAT.10	Is the container used to carry water left uncovered during transportation?	1	0
WAT.20	Is the container used to carry water dirty?	1	0
WAT.30	Is the water storage left open/uncovered?	1	0
WAT.40	Is there a water cleaning system visible (filter, boiling container, chlorine tablets…)?	0	1
WAT.50	While serving water to drink, is there a risk of water contamination? (do the fingers touch the water? Or is the scooping container used dirty?)	1	0

Food hygiene Observation		Yes	No
FH.10	Are there cooking utensils or food leftovers left on the ground or uncovered?	1	0

Animal waste Observation		Yes	No
Waste.10	Are there any animal excreta in or near the compound/playground/surroundings?	1	0

2/ ANNEX N°2: QUALITATIVE SURVEY QUESTIONNAIRE

ANNEX 2A. FOCUS GROUP DISCUSSION "NUTRITION"

After study presentation, demand of consent and rules explication of FDG, translator and analyst lead discussions during one hour and half.

- During the year, there is a moment with more birth and less birth?
- For your first children, how old were you?
- How many children you except during your life?
- How many children you want during your life?
- Do you talk with your husband about the number of children excepted?

Care practices

- At what age the child is easier to handle?
- At what age the child eat alone? Walk alone? It is gender specific?
- Who is in charge of the child? There are some caregivers for each age? Who help you to take care of the babies and children?
- Who teach you to take care of the babies?
- What is the aim issue when you take care of the children?

Nutrition

- Do exist specific meals for babies, for children? Girls and boys?
- At what age the children eat with the parents and eat the same meals than the parents?
- Do exist specific meals for pregnant woman? For lactating women?
- When you were pregnant do you eat less or more?
- Do exist specific meals for the men?
- Do you eat all together?
- How many time per day do you eat?
- What is a good (nutritive) food for you? What is a good meal for you? Can classified the top 5 of nutritious food?

- Do your household have enough food during the year? During the last month? During the last week? Why?

- What are the sharing rules of the meals?

Breastfeeding

- Do exist some difference about breastfeeding between tribes?

- The breastfeeding practices involve since your grandmother?

- Do you give the first milk (colostrum) to the newborn? Why? When give you the first breastfed to your newborn? Why?

Who teach you to breastfed?

- How many time and how long per day you breastfed your baby? Why?

- When the weaning happens? How you manage the weaning period?

- Do exist another income of milk (powder, animals, co-wife)?

Complementary food

- Do use you porridge to feed the baby? What kind? At what age you introduce porridge? Why?

- Do give you water at your baby? At what age? Whats kind of water (origin)? Do you treat the water? Do the child is sick after water? Do you give any other form of liquid to your baby?

- Do you give liquid medicinal receipts to your baby? At what age you introduce medicinal receipts? Who teach you medicinal receipts? What is the first medicinal and traditional attention given to the children (male and female)? Age?

Child sickness

- What are the most regular children sicknesses? Do exist a seasonal calendar?

Pregnant and lactating women sickness

- What are the most regular pregnant woman and lactating woman sickness?

- Do exist a seasonal calendar?

Reproduction

- Can you control the birth? Do you have any issue with the birth interval?

- Do you have any relationship with the birth intendance?

Under-nutrition

- What is undernutrition for you? What are the symptoms of undernutrition?

- Does the village cross an undernutrition situation?

- Can anyone suffer from malnutrition? Could adult can suffer from undernutrition? A woman can have undernutrition? Girl and boy are equally touched by undernutrition?

- What are the causes of undernutrition?

- When a child is undernutrition suffering? What you do?

- Is malnutrition a disease? If yes, it is contagious?

ANNEX 2B. FOCUS GROUP DISCUSSION "HEALTH"

After study presentation, demand of consent and rules explication of FDG, translator and analyst lead discussions during one hour and half.

- What is for you a healthy child?

- Who is taking heath decision in the household? Who is giving the health care in the household?

Health in the village:

- What are the aims diseases in the village?

- Do you have health center? How long?

- Do you have a traditional doctor? Do you have any traditional health care?

- Who do you prefer to visit if you are sick (traditional or orthodox medicine)?

Woman Health:

- Do you have a birth attendant in the village?

- Where the woman give birth? Where is the best place to give birth? Why?

- Does the woman can access to antenatal care? Why?

- Does the woman have post-natal care? Who? Why?

- What are the rules for the men in term of wife health care? And Birth health care?

- What are the woman diseases? Across the years? Where the best place to woman health care?

Child Health:

- What are the main child diseases? There is an annual calendar of child sickness?

- Who is in charge of the child health care?

- If the child is sick, what do you do first? At which person you ask some support?

- There is some traditional heath care for the child disease? Which diseases? Which treatment?

- Have ever you given your child drug? If 'Yes' what type of drug do you give to the child of 0 to 6 months?

- Do you do immunization? What do you think about immunization?

- How is the reception, greeting in the health center?

- Who takes decision about the money management for the child health care? At which person you ask some monetary support?

Man Health:

- If the man is sick, what do you do first?

- What are the diseases of the man? There is an annual calendar of man sickness?

Therapeutic itinerary:

- Can you explain the therapeutic itinerary of the children? The woman. And the man?

- What represent for you the health center? What is the price?

- Do you do auto medication?

- Where do you find your medicine? What is the price?

- How do you know if it is the good medicine?

- Do you think that the traditional doctor know what is undernutrition?

Mental health:

- Can you do a difference between physical sickness and mental sickness? Who treats mental diseases?

- Do you know what mental depression is?

Reproductive health:

Pregnancies bellow 18

- What to you is the best age to be pregnant and getting a first child?

- Have you ever heard of pregnancy before the age of 15? What do you about that? Pregnancy bellow 18?

- Has either your mother or grandmother ever spoken to you about pregnancy? At what age your grandmother gave birth to her first child? At what age your mother gave birth to her first child?

Space birth:

- What are the intervals of your childbirth?

- What space do you think is best for an interval in childbirth?

- Do you know what a child spacing is?

ANNEX 2C. FOCUS GROUP DISCUSSION "FSL"

After study presentation, demand of consent and rules explication of FDG, translator and analyst lead discussions during one hour and half.

- How many people are in the household?
- Does this number involve? Through years, generations and due to the conflict?
- What are the rules to share the food in the household?

Consumption food in the Household:

- What kind of food you consume at the household? What are the origins of this food? (Crops, market, exchange, nature)
- Did you have enough food during the year? The last month? The last week?
- When is the most challenging moment during the year to manage food income? Did this moment changed?

Market days:

- Do you find the extra food at the market? Store? Street vendor?
- What food are you buying mostly?
- Do the prices of the market and/or product involve? How? Why?

Incomes and monetary management into the household:

- What do you buy first? (Health, soap, food)
- Who is in charge of the money in the household? Who is taking money decision?
- What is the aim source of monetary incomes in the household? In the village?
- What is the management of the money during the year? During the month?
- When is the lack of money?
- Do you borrow some money? For what? When? To who?
- Do exist some solidarity system (cooperative system)? In the household? In the village?
- Do you practice the transformation of the crops product? Or any products?

Stock management:

- Can you stock the food? There is some family or community granary?
- Who is managing the food stock?
- Can you stock the seeds?
- Can you stock the livestock?

Land property:

- Are you the owner of your land? Your house?
- Where is your land? How long to join your land?

Activities:

- What is the annual work? (for man and woman)

- What is the daily work? (for man and woman)

- What is the daily work for the child?

- Do you do seasonal migration?

Farming:

- What do you cultivate? What do you eat from your crops? Who is in charge of the crops work?

- Do you do crops for sell and crops for food?

- What is the calendar of the crops?

- What is the usual size of the crops? Number?

- Do you have some garden?

- How you manage the water for the crops?

- How you manage the fertilization of the crops?

Raising: Livestock

- What is the usual size of the livestock?

- Who is in charge of the livestock?

- Did you do vaccination on the livestock?

- What are the aims diseases of the livestock?

- The livestock need seasonal migration?

- How you use the livestock? (milk production, meat, transport)

Employment

- Who are employees? Do you want to have a job? Why? Man and woman have jobs?

Restraint to the activities: What are the aims restraint to the village activities? (Conflicts, weather, lack of money, diseases, drought)

Soldering period: How you prepare the soldering period? There is any system of cooperation during this period?

Conflict and conflict Impact: Does the conflict have an impact on your activities? How? Your incomes household incomes? How? Solidarity system? How?

ANNEX 2D. FOCUS GROUP DISCUSSION "WASH" (MINI-FDGS)

After study presentation, demand of consent and rules explication of FDG, translator and analyst lead discussions during 30 minutes.

Mini-FGD "Water access and management"

- What is the water situation in the village?

- What are the sources of water in the village? (surface water-drilling-natural source)

- Did this situation involved during the last years?

Is water available as at when needed in your community?

If your answer to the above question is 'Yes' is the water in the same quality and quantity all times

Where do you get your water from?

Do your animals get water from the same source with you?

Is water free in your community?

- What is for you a good/clean water? (Taste, odor, quality)

- Do you have any rules about the good water? The community or family rules about good water?

- Do you have enough water?

- At what moment during the year is it more difficult to find water?

- Who is in charge of the water in the household?

- When are the daily moments for gathering water?

- How many liters per day the household need?

- How far is the source of water?

- What is the price of the water?

- Do exist a space management of the water in the village? (Different source of water)

- Do you manage the transport of the water to the household?

- What are the kind of recipient you use to transport and stock the water?

- Do you know any treatment of the water?

- Do you treat the water? When and why?

- Do you drink the water directly to the recipient/container? (glass, cut)

- Do you watch the recipient/container of the water?

- Do you do water recuperation? Rainwater recuperation? Washed water recuperation?

- Do you use some water for the crops? Do you use some water for the livestock?

Mini-FGD "Sanitation"

- Do you have latrines or toilets? This latrines are familial or by neighbor?

- Who build latrine? What is a good latrine for you?

- Do exist some local rules about latrines management?

- Where the men go to defecate? Where the women go to defecate? Where the children go to defecate? Where the animals defecate?

- There are some rules about open defecation?

- How you manage the trash in the household? Into the village?

How and where do you dump your solid waste?

Are there any restriction as where and how to dump the solid waste in your community? Which ones?

Do you have any waste management for the crops? Do you know compost?

Mini-FGD "Hygiene practices"

- How to maintain a clean house?

- How to maintain a good level of hygiene practices?

- How do you wash kitchen tools?

- Do you wash your hand after the toilet? Before food preparation? Before the meals? Before health and child cares?

- How many times per weeks you wash the clothes of the children?

- How many times per weeks you body wash the children?

- Do you have soap? What kind of soap?

- Who teach you the hygienic practices?

- Who teach to the children the hygienic practices?

- How do you the children level of hygiene?

ANNEX 2E. FOCUS GROUP DISCUSSION "PROTECTION"

After study presentation, demand of consent and rules explication of FDG, translator and analyst lead discussions during one hour.

- What is the organization of the village? Does this organization involve?
- When conflicts happen in the village, how the authorities manage that?
- There are some village solidarity systems?

Family structure and dynamics:

- What is the organization of the usual household? Does this organization involve?
- When conflicts happen in the household, how the head of the household manage or you manage that?
- There are some household solidarity systems?

Education:

- There is a school in the village? How far?
- Which kind of school?
- Does the school is free?
- Who goes to the school? (Girl, boy)
- Which kind of school for girl and for boy?
- At what age the children begin school?
- At what age the children stop school?
- How you choose who goes to which school?
- The school education involve this last years?

Woman/man:

- The woman are allow to work outside the household?
- The man found work outside the household? The village?
- What is the role of the woman?
- What is the role of the man?
- These rules involve in the past years?
- What are the aims conflict sources between man and woman?
- Do you think that women need more responsibilities? More power in terms of decision-making?

The young:

- How the young generation is going?

- Do you have any conflicts with the young generation?
- There is some alcohol or drug issue?
- What do you do to help the youngest generation?

The government:

- What represent the government for you?
- What are the principal authorities for you?
- Are you comfortable with the administrative procedures?
- Do you have an ID?
- Do you have certificate of birth for you and your children?

Infrastructures:

- How do you find the health center and all the state structure?
- What do you think about the road?
- What do you think about the house?
- What do you think about the communication system (TV, Phone, Internet)?

Unemployment:

- Are you suffering because of the unemployment?
- Which kink of jobs you want to do?

The conflict/impact of the conflict:

- Does the conflict impact your life? How?
- At which level this conflict impact your life? Your household? Your village?

ANNEX 2F. FOCUS GROUP DISCUSSION "GRANDPARENT"

After study presentation, demand of consent and rules explication of FDG, translator and analyst lead discussions during 3à minutes.

Care practices

- Who is in charge of the child? Who help you to take care of the babies and children? Do these practices involved?

- Do you evolution in terms of child development?

- Do exist some gender specific care practices? Do they have involved?

Nutrition

- Do exist specific meals for babies, for children? Girls and boys? Was it the same in your young age?

- Do exist specific meals for pregnant woman? For lactating women? Was it the same in your young age?

- What is a good (nutritive) food for you? What is a good meal for you? Did the meals involved?

- Do the lean season is the same than your young age?

Breastfeeding

- Do exist some difference about breastfeeding between tribes?

- The breastfeeding practices involve since your young age?

- Did you gave the first milk to the new born? Why?

- Who teach you to breastfed?

Complementary food

- Did you use porridge to feed the baby? What's kind? At what age you introduced porridge? Why?

- Did you give water at your baby? At what age? What's kind of water (origin)? Do you treat the water? Do the child is sick after water? Do you give any other form of liquid to your baby?

- Did you give liquid medicinal receipts to your baby? At what age you introduce medicinal receipts?

Child sickness

- The children sickness did involved since your young age? Did the seasonal calendar involved?

Reproduction

- Does the birth interval is the same since your young age?

Under-nutrition

- What is undernutrition for you? What are the symptoms of undernutrition?
- What are the causes of undernutrition?
- When a child is undernutrition suffering? What you do? Do you advices? Who? On what?
- Did you have undernutrition cases in your young age?

ANNEX 2G. FOCUS GROUP DISCUSSION "YOUNG PEOPLE"

After study presentation, demand of consent and rules explication of FDG, translator and analyst lead discussions during 20 minutes.

- What is the organization of the village? Does this organization involve? Do you fit into this social organization?
- What is the organization of the usual household? Does this organization involve? Do you fit into this family organization?
- How the young generation is going?
- Do you have any conflicts with the elder generation?
- There is some alcohol or drug issue?
- There is some help for the youngest generation?
- Does the conflict impact your life? How?

Education:

- Did you go to school? Which level? What do you think about school? What were your constraints to access to school?

The government:

- What represent the government for you?
- What are the principal authorities for you?
- Do you have an ID?
- Do you have certificate of birth for you and your children?
- How do you find the health center and all the state structure?

Unemployment:

- Are you suffering because of the unemployment?
- Which kink of jobs you want to do?

Undernutrition:

- What is undernutrition for you? How to avoid undernutrition?

ANNEX 2H. INTERVIEW "KEY-INFORMER"

After study presentation, demand of consent and mains explication of interview, analyst lead discussions with the support of translator during 45 minutes.

Local definition/understanding of malnutrition:

- What means for you undernutrition? How do you define malnutrition?

- How do you recognize a children suffering of undernutrition? How would you describe this child?

- What are the causes of malnutrition? Any behaviour, practices?

- Are there any children that can more likely suffer of malnutrition? Who are they? And why?

- Is malnutrition a disease? If yes, it is contagious?

- Did you notice any change regarding the care practices? Who, when, roles, status, numbers of children?

- Did you notice any change regarding the breastfeeding practices this past years? What kind of? Why did it change?

- Did you notice any change regarding the malnutrition situation these past years?

Livelihood:

- What are the livelihoods in your village?

- What people are coping?

- In the past years, when did you get a big problem to grow food? Why?

- Did one year the market prices went very high Is it easy to go to the market? What can you buy from the market? Are people coming inside to the village to sell food? If yes, what kind of food?

- Is there any shop in the village? What does it sell?

- How people get their food?

- Do people have livestock here? (Which animals?)

- Do you know who prepares the food at home? Who is choosing the food to buy and go to buy it?

- Is there any special items given only to the children?

- Did you notice any change regarding the food receipts and quantity/quality if food? This past years? What kind of? Why did it change?

Health:

- If a child is sick, what the family do first? Where do they go?

- Who take care of the sick child?

- Are some traditional treatments available at the village? What kind? Who gives advice to use this kind of treatments?

- Is immunization done ate the health center? Is it a good or a bad thing?

- Who get more sick girls or boys, or same? Why girls/boys get sicker?

WASH:

-What are your mains sources of water?

- Do you do water treatments?

- Do you have enough sanitation?

ANNEX 2I. INTERVIEW "BIRTH-ATTENDANCE"

After study presentation, demand of consent and mains explication of interview, analyst lead discussions with the support of translator during 25 minutes.

- How do you describe your experience as birth attendant? (How long, who teach you, how many cases)

- Are you official birth attendance? Do you feel close to the academic health system? Do you know "mama kit"?

- Did you notice some evolutions in your practices and observations during your practices?

Care practices and nutrition:

- Did women come get some advices during pregnancy? After pregnancy?

- Do you visit women during the labor or they come? What are the main problems during childbirth?

- What do you advice mothers?

- Do you advice to give first milk? Do you advice about the breastfeeding practices?

- Did the breastfeeding practices involved?

- When do you advice to start water? Complementary feeding?

- Did you give liquid medicinal receipts to your baby? At what age you introduce medicinal receipts?

- What is a good (nutritive) food for you? What is a good meal for you? Did the meals involved?

Child sickness and Reproduction:

- The children sickness did involved? Did the seasonal calendar involved?

- Does the birth interval is the same since your young age?

- Do women ask advices for family planning?

Under-nutrition:

- What is undernutrition for you? What do you advices? Who? On what?

ANNEX 2J. INTERVIEW "TRADITIONAL DOCTOR"

After study presentation, demand of consent and mains explication of interview, analyst lead discussions with the support of translator during 25 minutes.

- How do you describe your experience as Traditional Doctor? (How long, who teach you, how many cases)
- Did you notice some evolutions in your practices and observations during your practices?

Care practices and nutrition:

- Did women come get some advices during pregnancy? After pregnancy?
- What do you advice mothers?
- When do you advice to start water? Complementary feeding?
- What is a good (nutritive) food for you? What is a good meal for you? Did the meals involved?
- Did you give liquid medicinal receipts to your baby? At what age you introduce medicinal receipts?

Under-nutrition:

- What is undernutrition for you? What do you advices? Who? On what?
- What are the causes of undernutrition?
- Did you observe evolutions about undernutrition?
- Does undernutrition can be cause by spirit?
- What do you give in case of undernutrition?
- Do you treat adult case of undernutrition as a child one?

Child sickness and adult health:

- The children sickness did involved? Did the seasonal calendar involved?
- Did adult consult you? For what? Which kind of treatment you give? Did the adult diseases involved?
- What is the price for child sickness and adult sickness?
- Do you have other activities?

ANNEX 2K. INTERVIEW "NUTRITION WITH VULNERABLE WOMAN"

After study presentation, demand of consent and mains explication of interview, analyst led discussions with the support of translator during 20 minutes. These interviews were done during OTP or into household after identification through the community facilitator. This interview is typically comprehensive.

- How old are you? How many children you have? How many are in undernutrition situation?
- Since when your children have undernutrition?
- Do you know whey your child is in this situation?
- Since when are you involved in Nutrition program?
- How do you find your child evolution?
- Do you know why your child is getting better (or not)?
- Do you was sick during pregnancy? Are-you sick now?

Care practices, FSL and WASH:

- Who help you to take care of the babies and children?
- What is the source of incomes into the household?
- Do you have access to water? How? Do you treat water?
- Do you have latrine?

Nutrition and care practices:

- Did you give the first milk? Why?
- How is the breastfeeding with the child?
- When did you give the first water? Why? Do you treat it?
- When did you give the first pap? Why?
- What is a nutritious food for you? Can you give me example?
- Did you give liquid medicinal receipts to your baby? At what age you introduce medicinal receipts?

Child sickness:

- When was the first sickness of the child? How do you manage it?
- What is the most frequent sickness of your child?

Under-nutrition

- What did you change to improve to health/nutrition situation of your child?
- How do you use the Plumpy'Nut? Do you share it? What is Plumpy'Nut for you?
- Are-you into the cash program? How this program improves the situation of the household? Of your child?

ANNEX 2L. INTERVIEW "HEALTH WORKER"

After study presentation, demand of consent and mains explication of interview, analyst lead discussions with the support of translator during 10 minutes.

- How do you describe your experience as Health Worker? (How long, who teach you)
- Did you notice some evolutions in your practices and observations during your practices?

Care practices and nutrition:

- Did women come get some advices during pregnancy? After pregnancy?
- What do you advice mothers?
- When do you advice to start water? Complementary feeding?
- What is a good (nutritive) food for you?
- How ANC is going with women?
- Did you observe some evolutions about care practices (breastfeeding, complementary feeding)?

Under-nutrition:

- What is undernutrition for you? What do you advices? Who? On what?
- What are the causes of undernutrition?
- Did you observe evolutions about undernutrition? And about the seasonal peak of undernutrition?
- Do you treat adult case of undernutrition as a child one?

Child sickness and adult health:

- The children sickness did involved? Did the seasonal calendar involved?
- Did adult consult you? For what? Which kind of treatment you give? Did the adult diseases involved?
- What is the price for child sickness and adult sickness?
- Do you have other activities?

3/ ANNEX N°3: BIRTH ATTENDANT CERTIFICATE AND « MAMA KIT »

Certificate of Birth Attendant delivered by Health Ministry of Yobe State

Mama Kit delivered by Health center to any woman in need

Support kit for birth attendance delivered by Health Ministry of Yobe State

4/ ANNEX N°4: VULNERABLE WOMEN INTERVIEWS TABLE

VILLAGE	MOTHER AGE	NUMBER CHILDREN+ AGE OF UNDERNOURISHED CHILD	INCOME	SICKNESS OF THE CHILDREN	MOTHER SICKNESS DURING THE PREGNANCY – BREASTFEEDING	ANC	BIRTH PLACE AND SUPPORT	COLOSTRUM	FIRST WATER	FIRST PAP
DAN DISA	25	5 (2) 3 years old 9 months	Shop	No Low weight birth[88]	Yes Lack BM[89]	1	Home Good Alone	No (Dirty)	First day	4 months
DAN DISA	25	3 2 years old	Farmer	Yes After	Yes Fever	0	Home Good	Yes	First day	4 months

[88] There is no direct question on the LWB in this questioner. We asked to the mother how was the baby at the birth moment and the few weeks after birth. The LWB declarations are spontaneous.

[89] There is no direct question on the LBM in this questioner. We asked to the mother how was the breastfeeding period. The LBM declarations are spontaneous.

				weaning	Anemia		Mother-in-law			
DAN DISA	28	5 (2) Twins (one year and half)	Shop	Yes Vomit diarrhea Spirit	Yes Lack of BM	2	Home BA Mother	Yes (Hospital)	First day	2 months
DAN DISA	30	4 9 months old	Farmer	Yes Fever	Yes Malaria	2	Home Mother-in-law	No	First day	3 months
DAN DISA	20	2 One year old	Business	Yes Diarrhea	No	1	Home Alone	No	First day	4 months
DEGUBI ZAKAR	20	2 2 years old	Business	Yes After weaning Vomit Diarrhea	Yes Anemia	1	Home BA	No	First day	3 months
DEGUBI ZAKAR	30	3 7 months	Farmer	Yes Low weight	Yes Vomiting	3	Home Difficult	No	First day	4 months

				birth			BA			
DEGUBI ZAKAR	30	6 Two years old	Farmer	Yes Low weight birth	Yes shirking	1	Home Mother	No	First day	1 month
DEGUBI ZAKAR	20	3 (2) 2 years Seven months	Farmer	Yes Diarrhea Fever	Yes Fever	2	Home Good Mother-in-law	No	First day	6 months
DEGUBI ZAKAR	30	7 One years old	Farmer	Yes Diarrhea Vomiting	Yes Pneumonia Olsa	2	Home Difficult Alone	No	First day	5-6 months
DEGUBI ZAKAR	20	2 2 years old	Farmer	Yes Diarrhea	Yes Vomiting	4	Home Difficult Doctor	No	First day	7 months
DEGUBI ZAKAR	20	1 1 years and half	Farmer	Yes Diarrhea	No Lack of BM	6	Home Good, BA	Yes	First day	5 months
DEGUBI ZAKAR	28	3 (2 dead) 9 months	Farmer	Yes Fever,	Yes	0	Home Co-wives	No	First day	3 months

				Diarrhea						
DEGUBI ZAKAR	20	1 2 years old	Farmer	Yes LWB	Yes Lack of BM	3	Home Alone	No	First day	2 months
GARIN KADAI	20	3 3 years old	Farmer	Yes LWB	Yes Lack of BM	0	Home Good, Alone	No	Frist day	2 months
GARIN KADAI	40	11 3 years old	Farmer	Yes No grows well	Yes Anemia Lack of BM	2	Home Good BA	No	First day	3 months
GARIN KADAI	23	5 (2) Twins of 8 months	Farmer	Yes LWB	No	2	Home Good, Alone	No	First day	3 weeks
GARIN KADAI	30	9 1 year old	Shop	Yes Diarrhea Vomiting	Yes Fever	2	Home Good Mother	No	Second day	1 year
GARIN KADAI	25	4 One year old	Farmer	Yes Vomiting	No	1	Home BA, Mother-in-law	No	Frist day	2 months

GARIN GAYE	30	3 Adopt the last one	Begging	Yes Diarrhea	Yes Dead	?	HC	No	First day	First day
GARIN GAYE	34	5 (2) 2 years old 9 months	Farm + business	Yes Low weight birth	No	4	HC	Yes	First day	4 months
GARIN GAYE	25	4 1 (one year old)	Mechanic	Yes Low weight birth	Yes Malaria Lack of BM	6	Home Alone	No	First day	2 months
GARIN GAYE	22	2 (one died) One year old	Farmer	Yes Diarrhea	Yes Fever Lack of BM	8	Home BA	No	2 months	3 months
GARIN GAYE	25	4 9 months	Farmer	No	Yes Lack of BM	1	Home BA	No	First day	2 months
GARIN KOLO	25	5 (2) 2 years old 7 months	Fisher	Yes After weaning Diarrhea	Yes	1	Home Mother	No	First day	2 months

GARIN KOLO	17	1 1 year old	Farmer	Yes Diarrhea	Yes Malaria	1	HC Difficult	No Problem in HC	First day	3 months
GARIN KOLO	25	5 1 year old and half	Farmer	Yes LWB, Diarrhea	No	8	Home Alone	No	First day	6 months
GARIN KOLO	30	2 (2 dead) 9 months	Farmer	Yes Fever, Vomit, Diarrhea	Yes Anemia Lack of BM	10	Home Alone	No	First day	4 months
GARIN KOLO	20	3 One year old	Farmer	No	Yes Lack of BM	1	Home BA	No	First day	2 months

5/ ANNEX N°5: OPERATORY CHAIN OF WATER COLLECTION

(with Hussaini Ibn Mohammed, Anthropologist assistant)

Step 1: Water extraction

Step 2: Transfer of the water form the bag into another container

Step 3: use of balance disposal to transport the water into the household

6/ ANNEX N°6: DISEASES LEXICA

ENGLISH	HAUSA	KARAÏ-KARAÏ
Anemia	Rashinjini	Dartau don
Asthma	Asma	Asma
Back Pain	Ciwon baya	Fada mau bai
Bleeding	Zubansini	Tabe mau don
Blood pressure	Hawansini	Dina mau don
Cancer	Jesi	Riya
Chicken pox	Mai kobo	Kobo-kobo
Cholera	Kwalara	Kwalara

Coughing	Tari	Jaba
Diarrhea	Zawayi	Isha-Ishe
Epilepsy	Farfadiya	Ngate
Eyes pain	Ciwon idau	Fada mau idau
Fever	Zazzabi	Zazzabi
Headache	Chiwonkai	Fada mau kah
Heart pain	Ciwon zuciya	Fada mau zimbulum
Hepatitis	Ciwon siga	Ciwo mau siga
Liver problem	Ciwon hanta	Fada mau hanta
Measles	Kenda	Kwafcharau
Meningitis	Sankarau	Sankarau
Perianal ulcer	Rana	Fati
Pile	Basir	Basuru
Polio	Shan'inna	Gwadala mau ure
Sickle cue	Sanyin Kashi	Daba-dabe mau don
Stomach pain	Ciwon ciki	Fada mau akau

Swelling	Kumburi	Saaki
Ulcer	Olsa	Olsa
Vomiting	Amai	La'e

7/ ANNEX N°7: PRINCIPAL FOOD RECIPES

ANNEX N°7A: GENERAL FOOD RECIPES

NAME	RECIPE
Akara – Moi moi	Beans, water, onions, oil, pepper, cube, salt
Bobo soup	Bobo leafs (granded), water, daddawa (kaiwa), palm oil, potash, beans, soalt, cube, pepper (Meat or fish if you have)
Danwake	Beans, Bambara nut, millet or sorghum (granded), potash, bobo powder, water non boiled
Dambu	Moringa leaf, groundnut, onions, water from the boiling of moringa, oil, pepper, cube, salt (Millet, maize or Bambara nut if you have it)

Gayan Waye	Beans, potash, bobo leaf, water, oil, pepper
Gogale	Beans, Bambara nut, millet, sorghum, potash, eaten inside bobo leaf
Jabi	Millet, sorghum, beans, groundnut, onions, water, salt, cube
Kutau Soup/ Miyau Toka	Bobo leaf, toka, water, onions, pepper, cube
Lamba	Beans, sorghum, Bambara nut, sessem leaf, beans leaf, potash
Tuwo	Millet, maiz or sorghum (granded), boiled water
Waina	Beans, Bambara nut, bobo leaf, potash, water non boiled, salt
Yam and beans potage	Yam, beans, vegetable, meat or fish, onion leafs, water, pepper, salt, cube, palm oil

ANNEX N°7B: FOOD/MEDICINAL RECIPES FOR PREGNANT WOMAN

Zorbo for pregnant woman (drain amniotic water, diurétique)	Bobo leaf, ginger and water, drink the boiled water without sugar (with sugar it's called Zaïki)
Sirki for pregnant woman (close to the due date	Millet of sorghum (granded), cold water, sugar, ginger
Kurbau soup "rossu" (after birth)	Gurguzu, onion leafs, potash, water, pepper, salt, cube

ANNEX N°7C: FOOD RECIPES FOR CHILDREN

Pap for children	Wash the millet, blend it, sieve it, use boiled water to mix it
Awara for children	Soya beans, non boiled water, oil, salt, pepper

8/ ANNEX N°8: PRINCIPAL MEDICINAL RECIPES

NAME OF THE DISEASE	HERBAL RECIPES
Cough	Cow milk oil, garlic, ginger
Diarrhea	Oarti, sel and sugar
Fever	Gasaya, garafunu (drink or massage)
Rana	Saiwai, trya, sabara, hararrabi, dorawo, hankuka, kirya, taura, guava, garisi, gabarawa, dorawa: dry it, ground it + pap or water
Measles	Deyi, lime leafs, cassava leafs, onions, honey
Malaria	Dorawa, Ituren paul
Typhoid	Dorawa, Ituren paul

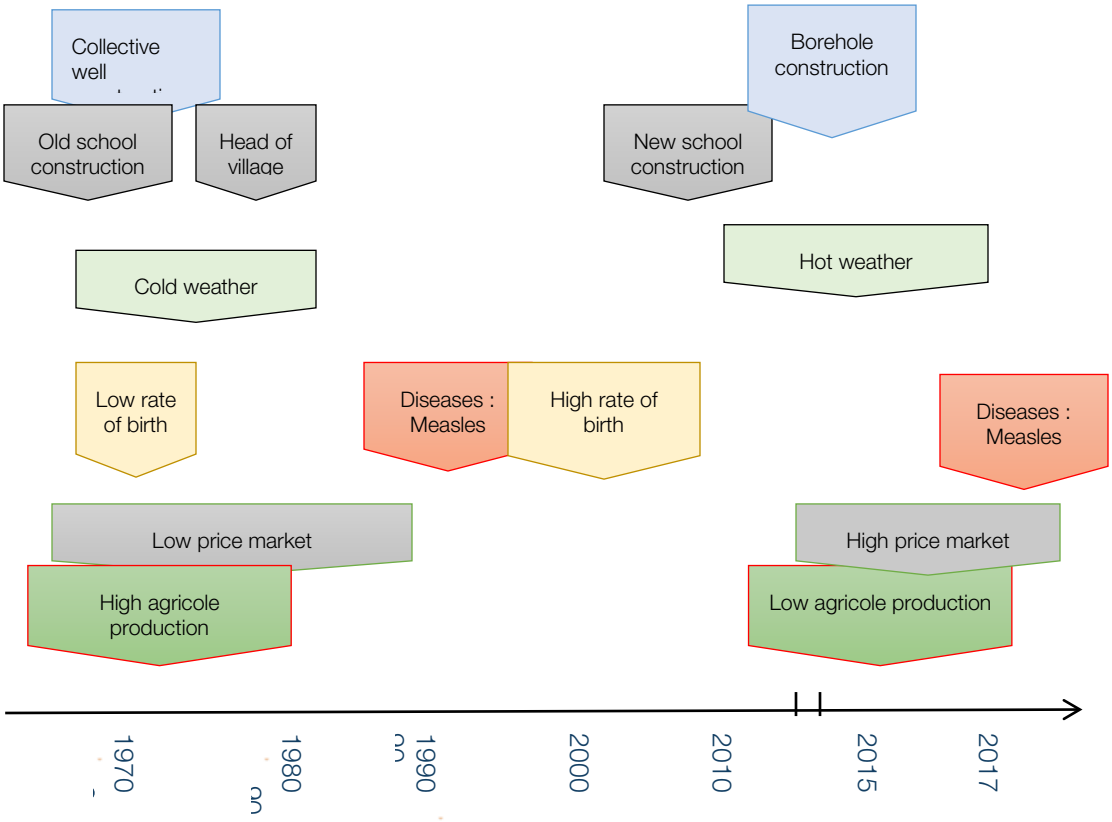
9/ ANNEX N°9: SEASONAL AND HISTORICAL CALENDAR BY VILLAGE

ANNEX N°9A: SEASONAL CALENDAR OF *DEGUBI ZAKAR*

Seasonal variation	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal variation of the undernutrition												
Weakness of food availability			Lean season									
Seasonal characteristics												
Rain season												
Cold season												
Hit season												
Wind season												
Seasonal disasters		Drought				Floods						
Seasonal increased of market prices												
Market price												
Seasonal disease factor												
Diarrhea												
Malaria												
IRA												
Typhoid												

Seasonal calendar of the activities												
Agriculture			Land preparation		Planting	Weeding			Harvest			
Millet												
Sorghum												
Groundnut												
Livestock	Vaccin		Calving season for ovine								Ovine reproduction	
Divers												
Festivity			Weddings period									
School												

ANNEX 9B: HISTORICAL CALENDAR OF *DEGUBI ZAKAR*

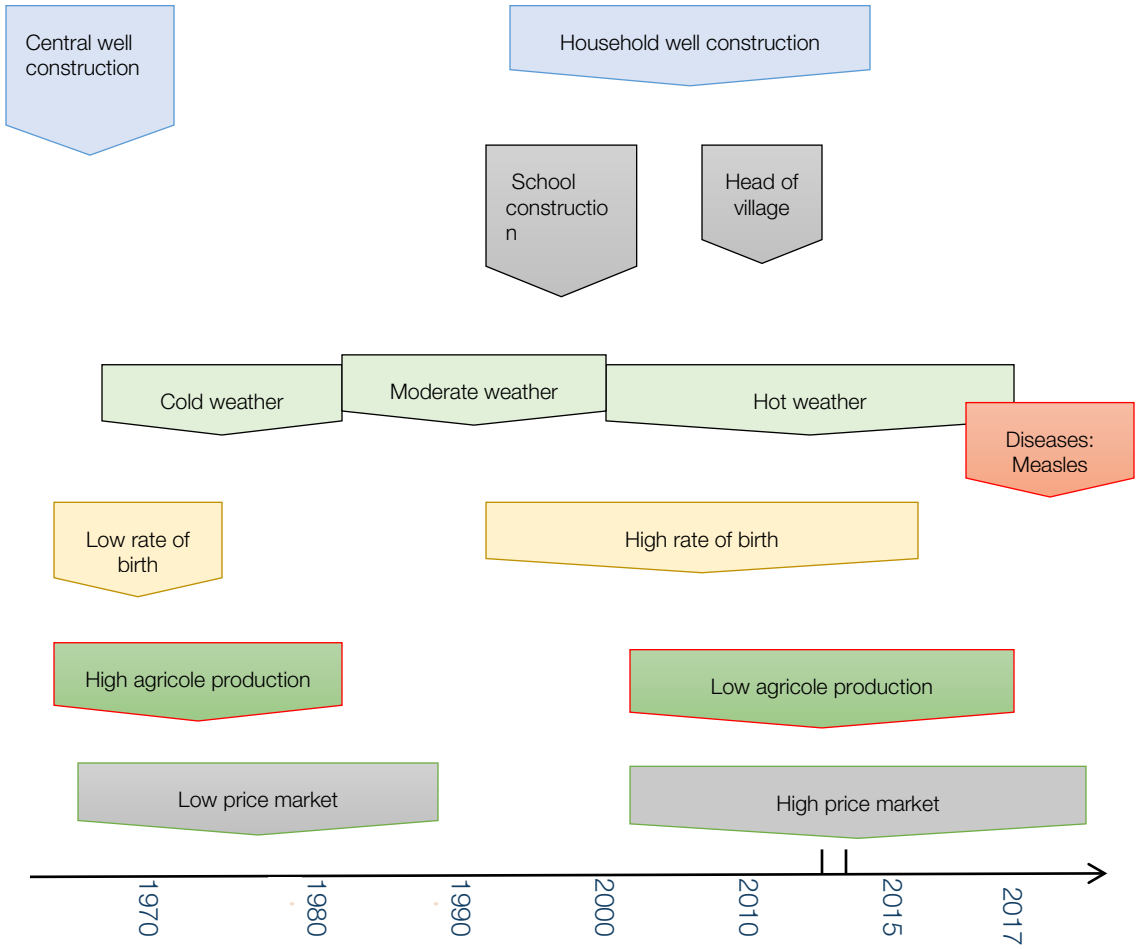


ANNEX 9C: SEASONAL CALENDAR OF *GARIN GAYE*

Seasonal variation	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal variation of the undernutrition												
Weakness of food availability						Lean season						
Seasonal characteristics												
Rain season												
Cold season												
Hit season												
Wind season												
Seasonal disasters		Drought					Floods					
Seasonal increased of market prices												
Market price												
Seasonal disease factor												
Diarrhea												
Malaria												
IRA												
Typhoid												
Seasonal calendar of the activities												
Agriculture			Land preparation		Planting	Weeding			Harvest			
Millet												
Sorghum												
Groundnut												

Livestock	Vaccin		Calving season for ovine						Ovine reproduction		
Divers											
Festivity			Weddings period								
School											

ANNEX 9D: HISTORICAL CALENDAR OF *GARIN GAYE*

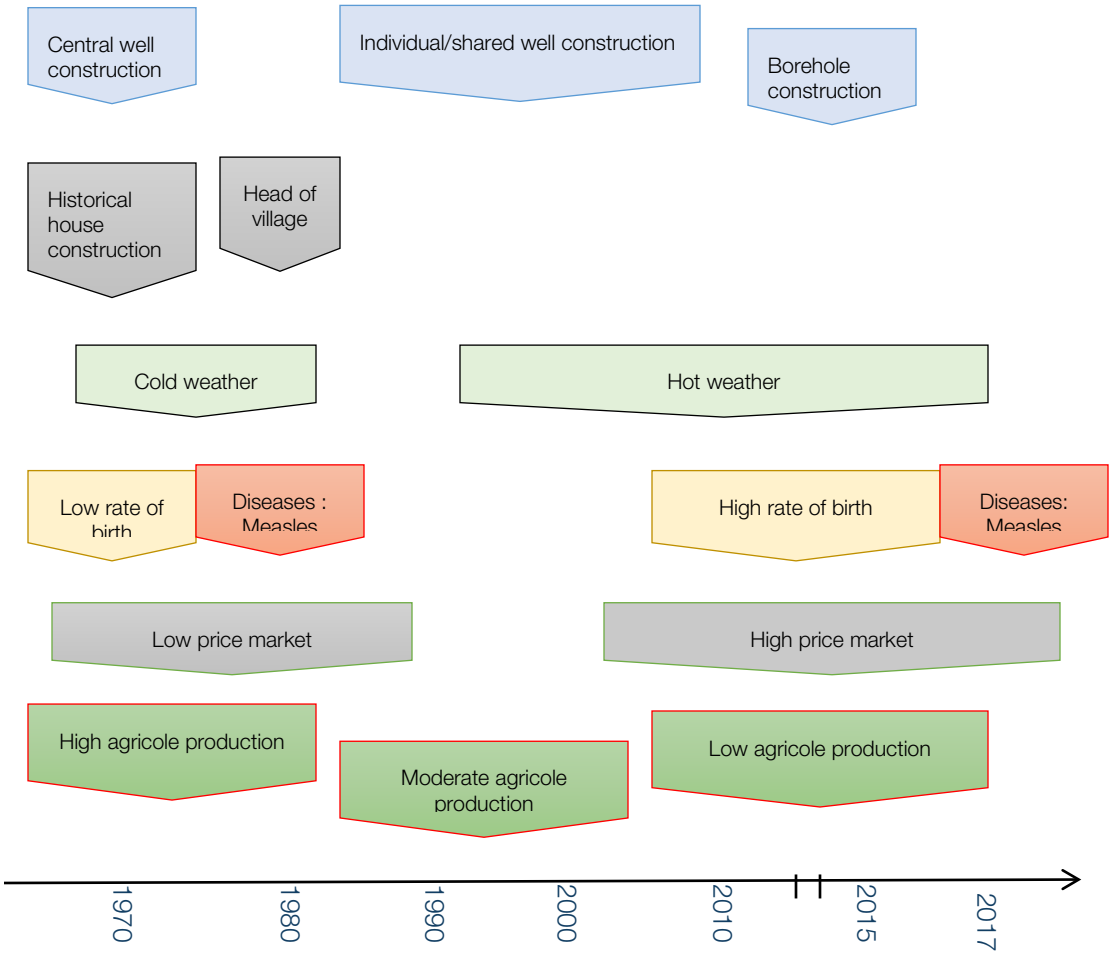


ANNEX 9E: SEASONAL CALENDAR OF *GARIN KADAÏ*

Seasonal variation	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal variation of the undernutrition												
Weakness of food availability						Lean season						
Seasonal characteristics												
Rain season												
Cold season												
Hit season												
Wind season												
Seasonal disasters		Drought					Floods					
Seasonal increased of market prices												
Market price												
Seasonal disease factor												
Diarrhea												
Malaria												
IRA												
Typhoid												
Seasonal calendar of the activities												
Agriculture			Land preparation		Planting	Weeding			Harvest			
Millet												
Sorghum												
Groundnut												
Livestock	Vaccin		Calving season for ovine								Ovine reproduction	

Divers												
Festivity			Weddings period									
School												

ANNEX 9F: HISTORICAL CALENDAR OF *GARIN KADAÏ*

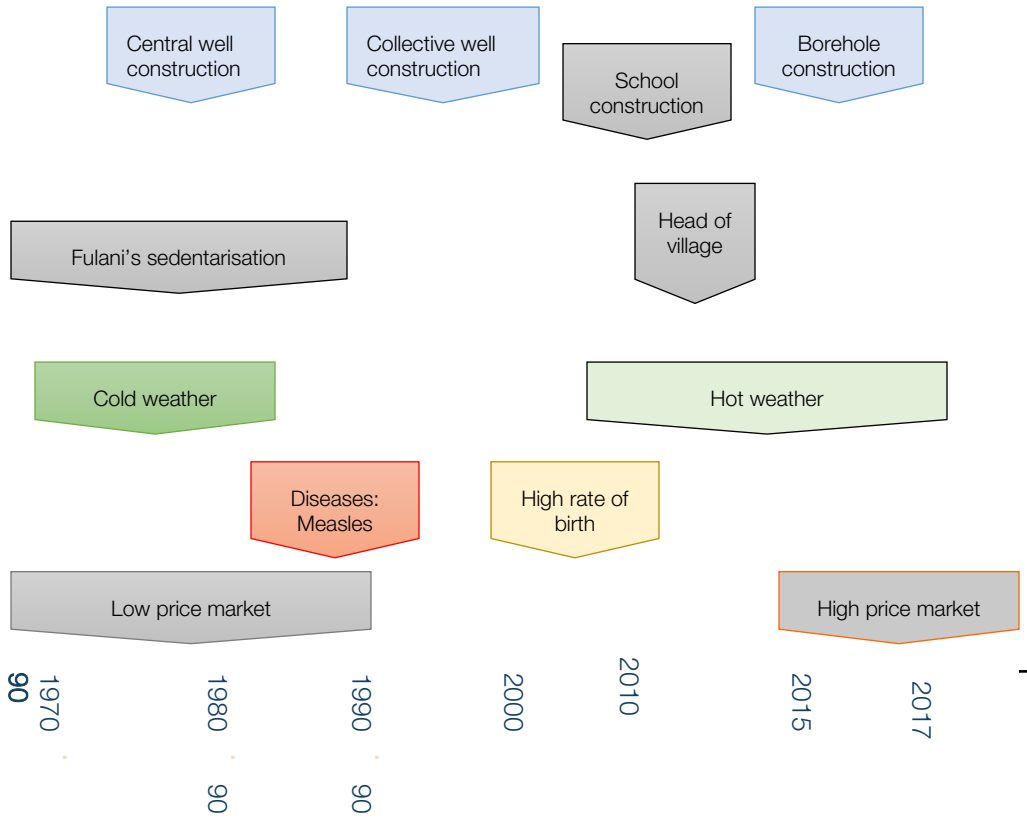


ANNEX 9G: SEASONAL CALENDAR OF *GARIN KOLO*

Seasonal variation	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal variation of the undernutrition												
Weakness of food availability						Lean season						
Seasonal characteristics												
Rain season												
Cold season												
Hit season												
Wind season												
Seasonal disasters			Drought			Floods						
Seasonal increased of market prices												
Market price												
Seasonal disease factor												
Diarrhea												
Malaria												
IRA												
Typhoid												
Seasonal calendar of the activities												
Agriculture			Land preparation		Planting	Weeding				Harvest		
Millet												
Sorghum												
Groundnut												
Livestock			Calving season for ovine								Ovine reproduction	

Divers				
Festivity			Weddings period	
School	No school			

ANNEX 9H: HISTORICAL CALENDAR OF *GARIN KOLO*

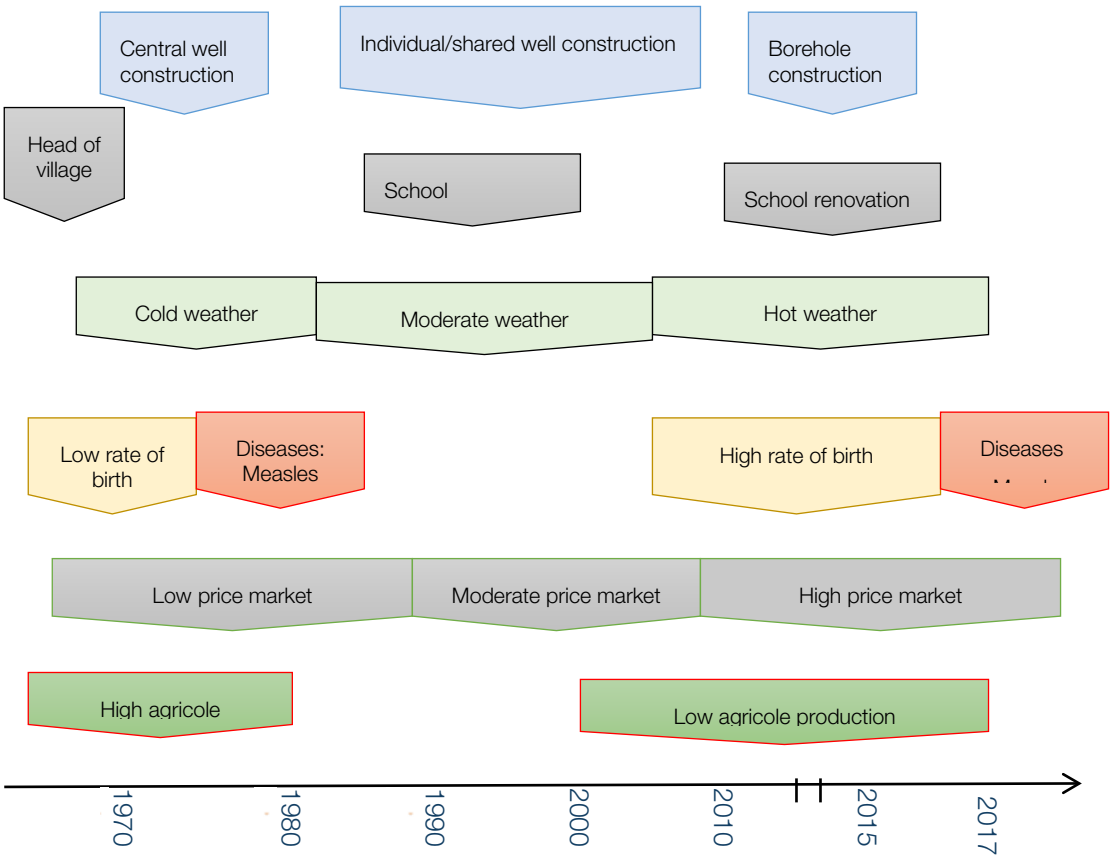


ANNEX 9I: SEASONAL CALENDAR OF *DAN DISA*

Seasonal variation	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal variation of the undernutrition												
Weakness of food availability						Lean season						
Seasonal characteristics												
Rain season												
Cold season												
Hit season												
Wind season												
Seasonal disasters		Drought					Floods					
Seasonal increased of market prices												
Market price												
Seasonal disease factor												
Diarrhea												
Malaria												
IRA												
Typhoid												
Seasonal calendar of the activities												
Agriculture			Land preparation		Planting	Weeding			Harvest			
Millet												
Sorghum												
Groundnut												
Livestock			Calving season for ovine								Ovine reproduction	
Divers												
Festivity			Weddings period									
School												

Electricity												

ANNEX 9J: HISTORICAL CALENDAR OF *DAN DISA*



Official Holydays: New Year's Day: 1st January; Good Friday: 14th April; Easter Monday: 17th April; Workers' Day: 1st May; Democracy Day: 29th May; Eid el Fitr (End of Ramadan); Independence Day: 1st October; Eid el Kabir (Feast of Sacrifice); Eid el Maulud (Birth of the Prophet Muhammad); Christmas Day: 25th December 2017; Boxing Day: 26th December 2017

10/ ANNEX N°10: LINK NCA EXPERT RATING GRID

SOURCE OF INFORMATION	NOTES
STRENGTH AND CONSISTENCY ACROSS CONTEXTS OF ASSOCIATION BETWEEN THE RISK FACTOR AND UNDER-NUTRITION (FROM THE PATHWAYS TO UNDER-NUTRITION MODULE)	[-] NA: only risk factors having a demonstrated association with undernutrition are considered in the Pathways to Undernutrition Module [-] 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 Link NCA
SEASONALITY AND MEDIUM-TERM TRENDS OF RISK FACTOR RELATED TO SEASONALITY AND MEDIUM-TERM TRENDS OF UNDER-NUTRITION (APPLIES MAINLY FOR WASTING)	[-] The 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 COMMUNITY	[-] 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

CATEGORY	CRITERIA
MAJOR RISK FACTOR	No contradictory information AND Strength of association from literature review is classified as [++] or [+++] AND

	Majority of [++] or [+++] for all other sources of information
IMPORTANT RISK FACTOR	A minor amount of contradictory information exists AND Strength of association from literature review is classified as [++] or [+++] AND Majority of [++] or [+++] for all other sources of information
MINOR RISK FACTOR	A moderate level of contradictory information is permitted AND Strength of association from literature review is classified as [+] or [++] AND Majority of [+] for all other sources of information
REJECTED RISK FACTOR	No contradictory information AND Majority of [-] or [+] for all sources of information

nk
ca

USAL ANALYSIS

ACTION AGAINST HUNGER

The Link NCA methodology was developed by Action Against Hunger – France with technical support from our scientific committee including multi-sectorial experts and eminent scientists from Tufts University | Friedman School of Nutrition Science and Policy, the French Institute for Development Research (IRD), and World Food Program (WFP).

Its development was made possible by the funding provided by:

USAID
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