Mapping the Nutrition Landscape in Mali: Defining Opportunities for Action

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Landscape Review and Action Plan

Prepared for USAID/Mali
by

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List of Acronyms

ACDI/VOCA	Agricultural Cooperative Development International and Volunteers in Overseas Cooperative Assistance
AMEPPE	L'Association Malienne pour l'Éducation du Public et la Protection de l'Environnement
ASACO	Association de Santé Communautaire
ATN Plus	Assistance Technique Nationale Plus
AVRDC	Asian Vegetable Research Development Center
BCC	Behavior Change Communication
BMI	Body Mass Index
CARE Mali	Cooperative for Assistance and Relief Everywhere, Mali
CMAM	Community Management of Acute Malnutrition
CQ	Chloroquine
CRS	Catholic Relief Services
CSCOM	Centres de Santé Communautaires
CSREF	Centre de Santé de Référence
DHS	Demographic and Health Surveys
EBSAN 1	Étude de Base de la Sécurité Alimentaire et de la Nutrition I
EBSAN II	Étude de Base de la Sécurité Alimentaire et de la Nutrition II
FAO	UN Food and Agriculture Organization
FEWSNET	Famine Early Warning Systems Network
FtF	USAID Feed the Future
GAM	Global Acute Malnutrition
GHI	USAID Global Health Initiative
GIS	Geographic Information Systems
HEARTH	Positive Deviance/Hearth
HKI	Helen Keller International
I/FS	Iron-folate supplements
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IER	Institut D'Economie Rurale
IICEM	Initiatives Intégrées pour la Croissance Economique au Mali
INSORTMIL CRSP	International Sorghum and Millet Collaborative Research Support Program
IPR-IFRA	Institut Polytechnique Rurale de Formation et de Recherche Applique
IPTp	Intermittent Preventive Treatment of Malaria (Sulfadoxine-pyrimethamine)
LICNAG	Linkages between Agricultural Productivity Growth and Childhood Nutrition
MCA/Mali	Millennium Challenges Account, Mali

MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
MRDR	Modified Relative Dose Response Test
MRTC	Malaria Research and Training Center, University of Bamako
MYAP	Multi Year Assistance Program
NGOS	Non Governmental Organizations
NMCP	National Malaria Control Program
NTD	Neglected Tropical Diseases
Nutrition CRSP-Africa	Nutrition Collaborative Research Support Program-Africa
ORS	Oral Rehydration Solution
ORT	Oral Rehydration Therapy
PMI	President's Malaria Initiative
PNIP-SA	Programme National d'Investissement Prioritaire du Secteur agricole
PNPCMA	Protocole Nationale de Prise en Charge de la Malnutrition Aiguë
PRODRESS II	Programme de Développement Sanitaire et Social
PSNAN	Plan Stratégique National pour l'Alimentation et la Nutrition: 2005-2009
REACH	(no acronym)
SAM	Severe Acute Malnutrition
Save Canada	Save the Children Canada
Save US	Save the Children USA
SIAN	Semaine d'Intensification des Activités de Nutrition
SP	Sulfadoxine-pyrimethamine
SUN	Scaling up Nutrition Initiative
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USAID/Mali	United States Agency for International Development Mission in Mali
USAID/Mali AEG	United States Agency for International Development Mission in Mali, Agriculture and Economic Growth Team
WASA	West Africa Seed Association
WASH	Water, Sanitation and Hygiene
WFP	United Nations World Food Programme
WHO	World Health Organization

Executive Summary

Nutrition is linked directly or indirectly to all the Millennium Development Goals and some progress has been made in achieving the goals. While many countries are on track on achieving some of the goals, 54 nations are making insufficient progress or none at all (1) including Mali. (2). Mali faces a population growth rate of 3.6% with its population having grown from 9.8 million to 15 million from 1998 to 2009 (3, 4). Despite economic growth since 1994, Mali has 64% of the population living under the poverty threshold with majority of its economy driven by agriculture and its economic performance. Malnutrition rates (both child and maternal, chronic and acute) are high as are rates of morbidity and mortality. Insufficient funding, access to human resources, high infectious disease environment with lack of access to safe drinking water and good hygiene are major concerns (3).

The Feed the Future initiative is a strategic and analytical approach to accelerate progress in achieving the Millennium Development goals of reducing the proportion of people living in extreme poverty and suffering from hunger by half by 2015. It emphasizes the importance of leveraging science and technology and encourages new collaborations and flexible partnerships with a broad range of partners including the private sector. The aim of the Global Health Initiative is to improve health outcomes through strengthened health systems targeting maternal, newborn and child health outcomes with programs targeting infectious disease, nutrition, health and safe water supply. In addition, improving metrics, monitoring and evaluation and promoting research and innovation are common themes across Feed the Future and the Global Health Initiative (5).

Within this context, the Nutrition CRSP –Africa team has worked with USAID/Mali to develop a framework of action under the auspices of USAID Feed the Future in Mali. The aim of the report and activity is to provide USAID/Mali with a clear picture on the landscape of nutrition, health and agriculture activities as well as develop a package of interventions with the Malian context.

The objectives were:

1. To provide USAID/Mali with an analysis of the nutrition landscape in Mali in order to understand the overlaps and target areas of intervention (nutrition, health, sanitation),
2. To assist USAID/Mali in identifying identify vulnerable communities and opportunities for intervention (including nontraditional sectors such as governance or education),
3. To identify opportunities for USAID/Mali to link activities in health sector to those in the economic growth, rural development and agriculture sectors,
4. To determine USAID's comparative advantage in the area of scientific research, capacity building and program implementation targeting nutrition, health and agriculture, and
5. To facilitate a consultative process to develop a mission-wide inter-sectoral nutrition strategy.

The Nutrition CRSP team undertook literature reviews, data collection of nutrition activities by region, commune and cercle in country and conducted key informant interviews. Interviews were held with Government of Mali, UN agencies, international and local NGOS as well as academic

institutions. Field visits were conducted in two regions of Mali (Segou and Mopti). Data collected on programming and research activities were analyzed for frequency of occurrence by region, commune, cercle and type of organization. Information collected was used to understand the current policy environment, current programming environment (type of programming and geographic coverage), research activities around agriculture, health and nutrition, issues and constraints in programming and research, opportunities for investment and the potential niche for USAID/Mali within these contexts.

There is currently high-level movement in the policy realm on making nutrition a priority action across various sectors with a single executive agency to work across different government stakeholders/agencies. Donors including bilateral agencies such as USAID/Mali and UN agencies are working actively in enabling the policy environment around the development of the single agency and the alignment of priorities across the different sectors with reference to nutrition.

A review of the nutrition situation in Mali indicates that despite a reduction in rates of malnutrition, stunting rates are higher than 25% in all regions except Bamako. Regions like such as Sikasso, Segou and Timbuktu have the rates greater than 30%. Exclusive breast feeding rates are still low at 20% (over 6 month period) with most women pre-dominantly breastfeeding introducing other liquids such as water, honey and other non milk liquids as early as 1 month of age. Complementary feeding practices are poor across all regions with only 27% of Malian infants receiving a semi-solid or solid food between 6-8 months of age (the recommended age for introduction of complementary foods). Furthermore dietary diversity is poor with only 16% of infants having a diverse diet while only 7% of infants meet the requirements for a minimum acceptable diet and only 21% receive animal source foods through before the age of two years.

Examining NGO and UN activities across the regions and communes shows extensive presence with over 95% of communes (682 out of 702) exposed to either a programmatic intervention or a research activity with several regions having more than 4 interventions per commune. Activities range from advocacy, policy enabling and technical assistance to the Ministry of Health, national and regional level implementation of activities focused on improving agricultural productivity, capacity strengthening of high impact health services, SIAN as well as community level interventions utilizing community mobilization, HEARTH model (Positive deviance) targeting nutrition, health, food security and improving agricultural productivity at the community level. However lack of appropriate monitoring and evaluation systems do not permit further analyses of the impact of these intervention activities as well as understand the sustainability of programmatic actions.

The review allowed the Nutrition CRSP to identify key needs in Mali, which led to the identification of key priority actions for investment. The implementation of these actions would be of strategic advantage for USAID/Mali, and are USAID/Mali's niche within nutrition considering the existing need, the current policy environment and the ongoing activities in Mali.

The prioritized interventions include:

1. Increasing rates of exclusive breast-feeding

2. Improving access of high quality complementary foods through market development
3. Increasing access to iron/folate supplementation linked to intermittent preventive malaria treatment
4. Increasing access to hand washing messages and low cost soap to target hygiene practices and reduce disease transmission.

The implementation of the set of prioritized interventions would have the strategic objective of ***improving the nutritional status of women and children less than two years of age as well as reducing the risk of morbidity and mortality associated with poor nutrition outcomes.*** The program would focus on utilizing BCC (Behavior Change Communication) and social marketing to target breast-feeding rates, improve the use of iron/folate supplements coupled with IPTp and use of soap and hand washing at the household level. The program would incorporate market development interventions for making accessible high quality complementary foods. In areas with poor access to markets due to economic constraints, programmatic delivery through social transfer (vouchers) would be implemented to provide access to high quality complementary foods and low cost soap.

The key overall results would be a reduction in the percentage of children under two years of age who are classified as undernourished according to three anthropometric indices including height for age, weight for age and weight for height, disaggregated by demographic/background characteristics including gender, ethnicity and socio-economic status. In addition the percentage of neonatal and the percentage of infant deaths and percentage of low birth weight babies will be reduced. For women the key results are the percentage of pregnant women with anemia will be reduced as will the percentage of pregnant women with malaria.

The anticipated intermediate results of such an implementation are as follows:

IR 1: Improved rates of exclusive breast-feeding through a behavior change communication program
IR 2: Improve access to high value complementary foods through market development including value chain development; quality certification and marketing of locally produced foods of high nutrient density and digestibility
IR 3: Iron/folate supplementation linked to intermittent preventive malaria treatment (IPTp)
IR 4: Increase use of soap for frequent hand-washing to cut disease transmission

Implementation of the prioritized set of intervention should be accompanied by a robust external monitoring and evaluation system to generate evidence base on program effectiveness would allow future decision-making. An outline of illustrative intervention design for each IR, illustrative impact indicators and expected impact are provided in the report.

Background

Introduction

Addressing under-nutrition is a critical and cost effective intervention towards addressing poverty and driving social and economic development. Nutrition is linked directly or indirectly to all the Millennium Development Goals (MDG) and while some progress has been made in achieving the goals, 54 nations including Mali are making insufficient progress (1). In Mali, with the exception of improving maternal health (which is off track), the rest of the goals could be achieved if some changes are made (2).

Mali's population has grown from 9.8 million in 1998 to 12 million in 2006 and approximately 15 million in 2009 (3, 4) with an annual growth rate of 3.6%. As of 2006, 46% of the population was under the age of 15 and about three quarters of the population lived in rural areas (3). According to the 2009 census, Sikasso region has the highest population density (18%) followed by Koulikoro (16.7%) and Segou (16.1%). In contrast the regions of Kidal, Gao and Timbuktu have low population densities (0.5%, 3.7% and 4.7% respectively) (3) . Despite improved economic growth since 1994, Mali has 64% of the population living under the poverty threshold. Mali's economy is primarily agrarian with economic performance dictated by climate conditions, global commerce fluctuations, and exchange rates. However, of the 3.2 million available hectares only 7% is cultivated for farming or livestock production. The country's water is supplied by the Niger and Senegal rivers (6). Its two principal global exports are gold and cotton, while its main export within Africa is livestock. Mali remains heavily dependent on foreign development aid, which makes up 9% of its GDP.

Globally, maternal and child under nutrition contributes towards 3.5 million deaths or 35% of disease burden in children fewer than five years of age (7) while intra-uterine growth restriction along with stunting and severe wasting contributes to 2.2 million deaths. Morbidity and mortality rates are high in Mali as are rates of acute and chronic malnutrition in children. Insufficient funding, access to human resources, high rates of infectious diseases with lack of access to safe drinking water and good hygiene are major concerns (3). Under five mortality is reported at 191 per 1000 (under the age of five) whilst infant mortality is 96 per 1000 children (under age one) (3). The risk of child mortality is 48% higher in the rural areas than in the urban areas with child survival being positively affected by level of education of mother, residence (urban versus rural) and household income.

The USAID Feed the Future initiative is a strategic and analytical approach to accelerate progress in achieving the Millennium Development goals of reducing the proportion of people living in extreme poverty and suffering from hunger by half by 2015. It emphasizes the importance of leveraging science and technology and encourages new collaborations and flexible partnerships with a broad range of partners including the private sector. The USAID FtF results framework is provided in Annex 1. While the USAID Global Health Initiative aims to improve health outcomes through strengthened health systems targeting maternal, newborn and child health outcomes with programs targeting infectious disease, nutrition, health and safe water supply. In addition, improving metrics, monitoring and evaluation and promoting research and

innovation are common themes across both initiatives (5). These are in line with global initiatives such as REACH and Scaling up Nutrition (SUN) Framework. While there are no simple prescriptions, evidence suggests that high coverage with a package of proven interventions can have a sizeable effect on tackling under nutrition but while there is agreement on the range of interventions that on scale up would tackle the situation, evidence on how to scale up is weak and or non existent (8). Within this context the need to integrate nutrition programming and policy with actions across multiple sectors has been clearly stated. Globally emphasis has also been placed on multi-sectoral approaches and the need to incorporate nutrition interventions into agriculture, livelihoods, health and sanitation programs within country level agendas (9).

Within this context, the Nutrition CRSP –Africa team has worked with USAID/Mali to develop a framework of action under USAID Feed the Future Initiative. The aim of the activity was to provide USAID/Mali with a clear picture on the landscape of nutrition, health and agriculture activities as well as develop a package of interventions within the Malian context. The objectives of the activity are described below.

Objectives

The objectives of this activity were:

6. To provide USAID/Mali with an analysis of the nutrition landscape in Mali in order to understand the overlaps and target areas of intervention (nutrition, health, sanitation),
7. To assist USAID/Mali in identifying identify vulnerable communities and opportunities for intervention (including nontraditional sectors such as governance or education),
8. To identify opportunities for USAID/Mali to link activities in health sector to those in the economic growth, rural development and agriculture sectors,
9. To determine USAID's comparative advantage in the area of scientific research, capacity building and program implementation targeting nutrition, health and agriculture, and
10. To facilitate a consultative process to develop a mission-wide inter-sectoral nutrition strategy.

Methodology

The activity is the outcome of interactions between USAID/Mali (AEG and Health team) and Nutrition CRSP- Africa. It involved in country data collection followed by a synthesis, preparation and presentation of report. The methods utilized in the development of this report and action plan for implementation include the following

1. Review of existing literature in Mali (provided by USAID/Mali, obtained from implementing partners, obtained through searches on the internet for global/region specific literature),
2. Interviews with USAID/Mali Health Team, USAID/Mali Program Office, debriefing with USAID/Mali AEG team and MCA/Mali.
3. Key informant interviews were conducted with:

a. The Division of Nutrition, Ministry of Health, the Ministry of Fisheries (Aquafish CRSP), the Malaria Research and Training Center at the University of Bamako, (MRTC) and the Institut Polytechnique Rurale de Formation et de Recherche Applique at the University of Bamako (IPR-IFRA).
b. UN agencies including the United Nations Children's Fund (UNICEF) and the World Food Programme (WFP).
c. International and local non-governmental agencies/program including Assistance Technique Nationale Plus (ATN Plus/Abt Associates), Catholic Relief Services (CRS), Care Mali, Keneya Ciwara, Helen Keller International, Africare, Save the Children (US/Canada), Initiatives Integrees pour la Croissance Economique au Mali (IICEM), ACDI/VOCA (Millennium Challenges Corporation program), Millennium Villages project, AMEPPE and AfriCare.
d. Research institutions including International Crops Research Institute for Semi-Arid Tropics (ICRISAT) and AVDRC and the International Sorghum and Millet CRSP (INTSORMIL CRSP) at the Institut D'Economie Rurale (IER).
e. Regional organizations such as the West Africa Seed Association (WASA).

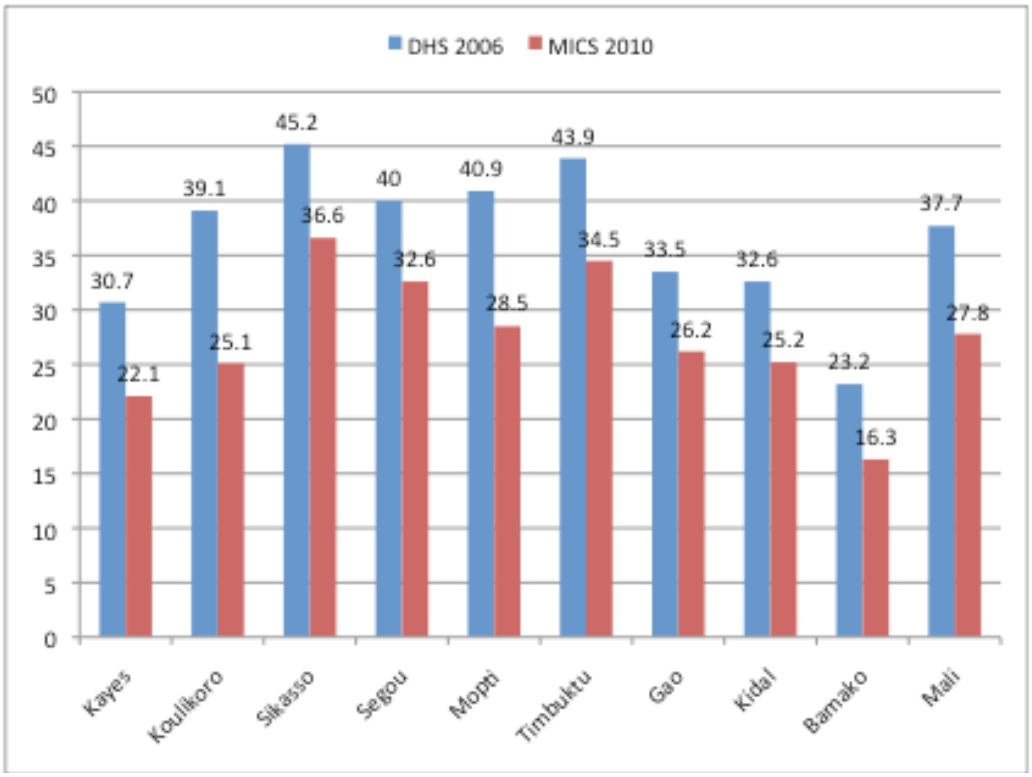
4. Field visits were conducted in Segou and Mopti regions:
    a. Segou: Programs visited included the Millennium Villages Project in the villages of the Markala district, the MCA/Mali project in Niono and Alatona areas of Segou.
    b. Mopti: Programs visited included the USAID funded MYAP implemented by CRS in Douentza district) and the "Bonne Nutrition Pour Les Enfants" implemented by CARE Mali in the Bandiagara area of Mopti.
5. Data were collected and analyzed on programming and research activities by organization, region and commune.
    a. Data included type of activity, geographic coverage disaggregated by region, cercle and commune and in many cases by village.
    b. Data were coded for type of activity as well as for geographic coverage with unique code identifiers from USAID/Mali GIS database for region, cercle and commune.
    c. All data were compiled in Microsoft Excel and SPSS.
    d. Frequency of occurrence of activity by region, commune, cercle and type of organization was calculated using SPSS.
    e. Data were provided to USAID/Mali GIS unit (January 20, 2011) for geo-mapping exercises.

Nutrition and Health in Mali

Child Malnutrition in Mali

Stunting, wasting and underweight are the three key indicators used to depict rates of malnutrition in children under the age of five. In Mali, prevalence estimates on stunting, wasting and underweight are available from DHS and MICS surveys. In Mali, the 2010 MICS shows a distinct reduction of rates of both chronic and acute malnutrition, a pattern consistent across regions when compared to the DHS 2006 (3, 10).

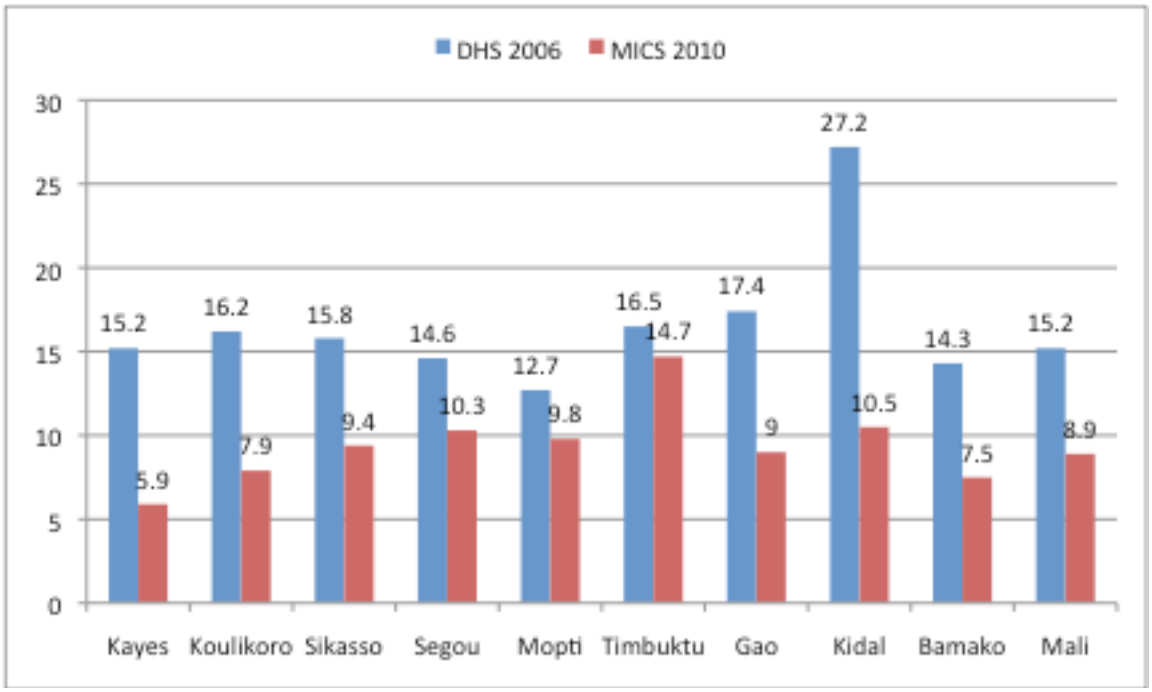
Figure 1: Comparison of prevalence of stunting in DHS 2006 to MICS 2010 (by region)



Source: (3, 10)

Stunting rates (chronic malnutrition) reduced substantially between the two surveys from 37% to 28% (Figure 1), the change being consistent across all regions and across gender and type of residence (rural/urban) (data not shown). Current stunting rates range from 16% in Bamako to 36% in Sikasso. Rates in Segou and Mopti are 32.6 and 28.5% respectively (MICS 2010). Global acute malnutrition (GAM) as represented by moderate wasting (Figure 2) has significantly reduced across all regions. GAM rates were as high as 27% in Kidal to 12.7% in Mopti in 2006. Rates according to the MICS survey range from 6% in Koulikoro to 11% in Kidal (Figure 2).

Figure 2: Comparison of prevalence of wasting (global acute malnutrition) in DHS 2006 versus MICS 2010 (by region)

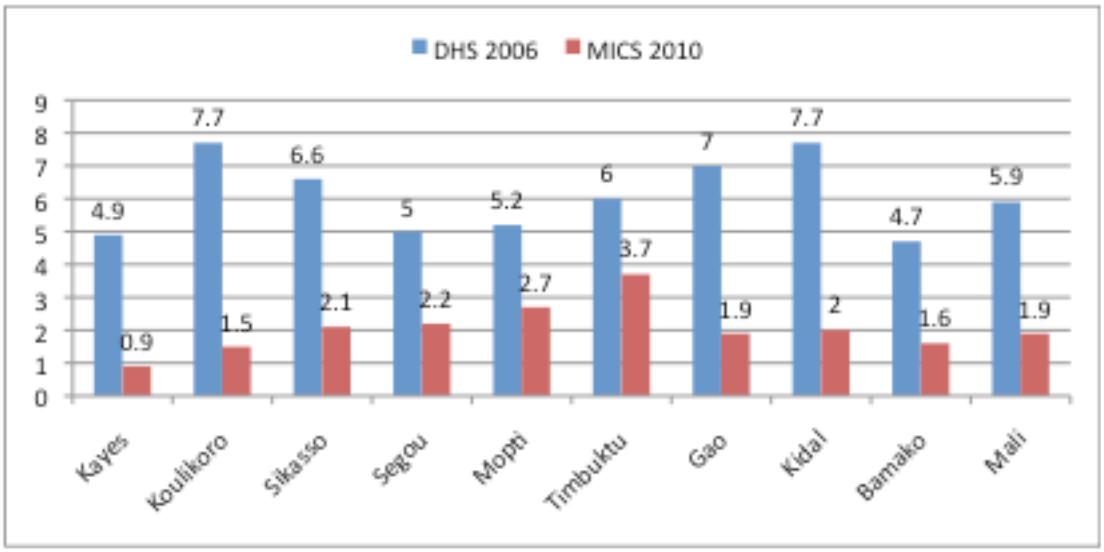


Source: (3, 10)

Rates of severe acute malnutrition (SAM) in 2010 range from 0.9% in Kayes to 3.7% in Timbuktu while rates of underweight (composite of stunting and wasting) are as low as 11.4% in Kayes to as high as 31% in Timbuktu.

Such a change in indicators of growth could reflect an improvement in nutritional status due to appropriate implementation of interventions however the uniformity in the reduction prevalence of all growth indicators is surprising. Currently, only preliminary information/results are available from the MICS Survey to confirm the reason for this observed difference. Despite this, the figures of stunting are still at a level that requires consideration within the perspective of nutrition and health programming priorities.

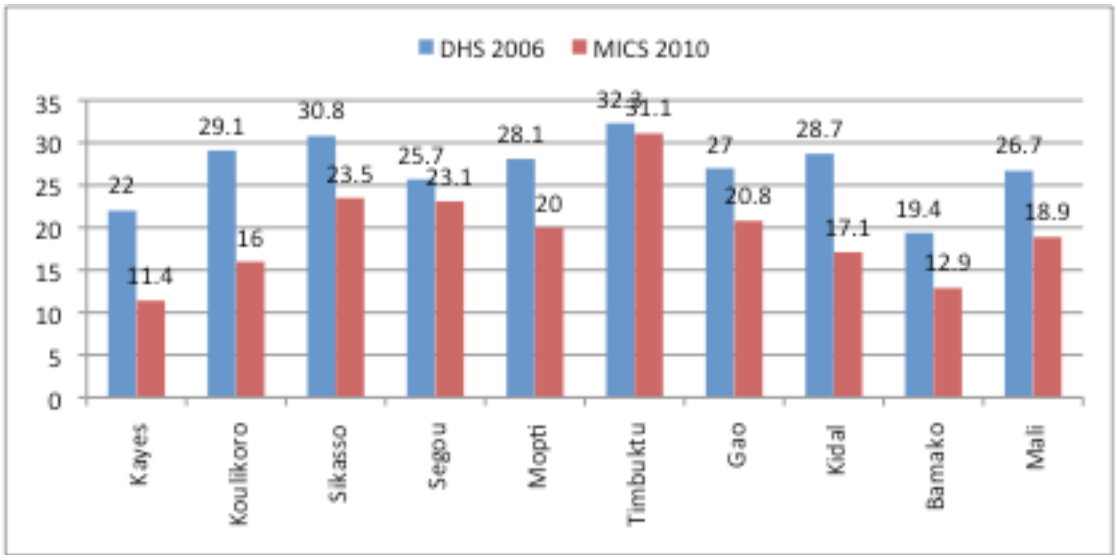
Figure 3: Comparison of prevalence of severe wasting (severe acute malnutrition) in DHS 2006 versus MICS 2010 (by region)



Source: (3, 10)

Figure 4:

Comparison of prevalence of underweight in DHS 2006 versus MICS 2010 (by region)



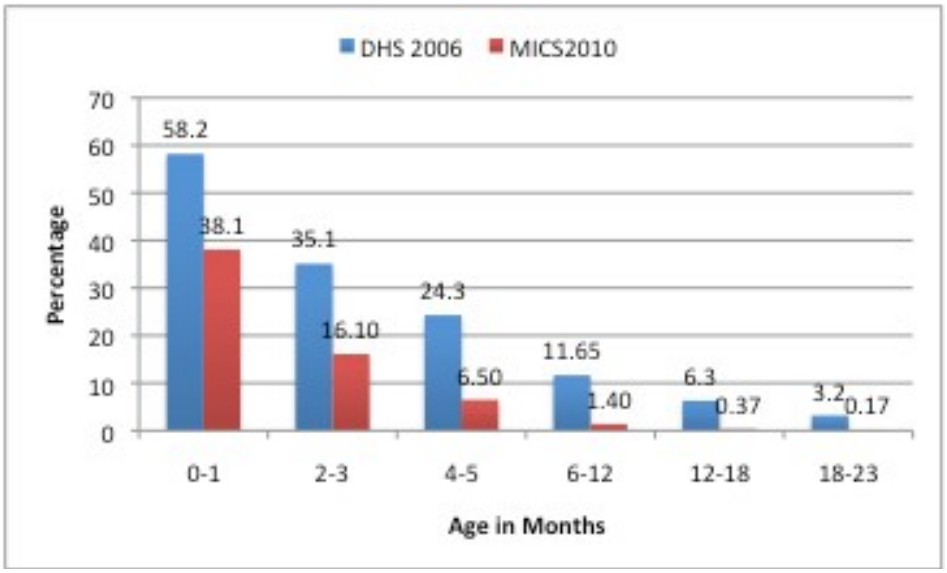
Source: (3) (10)

Breast feeding and Complementary Feeding Practices in Mali

Malian policy recommends exclusive breastfeeding from birth through 6 months of age, and initiation of breastfeeding within one hour of birth. However, exclusive breast feeding rates in Mali are at 20% (all infants through 6 months of age) (10) with only 38% of infants being breast fed at one month of age. A comparison of 2006 to 2010 data shows that overall exclusive breast feeding rates are lower then in 2006 (Figure 7). In contrast, rates of pre-dominant breastfeeding (breast feeding with introduction of water, sugar or other non milk liquids) are as high as 56% in the first month of life (Figure 8). The UNICEF MICS preliminary report indicates that the differences observed are primarily due to a change in definition of indicator as well as change in

methodology associated with data collection. In addition, the survey was conducted in the dry season when women are most likely working in the fields and are less likely to exclusively breast feed their infants possibly due to a lack of time.

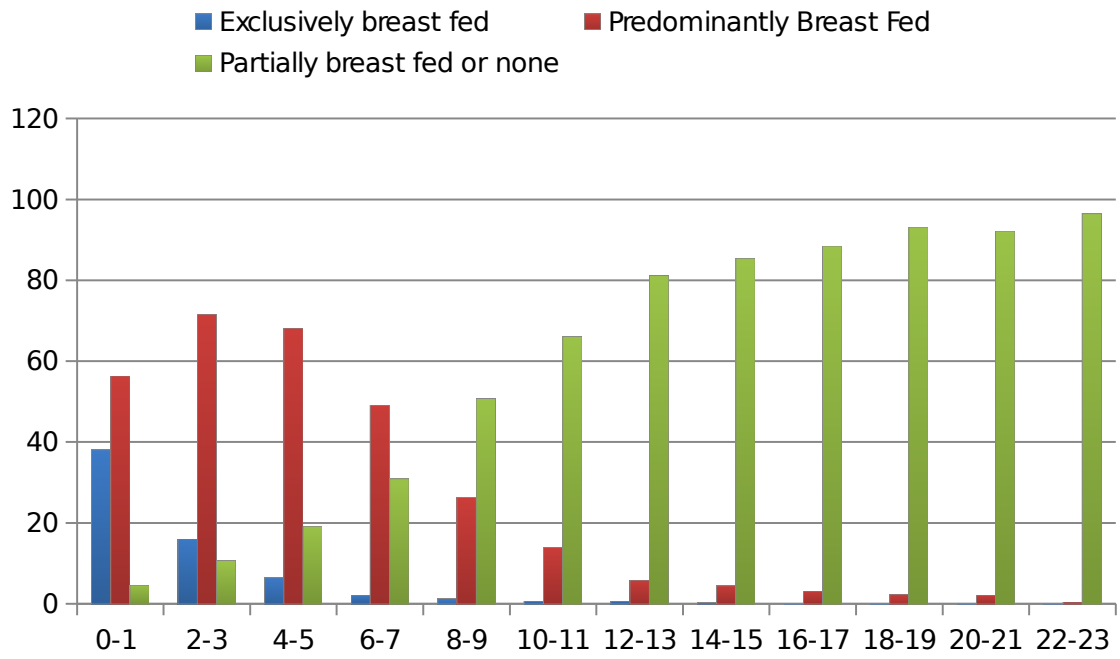
Figure 7: Comparison of Percent Exclusively breast fed from 0-24 months (DHS 2006 versus MICS 2010



Source: (3, 10)

A significant proportion of women introduce water and other non milk liquids (predominant breast feeding) with more than 50% introducing other liquids as early as 1 month of age (Figure 8). In 2006, children with mothers that have secondary or higher education were more often breastfed within one hour after birth than those whose mothers had primary education or less (61% vs. 47%) Women in urban areas are more likely to breastfeed within an hour of birth (56.5%) compared to those in rural areas (42%). Regions of Kayes and Koulikoro about a third of women report breastfeeding within an hour of birth while in Gao, Timbuktu and Kidal, breastfeeding within one hour of delivery reaches rates of 85%, 75% and 77% respectively. While many women do start breastfeeding within 24 hours, rates are lower in Kayes and Koulikoro (65% and 81% respectively).

Figure 8: Patterns of Exclusive to predominant and partial breastfeeding in infants 0-23 months of age, MICS 2010



Issues around complementary feeding practices include late introduction or too early introduction of complementary foods, poor nutrient density of complementary foods, poor dietary diversity, lack of minimum number of food groups being introduced and/or food being introduced (11). Only 27% of infants receive a semi-solid or solid food between 6-8 months of age, which is the recommended age for introduction of complementary foods. In addition, dietary diversity is poor with 57% of children aged 6-23 months primarily receiving complementary foods based on cereals. Dietary diversity and minimal acceptable diet are at 16% and 7% respectively (3, 12). Cereal based complementary foods while ideal as a starting food are generally poor in nutrient density including total energy, protein quality and micronutrients (13). Furthermore only 21% children receive animal source foods (meat, fish, poultry and eggs).

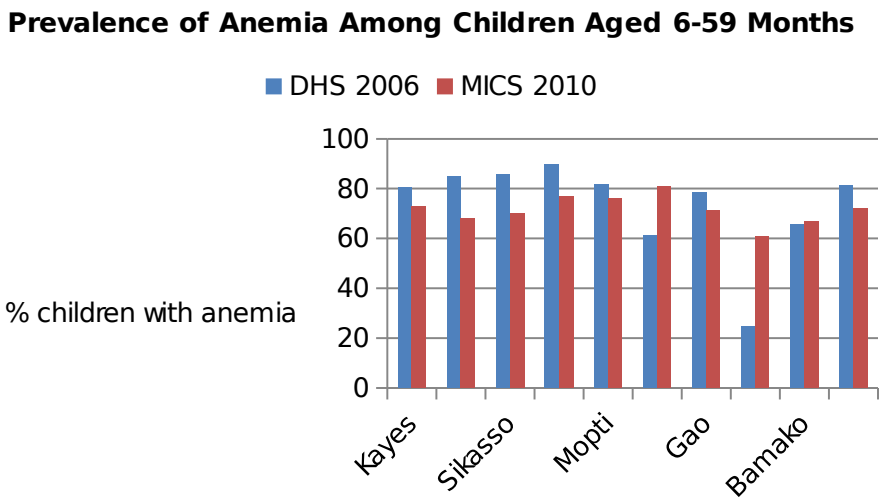
Vitamin and mineral deficiencies in children under five

Deficiencies in Vitamin A, iron and iodine are also reported as being common in Malian children under the age of five. Studies by Schémann (2002) in the Bandiagara area of Mali identified subclinical Vitamin A deficiency as a major public health issue and that mass distribution of Vitamin A to Malian children has an effect not only on xeropthlamia rates but also indicators of liver retinol stores. The modified relative dose response test (MRDR), an individual indicator of liver retinol stores was found to be abnormal in 77.1% of the sampled subjects (95% CI: 70.3–82.7) in 1998(14). In 1999, prevalence of abnormal MRDR reduced to 63% (95% CI: 54.25-71.2) indicating that mass distribution of vitamin A in Mali was associated with improved parameters of Vitamin A status. Significant amount of work has been conducted around Vitamin A deficiency in Mali. As of 2006, 72% of children less than two years of age received Vitamin supplementation 6 months prior to the survey.

In Mali, seven out ten children aged 6-59 months in ten (72%) are anemic with children aged 6-23 months more affected (10) than the older age groups. The survey also indicates that about

42% of children are moderately anemic. Results of the MICS 2010 are similar to DHS 2006 and indicate that anemia in children is associated with education level and geographic location. Anemia rates in children with mothers with a secondary education were lower (60%) then those with primary education (69%) and those no education (75%). Children in urban areas were less likely to be anemic (66%) compared to those in rural areas (74%). Anemia rates in children were the highest in Timbuktu (81%) followed by Segou and Mopti (approximately 76%). Rates ranged from 61-72% in the other regions. With respect to severe anemia, rates were high in across all regions ranging from 23% (Kidal) to 28% (Sikasso).

Figure 9: Prevalence of anemia among children 6-59 months of age



Diarrheal Diseases

Diarrheal diseases are directly or indirectly, a leading cause of death for young children in developing countries. Results from the 2006 DHS indicate that about 13% of children suffered from diarrhea during the two weeks preceding the survey. The prevalence of diarrhea is particularly high among children 6-11 months (20%) and 12-23 months (22%). These result s are similar to results in a study looking at the causes of hospital admission and death among children in Bamako, Mali (15). Examining the MICS data for regional distribution, high rates are found in Gao (27%), Timbuktu (335) and Kayes (21%). Overall the prevalence of diarrhea is 17% according to MICS 2010. Children in rural areas had higher rates (17.5%) compared to those in urban areas (14.7%)

Mali has a policy for treatment of diarrhea with ORS and Zn based on the 2004 recommendation by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). Adjunctive zinc therapy results in a 25% reduction in the duration of acute diarrhea and a 40% reduction in the treatment failure or death in persistent diarrhea (16). However both the DHS and MICS data show low usage of ORT (oral rehydration therapy) with 44% of children who reported diarrhea, having received ORT. Rates of ORT use are the highest in Bamako and Gao followed by Sikasso (Figure 11).

Figure 10: Prevalence of Diarrhea in Children under five (2 weeks prior to survey) by region

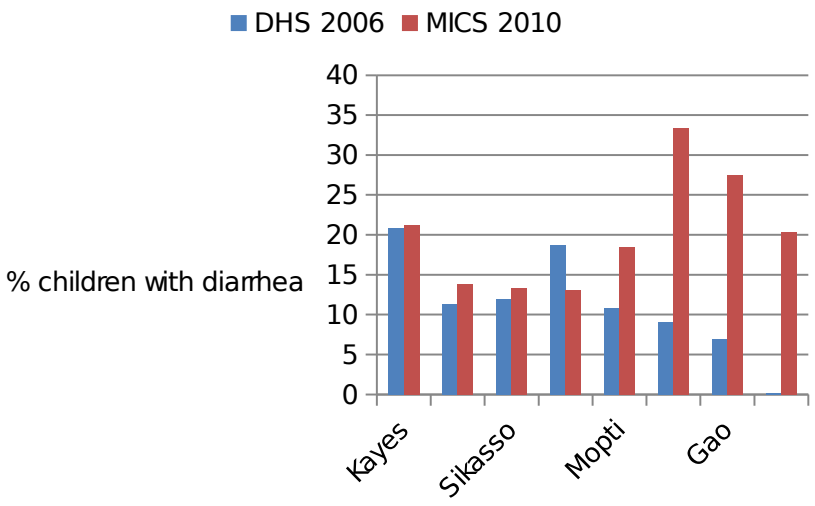
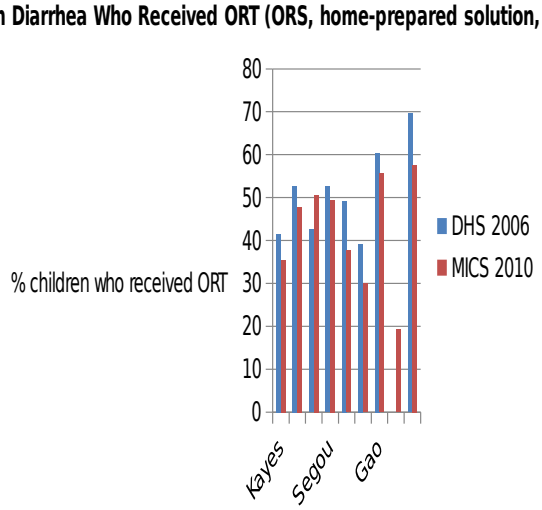


Figure 11: Use of ORT in children under five suffering from diarrhea



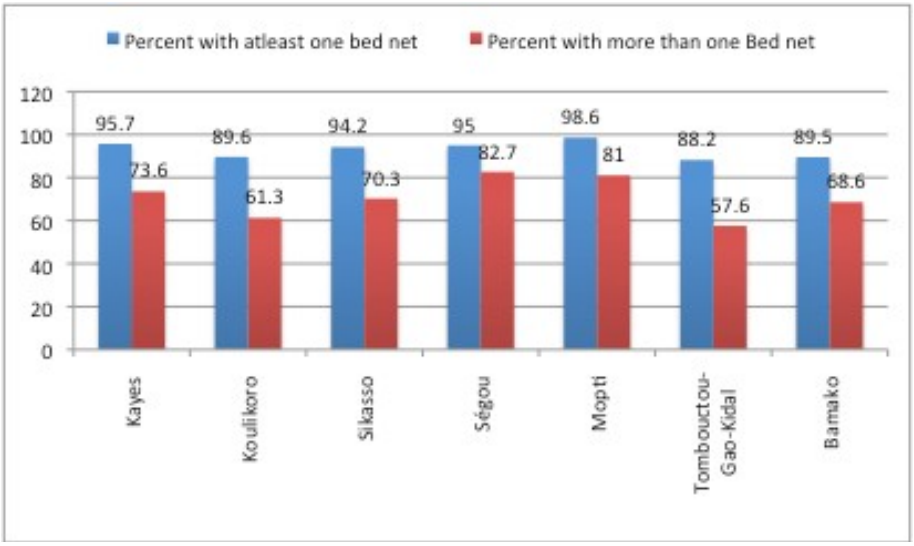
Malaria

In the 2010 survey, fever due to malaria is occurred in 18% of children. In the 2006 survey, this prevalence was particularly high among children aged 12-23 months (27%) and children aged 6-11 months (23%) and in the regions of Kayes (24%) and Sikasso (23%). Only 20% of children with malaria had received an anti malarial therapy. There is an urban/rural difference in treatment with 25% of urban children receiving an anti-malarial compared to 16% of rural children.

Rates of parasitemia are high in children aged 6-59 months of age and increase with age starting at 16% in children aged 6-11 months and ranging to 45% among children aged 48-59 months. Prevalence of malaria parasitemia is 1.8, 2.5, 2.6, and 2.8 times higher in children aged 12-23 months, 24 - 35 months, 36-47 months, 48-59 months compared to those aged 6-11 months. Parasitemia is also 10 times higher in rural versus urban areas (45% against only 5%). Parasitemia levels are low in in Bamako (2%) and the northern regions of Timbuktu / Gao / Kidal (17%) but high in Sikasso region (59%), Mopti (47%), Kayes (29%), Koulikoro (42%) and Segou (42%) (17).

Results from a recent national survey on the use of bed nets, prevalence of treatment of fever and prevalence of anemia show high usage rates of bed nets (treated or untreated) yet at the same time high reported rates of fever (17). In Figure 12, a comparison of the percentage of households that possess at least one bed net versus those that possess more than one bed net is made by region. Use of bed nets the night before the survey was reported by 74-85% of children with higher usage in younger age groups (most of treated with long acting insecticide). By region similar high rates of use of insecticide treated bed nets were observed.

Figure 12: Percentage of households reporting at least one bed net being used in the household prior to the interview



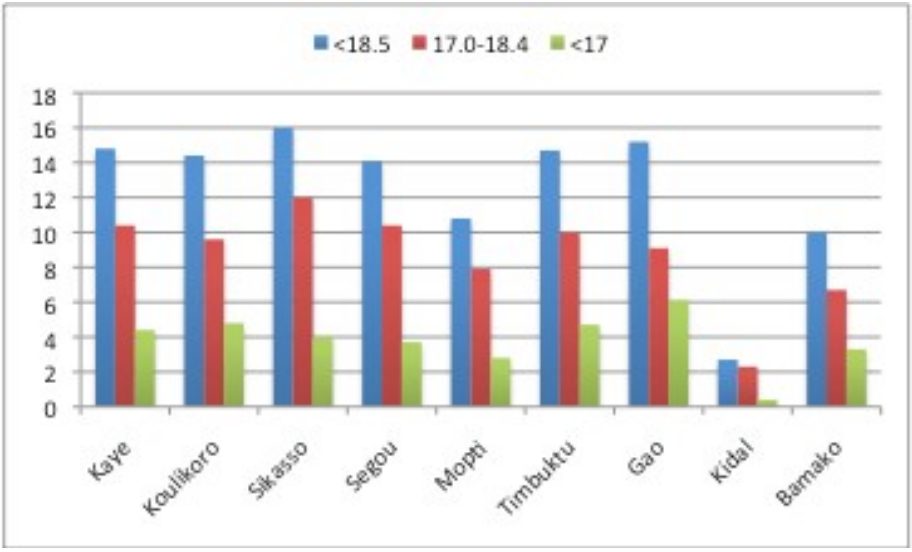
Source: (17)

Maternal Nutrition and Health Status in Mali

Maternal underweight is a significant issue in Mali, which can significantly impact birth weight. In Mali, 13.5% have a BMI less than 18.5 kg/m^2 with 9.5% of women with mild underweight and 4% moderately to severely underweight (Figure 13). Rural women are more likely to be underweight (15%) compared to urban women (10%) however there is no difference in maternal underweight based with respect to maternal education. Geographically, except for Kidal where rates are low, all other regions have similar rates of underweight (Figure 13). At the socio-economic level there is a trend of increasing underweight with decreasing socio-economic status

with 16% underweight in the lowest socio-economic category compared to 10% in the highest socio-economic category

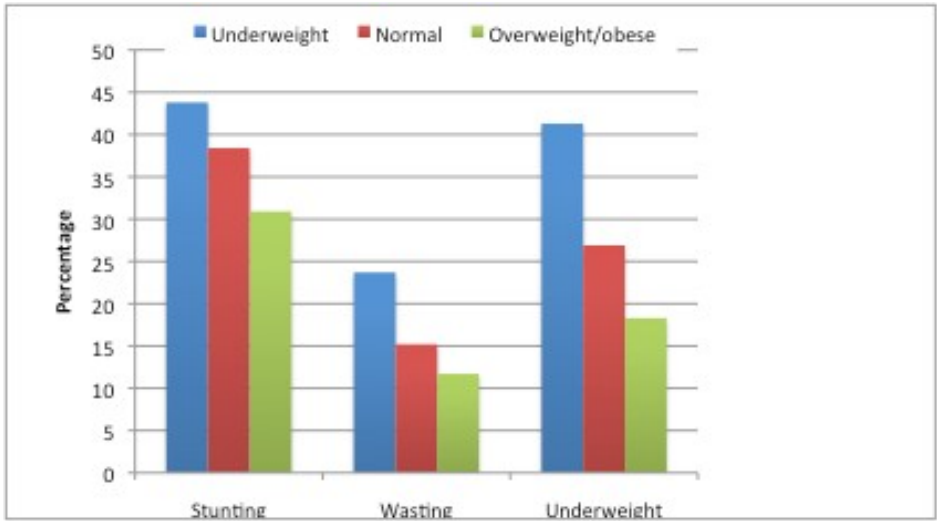
Figure 13: Percentage of women with low body mass index (DHS 2006)



Source: (3)

Anthropometric indicators of children in Mali are linked to mother's nutritional status. Rates of stunting, wasting and underweight are substantially higher in children of mothers who are underweight, with percent prevalence reducing with increasing Body Mass Index (BMI) of the mother (Figure 14).

Figure 14: Prevalence of underweight, wasting and stunting in children with underweight, normal weight or overweight/obese mothers



Source: (3)

Anemia in women (Hb <11 g/dl) is high across all age groups with prevalence ranging from 54-56%. Pregnant women are more vulnerable at 60% prevalence compared to non-pregnant women (55%). Differences in prevalence exist between areas of residence and amongst regions. Women living in urban areas are less anemic compared to those in rural areas (47.1 compared to 58.5%). At regional level, the proportion varies from 43% in Bamako, to a maximum of 65% in Timbuktu (10) with Kayes and Timbuktu showing the highest prevalence rates of anemia in women. To reduce maternal anemia in pregnancy, while iron-folate supplementation exists as a policy and supplements are available at the CSCOM level, the MICS survey indicates that use of pre-natal services by pregnant women in Mali is poor with only 33% of women having seen a qualified medical professional (doctor, nurse aide, qualified midwife) at least once through the pregnancy and 35% have visited any health professional at least 4 times through the pregnancy.

Malaria is a major cause of morbidity in Malian women (18). Malaria in pregnancy increases maternal anemia as well as increases risk of neonatal mortality (19). In Mali, the National Malaria Control Program funded through the President's Malaria Initiative (PMI) focuses on providing 2 doses of sulphadoxine-pyrimethamine through the pregnancy. A study carried out in 2004 found malaria infection to be reduced by 79% in the women who received sulfadoxine-pyrimethamine (SP) compared to those who received chloroquine (CQ). Additional anemia rate was reduced by 75% in the SP group compared to the CQ group (20).

Nutrition, Agriculture and Food Security Linkages in Mali

The determinants of maternal and child under nutrition can be divided into immediate, underlying and basic determinants (21). Immediate determinants include inadequate dietary intake and diseases while underlying determinants include household food insecurity, poor sanitary environment, income poverty, lack of assets, employment and basic causes include

overall social, economic and political factors that have an impact on access to human, physical, social or financial capital (7). Further links of poor nutrition in women and children can be made to short term and long-term consequences. Short term consequences include morbidity, mortality and disability while long term consequences include impacts on adult size, economic productivity, intellectual capacity, reproductive performance and metabolic and cardiovascular disease (7). Principal factors within agriculture that affect maternal and child nutrition include food production, food security, income and distribution across the household, feeding practices, childcare, access to water and sanitation and prior disease status (22). Direct impacts of agricultural growth include improvements in total quantity and quality/diversity of food production and imports, improvements in income, prices and self-sufficiency. Agriculture can have a positive or negative impact on nutrition through income utilization within the household (woman's access to income), food processing and quality of foods produced, access to potable water, sanitation and time constraints (mother's involvement in agricultural labor) and disease occurrence (for example malaria in areas with stagnant water supply used for irrigation).

In Mali food security was found to be 11% in households during the hungry season (July 2007) and 8% in the post harvest (March 2008) with 17% and 18% households being moderately food in secure during the post harvest and hungry seasons respectively (Étude de Base de la Sécurité Alimentaire et de la Nutrition: EBSAN I, July 2007 during the hungry season and EBSAN II, March 2008 during post-harvest prior hungry season) (23). Despite adequate rainfall over a three year period, another survey found 81% of households reporting difficulty in meeting their food needs at least one month of the year (24). The most difficult period is July to September, however there is great variability between households. Thus food insecurity in Mali is chronic in nature. However differences do exist at the regional level with respect to type of food security/insecurity (23). Furthermore the more vulnerable and food insecure the household the less likely they are to experiment in new production techniques and thus more effort should be made to reach these at-risk groups.

There is little empirical evidence that directly links nutrition and agriculture in Mali and elsewhere. The LICNAG survey conducted from May 2001-2002 (n=750 households) examined the linkages between child nutrition outcomes and three agricultural systems, the irrigated rice zone in the Office du Niger (Segou Region), a rainfed cotton zone (Sikasso region) and a traditional millet and sorghum zone in the Mopti Region. The study found that per capita income for parents of children less than four years old is significantly higher in the irrigated areas than in other zones, (2) women have greater access to and control over income in the irrigated areas, and (3) rates of wasting and stunting are significantly lower in the irrigated areas. In the cotton zone, significant gender disparities exist with income being concentrated in the hands of large extended families in the cotton zone and very little access for women in the cotton zone. Finally food insecurity at both adult and child level in the coarse grain production systems of the Mopti region was high. In the Mopti region, households were also heavily dependent on off-farm labor to meet food needs with remittances from both men and women working as laborers in the Office du Niger irrigated rice zone (25).

Nutrition, Health and Agriculture Policy Environment in Mali

Country level ownership and prioritization of activities are crucial for effective adoption and implementation of global recommendations. Both FtF and the GHI emphasize the importance of country driven plans and prioritization of activities (5, 26). The core focus areas of the Feed the Future including the recommended actions in targeting health and nutrition of women, infants and young children (1000 days) are aligned with the Lancet series global recommendations as well as global initiatives including REACH and Scaling up Nutrition (SUN) Framework (27). While there are no simple prescriptions, evidence suggests that high coverage with a package of proven interventions can have a sizeable effect on tackling under nutrition but while there is agreement on the range of interventions that on scale up would tackle the situation, evidence on how to scale up is weak and or non existent (8, 27).

Globally emphasis has also been placed on multi-sectoral approaches and the need to incorporate nutrition interventions into agriculture, livelihoods, health and sanitation programs within country level agendas (9). In Mali, a World Bank desk review on understanding the political and institutional factors that affect nutrition in Mali found that while activities from 1990-2005 did show an increased number of nutrition activities, progress was not being made in addressing nutrition concerns of Mali due an absence of domain for collaboration and coordination, lack of donor involvement (technical and financial) favoring nutrition and lack of knowledge (households as well as decision makers) on the advantages of improved nutritional status with respect to socio-economic and cultural development. The review recommended creating a new structure focused on nutrition, increasing advocacy efforts around nutrition and the development of an information education and communication committee (28). Conversely to one of the findings of the World Bank, an issue outlined by the Division of Nutrition (Dr. Samake Ratiba) is the multitude of stakeholders and strategies that exist that are linked to nutrition and/or explicitly state nutrition as a priority.

As of late 2010, however, there has been considerable emphasis on harmonization of nutrition activities across the different sectors as well as significant high-level movement to better integrate nutrition within the development agenda and coordinate better the various stakeholders. Three major active policy strategies focus on targeting nutrition outcomes in an integrated manner. These include the PRODRESS II, the PNIP-SA and the PSNAN (PNPCMA). The major health policy strategy in Mali, PRODRESS (II) has been renewed through 2011. The PRODESS focuses on goals outlined in the Strategic Framework for Poverty Reduction (29). The strategy differs from past policies as it works towards integrating activities into poverty reduction, capitalize the benefits of decentralization, work on sustainability of activities and improve the financing of health care (30) attributing 51% of child and infant deaths to malnutrition. The policy recognizes the issues of acute malnutrition, chronic malnutrition and infectious diseases and focuses on the development of a multi-sectoral national policy on nutrition, improvement of status of women and children, reduction of global malnutrition (GAM) and micronutrient deficiencies (especially iron and iodine). The PNIP-SA is the guiding document for all future agricultural investments from 2011-2015 in Mali. The investment priorities include promotion of cereal production, milk and meat production and fishing and aquaculture. These are aimed to guarantee nutrition and food security for all and increase

agricultural and economic growth. The PNIP-SA specifically focuses on the nutrition outcomes and recognizes malnutrition as a significant public health problem. One of its major objectives is to improve nutritional status through the World Bank recommended Information, Educational and Communication (IEC), the promotion of nutrition education will be encouraged and promoted to ensure efficacy in the implementation of this policy. Finally PSNAN **(**Plan Stratégique National pour l'Alimentation et la Nutrition: 2005-2009 and the Protocole Nationale de Prise en Charge de la Malnutrition Aiguë) directly focus on issues revolving around nutrition, food security and acute malnutrition (protocols for management are covered) (31, 32). The National Plan on Nutrition is in the process of being revised.

Further actions to improve enable nutrition policy in Mali and encourage/foster collaboration included the following:

1. A National Nutrition Forum was held in 2010 that led to the development of recommendations for policy development and opportunities (e.g. development of PRODRESS, nutrition PRSP) in Mali. The workshop objectives, findings and recommendations are presented in Annex 2.
2. The set up of a separate executive agency for nutrition aligning priorities of different government stakeholders is being considered within the context of the National Nutrition Forum.
3. To communicate the findings of the National Forum on Nutrition and also to gain insight from NGO partners, the Groupe Pivot Santé in collaboration with the Nutrition Division of the National Direction of Health, with technical and financial support from the USAID Health Program/National Technical Assistance (ATN Plus) organized a workshop focused on NGOS and other civil society organizations. Objectives and findings of the workshop are presented in Annex 3.

A comparison of current Mali policy to Lancet recommendations as well as recommendations of the National Nutrition Forum show progress in the area of policy enabling and advocacy efforts around nutrition (Table 1). There are however gaps in implementation of policies with a lack of information on effectiveness of implementation activities. Above and beyond the existing Mali policy, the National Nutrition Forum recommends promotion of breast feeding, local production of complementary foods,

Table 1: Global recommendations in relation in current Malian policy and actions and National Nutrition Forum recommendations in Mali

Lancet Interventions (Sufficient evidence for implementation in all 36 countries	*Current Mali Policy and actions*	*National Nutrition Forum Recommendation*
Maternal and birth outcomes		
Iron -folate supplementation	Yes, no evidence on effectiveness of program, use of pre-natal services low	
Maternal supplements of multiple micronutrients	No	No
Maternal iodine through iodization of salt	In place at universal level, effectiveness of implementation unclear	No
Maternal Calcium supplementation		No
Interventions to reduce tobacco consumption or indoor air pollution		
New Born babies		
Promotion of breast feeding (individual and group counseling)		Yes
Infants and children		
Promotion of breastfeeding (individual and group counseling)		Yes through use of IEC
Behavior change communication for improved complementary feeding	Currently with promotion of local production of foods, no evidence on success of strategy	Yes with promotion of local production of complementary foods and use of IEC (BCC)
Zinc supplementation		
Zinc in the management of diarrhea		

Source: (27) (33)

Table 1: Global recommendations in relation in current Malian policy and actions and National Nutrition Forum recommendations in Mali (continued)

Lancet Interventions (Sufficient evidence for implementation in all 36 countries	*Current Mali Policy and actions*	*National Nutrition Forum Recommendation*
Vitamin A fortification or supplementation	SIAN, Evidence of outreach, no evidence on impact	Continued micronutrient supplementation, deworming
Universal salt iodization	In place but not effective given the rate of deficiency observed, no surveillance data	
Hand washing or hygiene interventions	Hand washing in Schools, Curriculum development	Improve sanitation and hygiene practices
Treatment of severe acute malnutrition	Implementation of CMAM protocol recommended however protocol adherence is variable being mixed with facility based management	Revise national protocols on management of acute malnutrition
Country context specific		
Treatment of malaria	With President's Malaria Initiative, again not clear on impact, community case management of malaria under way	
Prevention of malaria	Distribution of Insecticide treated bed nets, IPTp for pregnant women (President's Malaria Initiative)	Distribution of ITNs
Food Fortification	Grand Moulins Initiative, strategy in place, Work undergoing on legislation for food fortification	Yes with a focus on regulation, availability, capacity (quality control), communication
Anemia Control	Iron and folate supplements for pregnancy, no data on impact, levels of deficiency high	Through development of food fortification processes (see above)

Source: (27) (33)

Programming in Mali

A range of international, regional non-governmental organizations and UN agencies work at the national, regional and community level in Mali. The focus of activities ranges from research to program implementation and in-service capacity building. Activities reviewed in this section focus primarily on programmatic interventions including:

1. Advocacy, policy enabling and Technical assistance to Ministry of Health
2. National and regional level interventions (improving agricultural productivity capacity strengthening of de-centralized health care system, Vitamin supplementation)
3. Community level interventions (with specific geographic and regional coverage)

Advocacy, Policy Enabling and Technical Assistance to Ministry of Health

Several agencies and organizations work with the Division of Nutrition, Ministry of Health at the advocacy and policy enabling level. ATN Plus, a USAID program supports the Ministry of Health at the national, regional, district/community health center level to develop and scale up policies, improve services and expand access to care to vulnerable segments of the population. The program also aims to design and implement behavior change communication activities to increase the demand for services and identify opportunities for public-private partnerships that expand the provision of services. UN agencies such as UNICEF and to some extent WFP also support the Ministry of Health in policy and strategy development and advocacy, regional programmatic support and production communications and advocacy materials (strategy documents, norms and procedures, in-service training materials, counseling materials including job aids).

A review of the communications materials shows a range including strategies for behavior change communication (e.g. within nutrition focusing on breastfeeding promotion, promotion of good infant and young child feeding practices, policies procedures in nutrition to hand washing message cards, job aids, counseling materials and packets (e.g. Essential Family Practices) and training materials for in-service use by for example ATN Plus.

National and Regional Level Interventions

Capacity Strengthening for High Impact Health Services

Activities around health systems strengthening also focus on building and extending capacity of community health associations (ASACO) in the area of good governance, management of health, strengthening CSCOM service delivery as well as community mobilization to improve access of the demand and the use of quality services at the community level through the Keneya Ciwara program. Services include contraceptive distribution, improving immunization, control of malaria and diarrhoeal diseases, nutrition, and reproductive health targeting households through the system of volunteer outreach workers (relais) and community health agents that provide basic health information and peer-counseling. In the first phase of Keneya Ciwara an approximate 10%

increase was observed in knowledge on contraception (going from 76% to 85% from 2004 to 2008) and a nearly threefold increase in contraceptive use in Bandiagara cercle. However an analyses of DHS data (3) to examine the difference in reproductive health of men and women and the nutritional status of women and men in the Keneya Ciwara intervention districts found similar use of contraception (7%) compared to the national rates and higher rates of infant and child mortality (110% and 125% respectively) compared to national average (96% and 105%). While levels of pre-natal consultation were higher as were rates of maternal tetanus vaccination and child immunization, infections in children were more common and rates of exclusive breastfeeding were not different between intervention and national data. Finally, rates of wasting (15%), stunting (45%) and underweight (32%) were higher in the Keneya Ciwara zones than in Mali in general (15%, 38% and 27% respectively) (34).

Vitamin A Supplementation

Universal Vitamin A supplementation (twice a year to children aged 6-59 months) is implemented through the SIAN (Semaine d`Intensification des Activités de Nutrition) led by ATN Plus in collaboration with HKI. Vitamin A supplements are administered along with vaccinations, de worming medication, mosquito nets and educational messages. The SIAN is also being utilized a vehicle for targeting neglected tropical diseases (NTD) in two pilot campaigns in 2010. An evaluation of the integration of NTD drug administration with SIAN in two districts of Koulikoro found 80% coverage depending on villages (35). However community intermediaries, health workers, and population had mixed responses with many hesitant about its success and effectiveness going forward. Major concerns included confusion among intermediaries regarding the treatments, side effects of the medications, and the timing of the study during the winter, rainy season. According to authors, a second study in the dry season would be necessary to understand the potential for the treatments to be integrated. Also educating the public about the advantages of the campaign; recruiting educated and former intermediaries to avoid confusion about the treatments; providing care for side effects; and conducting meetings with health workers and intermediaries to discuss impact of integration and practical issues such as per diem and travel support were important issues that according to authors should be addressed (35).

Results from the 2006 DHS indicate that children in urban areas are more likely to have received Vitamin A supplementation (78%) than rural (70%). By region, results show that coverage is highest in Bamako (81%), and in the regions of Segou (79%) and Sikasso (78%). In contrast, only 25% and 52% had received Vitamin A supplementation in the Kidal and Gao regions. Almost 2.8 million children received Vitamin A in the second round of 2009 as well as in the first round of 2010 (36). Approximately 2.4 to 2.5 million children received albendazole while 75,000 women post-partum received vitamin supplements in the second round of 2009 and in the first round of 2010 (36). Interviews indicate that Vitamin A supplementation through SIAN has been integrated into the health system and is now within the annual budget of two regions.

Food for Education and Food for Training Programs

As a major implementing UN agency, WFP provides assistance in four main areas: (i) development (school feeding program and rural development), (ii) transitional development projects, (iii) irrigation support and; (IV) Purchase for Progress. As part of the *Food for Work* and *Food for Training* programs, WFP works with the *Rural Development Program* and assists small groups in rural communities with support for reforestation, building and maintenance of rural roads, construction of bridges, and rehabilitation of water wells. WFP provides food assistance to 42 district hospitals and over 900 CSCOMs in six of the eight vulnerable regions. Food assistance is also provided to HIV positive and TB patients and includes women, pregnant and lactating women, and children under five years of age. The goal of Purchase *for Progress* is to increase farmers' incomes by $50 per year. A five-year program it is currently in its second year of operation. The program works with smallholder farmers and helps them organize to form a cooperative which serve as the facilitator to link farmer's staple crop supply to WFP's food assistance demand.

Management of Acute Malnutrition and Supplementary Feeding Programs

Rates of severe acute malnutrition were significantly high in in the 2006 DHS survey. This has led to significant emphasis in Malian policy on the management and treatment of severe acute malnutrition as well as investment at the programmatic level. At the national level, UNICEF is leading the implementation activities and scale up of interventions. UNICEF is also working with the Government of Mali on the development of a policy for community management of acute malnutrition (CMAM) to enable support of programs for the management of moderate and severe acute malnutrition. WFP also provides food support for the treatment of malnutrition through supplementary feeding and support the strengthening and implementation of national protocols for health, nutrition and management of malnutrition. While the Malian government considers screening for malnutrition and use of CMAM as a key protocol for tackling acute malnutrition, current programs across the country (implemented by a variety of non governmental organizations, at community, CSCOM and CSREF) have varying protocols including indicators used for screening as well as type of treatment (foods/diet) provided.

Food Fortification

Food fortification activities are being launched for the production of fortified wheat flour with iron, folic acid, zinc and vitamin B (B1, B2, B3, B6 and B12). This project is funded by USAID and coordinated by HKI with the Grands Moulins and the Moulins Modernes du Mali. A survey conducted by HKI in Bamako indicates that 45% of poor households utilize wheat flour, while 32% middle income and 26% high income households consume wheat flour.

Breast Feeding Promotion

While exclusive breast feeding rates are low, the Division of Nutrition is supportive of the establishment of the Baby Friendly Hospital Initiative in Mali. Currently, very few hospitals are classified and designated as baby friendly hospitals. Among the few Baby Friendly hospitals, the

lack of inadequate supervision and follow up post accreditation does not ensure that all 10 steps of essential actions to ensure exclusive and appropriate breast feeding practices are being effectively implemented (37). Some breastfeeding promotion does occur at the community health care center level (CSCOM) during ante and postnatal visits however impact of these activities is undocumented. Breast-feeding promotion also seems to be incorporated within the behavior change communication activities in community-based programs however whether the messages translate into behavior change is not documented. The low levels of exclusive breastfeeding observed in DHS 2006 and in MICS 2010 are indicative of a significant need of appropriate breastfeeding promotion activities in Mali.

Improving Agricultural Productivity in Mali

A major activity focused on improving agricultural productivity of sorghum and millet (IICEM) is being implemented in Sikasso, Mopti, Timbuktu and Gao. The program aims to improve agricultural production, increase agricultural sales, improve income, and alleviate poverty. The program focuses on dissemination of improved seed varieties and provision of support systems and inputs (e.g. credit/finance) targeting value chains of rice, millet, sorghum, potatoes, onions and horticultural crops. Market analyses and investigations in business and trade opportunities provide information to farmers that allow them to determine the level of investment for specific crops. Support is also provided in reference to production, post harvest and storage practices with the aim of intervening at different points in the value chain. All farmers are encouraged to interact with markets and are provided market information on prices etc. A key issue with large-scale agricultural programming is linking production to markets, which could be a significant constraint affecting agricultural productivity. While scaling up of production activities and providing support systems is possible, lack of markets and demand for grain are major issues especially for sorghum and millet producers.

Community Based Interventions

Community based interventions implemented by international NGOs and their local partners are found in all eight regions of Mali. Some regions (e.g. Mopti: Bandiagara and Dogon plateau) are considered as over populated with interventions. However, such interventions are short term, the longevity being entirely dependent on donor priorities. There are interesting models of integrated community interventions using a comprehensive approach of linking health services, treatment of acute malnutrition, agro-enterprises, food security, women's empowerment and infant and young child nutrition. In Douentza, HEARTH is being utilized while in Bandiagara community mobilization is being utilized in addressing issues ranging from infant feeding, treatment of acute malnutrition, bringing health services closer to the community, reducing the burden on the relais by training local mothers in nutrition and young child and infant care and feeding and working with communities in setting up sustainable agricultural practices. In parts of Segou, integrated intervention approaches along with community mobilization are helping communities link different aspects of development ranging from maternal care, infant and young child feeding education, infra structure etc. Within these approaches, sits behavior change communication however this is being achieved in a more interactive manner than can be achieved by delivering messages through formal environments such as CSCOMs. Some illustrative examples of programs are outlined below.

Millennium Villages Project

The Millennium Village project is located in Segou region operating in 39 villages (5 CSCOMs) in Markala district. The project focuses on integrating health, education, agricultural, business sectors at the community level and on improving practices at the farm (crop and livestock) and household level. The focus of nutrition activities involves screening for acute malnutrition (community level using relais and clinic for treatment of malnutrition), provision of twice yearly Vitamin A supplements to children less than five years of age, zinc supplements and ORS (in case of diarrhea), iron/folate supplements for pregnant women, deworming and behavior change communication utilizing the modules of the Essential Nutrition Actions. Information is also provided in the form of cooking demonstrations, household gardens and cultivation of fruits and vegetables for household consumption. A crucial issue around treatment of SAM using CMAM protocols is the channels that the program has to go through to get Plumpy Nut to the ground, thus reducing the number reached**.** The project also works with Novartis and the Misola association but the interaction amongst entities is unclear.

Millennium Challenges Account, Mali

The MCA Mali project within Office du Niger zone focuses on the development of irrigation systems for rice production, post harvest horticulture production and on the provision of access to potable water. The development of the irrigation scheme is challenging, requiring the re-settlement of communities (33 communities in total) that are traditionally herders. Re-settlements involves building standardized housing within well planned communities with access to sanitation facilities with each displaced household gets 500 m squared of land for farming for vegetable gardens. Management committees have been put in place to ensure the proper use of community infrastructure. These committees also provide guidance on governance. In addition an agriculture program provides technical support and education for women on farming practices. The project sites in Niono and Alatona provide a platform for the testing and introduction new interventions that can impact nutritional status.

USAID Multi Year Assistance Program

The USAID Food for Peace Multi Year Assistance Program (MYAP) funded by USAID's Food for Peace aims to increase the access to food through improved agro-enterprise activities and improved access to financial services, improve the nutritional status of mothers and their children as well as provide potable water and basic health services. The goal is to assist communities in the development of systems to manage risks and cope with shocks. Focus regions include Mopti and Gao regions of Mali. The program is being implemented in Douentza District in the Mopti Region (by CRS and its local partner) and Bourem District in the Gao region (Save US and its local partner). HKI provides crosscutting technical training and oversight for the nutrition component.

Within the MYAP program, 38 villages are using the HEARTH model to prevent and treat moderate malnutrition among children 6-36 months of age: The HEARTH model is a positive

deviance model used to encourage behavior change in communities where children have been identified as malnourished. Mothers with healthy children in these communities are used as role models to reinforce messaging. All children 6-36 months of age in the community are weighed and measured on a monthly basis to identify cases of malnutrition. Children with SAM are referred to the CSCOM for treatment. Underweight children are enrolled in the community HEARTH program. Mothers in the community with "good practices" become role models. CRS hires facilitators who work with the technical directors of CSCOMs and the community relais.

The Bandiagara Initiative

An analysis of food security and vulnerability by FEWSNET has identified 166 communes as being at risk. In an integrated approach, UN agencies UNICEF, FAO, WHO, UNDP and WFP are in the process of implementing a new initiative called "The Bandiagara initiative" funded by the Spanish agency for development. The aim of the initiative is to implement (in a pilot intervention) an integrated nutrition, health, water, sanitation and agriculture program within select communes (of the 166). Lessons learned will be used to scale up to all the 166 communes.

Issues and Constraints in Current Programming

Several issues and constraints are identified within the context of current programming and are outlined below.

1. **Lack of harmonization**
    a. **Development and implementation of training and BCC materials**: Several different groups are involved in development of norms and procedures as well as communication materials for BCC (counseling packages, job aids). The level of coordination amongst different stakeholders on the development and implementation of these materials and the number of such BCC materials being distributed in the health care system is unclear. For instance ATN Plus and UNICEF recommend specific training materials focusing on nutrition and health, materials that are likely to overlap in messaging. A visit to a CSCOM in Alatona revealed five different manuals/packages of BCC materials (related to nutrition and health) that a physician would have to review with mothers. It was considered as a burden on the physician's/health care provider's time given the number of outpatients to be treated per day. A harmonization and merging exercise on existing BCC materials is important.
    b. **Protocols on Management of acute malnutrition:** While there is work on improving national protocols on management of acute malnutrition with a focus on community-based management of acute malnutrition, there is a lack of harmonization on indicators for screening and treatment options. The protocols being used for screening (e.g. weight for age versus MUAC) and treatment (RUTF versus home made porridges) are different across programs. A consistent nationally approved protocol should be applied across programs. A review of availability and accessibility of RUTF is also necessary especially if considering

CMAM as a viable option for implementation. Communication of the protocols at all levels of implementation (NGOS, CSCOM CSREF) is necessary in order to improve service delivery and provide a uniform source of information for health workers.

2. **Lack of monitoring and evaluation**:
    a. There are no evaluations of the use and dissemination of materials being produced as part of technical assistance to the Ministry of Health. The measurement of success of uptake of messages is important to determine impact and/or lack thereof. There is lack of clarity on how consistently and appropriately the materials are being utilized at provider level and there is no information on the effectiveness of the materials in bringing about behavior change. There is a lack of feedback from the bottom up on the issues and constraints in implementing/delivering BCC materials. Given that physicians/health care providers or relais who are the target of these materials are possibly over burdened, such an evaluation would be crucial in understanding the constraints in appropriate implementation of BCC materials and interventions at the CSCOM level.
    b. Most programs reviewed do not have effectiveness evaluations incorporated into program plans and while there may be programmatic monitoring data being collected, very little researchable data exists to compare intervention types and to understand the impact and scalability of interventions. This is crucial for understanding the impact of interventions on indicators (e.g. prevalence of stunting, wasting) that are part of the FtF results framework.
    c. Within the context of agricultural programs and scale up, supply versus demand dynamics of markets need to be considered. Programs focusing on value chain development might be constrained due to lack of demand of the crop in concern and lack of markets. Furthermore, market development and linkages need to be made between such programs and private sector/small scale enterprises focused on production of processed and/or fortified foods.
3. **Lack of nutrition surveillance data and dependence on cross-sectional surveys:** The substantial differences observed in nutrition indicators between the DHS 2006 and the MICS 2010 could have been attributable to improved services and/or management of malnutrition however with a lack of impact data on any of the program, it is hard to make such attributions. UNICEF is working with the Malian government towards the development of standardized nutrition indicators however given the drastic changes observed from survey to survey (DHS 2006 to MICS 2010), surveillance systems monitoring specific nutrition indicators are necessary. This however a long term investment and might not be feasible within the current context.
4. **Capacity building and training**:
    a. There is a lack of a guided strategy within capacity building at health systems levels and a lack of harmonization between activities of NGOS at the community level that may have training inclusive to their projects. Physicians at CSCOMs frequently undergo training at different levels however how that translates into action at the implementation level is not clear. Our visits to CSCOMs indicated several and even excessive opportunities for training which translated into a burden on an already meagerly staffed health center (CSCOM). While capacity

building is essential, this needs to be targeted and linked to some form of return of capacity investment.

b. Inadequate supervision and training of relais is likely to influence the effectiveness of program implementation (especially BCC messaging) at the community level. For example, there is very little training and supervision at the field level on simple strategies of counseling and transferring behavior change messages. Many of NGO implemented community based programs are able to provide counseling and supervision of relais through their own staff however once the program ends, there is little or no capacity and motivation to maintain the service.

5. **Nutrition BCC delivery through SIAN**: The SIAN are considered as a success for the delivery of services such as Vitamin A, deworming, linking to delivery of treatment of neglected tropical diseases etc. BCC is also incorporated into the delivery system with radio messaging on nutrition during the nutrition week. Similar to delivery of BCC through health systems, the impact and coverage of these messages is unclear. A review of planning reports of the National Malaria Control program indicates that radio and TV messages often do not reach the most vulnerable. There is thus a lack of clarity on the success of such BCC delivery through the SIAN.

Research and Training in Mali

The Nutrition CRSP team visited several organizations involved in research and training around agriculture productivity, food processing, storage, nutrition and health. Some illustrative examples are provided below:

Sorghum and Millet Value Chains

Bio-fortification research targeting sorghum and millet (for iron and zinc) is a major agricultural research activity implemented by ICRISAT which links to nutrition to agricultural productivity. The Sahel region has high sorghum and millet bio-diversity and these crops are consumed by majority of the population (Mali and other West African countries). These micronutrients are known to be lost during transformation and processing at the consumer level. Food grains of sorghum and millet are de-corticated which reduce the levels of iron and zinc. ICRISAT is working on:

1. Characterizing a diverse range of varieties to identify high iron/zinc varieties
2. Conducting farmer evaluations of existing adopted varieties
3. Work with farmers/household on behavior change in preventing de-cortication thus allowing retention of nutrient value
4. Examine the potential for use of fermentation procedures in order to improve bio-availability
5. Monitor introduction and use of new varieties

INSORTMIL (CRSP) Mali focuses on the transfer of production technology, commercialization and transformation of millet and sorghum. The activities around INSORTMIL are implemented by the Rural Economic Institute (IER) and include: (i) production and commercialization of

improved millet and sorghum grains (working with IICEM), (ii) post harvest transformation of the improved millet and sorghum focusing on small scale transformation (iii) diffusion of new improved sorghum technologies in dry areas; and (iv) short and long term training around production, storage and marketing skills. Training centers have been created to train farmers on the proper use of equipment and different transformation techniques available.

Food and Crop Safety

ICRISAT is developing strategies to link health to food safety and consumption. The strategy will transfer knowledge on good post-harvest processes (example: to reduce the risk of aflatoxins, in peanuts and maize). Education on proper post-harvest storage practices for different cereals and other food crops is being encouraged to preserve nutritional and organoleptic properties of these foods. The aim is not to only improve agricultural productivity but also to make food consumption safer.

Improvement of Vegetable Production

A major activity of AVDRC is to develop improved varieties of specific exotic and indigenous vegetables that are high yielding and are resistant to pests and diseases while maintaining the nutritional value of vegetables. These new varieties would be introduced into agricultural sectors (private and public) for dissemination. Vegetable varieties to be improved include tomatoes, onions, peppers, cabbage, amaranth, okra, eggplant and hibiscus (flower, leave, calyx, seeds). It is anticipated that the improved varieties will be an incentive for farmers to grow vegetables. Given that the consumption of vegetables is low, advocacy and communication around the importance of vegetables in the diet would be important for increasing demand.

Malaria Prevention and Treatment

Active research is being conducted on methods of reducing vector transmission, production of vaccines and other social communication issues that decrease the risk of contracting malaria. Much of the data on insecticide resistance and drug resistance used by the national services as well as many NGOs for monitoring malaria prevalence and outcomes as well as for use in preventive intermittent therapy programs for pregnant women comes from MRTC. The center is currently working in 60 health districts and providing support to district personnel. Activities related to nutrition include studies on the effect of vitamin A and zinc supplementation on malaria morbidity. The center is well equipped and funding from USAID is used to provide support to regions and district hospitals on new protocols and methods for malaria management and to build the capacity of health services staff in the area of malaria prevention and treatment.

Aquaculture

Aquafish (CRSP) is collaborating with the Ministry of Fisheries in promoting fish production in Mali. The project provides technical assistance and training to aquaculture entrepreneurs. Training activities provide support and training in the construction of fish culture tanks/floating cages, encouraging the reproduction of certain fish species (e.g. Claris and Tilapia) and education

on management techniques and practices around aquaculture business, trading and marketing strategies.

In Service Training Opportunities

The primary pre-service training institution focusing on agricultural development is IPR-IFRA. There are degree programs in the fields of Horticulture, production of staple crops (commercial), plant breeding, animal husbandry, poultry, livestock fattening, natural resource management (including hydrology), forestry, pisciculture, and agriculture economics and extension training. No specific training activities exist within the realm of nutrition though students are trained on food security and regulatory affairs around food. In-service training is also an option within IPR-IFRA which links to agricultural extensions and brings in local agricultural staff for further training.

Geographic Coverage of Programming Interventions and Research Activities

Mali has a total 702 communes with over 95% having a program or a research activity that focuses on health and nutrition (Table 2). One third of communes in Mali have a food security/education intervention. About 10% of communes have an agricultural program, while 85% had agricultural research (this is primarily from ICRISAT- farmer group activities and it unclear how extensive these activities are). Fifteen percent of communes have activities around nutrition education and management of acute malnutrition.

Table 2: List of programs and number of communes where programs are being implemented

Program	No of Communes	Percentage of total Communes in Mali
Agricultural Extension/Pilot	40	5.7
Agricultural Program	72	10.2
Agricultural Research/Nutrition	601	85.5
Education/Governance	13	1.8
Food Security	19	2.7
Food Security/Education	231	32.9
Food Security/Nutrition	91	12.9
Health Research	47	6.7
Health/Nutrition Program	429	61.0
Nutrition	9	1.3
Nutrition Education/Acute Malnutrition	108	15.4
Water and Sanitation	24	3.4
Women/Agriculture	29	4.1
Women/Girl Empowerment	51	7.3
Education	12	1.7

Organizations visited and that provided data cover anywhere from 6 to 601 communes in Mali. Agricultural research activities seem to be across the country (ICRISAT) though the length and coverage of these activities is not clear (Table 3).

Table 3: List of organizations and number of communes actively implementing programs and/or research and extension activities (visited by the Tufts Team)

Organization	No of Communes	Percent of total Communes in Mali
AfriCAre	15	2.1
AMEPPE	6	0.9
ATN Plus and Keneya Ciwara	429	61.0
CARE Mali	170	24.2
Catholic Relief Services	20	2.8
Helen Keller International	164	23.3
ICRISAT	601	85.5
IER	41	5.8
IICEM	53	7.5
MRTC	47	6.7
WFP	231	32.9

*Number of communes where farmer groups have been conducted

Interventions are spread through all the regions irrespective of type (Table 4 and Table 5). There is clear overlap of activities by commune across all regions. Almost all communes across Mali have some form of an activity (programmatic or research) though not necessarily linked. There is also considerable overlap in activities by commune with some regions showing 4-8 interventions per commune. For example in Kayes (total of 129 communes), 32 communes had an activity associated with food security and education, 18 communes had an activity linking food security with nutrition, 43 communes had an activity associated with health and nutrition while in Koulikoro (108 communes), 21 had an activity associated with food security and education while 71 had health/nutrition activity and 108 communes had been targeted with nutrition education/screening and management of acute malnutrition (Table 4). All 108 communes in Koulikoro had atleast one intervention (with 78 communes with 3 or more interventions, 144 communes of Sikasso had atleast one intervention but most had one or two interventions per commune, 105 communes of Mopti with most having three or more interventions. A similar pattern is observed for Gao and Kidal. In the case of Kayes and Segou, most of the communes had 1-2 interventions. This is based on data from implementing partners (USAID funded or non USAID funded activities) thus it is likely that there are more interventions per commune in each of the regions. Overall, geographically, all regions of Mali, most communes have two or more intervention activities associated with agriculture, health, nutrition, water and sanitation (Table 5).

Table 4: Programs and Research Activities by number of communes per region

Program Type	Kayes	Koulikoro	Sikasso	Segou	Mopti	Timbuktu	Gao	Kidal	Bamako
Total communes	129	108	147	118	108	52	23	11	6
Agricultural Extension/Pilot	1	5	19	11	5	0	0	0	0
Agricultural Program	6	8	15	7	23	8	5	0	0
Agricultural Research/Nutrition	97	101	134	107	84	45	21	10	0
Education/Governance	0	0	0	0	13	12	0	0	0
Food Security	0	0	0	0	0	19	0	0	0
Food Security/Education	32	21	0	0	93	50	24	11	0
Food Security/Nutrition	18	0	0	0	35	15	5	0	0
Health Research	7	9	9	8	8	0	0	0	6
Health/Nutrition Program	43	71	112	68	57	52	14	6	6
Nutrition Education/Acute Malnutrition	0	108	0	0	0	0	0	0	0
Nutrition	0	0	0	0	9	0	0	0	0
Water and Sanitation In Schools	0	0	0	0	14	0	0	0	0
Water and Sanitation program	0	1	1	4	4	0	0	0	0
Women/Agriculture	0	0	0	29	0	0	0	0	0
Women/Girl Empowerment	0	0	0	19	15	17	0	0	0

Table 5: Number of interventions and research activities by commune and region

Commune with	Kayes	Koulikoro	Sikasso	Segou	Mopti	Timbuktu	Gao	Kidal	Bamako
One Intervention	60	4	34	44	9	0	0	1	0
Two interventions	36	26	87	48	29	4	7	4	6
Three interventions	19	57	22	10	28	21	9	6	0
Four or more interventions	3	21	1	14	39	27	7	0	0
No interventions	11	0	3	2	3	0	0	0	0
Communes with an intervention	118	108	144	116	105	52	23	11	6
Total communes by region	129	108	147	118	108	52	23	11	6

USAID/Mali's Niche in nutrition

Identification of the USAID/Mali niche in nutrition, health and agriculture is based on a review of the nutrition situation of the most vulnerable groups (women and children), the current nutrition policy environment, current programming, research and capacity building activities, the geographic coverage of interventions and research and potential linkages to the proposed AEG strategy.

Nutrition Needs in Mali

Prevention of Stunting

In Mali, high rates of acute and chronic malnutrition in children under five years of age were reported in the 2006 DHS survey with acute malnutrition at levels that constitute a public health emergency. These increases were found between the 2001 and 2006 surveys even in areas with apparently high food security levels including Sikasso and Koulikoro. In response, considerable investment has been made in activities focused on the treatment and management of severe and acute malnutrition. While rates are considerably lower in 2010, the figures especially those of stunting are still at a level that requires consideration within the perspective of nutrition and health programming priorities. Regions of Sikasso, Segou, Timbuktu have over 30% of children stunted and rates in other regions range from 25-28% (except Bamako which is 16%). **Thus geographically, all the regions have more than 25% of children stunted and should be considered as intervention sites for activities around prevention of stunting**.

Prevention of Diarrhea in Children

Diarrhea levels are high in Mali in infants and young children. The impact of diarrhea findings is clear; in developing countries, there are an estimated 5 billion cases of diarrhea in children, which equates to at least 2.5 billion preventable deaths below five years of age (38, 39). Every additional episode of diarrhea before two years of age can contribute to stunted growth (40). Diarrhea has been shown to be an important risk factor for poorer school performance and diminished long-term cognitive function later in life (41). Activities around water and sanitation are needed within the context of health and nutrition.

The government of Mali is currently in the process of implementing a strategic plan for the promotion of high impact hygienic practices in the context of reducing diarrheal diseases recognizing the impact of diarrhea on childhood morbidity and mortality. The strategy aims to develop high impact behaviors, practices and hygiene conditions linked to the reduction diarrheal diseases particularly in children 0-5 years. It also hopes to reinforce the practice of hand washing with soap, improve access to hygienic drinking water in households and communities and improve behavior related to excreta disposal (42). While there are activities at the school level (funded through Dubai Cares) on WASH (Water, Sanitation and Hygiene) and messaging around hand washing practices, there is very little emphasis on WASH at the household level. A focus on household level intervention to increase access to simple and

low cost tools such as soap will allow reaching the most vulnerable in the household with respect to diarrheal morbidity and mortality. **Thus an intervention that targets improved hand washing at the household level would be useful in targeting the rates of diarrhea observed in infants and young children.**

Exclusive Breastfeeding

Breastfeeding is a universal practice in Mali and continues in most children through 18-23 months of age however exclusive breastfeeding rates in Mali are low as seen in the 2010 MICS survey. The preliminary report indicates that the differences observed are primarily due to a change in definition of indicator as well as change in methodology associated with data collection. In addition, the survey was conducted in the dry season when women are most likely working in the fields and are less likely to exclusively breast feed their infants possibly due to a lack of time. Nevertheless, low rates of exclusive breastfeeding are a serious concern given the increased risk of morbidity due to diarrhea and respiratory infections (upper and lower) and risk of mortality in infants that are predominantly or partially breast fed before 6 months of age (43). The level of maternal education has a significant influence on the practice of breastfeeding within one hour after the birth. Survey results show that children whose mothers have secondary or higher education were more often breastfed within one hour after birth than those whose mothers had primary education or less (61% vs. 47%). In Gao, Timbuktu and Kidal, breastfeeding within 24 hours of delivery reaches rates of 89%, 95% and 100% respectively. According to the Integrated Investment Plan (based on DHS 2006), 30% of children 6-8 months receive semi-solid or soft foods and dietary diversity and minimal acceptable diet are at 16% and 7% respectively (3, 12). **Thus promotion of breastfeeding practices using behavior change communication techniques that will target exclusive breastfeeding and appropriate initiation of breast feeding is crucial to protect Malian infants from increased risk of death and disability associated with preventable diseases such as diarrhea and respiratory infections.**

Improved Complementary foods

Improper transition from breast-feeding to complementary foods is a major contributing factor towards poor outcomes in growth and morbidity and in Mali. There are interventions currently that focus on household/community level preparation of high quality complementary foods blending cereal and legumes alongside nutrition counseling and community based care for prevention and treatment of acute malnutrition. However most of these activities are time consuming from the perspective of the mother. Discussions with women's groups in the Millennium Villages project identified time required for processing and the lack of appropriate equipment (for small scale production) as significant factors affecting the access of high quality complementary foods for infants in the households/communities. Behavior change communication (BCC) to target complementary feeding as a strategy (by itself) is successful only if it emphasizes the use of nutrient rich animal source foods (44). The analyses further documents that provision of complementary foods with or without education has the most impact on growth outcomes in children in Africa and South Asia; findings that clearly indicate the link to food security. **Thus interventions targeting access to high quality complementary foods in addition to behavior change communication are essential in Mali**

Iron/folate supplementation and Malaria in Pregnant Women

Malaria in pregnancy is a significant risk factor of maternal anemia (45) and pregnant women are four times more likely to suffer complications from malaria than those who are not pregnant. Four million infants die each year in the neo-natal period with countries in Sub-Saharan Africa (including Mali) exhibiting high neo-natal mortality rates (46, 47). Pregnant anemic women have an increased risk of pre-term delivery and delivering infants of low birth weight (48) with an increased risk of neonatal mortality risk (49). In malaria endemic areas, combined iron/folic acid supplement and malaria prophylaxis (two doses of sulphadoxine-pyrimethamine) reduces anemia and the risk of neonatal death significantly as observed in an analyses of studies conducted in 19 Sub-Saharan African countries (49). More recent work conducted in Burkina Faso (50) shows an additional benefit of introducing a 3rd dose of sulphadoxine-pyrimethamine in the regimen.

While iron-folate supplementation exists as a policy in Mali and supplements are available at the CSCOM level, the MICS survey from 2010 indicates that access of pre-natal services by pregnant women in Mali is poor with only 33% of women having seen a qualified medical professional (doctor, nurse aide, qualified midwife) at least once through the pregnancy and 35% have visited any health professional at least 4 times through the pregnancy. Furthermore, IPTp is currently a significant component of the national malaria control program (funded through the President's Malaria initiative). A review of the operational plan of the Malaria Control Program for fiscal year 2011 indicates that IPTp use was low according to the DHS data in 2006 with 4% of pregnant women receiving the recommended two doses of SP at antenatal (prenatal) visits. The National Malaria Control Program (funded by PMI) is focused on increasing the coverage and removing barriers and constraints including perceived need of payment, behavior change around the use of IPTp and improved training and training materials (51).

Nutrition Linkages within proposed AEG strategy

As per the USAID/Mali AEG strategy document (Dec 10, 2010), the likely focus of implementation in Mali will be value chain development with specific targets being sorghum, millet, livestock and rice and providing inputs at different points in the value chain.

In the case of sorghum and millet, focusing on building the value chains for bio-fortified varieties is proposed which has a potential for nutrition impact (i.e in the reduction in iron-deficiency anemia and improved zinc status). However for such an impact to occur at the programmatic level, the following steps should have already been completed:

1. Selection of varieties based on required traits (yield, nutrition, drought resistance)
2. Tested for bioavailability, efficacy and effectiveness
3. Available as seed grain and adopted by farmers (will require farmer awareness
4. Produced is sufficient quantities for household consumption and/or sales and/or available for scaling up within the context of programmatic interventions.

Findings from interviews on this activity indicate that the research in this area is at the upstream level with varieties being screened for iron and zinc content and bioavailability studies being currently conducted. There is no data on efficacy of the nutritionally enriched sorghum or millet nor is there any data on the adoption and impact on farmer yields, production etc. **Thus bio fortification of sorghum**

and millet should be considered as a research activity as this activity is unlikely to achieve programmatic implementation in the short term however has significant potential in the long term.

Intercropping with locally appropriate legumes in tandem with locally appropriate cereals is another potential intervention to impact nutrition. This practice allows for management of soil nutrition, the labor calendar, food needs and climate/pest risk. However it is a commonly practiced technology in most developing countries. In event, in Mali the practice of intercropping is lost and/or does not exist, this would be a recommended strategy. From a nutrition perspective, there is potential for intercropping to improve nutrition as observed in Malawi where households practicing intercropping with cowpea reported increased consumption of legumes (52). **In event, in Mali the practice of intercropping is lost and/or does not exist, it could be considered as target intervention however given the commonality of occurrence it is not a priority action.**

Commercialization across all the staple crop value chains is likely to impact income generation and agricultural growth. Thus it is important to consider supply and demand dynamics of markets. Current programming activities (IICEM) focused on sorghum and millet have the potential to scale up production and thus supply however markets in Mali are not sufficiently developed to create a demand for the staple crops. Attention needs to be paid towards linking agricultural value chains to private sector and industrial (small or large scale) production of foods (e.g. processed complementary foods, ready to use foods, fortified foods) following up on previous USAID-supported work in this area (53). **While there are commercial activities around complementary foods (Misola) and fortified foods (flour fortification through Grand Moulin du Sahel), these are not at a scale that will balance the increased supply. Development of these sectors is important for continued impact of agricultural growth activities around the value chains of sorghum, millet and rice.** Value chains could also be linked to "Purchase for Progress" (WFP) however programmatic demand for staple crops is likely to peak and there is lack of information on the sustainability of programmatic demand.

Aside from the need to develop markets for staple crops, role of women within agriculture could also impact nutrition. **Linking women within rice production zones to production of vegetables is a potential action but for household use only**. Commercial vegetable gardens given lack of infra structure (transportation) and poor access to markets (other than local) might be un-successful with growers likely to compete with each other for local markets. There is a clear impact of women in agriculture on the nutritional status of children and households (positive and negative). Household food security is strongly linked to the role of women in most cultures, this is especially the case in Sub-Saharan Africa (54). The most important factors explaining nutrient adequacy in households besides the food products and number of crops produced is the gender of the household. (55). Furthermore, time spent by the mother in income-generating activities is negatively associated with a child's animal protein intake and height for age ($p<0.05$) (54). There is also a positive association between maternal cash crop production and children's weight for height but a negative association between maternal staple food production and energy intake from non-breast milk foods ($p<0.05$). Maternal supervision while feeding was a positive indicator of animal protein intake by the children. **Secondary action points include linking women in the rice production and livestock value chains to household production of vegetables and milk which is likely to improve dietary diversity at the household level.**

Geographic Coverage Needs

Overall, the review of the geographic coverage of activities indicates that over 95% of communes in Mali have some form of programmatic or research activity. Our review of the nutrition landscape at the geographic level indicates that some communes have more than 4 interventions co-existing. How these are interlinked to each other is un-clear. Regions like Segou, Mopti and Koulikoro had the highest number of interventions per commune (ranging from 4 to 8 interventions) however that could be the nature of the data available from the USAID implementing partners and non-partner organizations. Generally, interventions are spread through all the regions irrespective of type (Table 4 and Table 5) and there is clear overlap of activities by commune across all regions.

With respect to specific nutrition issues identified including stunting, breastfeeding rates, diarrhea rates and use of iron/folate by pregnant women, these are issues that exist consistently across all regions of Mali. As per the proposed USAID/Mali AEG strategy document, agricultural interventions are likely to be implemented in **Sikasso, Segou, Mopti and Timbuktu**. All these regions have high rates of stunting, poor rates of exclusive breastfeeding, high diarrhea rates and poor usage of pre-natal services (including iron/folate and malaria prevention). Thus we recommend focusing on Sikasso, Segou, Mopti and Timbuktu for the key priority actions that are identified below.

Programming Constraints in Monitoring and Evaluation

Recommendations from the advocacy workshop (Atelier National d'Information des ONG et Autres Organisations de la Societe Civile sur la Nutrition au Mali) clearly stated the need for incorporating operational research and setting up appropriate monitoring and evaluation systems in programmatic interventions in Mali (Annex 3). The Feed the Future initiative also emphasizes the importance of learning and evidence-generating interventions as can be seen within the results framework (Annex 1). Appropriate process and impact evaluations allow for developing lessons learned and provide an evidence base for future decision-making. A review of ongoing activities in Mali indicates a significant lack of investment (technical and fiscal) in the area of monitoring, evaluation and operational research. Thus monitoring and evaluation components must be explicitly included in the development of programmatic interventions.

Monitoring and evaluation of programs are two distinct efforts with specific objectives and require distinctly different systems which need to be separately designed (56). Monitoring is also called process evaluation or implementation evaluation in which there is ongoing collection and review of information on project implementation, coverage and use. Evaluation seeks to measure the effects of a program on specific outcomes (e.g. quality of life, nutrition and growth outcomes). Most programmatic interventions usually collect monitoring data that can be utilized for nutrition project monitoring/process evaluations (56). With respect to evaluations generally the data collection revolves around developing and implementing a baseline survey (pre test data), one or two mid term evaluations (mid to late states of the project) and an endline evaluation (post test data).

An example of a comprehensive monitoring and evaluation system is that of the first Tamil Nadu Integrated Nutrition Project (TINP) (56). The system consisted of:

1. Ongoing monitoring of the quality, delivery, coverage, acceptance and utilization of services provided

2. Ongoing monitoring of project costs
3. Ongoing monthly impact snapshots using growth monitoring data
4. Longitudinal data collection of a sub-sample of target households or individuals in order to track the participation and benefits
5. Formal evaluation of 1% of the targeted population (consisting of a baseline, two mid term evaluations and a final evaluation).

It allowed the program to:

1. On an ongoing basis monitor changes in outcomes of the target population
2. Calculate costs for services delivered or impacts achieved comparable to other programs with similar inputs and objectives
3. Gain insights on characteristics of dropouts or non participants
4. Draw conclusions about the effectiveness of the intervention in producing short term and long term impacts

In more recent impact evaluations, data is also collect from control groups at pre-intervention (baseline) and post-intervention (final evaluation) level to allow for estimating more precisely the effectiveness of the project by attributing the exact benefit of the intervention. Data collected are then utilized to calculate specific process (monitoring) indicators or impact (evaluation) indicators that would allow program management and donors such as USAID/Mali to understand long term and short term effects of the program (or lack thereof) (56).

Monitoring and evaluation can be conducted by external researchers or by internal personnel or by a mixture of external and internal personnel (56). For objective results and analyses, it is recommended to have a separate or external entity conduct the monitoring and evaluation exercise (56).

Summary of Needs

A summary of needs in Mali is as follows:

- With all the regions showing high levels of stunting, activities around prevention of malnutrition are needed.
- With low rates of breast feeding, activities around promotion of breast feeding are crucial
- Access to good quality complementary foods needs to be improved
- Access to pre-natal services to increase use of iron/folate supplements needs to be improved
- Stronger linkages need to be made amongst existing programs (such as the National Malaria Control Program funded via the President's Malaria Initiative)
- Hygiene practices at household level to reduce disease transmission need to be improved
- Agricultural agricultural activities (sorghum, millet and rice value chains) need to be linked to markets and to private sector and small-scale entrepreneurs producing high quality processed foods
- Programmatic interventions need to set up robust monitoring and evaluation system (ideally external) that will allow generating evidence on process and impact of programmatic interventions, which would drive future policy and decision making

Priority Actions and Interventions

Based on the above review, the Nutrition CRSP identified key priority actions and interventions for implementation. The identified priority actions link the recommendations outlined above. According this analysis, USAID/Mali's niche within the area of program implementation lies within the following four outlined priorities:

1. Increase exclusive breast-feeding rates
2. Improve access to high value complementary foods through market development
3. Iron/folate supplementation linked to intermittent preventive malaria treatment
4. Access to messages and soap for hand washing and improved hygiene practices.

The above actions should be accompanied by a robust external monitoring and evaluation system that would enable research on program success and effectiveness.

Action Plan for Implementation

I. Action Plan Context

The primary purpose of this integrated action plan is to improve the nutritional status of women and children less than two years of age as well as reduce the risk of morbidity and mortality associated with poor nutrition outcomes. Activities around nutrition are gaining momentum in Mali following the findings of the World Bank landscape review on institutional and political factors impeding the incorporation of nutrition within the development agenda of Mali (28). Nutrition has been identified as a high priority activity within Mali as highlighted in the report of the National Nutrition Forum held in 2010 (57) and in three policy initiatives including PRODRESS II, PSNAN and PNIP-SA (29, 31, 32). Nutrition is linked directly or indirectly to all the Millennium Development Goals and while some progress has been made in achieving the goals, 54 nations including Mali are making insufficient progress or none at all (1). In Mali, with the exception of improving maternal health which is off track, the rest of the goals could be achieved if some changes are made (2).

The overall intent of the proposed action plan is to support the Ministry of Health/Division of Nutrition to combat the nutrition issues facing Mali. It contributes directly to specific nutrition, health and agriculture objectives outlined in PRODRESS II, PSNAN and PNIP-SA. The proposed set of interventions articulates a strategic set of actions that take advantages of USAID/Mali's history around health and agriculture activities and its unique comparative advantage as a donor and a key partner. It aligns with the global USAID Feed the Future initiative with activities targeting nutrition by improving food access, availability and utilization through direct and indirect interventions (Annex 1). The prioritized set of interventions would geographically target the regions of Sikasso, Mopti, Segou and Timbuktu with interventions targeting women and children at different levels (community, district and national level interactions).

II. Summary of Landscape Review

A. Nutrition and Health in Malian Children

In Mali, high rates of acute and chronic malnutrition in children under five years of age were reported in the 2006 DHS survey with acute malnutrition at levels that constitute a public health emergency. These increases were found between the 2001 and 2006 surveys even in areas with apparently high food security levels including Sikasso and Koulikoro. In response, there has been considerable investment in activities (at policy and programming level) in the treatment and management of severe and acute malnutrition. While the prevalence of wasting has significant reduced, stunting declines from 2006 to 2010, are not as significant indicating the need for programming around the prevention of stunting. Regions of Sikasso, Segou, and Timbuktu have over 30% of children stunted while rates in other regions except Bamako range from 25-28%.

Diarrhea levels in children are high in Mali. Every additional episode of diarrhea before two years of age can contribute to stunted growth (40). Diarrhea has been shown to be an important risk factor for poorer school performance and diminished long-term cognitive function later in life (41). Furthermore in Mali only 56% of rural households have access to treated/improved drinking water, only 11%

households have modern flush toilets; one third of households have basic latrines, another third share latrines with neighbors; and 21% of households do not have any toilet (3). The government is currently in the process of implementing a strategic plan for the promotion of high impact hygienic practices. The strategy aims to develop high impact behaviors, practices and hygiene conditions linked to the reduction diarrheal diseases particularly in children 0-5 years. It also hopes to reinforce the practice of hand washing with soap, improve access to hygienic drinking water in households and communities and improve behavior related to excreta disposal (42). While implementation of the strategy is clearly occurring at the school level (Dubai Cares) there are no interventions targeting households such as to reach infants who are most vulnerable to diarrheal disease.

Breastfeeding is a universal practice in Mali and continues in most children through 18-23 months of age however exclusive breastfeeding rates in Mali are as low as 20% (as seen in the 2010 MICS survey). Low rates of exclusive breastfeeding are a serious concern given the increased risk of morbidity due to diarrhea and respiratory infections (upper and lower) and risk of mortality in infants that are predominant or partially breast fed before 6 months of age (43).

Improper transition from breast-feeding to complementary foods is another major contributing factor towards poor outcomes in growth and morbidity in Mali. Issues around complementary feeding practices include late introduction or too early introduction of complementary foods, poor nutrient density of complementary foods, poor dietary diversity, lack of minimum number of food groups being introduced and/or food being introduced (11). Only 27% of infants receive a semi-solid or solid food between 6-8 months of age, which is the recommended age for introduction of complementary foods. In addition, dietary diversity is poor with 57% of children aged 6-23 months primarily receiving complementary foods based on cereals. Dietary diversity and minimal acceptable diet are at 16% and 7% respectively (3, 12). Cereal based complementary foods while ideal as a starting food are generally poor in nutrient density including total energy, protein quality and micronutrients (13). Furthermore only 21% children receive animal source foods (meat, fish, poultry and eggs).

B. Nutrition and Health in Pregnant Women

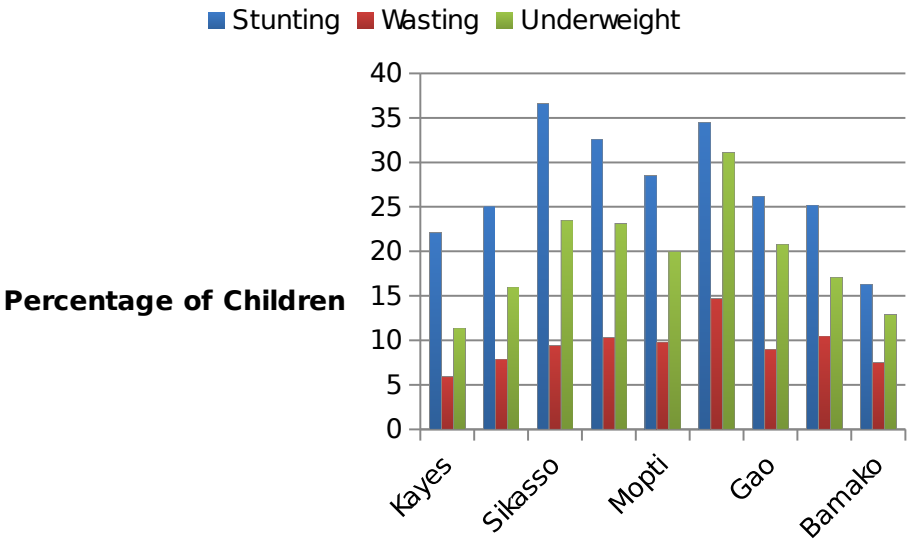
Malaria in pregnancy is a significant risk factor of maternal anemia (45) and pregnant women are four times more likely to suffer complications from malaria than those who are not pregnant. Pregnant anemic women have an increased risk of pre-term delivery and delivering infants of low birth weight (48) with an increased risk of neonatal mortality risk (49). In malaria endemic areas, combined iron/folic acid supplement and malaria prophylaxis (two doses of sulphadoxine-pyrimethamine) reduces anemia and the risk of neonatal death significantly as observed in an analyses of data from 19 Sub-Saharan African countries including Mali (49). More recent work conducted in Burkina Faso (50) shows an additional benefit of introducing a 3rd dose of sulphadoxine-pyrimethamine in the regimen. However, use of iron-folate supplementation is poor in Mali as access of pre-natal services is poor with only 33% of women having seen a qualified medical professional (doctor, nurse aide, qualified midwife) at least once through the pregnancy and 35% having visited any health professional at least 4 times through the pregnancy. Furthermore, the program on IPTp (Intermittent Preventive Therapy for malaria) being implemented by the National Malaria Control Program is poorly utilized with only 4% of pregnant women receiving the recommended two doses of SP at antenatal (prenatal) visits (DHS 2006).

III. Program Objectives and Expected Results

A. Geographic and Program Coverage

The target regions for prioritized set of interventions are chosen on the following criteria 1. High levels of stunting 2. Low levels of exclusive breast-feeding and 3. Potential collaboration with other complementary agriculture and malaria control programs. Thus Sikasso, Segou, Mopti and Timbuktu are the focus areas for this intervention. All these regions have high rates of stunting, poor rates of exclusive breastfeeding, high diarrhea rates and poor usage of pre-natal services (including iron/folate and malaria prevention. Some of these regions will also be areas where agricultural interventions on developing value chains around sorghum, millet, rice and livestock are likely to be implemented.

Figure 16: Child Nutrition Indicators by Region



In the selected regions, the most important and direct target groups will be pregnant women and children under two years of age. A solid evidence base exists on the importance of preventing malnutrition and reducing the risk of morbidity and mortality during the "window of opportunity" between conception and 2 years of age. This period is critical from short-term impacts (growth faltering) as well as long-term impacts (education and productivity, greater education attainment and reduced poverty).

The proposed set of interventions aims to reach and include the poorest and most excluded groups and will include other family members (fathers, mothers, mother in laws, local leaders, community groups, youth organizations, local NGOS) in order for it to succeed and endure. In areas of poverty, the program will target households with a social transfer (vouchers) for the transfer of high quality complementary foods and soap for handwashing.

B. Strategic Objective and Intermediate Results

B.1. Program Strategic Objective

The strategic objective of the prioritized set of interventions is to improve the nutritional status of women and children less than two years of age as well as reduce the risk of morbidity and mortality associated with poor nutrition outcomes.

B.2. Outcomes and Indicators

Key overall results on the implementation of the prioritized set of interventions include a reduction in the percentage of children under two years of age who are classified as undernourished according to three anthropometric indices including height for age, weight for age and weight for height, disaggregated by demographic/background characteristics including gender, ethnicity and socio-economic status. In addition the percentage of neonatal and the percentage of infant deaths and percentage of low birth weight babies will be reduced. For women the key results are the percentage of pregnant women with anemia will be reduced as will the percentage of pregnant women with malaria.

C. Intermediate Results

IR 1: Improved rates of exclusive breast-feeding through a behavior change communication program
IR 2: Improve access to high value complementary foods through market development including value chain development; quality certification and marketing of locally produced foods of high nutrient density and digestibility
IR 3: Iron/folate supplementation linked to intermittent preventive malaria treatment (IPTp)
IR 4: Increase use of soap for frequent hand-washing to cut disease transmission

The following sections provide more information about the background and aim of the prioritized activities within each IR as well as illustrative activities and indicators.

C.1. IR.1. Improve rates of exclusive breastfeeding through a behavior change communication program

Background and Approach

Low rates of exclusive breastfeeding from birth to 6 months of age are a major cause of poor health outcomes in Mali. Delayed initiation and early cessation are particularly common among rural mothers in lower socio-economic groups; mothers with a secondary or higher education are more likely to initiate breastfeeding within one hour after birth (3). Increasing the rate of exclusive breastfeeding throughout the 0-6 month window is closely associated with reduced disease prevalence, increased weights and heights, reduced mortality and improved outcomes in later life (37, 58-60). To achieve increases in exclusive breastfeeding, the recommended intervention is a program of **behavior change communication (BCC)** tailored to Malian conditions and USAID/Mali's strategic advantages.

Constraints on exclusive breastfeeding include the many other social and economic obligations imposed on mothers by their households and communities, such as collection of water and firewood, production of food and travelling to markets for trade. The design of this recommended intervention can have novel elements, but behavior change communication (BCC) itself is a frequently used instrument for USAID interventions. Many development partners have BCC experience, and can be expected to exercise creativity and offer innovations of their own on how to implement the intervention.

ACTIVITIES: Use of mass media (radio and billboards) to deliver messages on the benefits of exclusive breast feeding, face to face communication/ peer counseling/community based strategies/mother support groups to increase practice of exclusive breast feeding

TARGET GROUP: Malian elders and opinion leaders, fathers, mothers-in-law and children as well as mothers of infants 0-6 months

DURATION: At the programmatic level, this intervention should have a minimum of five years for implementation. Given the importance of maintaining the practice of exclusive breast-feeding in future generations of mothers, it is important to consider the potential institutionalization (similar to SIAN) of this activity.

Illustrative Intervention Design

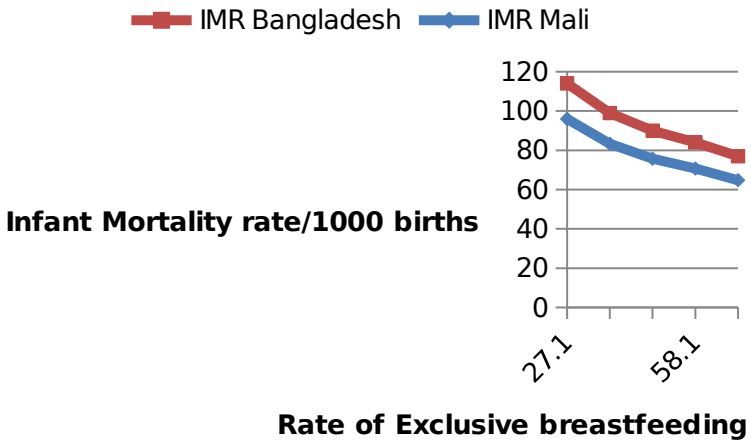
Interventions could utilize media campaigns using radio dramas, billboards, and other avenues of communication, plus face-to-face outreach using peer counseling and community-based strategies linked to existing organizations and CSCOMs to change how Malian parents, elders and opinion leaders, including fathers and mothers-in-law as well as mothers and children perceive the importance of exclusive breastfeeding for infants from 0 to 6 months of age. The goal is to make exclusive breastfeeding an attractive social norm, an intrinsic aspect of good parenting that all mothers are expected to pursue and that all other family members are expected to facilitate. A variety of implementation plans are likely to be needed, in response to variation in living conditions for different locations and segments of Malian society. A key feature of the desired intervention is that it targets both what mothers are expected to do, and how others are expected to help give mothers enough time and opportunities to breastfeed exclusively.

BCC messaging involves both factual information about the nutritional benefits of exclusive breastfeeding, and also role modeling about how exclusive breastfeeding can be achieved in various settings. To be successful, appropriate messages must target not only mothers but also fathers, other family members and non-relatives, each of whom has an important role to play in facilitating EB. It would also be helpful to embed the campaign in national health messaging, following Malian government policy on exclusive breastfeeding. In addition, while an intervention of five years will show a change in breast feeding practices, the economic incentives that influence current practices could erode these gains if the campaign is not institutionalized given the existing Malian policy on exclusive breast-feeding.

Expected Impact

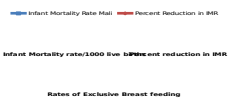
For every child who is converted to being exclusively breast fed (from being predominantly, partially or not breastfed), the mortality risk ratio from diarrhea and acute respiratory infections is lowered by 2.3 (59). In Mali, the approximate proportion of children exclusively breast fed at 3 months of age is 27% while those that are predominantly/partially or not breast fed are almost 72% (10) with an infant mortality rate reported as 96 deaths per 1000 live births (3). A mortality risk reduction calculation utilizing the risk ratio from Bangladesh (59), shows that an increase in exclusive breast feeding from 27% to 42% and a reduction in pre-dominant/partial/no breast feeding from 72 to 66% reduces mortality risk by 13% while an increasing the rate of exclusive breastfeeding to 66% reduces the mortality risk by 37% (Figure 17 and Figure 18).

Figure 17: Reductions in Infant Mortality in Mali and Bangladesh



Source of data: (59)

Figure 18: Calculated reduction in infant mortality risk reduction in Mali



Illustrative Impact Indicators

1. Increased prevalence of exclusive breastfeeding from 20% (MICS data) to 40%;
2. Decreased pre-dominant breast feeding (breastfeeding with water, sugar, honey, other non-milk liquids) by 20%; and
3. Decreased infant mortality rates from 96 births/1000 live births (DHS data) by 22%.

C.2. IR.2. Improve access to high value complementary foods through market development including value chain development, quality certification and marketing of locally produced foods of high nutrient density and digestibility

Background and Approach

Only 30 percent of Malian children receive semi-solid or soft foods in the 6-8 month window when continued growth requires these complements to breastmilk (12). The resulting deficits in total macro- and micro-nutrients are widespread in both rural and urban areas; deficits are also be seen in poor diet diversity and low prevalence of minimal acceptable diets, scored at 16% and 7% respectively (3, 12).. High quality complementary foods can be prepared from integrating appropriate levels of cereals and legumes for adequate energy and protein with added fruits/vegetables, animal source foods or micronutrient premixes for added micronutrients. In Mali, specific products that been supported by donors include a product called MILEG that was briefly manufactured by a local firm in 1995-97, MISOLA and other products from various local entrepreneurs and small cooperatives such as UCODAL, Sahelien, and La Corbeille. These are however not widespread.

To improve access to high quality nutrient dense foods at 6 months of age, the recommended intervention is to **develop agribusiness value chains around complementary food markets. This will increase the** supply of high quality complementary foods at lower cost in village markets thereby improving availability and access to foods that are now prohibitively expensive to buy and/or also prohibitively labor-intensive to produce at home.

ACTIVITIES: Develop agribusiness value chains for various types of complementary food products, using sorghum and millet or other cereals fortified with processed legumes and micronutrients; provide technical assistance to small scale and home based businesses; provide quality certification for the resulting products to promote competitive marketing; provide BCC messaging around breast feeding and complementary feeding to build awareness; and use vouchers or other social transfer programs to improve access for the most vulnerable households.

TARGET GROUP: Processors and small-scale producers of complementary foods, mothers and family members of infants 6-24 months

DURATION: At the programmatic level, a five year intervention will allow the set up of the certification program and market development efforts

Illustrative Intervention Design

The production process can readily be accomplished by home-based businesses and small-scale entrepreneurs using artisanal methods, at much lower cost compared to large industrial manufacturers.

The challenge is not production, but marketing. To create a competitive environment in which entrepreneurial start-ups can sell to consumers in local markets using locally appropriate ingredients and processing methods, it is necessary to complement any assistance to individual start-up firms with a consumer-oriented program of market development. The key feature of such a program is the provision of appropriately advertised quality guarantees for consumer assurance. Introducing a successful certification program would increase sales of the high quality certified locally produced complementary foods and improve nutrition outcomes among the children whose families have purchased those foods. The degree of success in achieving improved complementary food intake will depend on how well the intervention supports local producers, implements certification and communicates its value to consumers. The intervention design aims to implement certification in a cost-effective manner that allows measurement of its impact, so as to inform the continued expansion and scaling-up of the complementary foods market over time in Mali and to other countries.

The intervention would also help producers meet nutritional standards including achieving adequate energy, protein (quantity and quality), fat and micronutrient levels based on current complementary feeding guidelines. Three different kinds of complementary foods could be supported; one certified to be a complete food with both macro- and micronutrients, ready for cooking with water; one certified to only to have adequate macronutrients, requiring additional vegetable or animal-source foods (by the household) to meet micronutrient needs; and a third certified to have adequate protein and micronutrients, to be added to a cereal (available in the household) and requiring cooking oil to meet fat needs. Each of these can be simply formulated and/or evaluated for nutrient composition using linear programming techniques (61) based on current nutrient requirements (13, 62). The program could begin by assembling a working group on complementary food quality standards followed by provision of technical assistance, inspection services of production processes and sample products, issue appropriate certification symbols and implement randomized publicity campaigns at market places to advertise the significance of the stickers/quality assurance symbols. Initially, the certification and market-development services would be provided at no charge to complementary food manufacturers. Once the market has been created, on-going certification services would still be needed and could be converted to a sustainable commercial certification service (based on manufacturer and consumer willingness to pay). The certification service could in principle operate on an entirely commercial basis, although donors might want to supplement its fee-for-service revenues with additional support to expand coverage and further reduce infant feeding costs.

Programmatic Delivery and BCC. While consumer based market sales of high value complementary foods will allow for a wider out reach of the certified foods, we anticipate that there will be pockets of the population that will be unable to access these products due to lack of purchasing power. This is likely to be the case in rural areas of many of the regions of Mali. To ensure increased access, the program could propose a social transfer intervention that will provide vouchers to mothers to purchase of high value complementary foods. Attention would have to be given to eligibility criteria for voucher receipt (poverty levels, food insecurity levels, presence of an infant of 6 months of age) location for voucher pickup, voucher exchange as well as appropriate number of rations per voucher and the appropriate use of foods/products received from the voucher. As introduction of complementary foods must not displace breast milk, it is essential that mothers be provided information on appropriate methods to incorporate complementary foods. BCC should be delivered through the programmatic delivery as well as using mass media and through information in markets.

Expected Impact

The decisions on part of the producers about how to respond to the introduction of certification services would be an important determinant of program impact, along with consumers' behavioral responses and growth outcomes. In Mali only 20% of children receive a semi-solid or solid food at 6 months of age. A significant effect has been found on the provision of high quality nutrient supplements to Mexican children aged 0-23 months. Infants participating in the program were 0.96 cm taller than control children ($P<0.01$) and were 8.6% less likely to be stunted than control children. Guatemalan children who received a nutritional supplement in the first year of life had an additional 0.9 cm length gain and 350 g additional weight gain, gains in height and weight were lower as children got older (63). Gains in the second year of life were 0.5 cm in length and 250 g in weight as well as improved body sizes, economic productivity and increased wages in adulthood (64).

Stunting onset in Mali is similar to many developing countries with height dropping around 6 months of age and stunting prevalence increasing around 9-11 months of age (25% prevalence of stunting) with the highest prevalence around 18-23 months (50% prevalence of stunting). By providing access to high value complementary food and BCC messaging, more children will receive high value semi-solid or solid food starting at 6 months of age thereby providing a potential of 0.9 cm length gain (as per Guatemala data) by the first year of life and an additional 0.5 cm in the second year of life. For every 18-24-month-old child whose complementary feeding had been improved starting at 6 months of age, relative to current complementary feeding practices in rural Mali, the gains would be up to 1.3 cm.

Illustrative Impact Indicators

1. Increased market access to high value complementary foods in urban and rural areas of Mali;
2. Increased sales of the high-quality certified infant foods from local manufacturers;
3. Increased height gain in infants using high value complementary food by 1.3 cm in the first year of life; and
4. Reduced prevalence of stunting in infants 9-24 months of age by 25%.

C.3. IR 3. Iron/folate supplementation linked to intermittent preventive malaria treatment (IPTp)

Background and Approach

A significant fraction of Malian infants are permanently damaged before birth and/or are at increased risk of neonatal death due maternal anemia. Furthermore, malaria in pregnancy is a significant risk factor of maternal anemia (45). Four million infants die each year in the neo-natal period with countries in Sub-Saharan Africa (including Mali) having high neo-natal mortality rates (46, 47). Pregnant anemic women have an increased risk of pre-term delivery and delivering infants of low birth weight (48) with an increased risk of neonatal mortality risk (49). In malaria endemic areas, combined iron/folic acid supplement and malaria prophylaxis (two doses of sulphadoxine-pyrimethamine) reduces anemia and the risk of neonatal death significantly as observed in an analyses of combined effects of iron/folic acid supplements and malaria prophylaxis in 19 Sub-Saharan African countries (49). More recent work conducted in Burkina Faso (50) shows an additional benefit of introducing a 3rd dose of sulphadoxine-pyrimethamine in the regimen.

To achieve large-scale improvements in anemia rates coupled with reduced prevalence of malaria, the recommended approach for USAID in Mali is **social marketing of iron/folate supplements** (I/FS) for young and underweight mothers, **coupled with malaria prevention** through intermittent preventive therapy with sulphadoxine-pyrimethamine (IPtp-SP) during pregnancy. The combination of I/FS with malaria prevention has now been shown in review studies from sub-Saharan Africa – including Mali - to reduce maternal deaths from anemia; reduce the prevalence of severe anemia; reduce underweight births; and reduce neonatal mortality. In the Malian context, programs for appropriate messaging and provision of I/FS should be coupled with the activities of the National Malaria Control program funded by the President's Malaria Initiative (51), as detailed below.

ACTIVITIES: BCC and social marketing to increase awareness, availability, access and use of iron/folate supplements coupled with malaria preventive therapy (I/FS-IPTp) offered by the national malaria control program (funded by President's malaria initiative), subsidies I/FS provided to CSCOMs such that mothers have at least 90 I/FS tablets through pregnancy

TARGET GROUP: Women of reproductive age, their mothers and mothers-in-law, elders and opinion leaders

DURATION: Five years (linked to other interventions)

Illustrative Intervention Design

Increasing access and use of iron/folate supplements would require focusing on the use BCC including use of mass media to increase awareness of the importance of coupled health/nutrition intervention for pregnant women. This can be coupled to the BCC of the National Malaria Control Program (and/or to BCC for priority 1 and 2). The National Malaria Control Program has targeted religious leaders to include messaging on IPTp and the use of iron-folate in addition to IPTp could be included within this messaging. Supplements will need to be available free of charge. It is our understanding that iron-folate supplements are already part of the health care distribution system and these could be linked to IPTp that has been rolled out by the national malaria control program (NMCP). Thus the investment on part of this priority will focus on the "add on" components to the National Malaria Control Program (cost of supplement and cost of additional BCC). An important point to note with respect to this priority is the ability to link with an existing system, leverage existing resources and have an integrated nutrition/health intervention.

Expected Impact

The expected impact of provision of iron/folate with 2 or 3 doses of IPTp has been well documented by Titaley et al. and Valea et al. (49, 50). Titaley et al.'s analyses (inclusive of Malian data) found that neo-natal deaths (as measured by adjusted hazard's ratios HR) were highly associated with birth order, birth interval (less than 2 years), low birth weight, lack of ante natal care services. The hazard ratio decreased significantly if the mothers took iron/folic acid supplements with a borderline significance for use of anti-malaria prophylaxis. Furthermore, a dose response effect was observed of iron/folic acid supplements as the HR reduced by 18% (HR: 0.82, 95% CI: 0.69, 0.99) in mothers taking <90 tablets of iron/folic acid supplements and by 25% (HR: 0.76; 95% CI: 0.61, 0.95) in mothers who reported taking >=90 tablets. This significant finding indicates that if programmatically we achieve to provide

the mother 90 or more tablets through the pregnancy, there is a significant reduction in risk of neonatal death (in addition to the reduction of maternal anemia and prevention of malaria). With no specific data on number of tablets consumed by Malian women we cannot specifically calculate the impact of increased use of iron/folate coupled with IPTp but given that Titaley et al's analyses incorporates Malian data, we consider the results a good proxy for calculating "impact" of programmatic intervention.

Illustrative Impact Indicators

1. Increased use of iron/folate supplements and pre-natal services coupled with IPTp by 50%;
2. Increased compliance so that at least 50% of women of will consume 90 I/FS tablets or more through the period of pregnancy coupled with ≥ 2 doses of IPTp-SP.

C.4. IR 4. Increase use of soap for frequent hand-washing to cut disease transmission

Malian children experience frequent diarrheal and respiratory infections. For example, 30% of children in Timbuktu and around 15% of children in Sikasso and Segou are reported to have had at least one episode of diarrhea in any two week period, which translates into a high annual disease burden. Cutting disease transmission through frequent handwashing in similar contexts has been directly linked to major reductions in the incidence of diarrhea and acute lower respiratory infections (65-68). Diarrheal disease interacts with nutrient intake and simple interventions to promote hand-washing that combine BCC messaging with improved access through vouchers and other programs would allow the increase in hand-washing which has been directly linked to the reduction of incidence of diarrhea as well as infections such as pneumonia (65-68). These interventions can help reduce the economic cost of soap, and also change social norms to account for the fact that the benefits of handwashing lie in cutting disease transmission from person to person, and thereby generate benefits for other people as well as oneself.

To cut transmission of these diseases, the recommended essential actions in hygiene and sanitation that can most readily be scaled up through USAID intervention in Mali involve household soap use. This must overcome two inter-related constraints: first, one person's use of soap has an often under-appreciated social benefit to other people, both within and across households, and second, soap is a costly purchase especially for the poorest. Overcoming both constraints requires interventions to make soap more affordable, while also changing social norms regarding its use by adults as well as children. The recommended interventions are hand-washing messages relayed through BCC, coupled with vouchers and other social marketing interventions to increase access to low-cost soap in rural markets, both of which are readily linked to the messaging associated with other recommended priority actions.

ACTIVITIES: BCC and social marketing to increase awareness, availability, access and use of soap for frequent hand washing among young children and others. Increased recognition of the benefits to others of hand washing as well as to the self. Existing training materials and new initiatives linked to the other interventions, including vouchers to ensure access by the most vulnerable households, would be used to change social norms and reduce economic barriers to essential hygiene actions.

TARGET GROUP: Children under five years of age, all family members, elders and opinion leaders
DURATION: Five years (linked to and integrated with other interventions)

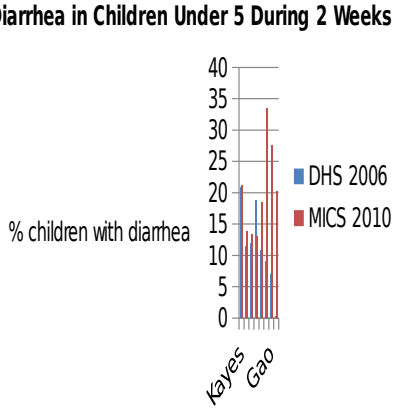
Illustrative Intervention Design

The intervention design should focus specifically on household hand washing with soap, through BCC to change social norms coupled with social marketing to increase soap availability, access and use. This recommendation should be delivered alongside the other priority interventions, as a whole-household behavior to improve outcomes at every age.

Expected Impact

Globally, 3.5 million children under 5 die from diarrhea and acute lower respiratory infections with most deaths being concentrated in low income countries (43, 58, 69). The expected impact of improved hand-washing has been demonstrated by Luby et al (65) in a hand-washing intervention conducted in Karachi, Pakistan. In households that received plain soap and hand-washing promotion, incidence of diarrhea was reduced in infants by 39% (95% CI; -61%, -16%) incidence of pneumonia was 50% lower than in the controls (95% CI; -65%, -34%) while children under 15 years had a 53% lower incidence of diarrhea (95% CI; -65%, -41%) and a 34% lower incidence of impetigo (95% CI; -52%, -16%). A major meta-analysis of hygiene and sanitation interventions (70) concluded that major benefits can be achieved with a variety of interventions that interrupt the transmission of common diseases such as diarrhea or pneumonia. These can include improved water supplies, waste management such as pit latrines to prevent contamination, and handwashing to remove pathogens. The recommendation to focus on handwashing is due to its relatively low cost and rapid impact.

Figure 19: Prevalence of diarrhea in children under 5 (two weeks prior to survey: DHS and MICS surveys)



SOURCE: (3, 10)

Illustrative Impact Indicators

1. Reduced incidence of diarrhea by 25% in children under five years of age;
2. Reduced incidence of pneumonia by 30% in children under five years of age.

D. Monitoring and Evaluation

USAID The Feed the Future initiative emphasizes the importance of learning and evidence generating interventions that would drive future decision-making. Appropriate process and impact evaluations allow for developing lessons learned and provide an evidence base for future decision-making. Thus monitoring and evaluation components must be explicitly included in the development of the programmatic intervention. A monitoring system should be set up along with protocols for evaluation including a baseline survey (pre-test), one or two mid term evaluations (mid to late stages of the project) and an endline evaluation. Data should also be collected from representative control groups to allow for estimating more precisely the effectiveness of the program. For objective results and analyses, monitoring and evaluation should be conducted by external researchers (56).

An illustrative example of a comprehensive monitoring and evaluation system is as follows (56):

6. Ongoing monitoring of the quality, delivery, coverage, acceptance and utilization of services provided
7. Ongoing monitoring of project costs
8. Ongoing monthly impact snapshots using growth monitoring data
9. Longitudinal data collection of a sub-sample of target households or individuals in order to track the participation and benefits
10. Formal evaluation of a statistically relevant sample of the targeted population (consisting of a baseline, two mid term evaluations and a final evaluation).

Activities around the proposed program and IRs should develop a comprehensive monitoring and evaluation framework.

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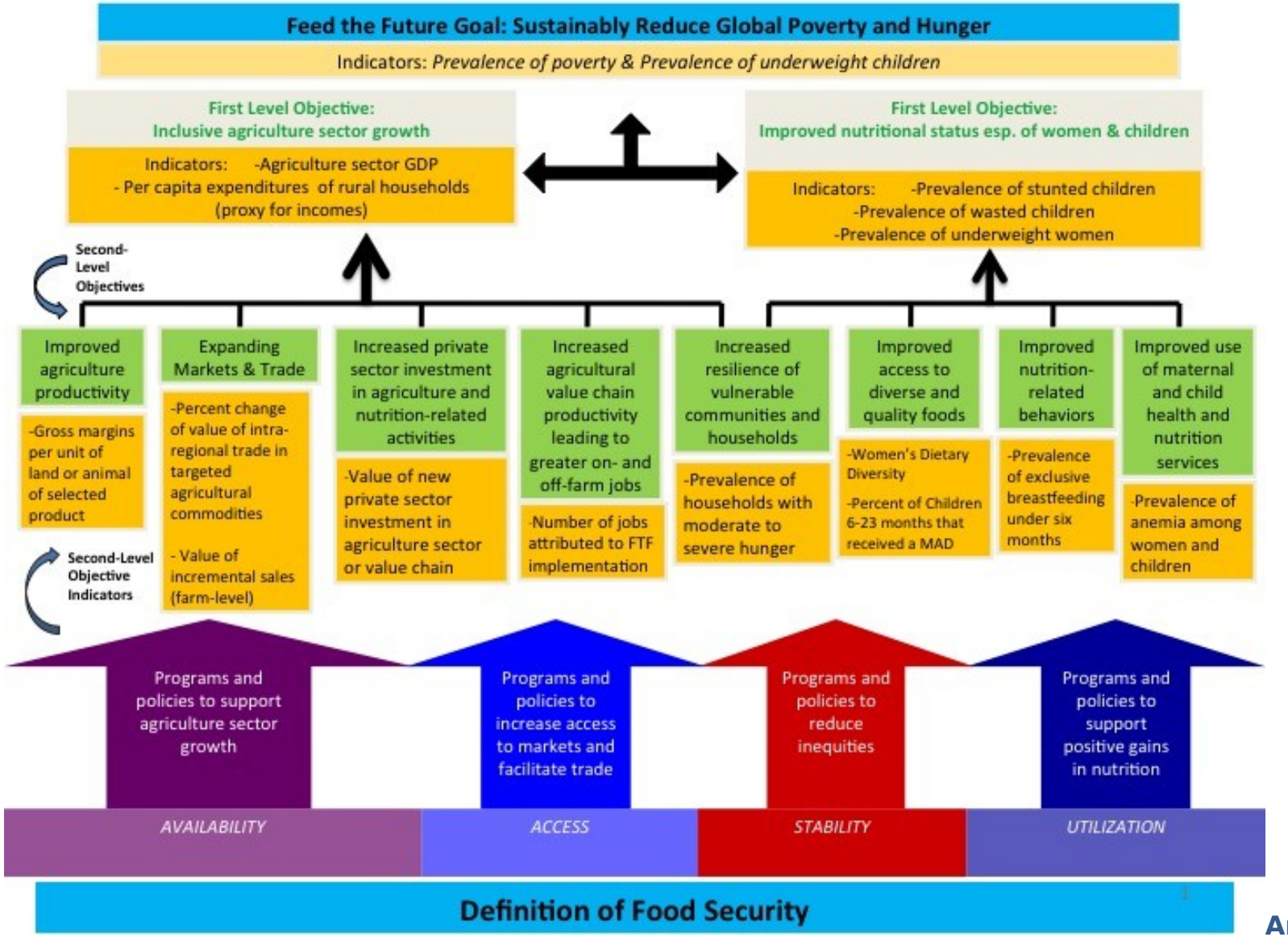
Annex 1: USAID Feed the Future Results Framework



Annex 2: National Nutrition Forum objectives, findings and recommendations

Workshop 1: The role and importance of nutrition in achieving the outcomes of the Strategic Framework for Growth and Reduction of Poverty (PRSP)				
Workshop objectives	*Priority issues identified*	*Opportunities identified*	*Constraints identified*	*Recommendations proposed*

• Understand that nutrition plays a critically important role in achieving the results of the PRSP through its contribution to improving the GDP, reducing poverty, reducing infant and maternal mortality, improving academic performance, and improving physical abilities. • Discuss the role of nutrition in achieving national food security to cover all relevant practices (breastfeeding, complementary feeding of young children (6 to 59 months of age), vitamin A supplementation, deworming, iodized salt, iron/iron folic acid supplementation for pregnant women, the management of acute malnutrition • Develop proposals for improving institutional linkages with nutrition in light of emerging issues and challenges	• There is a risk of not achieving MDGs 1c, 4 and 5 in Mali • Inadequate visibility and inclusion of nutrition in the PRSP • There is little awareness of the importance of nutrition by communities • Misunderstanding of the role of nutrition in economic growth	• Political will • Development of the 3rd PRSP • Development of PRODESS • Decentralization • Growing interest among worldwide partners	• Lack of macroeconomic impact of nutrition • Institutional weakness to influence policy • Inadequate human resources • Little multi sectoral consultation and coordination • Insufficient visibility of nutrition • Multisectoral problem with accountability • Improperly positioned in the local, regional, and national priorities	• Develop a national policy and strategic plan • Update the profile tool of the macroeconomic impact of malnutrition as a basis for advocacy • Include nutrition in the 3rd PRSP • Mainstream nutrition in economic development plans and employers at all levels

Workshop 2: Engineering nutrition: choice of interventions and synergy of actions in a multisectoral context				
Workshop objectives	*Priority issues identified*	*Opportunities identified*	*Constraints identified*	*Recommendations proposed*
• Conduct an analysis of existing nutrition interventions in Mali • Identify appropriate interventions based on scientific evidence in the form of a national nutrition strategy that is broader, more multisectoral, more integrated and functional, and where each of the actors, stakeholders and partners involved has a role to play • Propose a mechanism for monitoring and evaluation of each identified intervention requiring the mobilization of actors involved	• Exclusive breastfeeding: ignorance of good practices and benefits, sociocultural issues, poor availability of services, poor nutritional status of women • Supplementary feeding: low availability of complementary food, breach of good feeding practices, purchasing power • Therapeutic feeding: cases are not detected early, misperceptions of malnutrition, limited availability of inputs, inadequate human resources in quantity and quality • Micronutrient supplementation, deworming and fortification: inadequate regulations for mandatory food fortification, poor availability of fortified foods, insufficient expertise to control food quality, inadequate behavior change communication, limited availability of inputs for supplementation • Distribution of ITNs and preventive treatment: inadequate operational strategy to cover children from 1 to 5 years of age, inadequate availability of inputs	• Exclusive breastfeeding: existence of strategic communication in nutrition, existence of several technical partners, existence of media networks, decentralization, existence of breastfeeding/baby support groups, existence of trainers, existence of standards and protocols, existence of many initiatives to promote training, existence of higher education structures, existence of research structures, existence of PRODESS< existence of sectoral programs	• Exclusive breastfeeding: no media in some areas, low coverage, lack of coordination at national level, funding, inadequate human resources	• Exclusive breastfeeding: develop and implement a communications program for behavior change, train the actors (health and community), integrate breastfeeding into the curricula of basic education and secondary schools and family practices essentials, promote research on the knowledge and practice of breastfeeding, strengthen the supply of social and health services (coverage, accessibility and quality) • Supplementary feeding: intensification of IEC activities, promote the production and use of local products • Therapeutic feeding: revise the national protocol for the management of acute malnutrition, ensure the continued availability of inputs, build management capacity (human resources, infrastructure and equipment) • Micronutrient supplementation, deworming, and fortification: adopt regulations mandating fortification of certain foods, ensure the continued availability of fortified foods and inputs, strengthen the capacity of food quality control structures (human resources, control kit and equipment), develop a

Workshop 2: Engineering nutrition: choice of interventions and synergy of actions in a multisectoral context				
Workshop objectives	*Priority issues identified*	*Opportunities identified*	*Constraints identified*	*Recommendations proposed*
				communication strategy for behavior change in production and consumption of fortified products • Distribution of ITNs: accelerate the implementation of the child survival strategy, strengthen measures to prevent the proliferation of sanitation breeding sites, enhance the accessibility of inputs

Workshop 3: Financing of nutrition				
Workshop objectives	*Priority issues identified*	*Opportunities identified*	*Constraints identified*	*Recommendations proposed*
• To conduct an inventory of financing for nutrition at the international, national, local and community levels • To conduct an inventory of the cost of nutrition interventions • To identify the mechanisms and sources of financing for training and research • To develop proposals for adjustments and improvements and to identify opportunities and means to achieve them	• Little funding for the operation of nutrition activities • Insufficient financing at the national, regional, local and municipal levels • Delay in the mobilization of resources • Weak financial information system • Household poverty	• Political commitment through macro-policies (MDGs, PRSP etc.) • Existence of new sources of funding for nutrition • Renewed global interest for financing of nutrition actions • Awareness of nutrition problems is starting at the household and community levels • New scientific knowledge about nutrition	• Economic and financial crises • Climate change • Little awareness of nutrition at household and community levels • Sociocultural issues	• Revise the national nutrition policy • Make nutrition financing available in sectoral departments • Make a map of financial and nutrition partners • Develop a framework for medium term expenditure of the new strategic plan • Create a budge to fund nutrition activities • Strengthen technological capacity • Comply with commitments • Add nutrition activities in local municipal plans of regional development • Build local capacity • Promote income generating activities to support nutrition at the household level • Monitor the Paris declaration on aid

Workshop 4: Strengthening of human resources and training				
Workshop objectives	*Priority issues identified*	*Opportunities identified*	*Constraints identified*	*Recommendations proposed*
• To hold nutrition training at the international, national, and vocational levels • To strengthen nutrition research • To identify key constraints, strengths and weaknesses of different trainings in nutrition • To create proposals for changes and improvements in training and research	• Strengthen training in nutrition • Strengthen the capacity of stakeholders in nutrition (continuing education) • Train a sufficient number of specialists in nutrition • Strengthen collaboration between research organizations • Identify and disseminate research results • Strengthen the capacities of existing structures	• Existence of regional dynamics in favor of nutrition • Existence of nutrition modules at the national level and among partners • Existence of a strategic plan on training with all indicators • Sub-regional initiative for strengthening and harmonization of training and research • Re-engagement of partners in favor of nutrition	• Lack of critical mass of experts in nutrition • Lack of leadership and coordination mechanism between various stakeholders for the implementation of the national nutrition policy • Inadequate funding for training and research	• Provide adequate initial and continuing training in nutrition in all sectors • Initiate institutional reforms to meet the needs of nutrition specialists: institutional and budgetary items • Create a timeline for nutrition programming by setting a result: e.g. satisfy 50% of basic needs by 2015 • Consider training specialists in different career paths • Develop a set of specifications for the various stakeholders • Accelerate implementation of the West African initiative to strengthen capacity in nutrition

Workshop 5: The legal and institutional framework of nutrition				
Workshop objectives	*Priority issues identified*	*Opportunities identified*	*Constraints identified*	*Recommendations proposed*
• To conduct an inventory of legal and institutional framework in Mali • To identify major constraints, strengths, and weaknesses • To develop proposals and create an institutional and legislative framework adapted to the context of local, national, and international levels	• Weak policies • Lack of intra and intersectoral leadership • The multiplicity of stakeholders • Inadequate coordination and stakeholders on the ground • Inadequate collection, analysis and interpretation of data in relation to malnutrition • Inadequate collection, analysis and interpretation of nutrition data • Inadequate monitoring of nutrition activities • Lack of adequate formal mechanisms for consultation and coordination of nutrition • Little involvement by communities in the management of nutrition problems • Low visibility of nutrition • Insufficient funding for nutrition	• PRSP • Institutional and sectoral cooperation and the existence of CPS • Partnership • Decentralization • Funding • Commitment at global, regional, and sub-regional levels • Existence of experience in Burkina Faso and Mauritania • Research results	• Weak information systems • The non-appropriation of nutrition issues among policy makers and leaders • Failure to incorporate nutrition into sectoral development policies • Inadequate institutional anchoring of existing coordination	• Establish a preparatory committee for the development of nutrition policy • Propose the national policy statement of nutrition • Establish a unique cross-sectoral coordination and cooperation unit at the national level with a permanent secretariat • Empower and make regional, local, and municipal committees functional so that there is coordination exists for the inclusion of nutrition • Raise the level of institutional capacity of nutrition within the department of health and other ministries concerned

Annex 3: National information workshop for NGOs and other civil society organizations on nutrition in Mali

(Atelier National d'Information des ONG et Autres Organisations de la Societe Civile sur la Nutrition au Mali)

The objective of workshop was to reinforce the knowledge and capacities of NGOs and civil society actors to effectively support the State's efforts concerning nutrition. The workshop also aimed to improve the knowledge base of existing policy and programmatic documents.

The workshop identified several challenges ranging from field level implementation issues to training and implementation of appropriate protocols and coordination of stakeholders/actors at the implementation and policy level (national). Main challenges included lack of financial resources, qualified personnel, logisticians to implement nutrition programs, issues in procurement and supply of materials and medications for the care of malnutrition, weak involvement at the community and religious leader level in nutrition education activities, improper protocol implementation (especially that of acute malnutrition), issues with access to treatment centers, weak involvement of health agents (relais) in treatment activities, no monitoring and evaluation system set up, weak incorporation of nutrition indicators in the health information system and lack of coordination of actions and interventions between different actors in the field and the central government. Stakeholders felt while the emphasis on nutrition has improved within the Malian policy context, the Social Economic and Cultural Development Plan still did not adequately address nutritional aspects. The stakeholder workshop recommendations included establishing operational research studies reinforcing monitoring and evaluation of nutrition activities at the field level, reinforcing local production of ready to use foods, formalizing and reinforcing the coordination and consulting mechanisms amongst different nutrition actors and large scale dissemination of documents related to nutrition policy, strategies and programming.