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# KENYA HORTICULTURE COMPETITIVENESS PROJECT AN INTEGRATED NUTRITION FRAMEWORK FINAL REPORT

**November 2011**

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The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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## LIST OF ABBREVIATIONS

APHIA II	The AIDS, Population and Health Integrated Assistance project.
CBO	Community Based Organization
FtF	Feed the Future
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
KDHS	Kenya Demographic and Health Survey
KHCP	Kenya Horticulture Competitiveness project
KIHBS	Kenya Integrated Budget Survey
MDGs	Millennium Development Goals
MoA	Ministry Of Agriculture
MOMS	Ministry of Medical Services
MOPHS	Ministry of Public Health and Sanitation
MUAC	Mid-Upper Arm Circumference
OPV	Oral Polio Vaccine
OVC	Orphans and Vulnerable Children
SUN	Scaling Up Nutrition
UN	United Nations
UNICEF	United Nations Children's Funds
USG	United States Government
USAID	United States Agency for International Development
WFP	World Food Programme
WHO	World Health Organization

# 1. EXECUTIVE SUMMARY

Kenya currently faces chronic and growing food insecurity. According to the findings of the 2008 Kenya Demographic and Health Survey (KDHS), 35% of Kenyan children are stunted, while 14% are severely stunted. Wasting is also on the rise in Kenya, a 1.4% increase from 2003.

In response to President Obama's Feed the Future initiative focusing on reducing hunger and poverty through higher agricultural productivity and improved nutrition, the USAID-funded Kenya Horticulture Competitiveness Project (USAID-KHCP) contracted University of Nairobi Nutrition Professor, Dr. Alice Mwangi, to conduct a nutritional study in the project's target regions. Specifically, the consultant was hired to conduct a quantitative evaluation of nutritional deficiencies of project beneficiaries by region, document USAID-KHCP contributions to improving food security and nutrition, and make recommendations to improve alignment of project activities to address the identified food security and nutritional deficits. Dr. Mwangi combined desk and field research in the development of this report revealing the following nutrition and project findings:

- **Widespread challenges with maternal health and nutrition.** Regions are facing high incidences of both underweight and overweight (as high as 14.3% and 35.6% respectively) suggesting lack of access to food and/or poor food intake decision-making.
- **Alarming levels of child malnutrition in Eastern region** (28.6% underweight, 57.1% stunted) representing chronic food security challenges.
- **Low levels of vitamin A supplementation coverage** (between 30% in Nyanza and 69% in Coast), demonstrating a significant but surmountable risk to healthy child development.
- **USAID-KHCP activities (improving production, value addition and access to markets) are contributing to improved food security**, but the lack of training on food utilization could lessen positive impacts on nutrition.
- In all regions, **health and nutrition stakeholders are implementing activities** that could **complement core project activities**, by providing training on general nutrition and food utilization.

Based on the results of the nutrition survey and the review of USAID-KHCP food security activities, the consultant developed the following recommendations:

- Support project partners to incorporate **training on how to utilize food and income earned from horticulture sales for optimal nutrition** into agronomic curriculum.
- **Expand coverage of kitchen garden technology and food utilization awareness** to all field-based partnerships involving public, private and non-governmental organizations.
- **Collaborate with existing health and nutrition stakeholders** to increase impact of activities and address nutrition challenges not directly related to agriculture (e.g. infant and young child feeding practices and immunization coverage).
- **Identify dedicated nutrition partners and/or consultants** to engage in the development of a training curriculum and appropriate training approach.
- **Track project level impact** on nutrition by conducting periodic project evaluations.

## 2. INTRODUCTION

The Kenya Horticulture Competitiveness project (KHCP) is a five year initiative supported by the American people through the United States Agency for International Development (USAID). The goal of USAID-KHCP is to achieve a highly competitive horticulture industry and improve food security through increasing on-farm productivity, enhancing value-added processing, improving coordination among horticulture value-chain participants, and increasing the capacity of local organizations to provide improved technical services to smallholders. The program is designed to help the horticulture industry become a catalyst for increased rural income, employment generation and food security.

Food security is defined as having four main components: availability, access, utilization and stability. This implies the need, at the household level, for a reliable and consistent source of quality food as well as sufficient resources to purchase it. It is also important that people have the ability to choose, prepare and distribute food in a way that results in good nutrition for all household members. This means members of the household must also have access to nutrition knowledge and basic sanitary conditions. The ability to access and utilize food must stay stable and sustained over time. Food security is a necessary condition for good nutrition; however, adequate access, availability and stability of food are not sufficient. The proper utilization of a diverse diet of food is required for good nutrition.

The purpose of this study<sup>1</sup> is to:

- Establish a baseline of the nutritional status among KHCP beneficiaries
- Document project activities and their contribution to food security and nutrition
- Identify opportunities to increase the impact of existing activities on food security and nutrition
- Identify new project activities to fill gaps in KHCP food security framework

Kenya currently faces chronic and growing food insecurity. According to the findings of the 2008 Kenya Demographic and Health (KDHS) survey, 35% of Kenyan children are stunted, while 14% are severely stunted. Stunting is the result of prolonged failure to receive adequate nutrition. Wasting, which represents a more acute nutritional deficiency, is also on the rise in Kenya. The KDHS in 2009 reported a 1.4% increase in wasted children from 2003.

Research indicates that the nutritional problems in Kenya do not just result from lack of access to food, but also are impacted by other nutrition-related factors such as poor infant and young child feeding practices, lack of access to a diverse diet, poor food preparation and food choices, poor child spacing, mother/child interactions, shocks such as frequent drought, and lack of access to clean water, sanitation and health care services.<sup>2,3,4,5</sup>

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<sup>1</sup> SoW included in Appendix I

<sup>2</sup> KDHS (2003), CBS/MOH and ORG Macro 2004, GOK, Nairobi

<sup>3</sup> GOK (MOH) / UNICEF. Iron Deficiency Anemia, Vitamin A and Zinc National Survey, 1999, Nairobi

<sup>4</sup> Kenya Integrated Budget Survey 2005/2006, Revised Edition, Basic Report, Ministry of Planning and National Development, August 2007.

<sup>5</sup> Child Survival and Development strategy 2008 - 2012

USAID-KHCP's household survey evaluated the nutritional status of participants as well as other nutrition-related factors such as household demographics, infant and young child feeding practices and diet diversity. Environmental impacts such as drought and sanitation were not evaluated in the survey. Stakeholder interviews with local health and nutrition organizations and project partners were conducted to validate survey findings and map out the landscape of food security and nutrition activities.

The quantitative and qualitative food security and nutritional assessment form the basis of the USAID-KHCP Integrated Nutrition Framework. The framework aims to provide the project with tailored, clear and actionable recommendations to maximize food security by measurably improving the nutritional status of beneficiaries.

USAID-KHCP currently collects and reports on 21 indicators. At the time of writing this report, the Kenyan mission was developing guidance for USAID-KHCP and other project implementers on how to collect and report on specific nutrition and food security indicators. In the absence of these recommendations, the consultant recommends that USAID-KHCP tracks its impact on improving food security and nutrition through midterm and end of project surveys.

### 3. SURVEY METHODOLOGY

Dr. Alice Mwangi, a Nutrition Professor from the University of Nairobi, combined desk and field research in the development of this report. The desk review included project documents, development plans, regional reports, agricultural sector records/reports and health sector/facility records. The purpose of the desk review was to help familiarize the consultant with the project mandate and activities and to establish some baseline information such as population statistics, health and nutrition statistics, common dietary challenges of women and young children and common food preparation practices.

The field research was comprised of household surveys, stakeholder meetings and focus group discussions and took place in the six project regions over the course of five weeks (schedule appendix II). Dr. Mwangi accompanied by two assistants administered 460 household surveys and conducted 6 stakeholder meetings and 12 focus group discussions (one and two respectively in each region). Stakeholders included KHCP partners, agriculture and health and nutrition public and non-governmental organizations. The purpose of the household survey was to establish a nutritional baseline for KHCP participants. The stakeholder meetings and focus group discussions served to validate survey findings and identify complementary food security and nutrition activities taking place in the six project regions. Data entry and analysis was completed in Nairobi. Eight of the 460 household surveys were excluded from the analysis as they were incomplete.

## 4. THE NATIONAL SITUATION

According to the 2009 population and housing census, the population of Kenya is 38.6 million people,<sup>6</sup> of which approximately 18% are children between six months and five years of age. Of the total population, approximately 22.7% live below less than 1 US \$ per day ( $\leq$  US \$) while approximately 58.3% live on  $\leq$  2 US \$ per day. The 2005 IMF/ GOK Kenya Poverty Reduction Strategy conducted by the government reported that about 56% of the population lived below the poverty line.

Kenya's health and nutrition targets are to reduce severe and moderate stunting by one third, to reduce anaemia by 30%, and to virtually eliminate iodine deficiency between 2010 and 2030. Priorities for the Ministry of Public Health and Sanitation, Division of Nutrition, include reduction of incidence of malnutrition among children under five years by 20% and providing vitamin A supplements to 100% of all those eligible between 2008-2012. Nutrition priorities are spelt out in Kenya's Vision 2030 and also the existing national policy and strategic plans and platforms.

However, in endeavouring to achieve the MDG targets, Kenya's progress in the reduction of under nutrition in children below five years has been very slow at 0.6% to 2.5% average annual rate.<sup>7</sup> Since 2003 the stunting rates have shown some decline (by about 6%) but underweight and wasting have not declined. KDHS data from 2003 to 2008 show that the proportion of stunted children dropped in all provinces except for North Eastern, where it increased by 4%, and Eastern where it was virtually unchanged. The prevalence of underweight among children below 59 months old is estimated at 16% with 4% being severely underweight. Micronutrient deficiencies affect many of these children with over 40% considered anaemic and over 70% with acute to moderate vitamin A deficiency.<sup>8</sup> Thus, undernutrition persists in Kenya despite economic and agricultural growth. This situation and recent trends in nutrition, coupled with an analysis on causes of undernutrition among Kenyan children, calls for an approach that should be focused on prevention

The human and economic costs of malnutrition are enormous. Evidence shows that malnutrition in the first 2 years of life causes irreversible damage that permanently reduces cognitive function and physical capacity and makes individuals more vulnerable to disease. This, in turn, reduces productivity, slows economic growth, and perpetuates poverty. It is estimated that the losses in productivity caused by malnutrition represent 10% of an individual's lifetime earnings and approximately 2-3% of national GDP.<sup>9</sup>

National statistics misrepresent the nutrition picture at regional level. Some regions (North Eastern and Eastern provinces) have very high prevalence of undernutrition among children <5 years (Eastern has 42% compared to 35% national average; also wasting is 19.5% in North Eastern compared to 6.7% national average); (see Table 1 and Figure 1). Vast regional differences necessitate a focused and geographically targeted approach.

<sup>6</sup> National Bureau of Statistics, Ministry of Planning and Development (GOK). 2009 Population and Housing Census 31 August 2010.

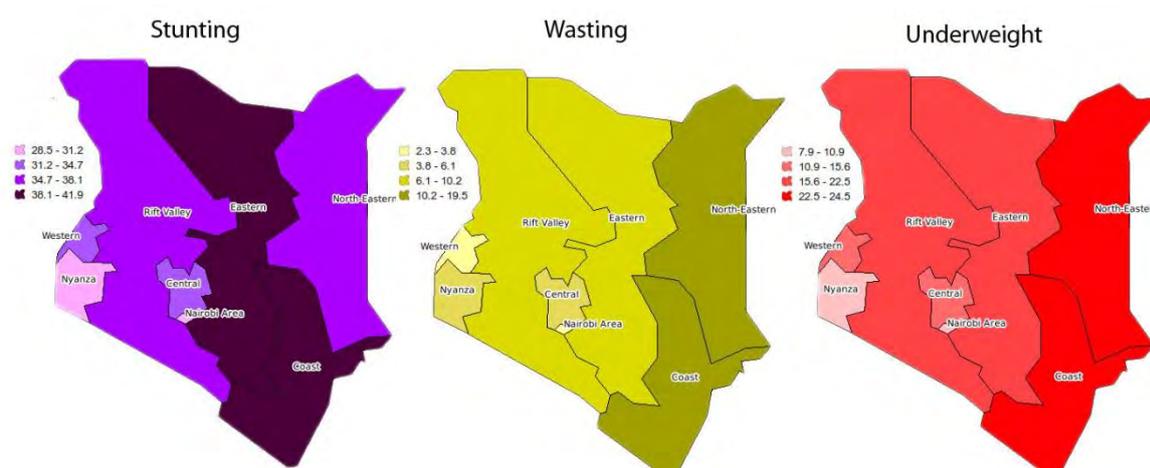
<sup>7</sup> UNICEF Progress for Children Report Card No4 Nutrition. UNICEF New York 2006.

<sup>8</sup> National Vitamin A, Iron and Zinc Study Government of Kenya/UNICEF 1999.

<sup>9</sup> The World Bank. Repositioning nutrition as central to development. A strategy for large-scale action. Washington DC: The World Bank, 2006.

**Table 1: Comparison of Nutrition Indicators by Region**

<i>Nutritional status</i>	<i>National</i>	<i>West-ern</i>	<i>Nyanza</i>	<i>Coast</i>	<i>North Eastern</i>	<i>East-ern</i>	<i>Rift Valley</i>	<i>Nairobi</i>	<i>Central</i>
	Percent of Children								
Underweight	16.1	11.8	10.6	23.5	24.5	19.8	19.1	7.9	12.1
Stunting	35.3	34.2	30.9	39	35.2	41.9	35.7	28.5	32.4
Wasting	6.7	2.3	3.9	10.7	19.5	7.3	8.9	3.8	4.9

**Figure 1: Maps showing Nutrition Indicators by Region**

Source: USAID-Kenya Integrated Nutrition Framework, 2011

Diets in Kenya are typically deficient in one or more micronutrients, particularly vitamin A, iron, iodine and zinc. Among the main causes of widespread micronutrient deficiencies in Kenya are low levels of micronutrients in the normal diet and characteristics of the normal diet that make some of the micronutrients consumed unavailable in terms of absorption (for example phytates in whole maize and whole wheat flour). However, some vitamins and minerals are not found in sufficient quantities in the overall diet of the general population (iodine), and some population groups, such as young children and pregnant and lactating women (iron, vitamin A and folic acid).

According to the Kenya National Food Security and Nutrition Policy (NFSNP) Draft (2008) efforts need to focus on four main areas to successfully address all forms of vitamin and mineral deficiencies for people in various life stages. These are:

1. Dietary diversification
2. Food fortification with vitamins and minerals
3. Bio-fortification

#### 4. Vitamin and mineral supplementation<sup>10</sup>

Each of these has its place in an overall strategy to assure adequate vitamin and mineral nutrition for all members of the population across their full life cycle. Each of the areas also has different costs, different stakeholders in terms of responsibility, and while some strategies may be effective on their own (e.g. universal salt/iodized salt) a careful integration of multiple interventions is necessary to substantially decrease or eliminate each of the major micronutrient deficiencies. Nutrition education, promotion of a more varied diet and shifting food subsidies to a package of food products with various macro- and micronutrients, as well as promotion of backyard gardens and small-scale animal husbandry, all relate to diversifying diets. Horticultural production and utilization may play a role in the diet diversification and bio-fortification strategies.

The draft NFSNP indicates that in order to address *micronutrient deficiencies*, the government will:

1. Support integrated, multi-intervention strategies to eliminate all vitamin and mineral deficiencies for all age and life stage groups in correspondence with Kenya's stated commitments in the UN General Assembly in 1992.
2. Develop standards and support high quality commercial micronutrient fortification activities.
3. Promote guidelines developed for the distribution and sale of off-the-counter vitamin and mineral supplements.
4. Promote cross-sectoral and public-private alliances for development and operations of programs to deliver and promote micronutrients to all sectors of the population.

In Africa, Asia and Latin America, fortification is increasingly recognized as a cost-effective strategy that, when combined with other interventions, can control micronutrient deficiencies. In Kenya, iodine deficiency has largely been controlled through universal salt iodization (industrial food fortification), which started on a voluntary basis in 1970 and became mandatory in 1992. Some margarine and cooking fats/oils in Kenya are fortified with vitamin A and other fat soluble vitamins. In addition, there have been commercially sponsored efforts to fortify maize flour with iron. However, incorporation of food fortification policy within the national food policy of Kenya remains at draft level.

Through the initiative of industries and mobilization of stakeholders, the Kenya National Food Fortification Alliance (KNFFA), a public-private partnership was established in 2006 to spearhead fortification efforts. By March 2007, KNFFA had developed oil fortification guidelines and standards for vitamin A based on ECSA Health Community Standards on food fortification and enabled three vitamin A fortified oil brands to be on the market shelves. It was, however, estimated that this effort would benefit about 10% of the total population. In 2008, the standards for flour fortification with iron was also developed based on the ECSA standards. In 2010, funding for implementation of oil, wheat and maize flour fortification program in the country was approved. Except for salt iodization, fortification activities in Kenya are voluntary but supported by government. This support has motivated food industries and agribusinesses to implement fortification activities and use them to promote their businesses. In 2011, one company started fortification of sugar with vitamin A and flour millers have started fortifying wheat and maize flour. While these efforts are timely, they can only reach a part of the population, mainly those in urban areas. Rural smallholders do not use processed maize flour. Instead they mill their grain in local *posho mills* without fortification. In addition, consumption of wheat flour among the rural folk in Kenya is not frequent. Further still, sugar and oil consumption is also low and since fortification is voluntary, they are likely to buy the unfortified brands since they are slightly cheaper. Therefore, horticultural production has opportunities in contributing to micronutrient intake by availing vitamin and mineral rich horticultural products to the rural population, as complementation to the fortification programs.

<sup>10</sup> National Food Security and Nutrition Policy (Draft 2008), Republic of Kenya

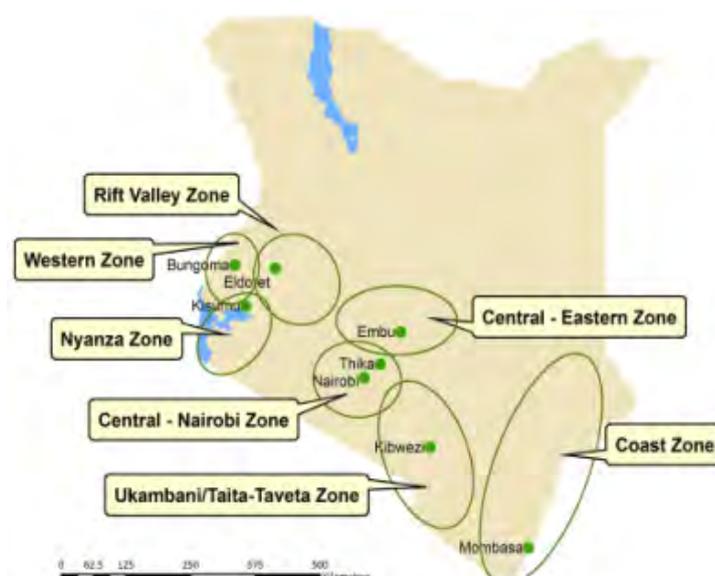
## 5. BACKGROUND INFORMATION ON USAID-KHCP

The goal of USAID-KHCP is to achieve a highly competitive horticulture industry and improve food security through increasing on-farm productivity, enhancing value-added processing, improving coordination among horticulture value-chain participants and increasing the capacity of local organizations to provide improved technical services to smallholders. Interventions are focused in four specific areas:

- **Productivity Enhancement and Food Security** strongly focuses on product selection and technology transfer
- **Value Addition and Processing** involves increasing and strengthening linkages between growers, micro-processors and larger-scale secondary processors
- **Value Chain Coordination, Marketing and Trade Promotion** comprise specialist training and technical assistance to national institutions and trade associations
- **Business Environment and Institutional Capacity Building** include obtaining consensus on enabling environment reforms through public/private-sector dialogue

USAID-KHCP works in six regions in Kenya (Central, Coast, Eastern, Nyanza, Rift Valley and Western) and is implemented through local private sector and non-governmental organization (NGO) partnerships. Project management is decentralized and partner activities are supported by six regional offices in Mombasa, Kibwezi, Thika, Eldoret, Bungoma and Kisumu (see Figure 2). The project operations are coordinated through the Nairobi office, which also acts as the central hub for collaboration with institutional partners on policy, trade promotion, research, and market information systems.

**Figure 2: Map Showing USAID-KHCP Regions**



Source: USAID-KHCP Quarterly Report, April 2011

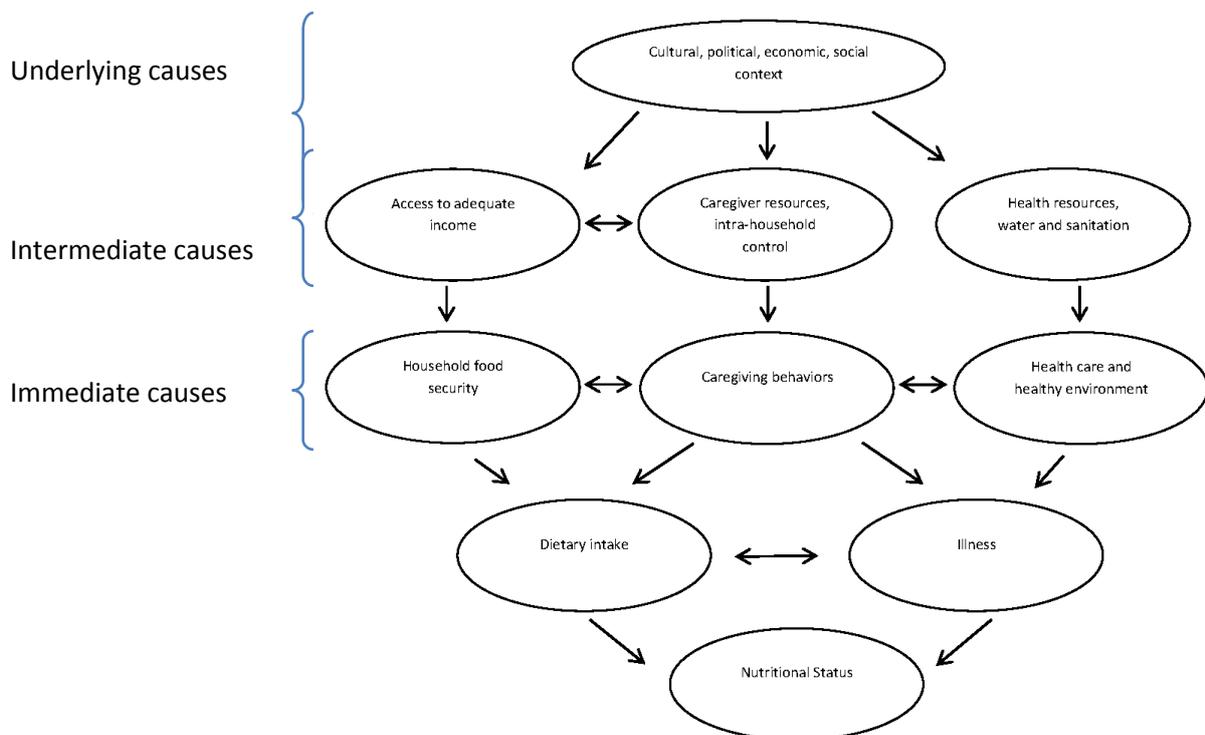
The project is also working in close cooperation with a wide array of stakeholders that support and represent the horticulture industry on a national basis, including Ministry of Agriculture (Horticulture Division/MOA), Horticultural Crops Development Authority (HCDA), Kenya Agriculture Research Institute (KARI), Kenya Plant Health Inspectorate Service (KEPHIS) and others in the private and public sectors. USAID-KHCP also participates in the National Task Force on Horticulture as part of its contribution to the Draft National Horticulture Policy.

## 6. RESULTS OF THE ASSESSMENT

The household survey was administered to 460 households in the six project regions. The survey included indicators in 6 thematic areas; demographics, household food consumption and dietary diversity, infant and young children feeding practices, health status of children, nutritional status of children, and maternal diet and nutritional status. The results of the survey are presented by thematic area and individually.

Nutrition status is not only affected by lack of access to food, but can also be affected by household demographics, caregiver resources and behaviours and health status among other things. The graphic<sup>11</sup> below (Figure 3) illustrates how nutrition status is affected by a complex set of factors.

**Figure 3: Framework for causes of malnutrition**



### 6.1 DEMOGRAPHIC CHARACTERISTICS

Demographic and cultural characteristics are important in understanding the nutrition and food situation of a population as they are known to impact the nutrition situation of communities. The household size determines the per capita food intake and influences nutrient adequacy of individual household members. This is because as household size increases, it implies more mouths to feed

<sup>11</sup> Adapted from UNICEF 1990

and, in poor resource environments such as poor single female headed households, it may impact negatively on food intake, nutrient adequacy and consequently nutritional status of vulnerable population groups particularly children, pregnant and lactating women as well as the elderly. In addition, factors including age, gender and physiological characteristics are important in understanding the nutrition situation of communities.

### Female headed households by region

Overall, 15% of the beneficiary households were female headed. Table 2 shows the proportion of female headed beneficiary households by region. This proportion was highest in Central and Eastern regions and lowest in the Western region.

Young children in single female headed households that are resource poor are more vulnerable to malnutrition than households in which both spouses are present. This is because single household heads may be overloaded with having to fend for household members, which may compromise the quality of care provided to young children.

**Table 2: Female headed households by region**

Gender of household head	Eastern (n=75)	Coast (n=75)	Nyanza (n=75)	Rift Valley (n=80)	Western (n=79)	Central (n71)	Total (N=455)
	% of households						
Female	21.4	13.9	16.7	15.1	6.4	20.3	14.7
Male	78.6	86.1	83.1	84.9	93.6	79.7	85.3

### Mean household size by region

The combined mean household size was  $6.0 \pm 2.4$ . Table 3 shows the descriptive statics of household size by region. Analysis of variance indicated a statistically significant difference in the mean household size between regions ( $F=8.845$ ;  $P<0.05$ ). Post hoc multiple comparisons showed that the household size was significantly higher in the Eastern region ( $p<0.05$ ) than the rest of the regions. Mean household size in the Nyanza region was significantly higher than Coast and Central Regions ( $p<0.05$ ) but was not significantly different from Western and Rift Valley regions. Central region, on the other hand, had the lowest mean household size, being significantly lower than Eastern, Nyanza, Western and Rift Valley but not Coast regions. The difference in the mean household size between Western, Nyanza and Rift Valley regions was not significant.

Child malnutrition tends to be associated with increasing household sizes in resource poor communities and it is important that people maintain manageable family/household sizes. While adults and older children are able to fend for themselves or can move around and access food in different ways young children and the elderly are relatively dependent on other people for food. Hence when household sizes overwhelm available resources, these are the groups that suffer most.

**Table 3: Mean household size by region**

Study Region	Household Size Descriptives							
	N	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Eastern	75	7.3	2.7	.32	6.67	7.92	3.00	14.00
Coast	75	5.4	2.1	.24	4.93	5.90	1.00	12.00
Nyanza	75	6.3	2.2	.26	5.81	6.83	2.00	12.00
Western	83	5.9	2.4	.26	5.41	6.45	2.00	12.00
Rift Valley	80	5.9	2.1	.23	5.44	6.36	2.00	12.00
Central	67	5.0	2.2	.27	4.43	5.48	2.00	13.00
All	455	6.0	2.4	.11	5.76	6.21	1.00	14.00

**Gender distribution by region**

Table 4 shows the study population distribution by gender and region. Generally, the population comprised of slightly more females than males especially in Central, Rift valley, Western and Nyanza. There were more males in Eastern and Coast provinces.

In general, energy requirements for a predominantly male population are higher than that which is comprised mainly of females. Males have to maintain higher muscle mass than females, and this requires more energy. These results indicate that household energy requirements might be higher for Eastern and Coast compared to the other regions. Eastern region appears to have even higher requirements given the fact that they have the highest household sizes compared to the rest of the regions. It is also worth noting that Eastern has the highest proportion of female headed households and this can compound the problem of dietary inadequacy given that it has the highest household size, with a male population that is higher than female.

**Table 4: Gender distribution by region**

Gender	Eastern (n=540)	Coast (n=405)	Nyanza (n=472)	Rift Valley (n=470)	Western (n=473)	Central (n=348)	Total (N=2,708)
% of Population							
Female	48.3	46.7	51.1	53.2	52.4	54.0	50.8
Male	51.7	53.3	48.9	46.8	47.6	46.0	49.2

About 20% of the population were less than five years old, and this proportion ranged between 16.7% in Eastern region and 22.4% in Western (Table 5). More than 90% of the population studied was less than 45 years of age. Thus the elderly population in the study households was small, more notably in Rift Valley, Nyanza and Western regions. This implies high levels of nutrient requirements, particularly the macronutrients, as the population comprised largely reproductive, active and still growing age groups.

## Age distribution of study population by region

**Table 5: Age distribution of study population by region**

Age (years)	Eastern (n=538)	Coast (n=405)	Nyanza (n=472)	Rift Valley (n=469)	Western (n=473)	Central (n=348)	Total (N=2,705)
<5	16.7	21.2	18.6	19.8	22.4	19.8	19.7
5-17	36.2	35.8	44.3	36.7	36.6	26.4	36.5
18-44	35.9	33.6	31.8	35.0	33.8	42.0	35.1
45-64	7.4	6.9	4.9	8.3	6.3	8.9	7.1
65+	3.7	2.5	0.4	0.2	0.8	2.9	1.7
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0

## 6.2 HOUSEHOLD FOOD CONSUMPTION AND DIETARY NUTRIENT CONTENT

A more diversified diet is associated with a number of improved outcomes in areas such as birth weight, child anthropometric status, improved hemoglobin concentrations, caloric and protein adequacy, and percentage of protein from animal sources (high quality protein). Even in very poor households, increased food expenditure resulting from additional income is associated with increased quantity and quality of the diet.<sup>12</sup>

### 24-hour household diversity

The household dietary diversity score (HDDS), assessed as the number of food groups consumed at household level during a given reference period, reflects in snapshot form, the economic ability of a household to consume a variety of foods. Studies have shown that an increase in dietary diversity is associated with socio-economic status and household food security (household energy availability). In addition, a more diversified diet is associated with a number of improved health and nutrition outcomes. The individual dietary diversity score (IDDS) aims to capture nutrient adequacy. Many studies in several different age groups have shown that an increase in individual dietary diversity score is related to increased nutrient adequacy of the diet. Dietary diversity scores have been positively correlated with increased mean micronutrient density adequacy of complementary foods (FANTA, 2006) and micronutrient adequacy of the diet in non-breastfeeding children<sup>13,14,15,16</sup>.

<sup>12</sup>Hoddinott, John and Yisehac Yohannes. *Dietary Diversity as a Household Food Security Indicator*. Food and Nutrition Technical Assistance project, Academy for Educational Development, Washington, D.C. 2002. As viewed at [www.fantaproject.org/publications/dietdiversity1.shtml](http://www.fantaproject.org/publications/dietdiversity1.shtml).

<sup>13</sup>Hatloy, A., Hallund, J., Diarra, MM. & Oshaug A. 2000. Food variety, socioeconomic status and nutritional status in urban and rural areas in Koutiala (Mali). *Public Health Nutrition* 3:57-65.

<sup>14</sup>Ruel, M., Graham, J., Murphy, S. & Allen, L. 2004. Validating simple indicators of dietary diversity and animal source food intake that accurately reflect nutrient adequacy in developing countries. Report submitted to GL-CRSP.

<sup>15</sup>Steyn, NP., Nel, JH., Nantel, G., Kennedy, G. & Labadarios, D. 2006. Food variety and dietary diversity scores in children: are they good indicators of dietary adequacy? *Public Health Nutrition* 9(5):644-650.

<sup>16</sup>Kennedy, G., Pedro, MR., Seghieri, C., Nantel, G. & Brouwer, I. 2007. Dietary diversity score is a useful indicator of micronutrient intake in non breast-feeding Filipino children. *Journal of Nutrition* 137: 1-6.

adolescents<sup>17</sup> and adults.<sup>18</sup>

Table 6 shows the mean household dietary diversity score assessed using the 24-hour recall method. Out of a possible score of 16 (food groups), the overall mean household dietary diversity score was 7.34 ±1.89. There was a significant difference in the score between regions (p<0.001). The lowest scores were found in Nyanza and Eastern regions, and were significantly lower than the scores in all the other regions (p<0.05). This implies that diet quality and adequacy may be relatively low in Eastern and Nyanza households compared to the rest of the regions. It is worth noting that some households consumed as low as 2 food groups within 24 hours in Eastern and Nyanza while others consumed as high as 13 food groups.

**Table 6: 24-hours mean household dietary diversity score by region**

Region	24-hours household diversity score descriptives							
	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Eastern	74	6.76	2.27	.26	6.23	7.28	2.0	13.0
Coast	74	7.65	1.59	.19	7.28	8.02	4.0	11.0
Nyanza	75	6.39	1.89	.22	5.95	6.82	2.0	12.0
Western	82	7.61	1.80	.20	7.21	8.01	3.0	12.0
Rift Valley	80	7.64	1.67	.19	7.27	8.01	3.0	11.0
Central	67	8.02	1.57	.19	7.63	8.40	4.0	11.0
Total	452	7.34	1.89	.09	7.16	7.51	2.0	13.0

[ANOVA, F=8.72, p=0.000]

### 6.3 INFANT AND YOUNG CHILD FEEDING PRACTICES

Inappropriate infant and young child feeding (IYCF) and malnutrition have been found to be major determinants of child mortality in Kenya<sup>19</sup>. For example, exclusive breastfeeding for 6 months significantly affects infant mortality and can reduce the under-five child mortality by 13%<sup>20</sup>. A mix of indicators such as frequency of daily feeding, duration of breast feeding, and age of introduction of foods other than breast milk were used to assess the status of IYCF practices in the regions.

<sup>17</sup> Mirmiran, P., Azadbakht, L., Esmailzadeh, A. & Azizi, F. 2004. Dietary diversity score in adolescents- a good indicator of the nutritional adequacy of diets: Tehran lipid and glucose study. *Asia Pacific Journal of Clinical Nutrition* 13(1);56-60.

<sup>18</sup> Foote, J., Murphy, S., Wilkens, L., Basiotis, P. & Carlson, A. 2004. Dietary variety increases the probability of nutrient adequacy among adults. *Journal of Nutrition* 134:1779-1785.

<sup>19</sup> Kenya Child Survival and Development Strategy 2008-2015; MOPHS and MOMS 2008

<sup>20</sup> The Lancet child survival series 2003

### Mean age at which children were introduced to foods other than breast milk

The mean age at which children were introduced to foods other than breast milk was  $4.61 \pm 2.02$  months for all the regions combined (Table 7), compared to the recommended 6 months. However, in the Coast region, the mean age of introduction of other foods was significantly higher than the rest of the regions except Nyanza ( $p < 0.05$ ). In addition, the mean age for Nyanza was significantly higher than that for Western while it was not different between the other regions. Some infants were introduced to other foods at zero months like in Eastern region, while others were introduced as late as one year old.

Breast milk contains antibodies to protect the baby against common infections, is uncontaminated and contains all the nutrients a baby needs<sup>21</sup>. Early introduction of complementary food, especially in unhygienic conditions, can result in infections. Delayed or poor complementary feeding on the other hand inhibits normal growth especially if the foods are of poor nutritional value. Not breastfeeding exclusively results in more than a two-fold increased risk of dying from diarrhoea or pneumonia<sup>22</sup>. The fact that children in the surveyed regions are introduced to complementary foods too early is a risk for child malnutrition and mortality. This is likely to be worse for Eastern where even newborns are introduced to foods other than breastmilk.

**Table 7: Mean age (months) at which children were introduced to food other than breast milk**

Region	Descriptives for age (months) at which children were introduced to foods other than breast milk							
	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Eastern	78	4.42	2.22	.252	3.92	4.92	.00	9.00
Coast	81	5.14**	1.78	.20	4.75	5.53	1.00	11.00
Nyanza	79	4.98*	2.10	.24	4.51	5.45	.25	12.00
Western	105	4.29*	2.02	.20	3.90	4.68	.25	9.00
Rift Valley	89	4.46	2.08	.22	4.02	4.90	.12	12.00
Central	61	4.44	1.675	.21	4.01	4.87	.50	7.00
Total	493	4.61	2.02	.09	4.43	4.79	.00	12.00

[ANOVA,  $F=2.53$ ,  $p=0.028$ ; \*\*higher than the rest except Nyanza; \*higher than Western;  $p < 0.05$ ]

### Distribution of Children aged 6-59 months by age at which they were introduced to foods other than breast milk

About half (49.7%) of the children aged 0-59 months were introduced to foods other than breast milk before the age of 6 months (Table 8) while the rate of exclusive breast feeding for 6 months among children 6-59 months was 46% ( $N=474$ ). The lowest rate of exclusive breast feeding for 6 months was found in Eastern and the highest in Coast regions, but the rates were not significantly different. However, the rates were generally higher than those indicated in recent national

<sup>21</sup> Linkages 2004

<sup>22</sup> Arifteen et al 2001

reports<sup>23, 24</sup> which showed that only 32% of infants below 6 months were exclusively breastfed.

Rates of exclusive breastfeeding for six months are lowest in Eastern, implying poor child feeding practices in this region compared to other regions and this makes the children in Eastern more vulnerable to malnutrition and mortality compared to other regions.

**Table 8: Distribution of Children aged 6-59 months by age at which they were introduced to foods other than breast milk**

Age in months	Eastern (n=78)	Coast (n=81)	Nyanza (n=79)	Rift Valley (n=89)	Western (n=105)	Central (n=61)	Total (N=493)
Percent of children aged 0-59 months old							
<6	52.6	38.3	43.0	53.9	54.3	55.7	49.7
6	41.0	53.1	48.1	41.8	43.8	42.6	44.6
>6	6.4	8.6	8.9	6.7	1.9	1.6	7.7

[ $\chi^2=13.8$ ,  $p=0.18$ ]

National data show that 42% of infants are introduced to pre-lacteal feeds and 54% of infants are introduced to solid, semi-solid or soft foods before they are six months of age<sup>25</sup>. By 5<sup>th</sup> month infants are given mushy food in addition to breast milk and 91% of infants 6-9 months are introduced to solid, semi-solid or soft foods. The early introduction of complementary foods (< 6 months) is clearly a failure to adhere to national and global guidelines on infant feeding where exclusive breastfeeding is the recommended way to feed infants below 6 months of age.

#### Prevalence of breast feeding of children <24 months by region

The prevalence of breast feeding among children <24 months old was about 75%. This prevalence ranged from 65% in the Rift Valley to 87% in Coast regions, but was not significantly different between regions (Table 9). Nationally, approximately 83% of infants under one year continued to be breastfed with duration of 20 months breastfeeding at national level.

**Table 9: Prevalence of breast feeding of children <24 months by region**

Breast feeding status	Eastern (n=37)	Coast (n=38)	Nyanza (n=37)	Rift Valley (n=46)	Western (n=52)	Central (n=21)	Total (N=231)
Percent of children aged <24 months							
Yes	81.1	86.8	75.7	65.2	69.2	71.4	74.5
No	18.9	13.2	24.3	34.8	30.8	28.6	25.5

[ $\chi^2=6.86$ ,  $p=0.231$ ]

<sup>23</sup> Kenya Integrated Budget Survey 2005/2006, Revised Edition, Basic Report, Ministry of Planning and National Development, August 2007.

<sup>24</sup> Kenya Demographic and Health Survey (2010), Ministry of Planning and National Development CBNS/MOH and ORG Macro 2008-9, GOK, Nairobi.

<sup>25</sup> Kenya Demographic and Health Survey (2003), CBNS/MOH and ORG Macro 2004, Ministry of Planning and Development GOK, Nairobi.

Low rates of exclusive breastfeeding and introduction of complementary foods before 6 months of age are big problems and can lead to undernutrition at early infancy as they undermine growth spurt and lead to more nutritional problems as children grow older.

### Mean daily frequency of feeding children 6-59 months old by region

Table 10 presents the mean number of times children aged 6-59 months were fed by region. The mean number of times children were fed per day was significantly low in Central compared to Western and Rift Valley regions and also significantly high in Western compared to Nyanza ( $p < 0.05$ ). The rest of regional comparisons did not yield any significant differences. On average, children were fed 3.4 times per day, compared to the recommended 5 times. Some children were fed only once in a day.

According to the Kenya National Strategy on IYCF 2007-2010, inadequate knowledge of optimal breast feeding and complementary feeding practices by mothers and caregivers was identified as one of the key issues/constraints that need to be addressed to improve IYCF in the country. In addition, in Kenya, women contribute 60–80 per cent of the labour in household and productive activities particularly in the agricultural sector, with work hours longer than men<sup>26</sup>. Male involvement with child care is poor in many communities. This contributes to inappropriate caring practices for young children. These are likely to be also the reasons for poor IYCF in the study regions and programmatic interventions should create an enabling environment for women to breastfeed and provide appropriate care for infants and young children.

The differences in the mean frequency of feeding children are likely to be due to availability of carers. It was earlier noted that Western region had the lowest proportion of female headed households while Central and Eastern had the highest proportion. The fact that most of the women in Western region do not have the heavy responsibility of being household heads may contribute towards availing more time to prepare food for the children.

**Table 10: Mean daily frequency of feeding children 6-59 months old by region**

Region	Descriptives for frequency of child feeding per day							
					95% Confidence Interval for Mean			
	N	Mean	Standard Deviation	Standard Error	Lower Bound	Upper Bound	Minimum	Maximum
Eastern	78	3.36	.82	.09	3.17	3.54	2.00	6.00
Coast	80	3.31	.87	.10	3.12	3.51	1.00	6.00
Nyanza	79	3.25	1.16	.13	2.99	3.51	1.00	10.00
Western	104	3.60 <sup>h</sup>	1.21	.12	3.36	3.83	1.00	8.00
Rift Valley	88	3.55	1.15	.12	3.30	3.79	1.00	8.00
Central	61	3.13 <sup>l</sup>	.87	.11	2.91	3.35	2.00	6.00
Total	490	3.39	1.05	.05	3.30	3.48	1.00	10.00

[ANOVA,  $F=2.32$ ,  $p=0.045$ ; <sup>h</sup>Significantly > Central and Nyanza, <sup>l</sup>Significantly < Nyanza and Western;  $p < 0.05$ ]

### Mean duration of breast feeding of young children by region

<sup>26</sup> Kenya National Strategy for IYCF 2007-1010; MOPHS, WHO and UNICEF.

The mean duration of breast feeding of young children was  $18.0 \pm 8.4$  months (Table 11). It is recommended that young children be breast fed for up to 2 years. The shortest duration was reported in Eastern province and was significantly different from that of Coast and Central regions only ( $p < 0.05$ ). The longest duration was found in Coast and was significantly longer than that of Western and Eastern regions only.

Optimal infant and young child feeding means that every infant/child should be initiated with breastfeeding within half hour to one hour of birth, continue to be breastfed exclusively (no other food or drink) for the first 6 months, from 6 months receive adequate quantities of safely prepared nutritious complementary foods and continue to breastfeed for at least 2 years<sup>27</sup>. Given that Eastern region has the lowest mean duration of breastfeeding, this practice is likely to compromise the nutritional status of the children. Eastern is one of those areas classified as Arid and Semi-Arid Lands, which receives low rainfall and has food insecurity problems. It is likely that women do not breastfeed as recommended not only due to lack of knowledge but also due to poor food security in the region.

**Table 11: Mean duration of breast feeding of young children by region**

Region	Descriptives for duration in months of breastfeeding							
	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimu m	Maximu m
					Lower Bound	Upper Bound		
Eastern	49	15.98 <sup>l</sup>	8.77	1.25	13.46	18.50	1.00	42.00
Coast	49	20.55 <sup>h</sup>	7.98	1.14	18.26	22.84	3.00	36.00
Nyanza	56	18.16	7.67	1.02	16.11	20.21	1.00	36.00
Western	74	16.61	9.28	1.08	14.46	18.77	.50	42.00
Rift Valley	58	17.71	8.90	1.17	15.37	20.05	.00	36.00
Central	47	19.45	6.18	.90	17.63	21.26	2.00	30.00
Total	333	17.95	8.38	.46	17.05	18.85	.00	42.00

[ANOVA,  $F=2.22$ ,  $p=0.052$ ; <sup>h</sup>Significantly > Western and Eastern, <sup>l</sup>Significantly < Coast and Central;  $p < 0.05$ ]

#### 6.4 INFANT AND YOUNG CHILD HEALTH STATUS

Malnutrition is synergistically associated with morbidity. Malnourished individuals are likely to suffer infections due to compromised immunity and sick individuals are likely to be malnourished due to poor feeding and changes in body metabolism. Infant and young child health status was evaluated using a mix of indicators such as childhood morbidity rates, immunization status and coverage of vitamin A supplementation.

<sup>27</sup> Kenya National Strategy for IYCF 2007-1010; MOPHS, WHO and UNICEF

### Childhood Morbidity

Almost 60% of children aged 6-59 months experienced illness during the two-week period prior to the survey (Table 12). This prevalence was highest in Eastern region, followed by Western, Coast, Nyanza, Rift Valley and Central regions in that order. There was a significant difference in the morbidity prevalence between regions ( $p < 0.05$ ).

**Table 12: Illness experience by children aged 6-59 months**

Experienced illness	Central (n=61)	Eastern (n=78)	Coast (n=81)	Nyanza (n=79)	Rift Valley (n=85)	Western (n=103)	Total (N=487)
	% of children 6-59 months old						
Yes	44.3	71.8	59.3	55.7	54.1	64.1	58.9
No	55.7	28.2	40.7	44.3	45.9	35.9	41.1

$[\chi^2=19.38, p=0.036]$

### Type of morbidity prevalence among children 6-59 months in the two-week period prior to survey by region

Malnutrition and morbidity are closely related. Malnourished individuals are likely to suffer infections due to compromised immunity and sick individuals are likely to be malnourished due to poor feeding and changes in body metabolism. For instance, children weakened by frequent diarrhoea episodes are more likely to be undernourished and suffer from opportunistic infections such as acute respiratory infections<sup>28</sup>. Therefore, apart from dietary intake, the health situation of an individual is considered an immediate cause of malnutrition. Hence it is important that, when evaluating the nutritional status of individuals, their morbidity status is also assessed.

Overall, the most common type of morbidity was acute respiratory infection (ARI) in all regions except Nyanza (Table 13). This was followed by febrile illness/malaria, which was the most common in Nyanza, and also very high in Western and Eastern regions. Diarrhea ranked third and scabies fourth in occurrence, but these illnesses were not found in the Central region. Other illnesses included stomach ache in Eastern and measles in Nyanza regions.

The number of illness episodes per child within the two week period prior to the survey were highest in Eastern (0.72) followed by Western (0.64), Coast (0.6), Nyanza (0.56), Rift Valley (0.54) and Central (0.44) in that order. Some illnesses, such as febrile diseases, increase nutrient requirements but also cause poor appetite. The region with the most frequent illness episodes per child is expected to present high levels of child malnutrition.

<sup>28</sup> Kenya Child Survival and Development Strategy 2008-2015, MOPHS and MOMS

**Table 13: Type of morbidity prevalence among children 6-59 months in the two-week period prior to survey by region**

Illness	Central (n=27)	Eastern (n=56)	Coast (n=48)	Nyanza (n=44)	Rift Valley (n=46)	Western (n=66)	Total (N=287)
	% of children 6-59 months old experiencing morbidity						
Diarrhea	0	7.1	2.2	18.2	4.3	19.7	10.1
ARI*	96.3	53.6	85.4	27.3	65.2	53.0	60.2
Febrile/malaria	22.2	35.7	12.5	43.2	40.0	50.0	35.2
Scabies	0	7.1	6.3	4.5	4.3	1.5	7.7
Others	0	3.6	0	13.6	0	0	2.8

\*Acute respiratory infection

### Immunization Status

Like other infectious diseases, vaccine-preventable illnesses lead to poor nutritional status and compromised nutrient metabolism. In addition, when malnourished individuals are infected with some of the vaccine preventable diseases, the outcome is usually more severe than well-nourished individuals. For instance, measles infection increases the risk of vitamin A deficiency and if a population that is largely vitamin A deficient gets measles, the diseases' impact is more severe and likely to result in higher mortality rates than a population without the deficiency.

Health card retention rate was generally low (59.4%). Coast had the highest retention rate at 76.7% while Nyanza region had the lowest rate at 43.7% ( $p < 0.001$ ) (Table 14). Hence for an average of 41% of the children, dates of birth, immunization and vitamin A supplementation information were obtained by recall.

**Table 14: Source immunization information for children aged 0-59 months by region**

Source of information	Central (n=65)	Eastern (n=86)	Coast (n=86)	Nyanza (n=87)	Rift Valley (n=92)	Western (n=114)	Total (N=530)
	% of children <60 months old						
Health Card	67.7	61.6	76.7	43.7	66.3	46.5	59.4
Recall	32.3	38.4	23.3	56.3	33.7	53.5	40.6

$[\chi^2=31.38, p=0.000]$

### Immunization status of children 0-59 months by region

The proportion of children less than five years old fully immunised for age was 85.5%. The highest coverage was in Central region while the least coverage was in Nyanza region (Table 15). The rate of immunization coverage for age was significantly different between regions ( $p < 0.001$ ).

**Table 15: Immunization status of children 0-59 months by region**

Fully immunized for age	Central (n=65)	Eastern (n=86)	Coast (n=86)	Nyanza (n=87)	Rift Valley (n=92)	Western (n=114)	Total (N=530)
	% of children 6-59 months old						
Yes	96.9	90.7	89.5	79.3	93.5	70.2	85.5
No	3.1	9.3	10.5	20.7	6.5	29.8	14.5

[ $\chi^2=40.79$ ,  $p=0.000$ ]

#### Immunization coverage of the various antigens by region

Immunization coverage for the various antigens was high (over 90%) for all regions except for OPV0 in Western and OPV3, DPT3 and measles in both Western and Nyanza (Table 16). Overall, measles coverage was the lowest and also in Nyanza.

This explains why some measles cases were reported in Nyanza during the two week period prior to the study.

**Table 16: Immunization coverage of the various antigens by region**

Antigen	Central	Eastern	Coast	Nyanza	Rift Valley	Western	Total
	% of children of appropriate age						
BCG	100.0	98.0	97.7	94.3	97.8	94.7	97.0
OPV0	96.9	100.0	98.8	94.3	97.8	78.9	93.6
OPV1	96.8	98.8	98.8	95.4	98.9	96.9	97.2
OPV2	100.0	97.6	97.6	93.0	100.0	92.9	96.5
OPV3	100.0	97.6	96.4	84.7	97.8	87.6	93.4
DPT1	96.9	100.0	98.8	95.4	98.9	94.7	97.3
DPT2	98.4	97.6	96.5	95.3	100.0	93.8	96.7
DPT3	100.0	96.4	96.4	87.1	96.7	87.6	93.4
Measles	96.6	94.5	88.2	81.3	92.1	89.0	90.0

#### Vitamin A supplementation coverage of children 6-59 months by region

It is government policy that all children 6-59 months be given vitamin A supplementation every six months due to wide spread deficiency of the vitamin. The survey results indicate very low vitamin A supplementation coverage of 51% (Table 18). The coverage was highest in Coast at 69% and lowest in Central at 34%. The disparity in vitamin A supplementation coverage was quite wide ( $p<0.001$ ).

This disparity implies that majority of children in some of the regions, especially Central, Nyanza and Western do not have access to the vitamin A supplementation and therefore probably continue to suffer from the deficiency. Most horticultural products are rich in pro-vitamin A and could be used to bridge this gap.

**Table 17: Vitamin A supplementation coverage of children 6-59 months by region**

Received vitamin A within last 6 months	Central (n=61)	Eastern (n=79)	Coast (n=81)	Nyanza (n=79)	Rift Valley (n=86)	Western (n=103)	Total (N=489)
	% of children 6-59 months old						
Yes	34.4	64.6	69.1	30.4	55.8	46.6	50.9
No	65.6	35.4	30.9	69.6	44.2	53.4	49.3

[ $\chi^2=38.18$ ,  $p=0.000$ ]

## 6.5 NUTRITIONAL STATUS OF CHILDREN

Malnutrition occurs in large areas of Kenya. The immediate impact of inadequate nutrition is manifested first in children below five years of age. Undernourished children are more vulnerable to infections and childhood illnesses such as severe diarrhoea and acute respiratory infections. The consultant used a mix of indicators such as prevalence of acute malnutrition, underweight and stunting to evaluate child nutrition in the regions.

### Acute Malnutrition (wasting)

Wasting or acute malnutrition is an indication of recent and/or prevailing food and health situation of the affected individuals and is highly influenced by seasonality. On average, the prevalence of global acute malnutrition (GAM) was 5.5% of which severe acute malnutrition comprised 1.8% (Table 18). These rates were lower than those at national level. There was no significant difference in the prevalence of GAM between boys and girls, but more girls tended to be severely malnourished than boys. These results might be a pointer to the tendency to favour feeding the boy child as opposed to the girl child when food is scarce. However, the rates were below alarm levels.

**Table 18: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) by sex**

Severity of Acute Malnutrition	All n = 454	Boys n = 232	Girls n = 222
	%		
	[95% Confidence Interval]		
Global acute malnutrition ( $<-2$ z-score and/or oedema)	5.5 [3.1 - 9.7]	5.2 [3.1 - 8.5]	5.9 [2.5 - 12.9]
Moderate acute malnutrition ( $<-2$ z-score and $\geq-3$ z-score, no oedema)	3.7 [2.3 - 6.0]	4.3 [3.0 - 6.1]	3.2 [1.5 - 6.4]
Severe acute malnutrition ( $<-3$ z-score and/or oedema)	1.8 [0.6 - 5.4]	0.9 [0.1 - 9.7]	2.7 [0.7 - 9.4]

The prevalence of oedema was 0.0 %

GAM was highest in Coast and Western regions and lowest in Rift Valley (Table 19). Compared to the KDHS 2008, the rates for Western region were almost four times (8.1% versus 2.3%) and vice versa for Rift Valley (1.2% versus 3.8%). It is possible that these surveys were done during different seasons hence reflect the need to maintain optimum nutrition and health throughout the year.

**Table 19: Acute malnutrition by region**

Nutritional status	Central (n=60)	Eastern (n=68)	Coast (n=74)	Nyanza (n=72)	Rift Valley (n=81)	Western (n=99)	Total (N=454)
	% of children						
Global Acute Malnutrition	6.7	5.9	8.1	2.8	1.2	8.1	5.5
Normal	93.3	94.1	91.9	97.2	98.8	89.9	94.5

Malnutrition based on Mid-upper arm circumference (MUAC) tended to be high in Eastern and Western regions (Table 20).

**Table 20: Acute malnutrition based on MUAC by region**

Child nutritional status based on MUAC	Central (n=60)	Eastern (n=71)	Coast (n=74)	Nyanza (n=72)	Rift Valley (n=81)	Western (n=102)	Total (N=460)
	% of Children						
Severe (MUAC<11.5)	0.0	0.0	1.4	0.0	0.0	0.0	0.2
Moderate (MUAC= 11.5-12.49)	0.0	7.0	0.0	1.4	4.9	6.9	3.7
At risk (MUAC=12.50-13.49)	15.0	15.5	10.8	13.9	7.4	13.7	12.6
Normal (BMI≥13.50)	85.0	77.5	87.8	84.7	87.7	79.4	83.5

### Weight status (underweight)

Underweight is a compound indicator of nutritional status depicting both chronic and acute situations. Prevalence of underweight was 16% with boys being slightly more underweight than girls. Severe underweight rate was about 4% of which more boys than girls were severely underweight (Table 21). In general, the prevalence of underweight was comparable to the national level.

**Table 21: Prevalence of underweight based on weight-for-age z-scores by sex**

Stage of underweight	All n = 459	Boys n = 236	Girls n = 223
	% [95% Confidence Interval]		
Global underweight (<-2 z-score)	15.9 [9.9 - 24.5]	17.4 [10.8 - 26.6]	14.3 [8.8 - 22.5]
Moderate underweight (<-2 z-score and >=-3 z-score)	12.0 [8.3 - 17.0]	12.7 [8.9 - 17.8]	11.2 [7.3 - 16.9]
Severe underweight (<-3 z-score)	3.9 [1.8 - 8.5]	4.7 [1.9 - 11.0]	3.1 [1.6 - 6.0]

High levels of underweight are expected in Eastern region given that it has the highest proportion of female households, highest household size, lowest household dietary diversity score, lowest rates of exclusive breast feeding for the first six months of life, lowest mean duration of breastfeeding children less than five years as well as highest child morbidity prevalence. This implies that Eastern requires more effort to be directed towards ensuring dietary adequacy, appropriate IYCF practices and sanitation and hygiene.

**Table 22: Prevalence of underweight based on weight-for-age z-scores by region**

Nutritional status	Central (n=60)	Eastern (n=70)	Coast (n=74)	Nyanza (n=72)	Rift Valley (n=81)	Western (n=102)	Total (N=459)
	% of households						
Global Underweight	11.7	28.6	16.2	8.3	11.1	18.6	15.9
Normal	88.3	71.4	83.8	91.7	88.9	81.4	84.1

### Chronic under nutrition (Stunting)

Overall, the level of stunting was comparable to National level (33% versus 35%), with 13% of the children being severely stunted (Table 23). There was no significant difference in stunting status between boys and girls.

**Table 23: Prevalence of stunting based on height-for-age z-scores and by sex**

	All n = 458	Boys n = 235	Girls n = 223
Global stunting (<-2 z-score)	33.0 [22.5 - 45.4]	33.6 [19.6 - 51.2]	32.3 [23.0 - 43.2]
Moderate stunting (<-2 z-score and >=-3 z-score)	19.9 [14.2 - 27.1]	18.7 [10.7 - 30.8]	21.1 [14.0 - 30.4]
Severe stunting (<-3 z-score)	13.1 [8.4 - 19.9]	14.9 [8.5 - 24.7]	11.2 [6.5 - 18.6]

The rate of stunting was very high in Eastern region (57%) (Table 24). The KDHS of 2008 also found highest rates of stunting (42%) in Eastern province compared to other provinces. The rates of stunting in the rest of the regions were slightly lower but comparable to the KDHS finding for the respective provinces. These results indicate that Eastern has long standing nutrition problems. Being an ASAL region, food insecurity and poor access to clean water are expected to be factors contributing to the very high rates of chronic malnutrition. In fact, lack of water featured as a main constraint to food production and optimal health and sanitation during discussion groups in Eastern.

**Table 24: Stunting status by region**

Nutritional status	Central (n=60)	Eastern (n=70)	Coast (n=75)	Nyanza (n=72)	Rift Valley (n=80)	Western (n=101)	Total (N=458)
	% of households						
Global Underweight	25.0	57.1	30.7	25.0	31.3	29.7	33.0
Normal	75.0	42.9	69.3	75.0	68.7	70.3	67.0

## 6.6 MATERNAL DIET AND NUTRITIONAL STATUS

Just like children's nutritional status, women's dietary intake and nutritional status are internationally recognised as indicators of the food and nutrition situation as well as level of development of communities. This is because women of reproductive age have special dietary and health needs. Maternal nutritional status was assessed using the following indicators; individual dietary diversity, maternal body mass index and maternal MUAC.

### 24-hours mean individual dietary diversity score for women by region

Maternal dietary diversity score (DDS) was comparable to the household dietary diversity score. On average, mothers consumed 7 out of 16 possible food groups in 24 hours (Table 25). However, there were significant differences in the maternal DDS between regions ( $p < 0.001$ ) with Nyanza and Eastern having the lowest maternal DDS and Central having the highest maternal DDS.

**Table 25: 24-hours mean individual dietary diversity score for women by region**

Region	Descriptives for the 24-hours individual dietary diversity scores for women							
	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Eastern	63	6.60	2.26	.29	6.03	7.17	2.0	13.0
Coast	72	7.32	1.63	.19	6.94	7.70	3.0	11.0
Nyanza	73	6.30	2.03	.24	5.83	6.77	2.0	12.0
Western	77	7.77	1.80	.20	7.36	8.17	3.0	12.0
Rift Valley	72	7.64	1.61	.19	7.26	8.02	3.0	11.0
Central	58	8.05	1.64	.22	7.62	8.48	5.0	12.0
Total	415	7.27	1.93	.10	7.09	7.46	2.0	13.0

[ANOVA,  $F=9.51$ ,  $p=0.000$ ]

### Maternal Body Mass Index

Table 26 shows the descriptives of maternal body mass index (BMI) by region. There was a significant difference in maternal nutritional status between regions (ANOVA;  $F=3.475$ ;  $p < 0.05$ ), with mean maternal BMI in Nyanza being significantly lower than that in Eastern, Coast and Central regions ( $p < 0.05$ ) but not significantly different from than in Western and Rift Valley regions. There was no significant difference in the mean maternal BMI between Eastern, Coast, Western, Rift Valley and Central regions. The low maternal BMI in Nyanza tended to be in line with the low maternal DDS in the same region.

**Table 26: Mean Body Mass Index for women by region**

	Maternal BMI descriptives							
	N	Mean	Standard Deviation	Standard Error	95% Confidence Interval for mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Eastern	63	23.6	4.0	.50	22.60	24.60	16.50	32.67
Coast	73	23.9	4.5	.53	22.88	24.98	17.89	40.84
Nyanza	72	21.7	2.5	.30	21.09	22.27	16.52	29.65
Western	78	22.7	3.8	.44	21.82	23.55	16.19	40.22
Rift Valley	70	22.9	4.3	.51	21.91	23.96	14.82	33.27
Central	57	24.0	4.5	.59	22.83	25.20	17.75	37.71
Total	413	23.1	4.0	.20	22.71	23.49	14.82	40.84

**Distribution of maternal BMI by region**

There was a significant difference between regions (chi-square = 26.2; p-value<0.05) in distribution of maternal BMI. Table 28 shows the maternal BMI by region. The highest prevalence of underweight mothers was found in Rift Valley while overweight was highest in Coast and Central regions. Although Rift Valley had high levels of underweight mothers, the proportion of overweight mothers was also high (30%) and therefore had the smallest proportion of mothers with normal weight (55.7%) compared to the other regions.

**Table 27: Maternal BMI by region**

Maternal Nutritional status	Central (n=57)	Eastern (n=63)	Coast (n=73)	Nyanza (n=72)	Rift Valley (n=70)	Western (n=78)	Total (N=413)
	% of mothers						
Underweight (BMI<18.5)	3.5	7.9	5.5	11.1	14.3	6.4	8.2
Normal (BMI 18.5-24.99)	61.4	58.7	58.5	80.6	55.7	71.8	64.9
Overweight (BMI≥25.0)	35.1	33.3	35.6	8.3	30.0	21.8	26.9

**Maternal MUAC by region**

The mean maternal MUAC was generally high in all the regions, albeit with some significant differences (Table 28). None of the regions had a mean maternal MUAC below normal. There was no significant difference in the prevalence of mothers at risk of malnutrition between regions using the maternal MUAC (Table 29)

Nevertheless, the results indicate a worrying trend in terms of levels of overweight among women, except for Nyanza. Due to the fact that high levels of child stunting and low levels of child underweight have been noted, the high prevalence of overweight among women implies poor dietary balancing. On exploring the dietary diversity of the women, the seven food groups commonly eaten included cereals, roots and tubers, dark green leafy vegetables, legumes, nuts and seeds, milk and milk products, oils, sugar and spices. It was only in Nyanza that fish consumption was encountered among a substantial proportion of women. Therefore consumption of animal products is poor. Even where milk is consumed, only a small amount is added to tea. This calls attention towards focusing on utilization of available food and income accrued from horticultural sales to improve dietary intake.

**Table 28: Maternal MUAC by region**

Region	Maternal MUAC descriptives							
	N	Mean	Standard Deviation	Standard Error	95% Confidence		Minimum	Maximum
					Lower Bound	Upper Bound		
Eastern	62	28.11	3.73	.47	27.17	29.06	21.20	37.10
Coast	73	27.92	3.74	.44	27.05	28.79	22.40	43.80
Nyanza	72	26.64	2.66	.31	26.02	27.27	21.60	33.80
Western	78	26.66	3.10	.35	25.96	27.36	21.60	34.60
Rift Valley	70	28.12	3.96	.47	27.18	29.07	20.60	37.20
Central	57	28.14	3.96	.52	27.09	29.19	21.70	38.20
Total	412	27.55	3.57	.18	27.21	27.90	20.60	43.80

Statistically significant difference  $F=3.12$ ;  $p<0.05$

**Table 29: Maternal MUAC by region**

Maternal nutritional status based on MUAC	Central (n=57)	Eastern (n=62)	Coast (n=74)	Nyanza (n=72)	Rift Valley (n=70)	Western (n=78)	Total (N=412)
	% of Children						
At risk (MUAC=18.50-22.99)	3.5	8.1	10.8	8.3	8.6	10.3	7.0
Normal (BMI $\geq$ 23.0)	96.5	91.9	87.8	91.7	91.4	87.7	93.0
No significance							

## 7. SURVEY RESULTS BY REGION

Access to food, household and community demographics, caregiving practices, and individual's health status among other things can all impact an individual's nutrition status. The regional snapshots are summaries of the survey results comparing each region's relative performance compared to the overall average across regions. The fields highlighted in pink indicate where the region performed worse than the overall average.

### 7.1 CENTRAL REGION

	Indicators	Results	Survey Average
Demographic	Female headed household (% of household)	20.3%	14.7%
	Mean household Size	5.0	6.0
	Gender Distribution (% female population)	54.0%	50.8%
Infant and young child feeding practices	Household diet diversity	8.02	7.34
	Mean age( months) at which children were introduced to food other than breast milk	4.44	4.61
	Distribution of children introduced to food other than breast milk under 6 months	55.7%	49.7%
	Mean duration of breast feeding of young children	19.45	17.95
	Prevalence of breast feeding of children < 24 months	71.4%	74.5%
	Mean daily frequency of feeding children 6-59 months	3.133	3.39
Infant and young child health status	Illness experience by children aged 6-59 months within 2 weeks prior to survey	44.3%	58.9%
	Immunization status of children	96.9%	85.5%
	Vitamin A supplementation coverage of children 6-59 months	34.4%	50.9%
Child nutritional status	Acute malnutrition	6.7%	5.5%
	Acute malnutrition by MUAC (moderate)	0.0%	3.7%
	Prevalence of underweight based on weight for height	11.7%	15.9%
	Stunting	25.0%	33.0%
Maternal diet and nutritional status	Maternal dietary diversity	8.05	7.27
	Maternal BMI (underweight)	3.5%	8.2%
	Maternal BMI (overweight)	35.1%	26.9%
	Maternal MUAC (at risk)	3.5%	7.0%

In Central region, household nutrition is better than the other regions despite the large number of female headed households. However, infant and young child feeding, particularly breastfeeding, practices are poor. This is likely the result of insufficient knowledge and time allocation to childcare since a high proportion of mothers also have to attend to the responsibilities of being household heads.

With regards to child health, vitamin A coverage is low. This is likely the result of mothers not having time to take the children to the health clinics once they have received their measles vaccination at nine months, coupled with problems with the vitamin supply. This can easily be addressed by increasing availability and utilization of foods rich in vitamin A.

Incidence of underweight and stunting is relatively low compared to other regions, while wasting is slightly higher than average. The lower rates of stunting and wasting can be explained by the relatively high household dietary diversity score in Central region. Studies (as previously cited) indicate that high dietary diversity is associated with dietary adequacy for both macro- and micro-nutrients. The slightly high level of wasting (acute malnutrition) is likely the result of poor food availability at the time of the survey. Wasting is immediately influenced by seasonal food variations and can be remedied by proper planning of agricultural production.

The maternal nutrition situation in Central region indicates high dietary diversity and high levels of overweight compared to other regions. These results suggest that project women in Central region are making suboptimal decisions about diet balancing and calls for education on ensuring that the available diversity of food is well balanced during intake. The dietary diversity score does not take into account the amount of every food group consumed and therefore it was not possible to make an indication of the balance intake in terms of quantities for women.

## 7.2 COAST REGION

	Indicators	Results	Survey Average
Demographic	Female headed household (% of household)	13.9%	14.7%
	Mean household Size	5.4	6.0
	Gender Distribution (% female population)	46.7%	50.8%
Infant and young child feeding practices	Household diet diversity	7.65	7.34
	Mean age( months) at which children were introduced to food other than breast milk	5.14	4.61
	Distribution of children introduced to food other than breast milk under 6 months	38.3%	49.7%
	Mean duration of breast feeding of young children	20.55	17.95
	Prevalence of breast feeding of children < 24 months	86.8%	74.5%
	Mean daily frequency of feeding children 6-59 months	3.31	3.39
Infant and young child health status	Illness experience by children aged 6-59 months within 2 weeks prior to survey	59.3%	58.9%
	Immunization status of children	89.5%	85.5%
	Vitamin A supplementation coverage of children 6-59 months	69.1%	50.9%
Child nutritional status	Acute malnutrition	8.1%	5.5%
	Acute malnutrition by MUAC (moderate)	0.0%	3.7%
	Prevalence of underweight based on weight for height	16.2%	15.9%
	Stunting	30.7%	33.0%
Maternal diet and nutritional status	Maternal dietary diversity	7.32	7.27
	Maternal BMI (underweight)	5.5%	8.2%
	Maternal BMI (overweight)	35.6%	26.9%
	Maternal MUAC (at risk)	10.8%	7.0%

Household nutrition in Coast region is comparable to the average of the survey results; infant and young child feeding practices are better than average but still below recommendations. This is likely due to insufficient knowledge on food utilization and IYCF practices, and lack of access to a varied range of food groups. Increasing availability and utilization of a variety of horticultural crops and providing education on the utilization of these foods and on IYCF practices can contribute to the mitigation of these problems.

With regards to child health and nutritional status, Coast region experiences high child morbidity rates and high levels of acute malnutrition and underweight. Morbidity and malnutrition are synergistically related due to their association with immunity status. Increasing utilization of micronutrient rich foods improves immunity and protects against infections. Vitamin A and immunization coverage are relatively higher than average but below recommendations. This is likely the result of mothers not taking children to the health clinics once they have received their measles vaccination at nine months of age coupled with ignorance on the importance of vitamin A supplementation and complete immunization. The vitamin A supplementation problem can easily be addressed by increasing availability and utilization of foods rich in vitamin A, but the immunization coverage problems may be addressed through increased community sensitization and mobilization. Child malnutrition in Coast region is high, probably due to dietary inadequacy and high levels of morbidity. Increasing the range of food varieties coupled with diseases control measures can contribute to addressing the high child malnutrition levels in the region.

The maternal nutrition situation in Coast region indicates high levels of poor decisions about diet balancing as well as poor intra-household food distribution and calls for education on ensuring that the available diversity of food is well balanced and distributed during intake.

## 7.3 EASTERN REGION

	Indicators	Results	Survey Average
Demographic	Female headed household (% of household)	21.4%	14.7%
	Mean household Size	7.3	6.0
	Gender Distribution (% female population)	48.3%	50.8%
Infant and young child feeding practices	Household diet diversity	6.76	7.34
	Mean age( months) at which children were introduced to food other than breast milk	4.42	4.61
	Distribution of children introduced to food other than breast milk under 6 months	52.6%	49.7%
	Mean duration of breast feeding of young children	15.98	17.95
	Prevalence of breast feeding of children < 24 months	81.1%	74.5%
	Mean daily frequency of feeding children 6-59 months	3.36	3.39
Infant and young child health status	Illness experience by children aged 6-59 months within 2 weeks prior to survey	71.8%	58.9%
	Immunization status of children	90.7%	85.5%
	Vitamin A supplementation coverage of children 6-59 months	64.6%	50.9%
Child nutritional status	Acute malnutrition	8.1%	5.5%
	Acute malnutrition by MUAC (moderate)	7.0%	3.7%
	Prevalence of underweight based on weight for height	28.6%	15.9%
	Stunting	57.1%	33.0%
Maternal diet and nutritional status	Maternal dietary diversity	6.60	7.27
	Maternal BMI (underweight)	7.9%	8.2%
	Maternal BMI (overweight)	33.3%	26.9%
	Maternal MUAC (at risk)	8.1%	7.0%

Eastern is the poorest performing region on most of the assessment indicators except for prevalence of breastfeeding of children < 24 months old, and on immunization and vitamin A supplementation coverage as shown in the results above.

Generally, Eastern region has major food and nutrition security challenges ranging from availability of, access to, utilization of water, demographic and socioeconomic issues. The highest levels of stunting and underweight are found in this region. The high proportion of female headed households implies more women have to divide their time between the responsibilities of being household heads, household provisions and chores as well as child care. The high male population implies high dietary requirements especially for energy. This situation is deteriorated by the fact that the region is highly vulnerable to food insecurity since it falls within arid and semi-arid lands. These factors impact negatively on household dietary practices, IYCF practices, nutritional status and morbidity experience of young children.

The high maternal overweight indicates poor dietary balance. This calls for a comprehensive strategy for Eastern region that addresses household size, availability and utilization of water and different types of foods as well as nutrition and health education.

## 7.4 NYANZA REGION

	Indicators	Results	Survey Average
Demographic	Female headed household (% of household)	16.7%	14.7%
	Mean household Size	6.3	6.0
	Gender Distribution (% female population)	51.1%	50.8%
Infant and young child feeding practices	Household diet diversity	6.39	7.34
	Mean age( months) at which children were introduced to food other than breast milk	4.98	4.61
	Distribution of children introduced to food other than breast milk under 6 months	43.0%	49.7%
	Mean duration of breast feeding of young children	18.16	17.95
	Prevalence of breast feeding of children < 24 months	75.7%	74.5%
	Mean daily frequency of feeding children 6-59 months	3.25	3.39
Infant and young child health status	Illness experience by children aged 6-59 months within 2 weeks prior to survey	55.7%	58.9%
	Immunization status of children	79.3%	85.5%
	Vitamin A supplementation coverage of children 6-59 months	30.4%	50.9%
Child nutritional status	Acute malnutrition	2.8%	5.5%
	Acute malnutrition by MUAC (moderate)	1.4%	3.7%
	Prevalence of underweight based on weight for height	8.3%	15.9%
	Stunting	25.0%	33.0%
Maternal diet and nutritional status	Maternal dietary diversity	6.30	7.27
	Maternal BMI (underweight)	11.1%	8.2%
	Maternal BMI (overweight)	8.3%	26.9%
	Maternal MUAC (at risk)	8.3%	7.0%

In Nyanza region household nutrition is generally low and infant and young child feeding practices are below recommendations. This is likely the result of insufficient access to adequate quantity and variety of food, and poor knowledge on utilization of available food.

With regards to child health, vitamin A and immunization coverage are low. This is likely to be the result a lack of understanding of the importance of vitamin A supplementation and complete immunization. The vitamin A supplementation problem can easily be addressed by increasing availability and utilization of foods rich in vitamin A, but the immunization coverage problems may be addressed through increased community sensitization and mobilization.

Child malnutrition is relatively lower than other regions but maternal underweight is higher. Stunting however remains substantially high probably due to chronic infections as more than half of the children reported illnesses two weeks prior to the survey. The better nutritional status among children reflects the better IYCF practices compared to the other regions albeit not meeting recommendations.

The high underweight levels among mothers are likely to be due to the poor dietary diversity resulting in poor adequacy. Women in the Nyanza region are generally taller than other regions. Whole fish constitutes a big proportion of their diet and positively contributes to increased linear

growth. Therefore low dietary intake of other foods will easily manifest itself in low weight for height, resulting in low BMI. These results call for increased access to a varied diet in Nyanza region and nutrition and health education on ensuring that available diversity of food is well balanced during intake and that vaccination and vitamin A supplementation of children is taken seriously.

### 7.5 RIFT VALLEY REGION

	Indicators	Results	Survey Average
Demographic	Female headed household (% of household)	15.1%	14.7%
	Mean household Size	5.9	6.0
	Gender Distribution (% female population)	53.2%	50.8%
Infant and young child feeding practices	Household diet diversity	7.64	7.34
	Mean age( months) at which children were introduced to food other than breast milk	4.46	4.61
	Distribution of children introduced to food other than breast milk under 6 months	53.9%	49.7%
	Mean duration of breast feeding of young children	17.71	17.95
	Prevalence of breast feeding of children < 24 months	65.2%	74.5%
	Mean daily frequency of feeding children 6-59 months	3.55	3.39
Infant and young child health status	Illness experience by children aged 6-59 months within 2 weeks prior to survey	54.1%	58.9%
	Immunization status of children	93.5%	85.5%
	Vitamin A supplementation coverage of children 6-59 months	55.8%	50.9%
Child nutritional status	Acute malnutrition	1.2%	5.5%
	Acute malnutrition by MUAC (moderate)	4.9%	3.7%
	Prevalence of underweight based on weight for height	11.1%	15.9%
	Stunting	31.3%	33.0%
Maternal diet and nutritional status	Maternal dietary diversity	7.64	7.27
	Maternal BMI (underweight)	14.3%	8.2%
	Maternal BMI (overweight)	30.0%	26.9%
	Maternal MUAC (at risk)	8.6%	7.0%

The main problems in the Rift Valley region are centred on poor IYCF practices and maternal diet. These are reflected in the high stunting levels and poor maternal nutritional status. The most likely cause of these problems is poor utilization of available food varieties due to lack of nutrition knowledge. In addition, Rift Valley region has a high percentage of female headed households who tend to be time poor. In spite of the poor feeding practices, child health, acute malnutrition and underweight, are better than the survey average and immunization coverage is very high, implying good health seeking behaviour; which contributes positively to nutritional status and morbidity.

## 7.6 WESTERN REGION

	Indicators	Results	Average of Survey Results
Demographic	Female headed household (% of household)	6.4%	14.7%
	Mean household Size	5.9	6.0
	Gender Distribution (% female population)	52.4%	50.8%
Infant and young child feeding practices	Household diet diversity	7.61	7.34
	Mean age( months) at which children were introduced to food other than breast milk	4.29	4.61
	Distribution of children introduced to food other than breast milk under 6 months	54.3%	49.7%
	Mean duration of breast feeding of young children	16.61	17.95
	Prevalence of breast feeding of children < 24 months	69.2%	74.5%
	Mean daily frequency of feeding children 6-59 months	3.6	3.39
Infant and young child health status	Illness experience by children aged 6-59 months within 2 weeks prior to survey	64.1%	58.9%
	Immunization status of children	70.2%	85.5%
	Vitamin A supplementation coverage of children 6-59 months	46.6%	50.9%
Child nutritional status	Acute malnutrition	8.1%	5.5%
	Acute malnutrition by MUAC (moderate)	6.9%	3.7%
	Prevalence of underweight based on weight for height	18.6%	15.9%
	Stunting	29.7%	33.0%
Maternal diet and nutritional status	Maternal dietary diversity	7.77	7.27
	Maternal BMI (underweight)	6.4%	8.2%
	Maternal BMI (overweight)	21.8%	26.9%
	Maternal MUAC (at risk)	10.3%	7.0%

Western region results reflect the synergistic relationship between IYCF practices, child health and nutrition. It has poor IYCF practices, high levels of child morbidity, low levels of immunization and vitamin A supplementation and correspondingly high levels of child malnutrition. The possible causes of these problems are lack of understanding of good health seeking behaviour, poor agricultural production planning and poor utilization of available food varieties. These problems can be addressed by educating and sensitizing communities on good health seeking behaviour, proper agricultural production planning to ensure that the communities have access to a varied diet including horticultural products, and education on the optimal utilization of available food varieties.

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## 8. KHCP AND STAKEHOLDER ACTIVITIES BY REGION

USAID-KHCP operates in six regions and works in partnership with the private sector and local non-governmental organizations (NGOs) to build the capacity of smallholder farmers and farmer groups. Partner activities aim to increase the competitiveness of the Kenyan horticulture industry by increasing productivity and food security, adding value to horticulture products, enhancing value chain coordination and improving the business enabling environment. The majority, however, of KHCP partners are focused on increasing productivity, food security and market access of specific value chains such as Green Leafy Vegetables, Bananas, Irish Potatoes, Kale, Papaya, Passion fruit, Pulses, Pumpkin, Squash, Tomatoes and Watermelon. Typical partner activities can include quality seed stock multiplication, farmer training on Good Agricultural Practices, introduction of new technologies, improving market access and value addition.

Thirteen of KHCP's 23 partners became operational in October 2010. The remaining ten partners started operations in April 2011. While writing this report, another nine partners (total 32) have been approved by USAID and are in the start-up phase. More information on partner activities and geographic coverage is included in Appendix III.

KHCP partner activities were evaluated based on their contribution to improving household food security along the four dimensions; access, availability, utilization and stability. The individual focus crops were also evaluated for their potential contribution to household nutrition.

In addition to evaluating, KHCP partner activities, the consultant also identified activities conducted by nutrition stakeholders such as the Ministry of Public Health and Sanitation (MOPHS) in the six regions. The purpose of including these activities is to map out the entire landscape of nutrition and food security activities being implemented in the region.

## 8.1 CENTRAL REGION

### Summary of food security and nutrition related activities by KHCP partners:

In Central region, KHCP is building farmer capacity in bananas, local market vegetables, Irish Potatoes and smallholder flower value chains. When properly prepared and consumed, the food crops can be major sources of Vitamins A, C and K. The partners of KHCP in the Central region include Africa Harvest, KENFAP, Real Impact and Wilmar Flowers.

Local Partner	Focus Crops	Major Vitamin/Minerals	Access	Availability	Stability	Utilization
Africa Harvest	Tissue culture bananas	Vitamin C, Potassium	Yes	Yes	Yes	No
KENFAP	Irish Potatoes	Vitamin C, Potassium	Yes	Yes	Yes	No
Real Impact	Leafy green Vegetables,	vitamins A, C & K, manganese and calcium	Yes	Yes	Yes	Yes
	Butternut squash	Vitamins A and C, potassium & magnesium,				
	Carrots	Vitamins A & C				
	Kale	Vitamins A & C potassium				
	Pumpkin	Vitamins A & C				
Wilmar	Smallholder Flowers	N/A	Yes	No	No	No

In Central region, KHCP partners have a strong emphasis on improving food security by increasing access, availability and stability of nutritious food. However, with regards to improving utilization of food, only one KHCP partner, Real Impact, is carrying out substantial activities. Real Impact promotes and trains farmers in the set up and use of Kitchen Gardens to help them understand the principles of good nutrition. Farmers learn how to grow enough of the right type of vegetables to meet the requirements of a balanced diet. Participants also receive training on how to prepare and consume the garden produce.

### Selected stakeholder nutrition and food security activities

#### General health and nutrition

- The Thika School of Health and Medical Sciences are training community health workers and trainers on health courses. Nutrition is incorporated in their curriculum. The school uses community health workers as a link to the community and they are used to disseminate information on good methods of food preparation.
- The Ministry of Public Health and Sanitation (MOPHS) works with community health workers in identification of areas affected by malnutrition. The community health workers are trained on key issues and are involved in giving advice to the members of the community on health and nutrition. They also conduct nutritional assessment by taking rapid MUAC measurements.
- The Home Economics Department in the Ministry of Agriculture (MOA) has a nutrition component that addresses issues such as food security which takes into account the nutrition needs of the community and household intervention programs. The home economists are also involved in agribusiness and their activities are not solely focused on a specific area.

The focus of the various health and nutrition stakeholders in Central region is on disseminating information on nutrition and measuring the impact on the community through nutritional assessments, which could when coordinated well, complement the work of KHCP partners. The community health workers are the vehicle through which most of the work is conducted.

## 8.2 COAST REGION

### Summary of food security and nutrition related activities by KHCP partner:

In the Coast region, KHCP is building capacity along the following value chains; cashew nuts, green leafy vegetables, mango, orange-fleshed sweet potatoes (OFSP), passion fruit and pigeon peas. These crops can be major sources of vitamins A and C.

KHCP is partnering with KRA, Pwani project Development Consultants (PPDC), Sunripe and Vision for Economic Empowerment in Africa (VEEMA).

Local Partner	Focus Crops	Major Vitamin/Minerals	Access	Availability	Stability	Utilization
Kenya Rainwater Association	NA		Yes	Yes	Yes	No
PPDC	OFSP	Vitamins A and C, potassium	Yes	Yes	Yes	No
	Passion fruit	Vitamin C				
Sunripe	OFSP	Vitamins A and C, potassium	Yes	Yes	Yes	Yes
VEEMA	Local Market Vegetables	Vitamins A and C	Yes	Yes	Yes	No
	Passion fruit	Vitamin C				
	Pulses	Calcium, iron, protein				

KHCP partners in Coast region have a strong focus on improving access, availability and stability of food security. Only Sunripe, a private sector firm focused on increasing production of new varieties of Orange fleshed sweet potatoes, is also training farmers on how to utilize the produce.

### Selected stakeholder nutrition and food security activities

- The Ministry of Medical Services (MOMS) in coast region undertakes nutrition education activities among patients and community health workers. They focus on utilization rather than sale of nutritious food and undertake preventive and therapeutic measures. Some of the nutritional challenges faced by members of the community that MOMS address include poor diet balancing, anemia, obesity and special diet patients
- The Home Economics Department within the MOA (HED-MOA) is conducting training activities on food utilization, value addition (for example oil extraction), preservation (for instance use of solar driers) and home sanitation.

The nutrition and food security stakeholders in Coast are implementing activities which complement the activities undertaken by KHCP partners. In particular, MOMS and HED-MOA appear to be addressing the critical utilization pillar of food security and improved nutrition.

### 8.3 EASTERN REGION

#### Summary of food security and nutrition related activities by KHCP partner:

In Eastern region, KHCP is partnering with Agricultural Technologies and Information Program (ATIP) Business Initiative for Survival and Eradication of Poverty (BISEP), Dryland Seed Company, KRA, Sunripe, UCCS, Vegpro and WONI Exporters to build capacity along the following value chains; Irish Potatoes, Local market vegetables such as African green leafy vegetables (amaranth, spider plant), OFSP and Irish potatoes, passion fruits and Pulses. When prepared and consumed properly, these crops can be major sources of vitamin A and C.

Local Partner	Focus Crops	Major Vitamins / Minerals	Access	Availability	Stability	Utilization
<b>ATIP</b>	OFSP	Vitamins A and C, potassium	Yes	Yes	Yes	No
	Pulses	Calcium, iron, protein				
	Local market vegetables	Vitamins A and C				
<b>BISEP</b>	Local market vegetables	Vitamins A and C	Yes	Yes	Yes	No
	OFSP	Vitamins A and C, potassium				
	Pulses	Calcium, iron, protein				
<b>Dryland Seed Company</b>	NA		Yes	Yes	Yes	No
<b>KRA</b>	NA		Yes	Yes	Yes	No
<b>Sunripe</b>	OFSP	Vitamins A and C, potassium	Yes	Yes	Yes	Yes
<b>UCCS</b>	Local market vegetables	Vitamins A and C	Yes	Yes	Yes	No
	OFSP	Vitamins A and C, potassium				
	Pulses	Calcium, iron, protein				
<b>VEGPRO</b>	Snow peas	Vitamin C	Yes	No	No	No
<b>Woni Exporters</b>	Chillies,	Vitamin C	Yes	Yes	Yes	No
	Passion fruit	Vitamin C				

In Eastern region, KHCP partners are increasing food security by creating better access, availability and stability of nutritious crops. However, there is not sufficient emphasis on improving utilization. Only one partner, Sunripe, is providing farmers with training on how to consume the crops they produce.

#### Selected stakeholder nutrition and food security activities

- The activities of the Kenya Red Cross Society in collaboration with the World Food Programme (WFP) and African Medical Research Foundation (AMREF) are focused on

improving the nutritional status of lactating mothers and children less than five years of age under the supplementary feeding program.

- AMREF is educating the community on environmental sanitation including advocating for construction of pit latrines.
- AMREF collects household data on nutrition and hygiene issues through Community Health Workers (CHWs) and uses the information to identify the malnourished individuals in the households.
- Other activities of AMREF are assisting the community to access health care, providing the community with registers for health monitoring, community empowerment through education programs on matters such as nutritional needs, dangers of home deliveries, the need for sanitary facilities and the dangers of not using such facilities.
- The MOPHS organizes the Nutrition Technical Forum at the district level. The forum addresses the nutritional needs of the community not only at the district level, but also to ensure that information on nutrition trickles down to members of the community.
- Day to day activities of MOPHS are aimed at preventing malnutrition through dissemination of knowledge and provision of relief food and at building capacity at the community level through trainings on the nutritional benefits of consuming certain foods. MOPHS works in collaboration with the Kenya Red Cross and AMREF
- Horticultural Crops Development Authority (HCDA) in the Eastern region is educating farmers on budgetary aspects of horticultural activities and the handling of monetary proceeds that accrue from the sale of horticultural produce.

In Eastern region, there are a number of groups active in improving nutritional outcomes. The technical information dissemination activities of both MOPHS and HCDA appear to be the most relevant to KHCP in that they could fill an identified project gap, training on food utilization.

#### 8.4 NYANZA REGION

##### Summary of food security and nutrition related activities by KHCP partner:

In Nyanza, KHCP is partnering with Animal Draft Power project (ADPP) and Farm Concern International to build capacity of farmers along the local market vegetable, OFSP, Passion fruit and pulse value chains. These crops are major sources of vitamin A and C.

Local Partner	Focus Crops	Major Vitamins/ Minerals	Access	Availability	Stability	Utilization
ADPP	Local market vegetables	Vitamins A and C	Yes	Yes	Yes	Yes
	OFSP	Vitamins A and C, potassium				
Farm Concern International	Local market vegetables	Vitamins A and C	Yes	Yes	Yes	Yes
	OFSP	Vitamins A and C, potassium				
	Passion fruit	Vitamin C				
	Pulses	Calcium, iron, protein				

In Nyanza region, KHCP partner activities are largely focused on improving food security through increased access, availability and stability of nutritious foods. ADPP, a local NGO which provides training to farmers on Good Agricultural Practices is partnering with another local organization, SIGOK, to provide farmers with information on how to properly consume the foods they produce.

### Selected stakeholder food security and nutrition activities

- Scientific Ideological Group of Kenya (SIGOK) is a research institution whose activities are aimed at horticultural development and integration of nutrition through value chain activities. It also helps the communities to identify resources and turn them into income generating activities. The institution participates in community agricultural shows, district field days and trainings on how to harness resources. In its effort to build the capacity of members of the community, the institution has developed fourteen micro-irrigation systems.
- SIGOK also promotes the use of the kitchen irrigation system in household kitchen gardens to facilitate the production of horticultural produce for subsistence.
- SIGOK carries out its activities through Common Interest Groups (CIG'S) that visit the community. Activities undertaken include promotion of kitchen gardening, provision of clean drinking water and value addition including juice making and production of snacks and foods from the local indigenous food varieties in ways that preserve their nutrient content. The institution also carries out outdoor training on processing, parking and marketing of the grain amaranth.
- The African Medical Research Foundation (AMREF) in Nyanza targets orphans and vulnerable children and is also involved in the funding of members of groups aiming at improving the nutritional status of vulnerable community members (women, children and people with HIV and AIDS).
- AMREF also encourages Income Generating Activities (IGA's). In collaboration with the Ministry of Agriculture, AMREF provides expertise and builds capacity among the youth in the field of agriculture.
- MOPHS is addressing the nutritional needs of the community at District level through the District Nutritional Officer. The district nutrition office is involved in running the *Malezi Bora* Week once a year, during which health campaigns are conducted and information on nutritious foods that community members can consume to improve their nutritional status is disseminated to the community.
- The Ministry of Agriculture in Nyanza is involved in addressing community nutritional problems through capacity building. This involves the training of community members on methods of food preservation to conserve the nutritional value and food balancing to make up for lost nutrients.
- Other MOA activities include promoting the establishment of kitchen gardens with a variety of vegetables, fruits and carbohydrate rich foods and value addition of nutritious food produce. For instance, the orange-fleshed sweet potato and cassava have been preserved through chipping, sun drying and milling to produce flour that can be consumed by the household.
- The ministry also offers extension services including demonstrations on how to prepare the African green leafy vegetables (spider plant, black night shade, and amaranth) and proper preservation of food items while retaining their nutritional values.
- Community Mobilization Against Desertification (CMAD) is a dependent non-governmental organization that focuses its activities on three areas; capacity building of farmers through training on new production technologies, income generation to improve the welfare of its beneficiaries and food security. The food security component is addressed through mobilization of community members against desertification. The organization, also builds on previous projects, for example, the orange fleshed sweet potato project and partners with other stakeholders to provide technology that is useful in value addition activities.
- To improve the nutritional status of the community, CMAD has employed the use of kitchen gardens to produce vegetables for household consumption, promoted household utilization

of horticultural food crops and in collaboration with the Ministry of Agriculture, promoted utilization methods that retain vitamins in food.

- Medicines Sans Frontiers (MSF) is a non-governmental organization whose activities aim at improving the overall health of the community. Its activities are largely curative.

There are numerous food security and nutrition stakeholders in Nyanza region each with a slightly different focus. MOPHS and MOA activities, however, appear to be the most aligned with KHCP training needs in produce utilization.

## 8.5 RIFT VALLEY REGION

### Summary of food security and nutrition related activities by KHCP partner:

In the Rift Valley, KHCP is partnering with CANKEN International, Good Neighbours Community Program (GNCP), KENFAP, MACE Foods and Wilmar to build capacity along the following value chains; Irish Potatoes, Local market vegetables such as African green leafy vegetables (amaranth, spider plant), export vegetables and spices, OFSP and Irish potatoes, passion fruit, and smallholder flowers. These crops can be good sources of vitamins A and C.

Local Partner	Focus Crops	Major Vitamins and Minerals	Access	Availability	Stability	Utilization
<b>CANKEN Int'l</b>	Passion fruit	Vitamin C	Yes	No	No	No
<b>GNCP</b>	Passion fruit	Vitamin C	Yes	Yes	Yes	No
<b>KENFAP</b>	Irish Potatoes	Vitamin C	Yes	Yes	Yes	No
<b>MACE Foods</b>	Chillies	Vitamin C	Yes	Yes	Yes	Yes
	Green leafy vegetables	vitamins A, C and K, manganese and calcium				
<b>Wilmar</b>	Smallholder flowers	NA	Yes	No	No	No

In Rift Valley, KHCP partner activities are strong in three out of the four areas of food security and nutrition; access, availability and stability. CANKEN, MACE Foods and VEGPRO are contributing to improving access by increasing income through the provision of high value export opportunities. There is, however, a clear gap in activities which focus on produce utilization.

### Selected stakeholder nutrition and food security activities

- The Academic Model Providing Access to Health (AMPATH) is an integrated model of health care services targeting persons with HIV/AIDS in Rift Valley and Western Regions. AMPATH is attempting to reduce malnutrition among HIV infected persons by enrolling vulnerable persons into food programmes, conducting nutrition assessment, providing counselling and capacity building through education on the importance of good nutrition in improving the welfare of persons with HIV.
- The Department of Home Economics in the MOA (DHE-MOA) in the Rift Valley is addressing nutrition by building the capacity of communities on optimal and beneficial utilization of the produced food. The department has embarked on working with farmer groups for capacity building. Community empowerment is carried out during field days in which members are trained and demonstrations carried out.
- DHE- MOA also undertakes the promotion of value addition activities that include the selling of passion juice in local centers. It has engaged MACE foods, a private processing firm, to take part

in the value addition activities through the processing of vegetables. MOA also targets to improve food security through the diversification of food crops and production using the resources available, promote the adoption of kitchen gardens to grow crops for subsistence and encourage farmers to grow horticultural and consume food crops thereby improving their nutritional status.

The stakeholder activities in Rift Valley are focused on food utilization and protection of marginalized groups. The training on food utilization provided by DHE-MOA appears to be a complementary fit for the current KHCP partner activities.

## 8.6 WESTERN REGION

### Summary of food security and nutrition related activities by KHCP partner:

In the Western region, KHCP is partnering with Community Research and Development Initiatives (CREADIS), Farm Concern International, GNCP and Wilmar to build capacity of project beneficiaries along the Irish Potato, local market vegetable, OFSP and passion fruit and smallholder flower value chains. These crops are major sources of vitamins A and C.

Local Partner	Focus Crops	Major Vitamins and Minerals	Access	Availability	Stability	Utilization
<b>CREADIS</b>	OFSP	Vitamins A and C	Yes	Yes	Yes	No
<b>Farm Concern International</b>	Local market vegetables	Vitamins A and C	Yes	Yes	Yes	Yes
	OFSP	Vitamins A and C, potassium				
	Passion fruit	Vitamin C				
	Pulses	Calcium, iron, protein				
<b>GNCP</b>	Passion fruit	Vitamin C	Yes	Yes	Yes	No
<b>Wilmar</b>	Smallholder flowers	NA	Yes	No	No	No

In Western region, KHCP partner activities are improving food security by increasing access, availability and stability of nutritious foods. However, there is a clear gap in the provision training on improved utilization of nutritious food.

### Selected stakeholder nutrition and food security activities

- The district nutrition office of MOPHS train via Community health workers and Community Health Extension Workers the severely malnourished and carers of infants and young children on nutrition. They also build capacity of healthcare practitioners transferred from peripheral health care institutions.
- The Mama SASHA project implemented by local NGOs and the US Agency for International Development (APHIA II) is promoting healthcare and Vitamin A consumption by distributing at local health facilities OFSP vines to prenatal women.

Stakeholder activities are focused on preserving nutrients through improved postharvest handling and improving the nutritional status of marginalized groups such as infants and young children.

## 9. STRENGTHS AND WEAKNESSES

In addition to evaluating the project partners, the consultant also evaluated the project level strengths and weaknesses in context of maximizing food security through promoting improved nutrition.

### Strengths

- KHCP works with partners that have highly trained and skilled personnel in horticultural production.
- The project is designed to increase productivity and income generation, thereby directly improving food accessibility at household level and at the local markets.
- The project focus on food production makes it easy to improve the nutritional status of the community by integrating nutrition and food utilization components.
- KHCP has an extensive outreach area (200,000 farmers, 6 regions) and can influence a large proportion of the population.

### Weaknesses

- The KHCP project design is directly focused on income generation through improved productivity and better access to markets and only indirectly (and in some cases not at all) focused on improving quality of household food consumption and nutritional status of household members.
- KHCP's production activities are not well integrated with nutrition activities.
- There is lack of collaboration with key players in nutrition and personnel (with the exception of Central region)
- KHCP does not train farmers on utilization or handling or budgeting of their income with an aim to improving their diets.
- Crop planning to meet the dietary needs of the household was not evident

## 10. INTEGRATED NUTRITION FRAMEWORK

The Integrated nutrition framework is the compilation of the results of the nutrition survey, stakeholder and focus group interviews and consultant recommendations. The framework is intended to build off of existing food security and nutrition activities and provide the project with tailored, clear and actionable recommendations.

	Identified nutrition challenges	Causes of nutrition challenges	Central	Coast	Eastern	Nyanza	Rift Valley	Western	Current KHCP Activities	New Recommended Activities	Potential areas of collaboration with local health and nutrition stakeholders
1	Low Household/ Maternal Diet Diversity	Diet diversity is affected by access, availability, stability and the proper utilization of food. Food intake can also be impacted by cultural norms, intra-household resource control and lack of adequate knowledge			X	X			<ol style="list-style-type: none"> <li>Promote value addition activities to conserve nutritious foods (green leafy vegetables, OFSP) during low rain seasons.</li> <li>Expand income generating activities (domestic and export market opportunities) to increase income and therefore access to food.</li> <li>Scale '<u>Kitchen Garden</u>' concept work to improve diversity of food intake</li> </ol>	<ol style="list-style-type: none"> <li>Train partners to include education on how to utilize food, horticulture produce and income accrued from sales for optimal nutrition. (<i>Nutrition Messaging</i>)</li> </ol>	<ol style="list-style-type: none"> <li>Collaborate with DNO and DHE-MOA to promote improved utilization of crops produced such as OFSP, pulses, local market vegetables (Eastern and Nyanza)</li> <li>Explore collaboration with local organizations (SIGOK, AMREF, etc.) and public sector institutions DHE- MOA already engaged in the promotion of 'Kitchen Gardens' (Nyanza)</li> </ol>
2	Low Child Feeding Frequency 6-59 months	Feeding frequency can be affected by the caregiver's available time to prepare food or access and availability of food		X	X	X			<ol style="list-style-type: none"> <li>Continue to seek and invest in labor saving technologies (water pits, irrigation) and Good Agricultural Practices (mulching, raised beds).</li> </ol>		<ol style="list-style-type: none"> <li>Collaborate with nutrition initiatives led by MOMS and HED-MOA to improve food utilization and infant and child feeding practices (All)</li> </ol>
3	Child Malnutrition	Lack of access, cultural norms, improper feeding practices and illness can all impact nutrition		X	X			X	<ol style="list-style-type: none"> <li>Expand income generating activities (domestic and export market opportunities) to increase income and therefore access to food.</li> <li>Expand '<u>Kitchen Garden</u>' work and design gardens to</li> </ol>	<ol style="list-style-type: none"> <li>Train partners to include education on how to utilize food, horticulture produce and income accrued from sales for optimal nutrition. (<i>Nutrition Messaging</i>)</li> </ol>	<ol style="list-style-type: none"> <li>Link beneficiaries with MOPH's community health workers engaged in improving infant and young child feeding practices (Western and Coast)</li> <li>Connect selected beneficiaries with the Kenya Red Cross Society initiative focused on improving the nutritional status of lactating mothers and children (Eastern)</li> <li>Link beneficiaries with MOPHS initiative to reduce</li> </ol>

									address specific mineral and nutrient deficiencies in the vulnerable populations. 3. Introduce and expand water harvesting technologies to enable yearlong food production		malnutrition through food relief and training on food utilization (Eastern)
4	Maternal malnutrition (BMI and MUAC)	Lack of access to food, cultural norms, and illness can all impact nutrition Improper food utilization due to lack of adequate knowledge	X	X	X	X	X		1. Promote value addition activities to conserve nutritious foods (green leafy vegetables, passion fruit and OFSP value addition) 2. Expand 'Kitchen Garden' concept to vulnerable populations. 3. Introduce and expand use of water harvesting technologies to enable yearlong food production (particularly coast and eastern)	1. Train partners to include education on how to utilize food, horticulture produce and income accrued from sales for optimal nutrition. (Nutrition Messaging)	1. Explore collaboration with MOPHS community workers who are targeting malnourished populations with nutrition training (Central) 2. Explore collaboration with MOA which is currently supporting green leafy vegetable value addition (Nyanza) 3. Investigate collaboration with local organizations (SIGOK, AMREF, etc.) and public sector institutions DHE- MOA already engaged in the promotion of 'Kitchen Gardens' (Nyanza)
5	Low Vitamin A Coverage	Lack of access to natural or supplemental vitamin A.	X			X		X	1. Continue to scale 'Kitchen Garden' concept with special focus on Vitamin A consumption 2. Promote value addition activities to conserve foods rich in vitamin A (OFSP flour)	1. Sensitize KHCP participants (partners and beneficiaries) on vitamin A supplementation and proper utilization of horticultural foods with sources of pro-vitamin A (Kale, OFSP, Pumpkin) (Nutrition Messaging)	1. Partner with Thika School of Health and Medicine and MOMPHS to disseminate information on vitamin A intake (Central). 2. Link beneficiaries with Mama SASHA project which is focused on improving prenatal health care provision and vitamin A intake through distribution of OFSP vines
6	Poor Infant and Young Child Feeding Practices	Lack of knowledge of good IYCF, lack of time	X		X		X	X	These health related nutrition challenges are not directly impacted by KHCP activities. Other health and nutrition organizations have the technical expertise to properly address these issues.		1. MOPH's community health workers are engaged in improving infant and young child feeding practices (Western)
7	High Child Morbidity	Environment, poor sanitation, proximity to health care, nutrition,			X			X	KHCP can play a role in directing Project beneficiaries to the appropriate health and nutrition organizations and or explore incorporating these health messages during field days.		1. AMREF is educating the community on environmental sanitation including advocating for construction of pit latrines (Eastern)
8	Low Child Immunization	Lack of knowledge, low income, proximity to health care facility				X		X			None identified

# 11. RECOMMENDATIONS

After reviewing the results of the survey and the comments from the stakeholder forums, it is recommended that KHCP address food security and nutrition needs by implementing the following recommendations in addition to the regional integrated nutrition framework:

1. **Capitalize on project strengths:** Field days and technical assistance visits are effective in disseminating agricultural training. KHCP should support project partners to incorporate nutrition and food utilization messages into training curriculum to improve food intake behaviors.
2. **Scale success:** expand coverage of kitchen garden technology and food utilization awareness to all field-base partnerships involving the public, private and NGO actors.
3. **Leverage community health resources:** Engage and collaborate, where appropriate, with existing health and nutrition stakeholders to increase impact of activities and address nutrition challenges not directly related to agriculture (e.g. infant and young child feeding practices and immunization coverage).
4. **Expand project nutrition resources:** Identify nutrition partners and/or consultants to engage in the development of a training curriculum and approach that sensitizes the communities on the costs and benefits of malnutrition and who will conduct actual trainings for farmers on nutrition issues and utilization of various foods.
5. **Measure impact:** Track project level impact on nutrition by conducting midterm and end of project evaluations.

# APPENDIX I: SOW

## Part I – Terms of Reference

### 1. Project background

The Kenya Horticulture Competitiveness project (KHCP) is a five year initiative supported by the American people through the United States Agency for International Development (USAID). The goal of KHCP is to achieve a highly competitive horticulture industry and improve food security through increasing on-farm productivity, enhancing value-added processing, improving coordination among horticulture value-chain participants and increasing the capacity of local organizations to provide improved technical services to smallholders. By the end of the project, KHCP will have benefited more than 200,000 agricultural households and put more than 60,000 hectares under improved and environmentally sustainable production practices.

Kenya currently faces chronic and growing food insecurity as a result of a number of factors including environmental and logistical challenges. According to the findings of the 2008 Kenya Demographic and Health (KDHS) survey, 35% of Kenyan children are stunted, while 14% are severely stunted. Stunting is the result of prolonged failure to receive adequate nutrition. Wasting, which represents a more acute nutritional deficiency, is also on the rise in Kenya. The KDHS in 2009 reported a 1.4% increase in wasted children from 2003.

Early childhood and maternal nutrition are priorities for not just the Government of Kenya, but also USAID and the KHPC project. Studies indicate that there are problems in Kenya concerning not just access to food, but also other nutrition-related factors such as food preparation, food choice, mother/child interactions, etc. For example, in Kenya amongst the highest quintile of income earners (the richest Kenyans), 26% of children suffer from stunting.

While the main aim of the KHCP is to increase the productivity and incomes of its beneficiary farmers, the project also recognizes that investments in value chains are not necessarily linked to improved nutrition outcomes. In order to ensure that KHCP is improving the food security of its beneficiary farmers in a measureable and sustainable way, it must integrated food utilization practices and behaviour change in into all program activities and monitor and evaluate the causal relationship between income availability, food availability and the actual effects on the nutritional status of household members, particularly children.

This fixed price contract will develop an integrated nutritional framework to ensure that the projects income-generating activities are resulting in improved nutritional statuses for the project's beneficiaries to guarantee a maximum impact on food security.

### 2. Scope of Work

To ensure the effective incorporation of nutrition concerns into the project's agriculture activities, Dr. Mwangi will develop a project-specific integrated nutritional framework. This framework will be no more than 30 pages in length, including a one page executive summary and will include:

- An overall assessment of the regions where KHCP operates, including descriptive statistics and analysis of current nutrition and food consumption issues in these regions relating to horticulture.
- An analysis of Kenyan diet by region and by gender, including common micronutrient deficiencies and suspected causes.
- A table of foods commonly consumed across Kenya, including caloric and nutrient content by weight.
- An analysis of feeding practices for children under two (including exclusive breast feeding, introduction of complementary foods, etc.) and the positive and negative impacts of these feeding practices.
- An analysis of maternal nutritional practices and diet (covering diet and deficiencies such as anaemia, vitamin A deficiency, Iron/Folic deficiency, and Zinc deficiency). This should include suggestion on how the project can promote nutritious foods and proper cooking practices which will in turn improve maternal nutrition.
- A summary of nutritional losses known to occur in Kenya due to post-harvest handling practices or plant disease, (e.g., poor drying methods).
- A description of the strengths and weaknesses of the current nutrition-related interventions being undertaken by the project.
- Strategies to overcome these challenges including potential partners and stakeholders with which to work in each targeted region.
  - These partners should include existing agriculture and nutrition initiatives (such nutrition assessment, counselling and support (NACS) programs, community health workers and home economists, etc) as well as NGO and health partners who are already working on nutrition in Kenya. A detailed description of the partners' activities and relevant synergies with the KHCP project should be discussed.
- Conduct 3-4 stakeholder forums to evaluate the role/impact of nutrition on the horticulture sector.
- A clear plan for monitoring the project's impact on nutrition in these regions.
- A clear plan for reporting on the project's impact on nutrition in these regions.
- Future steps needed to ensure positive nutrition outcomes based on current KHCP technical interventions.

# APPENDIX II: METHODOLOGY & SCHEDULE

## Methodology

- **Desk review** (*Programme Documents, Development Plans, KDHS, Regional Reports, Agricultural sector records/reports, Health sector/facility records/reports etc*)
  - Programme mandate and activities
  - Population statistics of regions where KHCP operates
  - Agricultural production in Kenya and regions where KHCP operates
  - Health and nutrition statistics in Kenya and by region
  - Dietary issues of women and young children (nutrition and food consumption issues/feeding practices) in Kenya and by region
  - Common micronutrient deficiencies and suspected causes by region
  - Nutrient content of foods commonly consumed across Kenya (including caloric and nutrient content by weight) and their limitations
  - Food preparation practices – pointing out practices that may lead to nutrient losses
  - Nutritional losses in Kenya due to post-harvest handling practices or plant disease
- **Stakeholder meetings**
  - Activities involved in
  - SWOT analysis on program nutrition related activities (any impact noted?)
  - Impact of nutrition on the horticulture sector
  - Ways in which horticulture may impact on nutrition
  - Best ways to incorporate/integrate nutrition in the programme
- **Household surveys** (*75 households per region*)
  - Food consumption at household and individual levels
    - Preparation practices particularly of horticultural foods
    - Recipe surveys
    - Consumption practices of households and women of reproductive age (household dietary diversity, household 3-day food inventory, Food consumption frequency for women, dietary diversity for women, dietary adequacy for women using 24-hr dietary intake recall method)
    - Infant and young children feeding practices (breastfeeding practices, complementary feeding practices, dietary diversity, dietary adequacy)
  - Nutritional status of children and women (anthropometry)
  - Agricultural production and utilization; emphasis on horticultural production and utilization of the produce and/or the proceeds
- **Focus group discussions** (*with program participants– 1 of 8-16 participants in each region*)
  - Views on program concerning:
    - Benefits/advantages
    - Challenges/disadvantages
    - Utilization of produce and/or proceeds
- **Key informant interviews** (*Area administrators, health and nutrition officers, agricultural officers, potential partners and stakeholders etc*)

- Views on program concerning:
  - Benefits/advantages
  - Challenges/disadvantages
  - Utilization of produce and/or proceeds
  - Best ways in which nutrition could be integrated in the program

### Data Collection tools

- Desk review guide
- FGD and KII guides
- Stakeholders meeting discussion guide
- Household survey questionnaire consisting of:
  - Household profile
  - Socio-economic and demographic characteristics
  - Agricultural production and utilization
  - Food preparation practices
  - Recipe survey questionnaire
  - Household 3-day food inventory questionnaire
  - Household dietary diversity questionnaire
  - Women's dietary diversity questionnaire
  - Food frequency questionnaire for the woman
  - 24-hr dietary recall questionnaire for young children and women
  - Infant and young child feeding practices questionnaire

### Time Schedule

Date	Activity
06 – 20/06/11	Develop and finalise methodology and data collection tools
20 – 02/07/11	Desk review of relevant documents; train field assistants
02 – 06/7/11	Field activities in <b>Eastern</b> : Stakeholder meetings, household survey, FGD and KII, review of records/ documents/reports
07 – 09/7/11	Field activities in <b>Coast</b> : Stakeholder meetings, household survey, FGD and KII, review of records/ documents/reports
11 – 13/7/11	Field activities in <b>Nyanza</b> : Stakeholder meetings, household survey, FGD and KII, review of records/ documents/reports
14 – 16/7/11	Field activities in <b>Western</b> : Stakeholder meetings, household survey, FGD and KII, review of records/ documents/reports
18 – 20/7/11	Field activities in <b>Rift Valley</b> : Stakeholder meetings, household survey, FGD and KII, review of records/ documents/reports
25 – 27/07/11	Field activities in <b>Central</b> : Stakeholder meetings, household survey, FGD and KII, review of records/ documents/reports
05 – 15/08/11	Draft INF
16 – 31/08/11	Final INF

## APPENDIX III: PARTNER PROFILES

### **Organization: Agricultural Technologies and Information Program (ATIP)**

**Key Objectives:** Improved production of pulses, sweet potato and vegetables in the Eastern Region

**Background:** Agricultural Technologies & Information Program (ATIP) is a local woman-led Kenyan NGO. The organization promotes increased land productivity amongst smallholder farmers, with a focus on women and youth. ATIP is working in the Eastern region.

**Period of Contract:** October 2010 and be completed in September 2013

### **Organization: Animal Draft Power Program (ADPP)**

**Key Objectives:** Product Development and Diversification in Nyanza

**Background:** Animal Draft Power Program (ADPP) is a local NGO that was founded in 1986 to improve food security in South Nyanza through the use of animal traction. Through its farm input supply centers in Homa Bay, Suba and Rachuono districts, AGA provides input and extension services and maintains close relations with growers. ADPP is working in the Nyanza Region.

**Period of Contract:** October 2010 and be completed in September 2013

### **Organization: Canken International Ltd**

**Key Objectives:** Enhancing Export Horticulture in the Rift Region

**Background:** Canken International Ltd is a cargo handling company at the Eldoret International Airport. The company has a cooling facility at the airport able to handle 230 metric tons (MTs) of fruits and vegetables and another 110 MTs of flowers. They have established markets for vegetables and fruits in the Middle East. The USAID-KHCP award will assist in increasing the volume of horticultural produce sourced from smallholders while strengthening supply-chain management. Regular supply of quality and quantity of raw materials is the key to growing Canken International Ltd market share in the Middle East. Canken International Ltd is working in the Rift Valley, Nyanza and Western regions.

**Period of Contract:** April 2011 and be completed in March 2013

### **Organization: Kenya National Federation of Agricultural Producers (KENFAP)/ Kenya National Potato Farmers Association (KENAPOFA)**

**Key Objectives:** National Promotion of Irish Potato Production - Extension, Training and Market Development

**Background:** In 2004, as a joint initiative between the Ministry of Agriculture and other relevant stakeholders, the Kenya National Potato Farmers Association (KENAPOFA) was formed to articulate and redress the challenges facing the potato industry. KENAPOFA currently has a membership of more than 10,000 individuals. Since its formation, the association has spearheaded various activities aimed at improving the status of the potato industry. KENFAP/KENAPOFA will be working in parts of Rift Valley and Central regions.

**Period of Contract:** April 2011 and be completed in March 2013

### **Organization: Kenya Rain Water Association (KRA)**

**Key Objectives:** Rainwater Harvesting and Utilization

**Background:** KRA has 15 years' experience in implementing rainwater harvesting projects with poor, rural, water deficient communities. This partnership aims to introduce and train farmers on rainwater harvesting technologies and water utilization. This partnership will build capacity in rainwater harvesting among smallholder farmers, local extension staff and local artisans in the Eastern region. Rain fed agriculture systems will be upgraded with integrated rainwater harvesting

systems and complementary technologies such as low-head drip irrigation. Beneficiaries will also receive complementary activities on in-situ soil moisture conservation. Kenya Rainwater is working in the Eastern region.

**Period of Contract:** May 2011 and be completed in April 2014

**Organization: Community Research in Environment and Development Initiatives (CREADIS)**

**Key Objectives:** Enhancing Horticulture Crop Competitiveness in Western Region through Diversification and Value Addition

**Background:** Community Research in Environment and Development Initiatives (CREADIS) is a women-run community based organization in Kanduyi, Bungoma-Central, founded in 2000. CREADIS aims to empower communities to become self-reliant and drive their own development process, thus achieving sustainable development. CREADIS is working in Western region.

**Period of Contract:** April 2011 and be completed in September 2014

**Organization: Africa Harvest Biotech Foundation International (AHBFI)**

**Key Objectives:** Production and Marketing of Tissue Culture Bananas in Nyeri District

**Background:** Africa Harvest Foundation International (Africa Harvest) is a non-profit organisation established in January 2002 to promote the use of advanced science and technology to improve agricultural productivity among Africa's farmers, and free Africans from poverty, hunger and malnutrition. This partnership will provide training and access to improved planting material to farmers in the Nyeri District. Africa Harvest is working in Nyeri District, Central Region

**Period of Contract:** April 2011 and be completed in September 2014

**Organization: Woni Vegetable and Fruit Exporters and Importers Ltd**

**Key Objectives:** Production, Certification and Marketing of Pulses, Chilies and vegetables

**Background:** Woni Vegetable Exporters and Importers (WONI), based in Kiboko, Makindu district, is a registered private company that has been exporting horticulture products since 1987. WONI has established well organized contract production with medium and small scale growers in the horticultural crops growing areas. Over 80% of their supply is from these contracted farmers. The company has established market outlets in the United Kingdom, France, Holland, Sweden and United Arab Emirates. They specialize in peas (French beans), Asian and local vegetables, chilies and baby corn. The purpose of their award is to increase the opportunities available for sustained income creation for smallholders. WONI is working in Eastern region

**Period of Contract:** April 2011 and be completed in March 2014

**Organization: VEGPRO (K) Ltd - Liki Outgrowers**

**Key Objectives:** Enhanced Infrastructure and Certification for Export Vegetables Production

**Background:** Vegpro (K) Ltd is a major exporter of vegetables, fruits and flowers to the UK and Europe. The company was started in 1979 by the late Mr. K.C Patel and has grown steadily over the last 30 years to become a large exporter of premium and prepared vegetables conforming to global standards. Although 90% of the company's produce comes from its own farms, Vegpro has undertaken partnerships with small-scale farmers through the Liki-outgrowers Self Help Group, with the aim of facilitating the marketing of sugar snaps and snow peas (Mangetout peas). The partnership with USAID-KHCP will help in providing specialized certification to growers on GLOBALGAP, unique in Kenya, and technology transfer using greenhouse tunnels. VEGPRO (K) Ltd is working in Central and parts of Eastern province.

**Period of Contract:** April 2011 and be completed in March 2013

**Organization: Wilmar Agro Ltd**

**Key Objectives:** Promotion of Smallholder Flower Production

**Background:** Wilmar Agro Ltd is a major exporter of summer flowers to the auction market in Holland for over last fifteen years. Currently, the company sources 100% of its products from 3,500 contracted smallholders mainly in Central, Eastern and Rift Valley provinces. Wilmar Agro Ltd is working in Central, Eastern, Nyanza, Western and Rift Valley regions.

**Period of Contract:** October 2010 and be completed in September 2013

**Organization: Pwani projects Development Consultants Ltd (PPDC)**

**Key Objectives:** Promotion of Smallholder Fruit and Vegetable Production in North Coast

**Background:** PPDC was established in 2008 as a consultancy group to support the development strategies of a wide range of clients from the public, private and donor sectors. From their offices in Mombasa and Malindi, they provide a comprehensive range of both field and office-based services including entrepreneurship, agribusiness and food security interventions. PPDC Ltd is working in the Coast region.

**Period of Contract:** October 2010 and be completed in September 2013

**Organization: Sunripe (1976) Limited**

**Key Objectives:** Expansion of sweet potato production and export capacity in South Coast

**Background:** Sunripe is one of Kenya's leading fresh produce exporters with an experienced technical team and an array of customers in Europe. While the company already buys the majority of its vegetable products from smallholder outgrowers, it is looking to expand its production base. It is confident of the market for sweet potato in Europe and will contract with growers who are compliant with trade standards to buy all product which meets specification. Sunripe has invested substantial amounts in development of sweet potato and other crops, and this partnership will introduce new technologies and new product opportunities for smallholders. Sunripe will work with KARI to establish long-term research trials for selection of improved varieties. The partnership will diversify export production from Kwale County and spread to other parts of the Coastal region. unripe Ltd is working in Eastern and the Coast region.

**Period of Contract:** October 2010 and be completed in September 2013

**Organization: Dry Land Seed Company (DLSC)**

**Key Objectives:** Enhanced supply of certified pulse seed in Eastern Region

**Background:** Dry Land Seed Company (DLSC) is a limited liability private company established in 2004 to produce and sell crop seeds adapted to dry land conditions. They have a main office and seed processing plant in Machakos, from which they support and distribute seeds throughout the Eastern Region. The seeds are developed in cooperation with Kenya Agricultural Research Institute (KARI) through a public-private partnership licensing agreement. All seeds are certified by the Kenya Plant Health Inspection Service (KEPHIS). This award will emphasize the production and access to certified pulse seed, increased incomes and promote greater food and seed security in the region. DLSC Ltd is working in the Eastern region.

**Period of Contract:** October 2010 and be completed in September 2013

**Organization: Business Initiatives for Survival and Eradication of Poverty (BISEP)**

**Key Objectives:** Improved production of pulses, sweet potato and vegetables in the Eastern Region

**Background:** Business Initiatives for Survival and Eradication of Poverty (BISEP) is a well-respected and long established local Kenyan NGO with its operations office in Wote town. BISEP targets smallholder farmers and development institutions to increase land productivity amongst poor and smallholder farmers. BISEP traditionally works with community based organizations in five districts: Makueni, Kitui, Taveta, Wundanyi and Kibwezi. The activities undertaken under KHCP will demonstrate and disseminate a variety of intervention measures designed to reduce the impact of climate change and improve natural resource management. These include the introduction of

drought tolerant food crops like pulses, roots, tubers and traditional vegetables, complemented by water harvesting and soil nutrient enhancing technologies. BISEP is working in the Eastern region.

**Period of Contract:** October 2010 and be completed in September 2013

**Organization: Ukamba Christian and Community Services (UCCS)**

**Key Objectives:** Improved production of pulses, sweet potato and vegetables in Kitui and Machakos Districts.

**Background:** Ukamba Christian Community Services (UCCS) is the development arm of the Anglican Church of Kenya Dioceses of Kitui, Machakos and Garrisa DMA. UCCS has played a distinctive role in supporting vulnerable communities to address issues aimed at achieving improved livelihood in Ukamba region. Under USAID-KHCP partnership, UCCS will increase the efficiency of water use from water harvesting structures through the introduction of drip irrigation kits. UCCS is working in Machakos and Kitui Districts in Eastern region.

**Period of Contract:** October 2010 and be completed in September 2013

**Organization: Good Neighbours Community Programme (GNCP)**

**Key Objectives:** Smallholder Passion Fruit Production

**Background:** GNCP is a women-run community based organization in Naitiri, Bungoma North. It was established in 2004 on the premise that if neighbors learned from each other, together they could address poverty and rampant famine in the area. Through this approach, GNCP has been able to reach many farmers and help convert them from subsistence farmers into commercial growers. To broaden this impact and initiate further commercial activities, GNCP has established a nursery which can produce 100,000 seedlings annually to meet the demand for high quality planting material. Through this nursery, GNCP has developed a commercial process for supplying grafted seedlings to the growers. It has also continued to provide trainings and technical assistance to farmers who purchase materials from the nursery. USAID-KHCP will build on the existing framework to ensure that the sources of planting material have the capacity to technically produce clean material and that farmers are equipped with the appropriate crop management skills. GNCP is working in the Rift Valley, Nyanza and Western regions.

**Period of Contract:** October 2010 and be completed in September 2013

**Organization: Mace Foods Ltd.**

**Key Objectives:** Enhancing Export Horticulture in the Rift Region.

**Background:** Mace Foods Ltd is an innovative local company based in Eldoret that specializes in new agricultural products that can be grown competitively by smallholder out growers. From 2005-2009, Mace Foods Ltd collaborated with USAID funded Kenya Horticulture Development Program in the successful commercialization of African Bird's Eye Chili as an alternative new export product from the Rift Valley, Western and Nyanza regions. The purpose of the KHCP and Mace Foods partnership is to increase the opportunities available for sustained income for smallholder outgrowers. New and existing farmers will benefit from trials, demonstrations and eventual commercialization of dried African indigenous vegetables, chili products, herbs, spices and other new products. Mace Foods Ltd is working in the Rift Valley, Nyanza and Western regions.

**Period of Contract:** April 2011 and be completed in March 2014

**Organization: Vision for Economic Empowerment in Africa (VEEMA)**

**Key Objectives:** Enhanced Performance of fruits, vegetables, pulses, root crops and cashew nuts in South Coast

**Background:** Vision for Economic Empowerment in Africa (VEEMA), established in 2008 by a group of ten families, has a strong base of expertise in the spheres of agricultural, business and micro-finance activities. The purpose of this award is to develop VEEMA's outreach to include more farmers, expand the production base, diversify markets and products, increased volumes, raise

incomes from horticultural production, and enhance food security. Existing and new farmer groups will benefit through training and technical assistance via demonstration and dissemination of information on modern farming technologies such as drip irrigation, collection centers, shade nets, new varieties, grading shades, integrated pest management and well-coordinated marketing and market information. VEEMA is working in the Coast region

**Period of Contract:** April 2011 and be completed in March 2014

## APPENDIX IV: STAKEHOLDER ACTIVITIES

### ***Activities of Other Stakeholders in Central Region***

The Thika School of Health and Medical Sciences undertakes training of community health workers and trainers on health courses. Nutrition is incorporated in their curriculum. The school uses the community health workers as a link to the community and they are used to disseminate information on good methods of food preparation. The school partners with Real Impact to carry out demonstrations on kitchen gardens and train beneficiaries on utilization.

The Ministry of Public Health and Sanitation (MOPHS) has collaborated with Real Impact and the Thika District Health Management Team (TDHMT) in the promotion of kitchen gardens to improve on the nutritional status and to assess overall health status of the community. In addition, MOPHS works with community health workers in identification of areas affected by malnutrition. The community health workers trained on key issues and are involved in giving advice to the members of the community on health and nutrition. They also conduct nutritional assessment by taking rapid MUAC measurements.

The objective of the Home Economics Department in the Ministry of Agriculture (MOA) is to improve livelihoods. MOA has a nutrition component in its activities through the Home Economics Department that addresses issues such as food security which takes into account the nutrition needs of the community and household intervention programs. The home economists are also involved in agribusiness and their activities are not solely focused on a specific area.

### ***Activities of Other Stakeholders in Eastern Region***

Nutrition stakeholders in Eastern region included the Kenya Red Cross, World Food Program (WFP), African Medical Research Foundation (AMREF), Ministry and Public Health and Sanitation (MOPHS), Ministry of agriculture (MOA) and Ministry of Medical Services (MOMS) among others.

The activities of the Kenya Red Cross Society in collaboration with the World Food Programme (WFP) and African Medical Research Foundation (AMREF) were focused on improving the nutritional status of lactating mothers and children less than five years of age under the supplementary feeding program. The society also provided food in exchange for labor services under the Food For Assets programme, distributed relief food including cereals (mainly maize and rice), pulses (such as split peas and beans) and vegetable oil (fortified with vitamin A) and promoted production to improve food availability through capacity building..

AMREF was involved in Educating the community on environmental sanitation including advocating for construction of pit latrines. The foundation also collected household data on nutrition and hygiene issues through Community Health Workers (CHWs) and used the information to identify the malnourished individuals in the households. In doing this, it provided household data for use by other interest groups or organizations, for instance the Ministry of Health to provide a broad analysis of the community. Other activities of AMREF were assisting the community to access health care, providing the community with registers for health monitoring, community empowerment through education programmes on matters such as nutritional needs, dangers of home deliveries, the need for sanitary facilities and the dangers of not using such facilities. It played the roles of bridging the gap between health facilities and the community and liaising with other organizations by providing analyzed and compiled data.

The MOPHS was involved in the organization of the Nutrition Technical Forum at the district level. The forum aimed at addressing the nutritional needs of the community not only at the district level, but also to ensure that information on nutrition trickled down to members of the community. The District Nutrition Officer (DNO) was charged with the responsibility of organizing and facilitating the forum. The activities of MOPHS were aimed at preventing malnutrition through dissemination of knowledge and provision of relief food and at building capacity at the community level through trainings on the nutritional benefits of consuming certain foods. MOPHS worked in collaboration with the Kenya Red Cross and AMREF

The activities of the Horticultural Crops Development Authority (HCDA) in the Eastern region include regulating the horticultural industry, improving production and marketing of horticultural produce and advocating for the production and consumption of African green leafy vegetables because of their high mineral content. However, HCDA mainly focuses on financial components in horticultural activities. Hence their activities include education of farmers on budgetary aspects of horticultural activities and the handling of monetary proceeds that accrue from the sale of horticultural produce.

### ***Activities of Other Stakeholders in Coast Region***

The Ministry of Medical Services (MOMS) in coast region undertakes nutrition education activities among patients and community health workers. They focus on utilization rather than sale of nutritious food and undertake preventive and therapeutic measures. Some of the nutritional challenges faced by members of the community that MOMS address include poor diet balancing, anaemia, obesity and special diet patients:

The Kenya Agricultural Research Institute (KARI) is mandated with agricultural research. This institute is involved in:

- Availing quality planting materials to farmers, for example, seedlings
- Value addition activities Income generation from the production and sale of produce
- Research and the development of new farming technologies
- Seminars and material publications on matters related to crop production
- Holding planting trials and demonstrations on how to grow different types of farm produce

Although the Ministry of Agriculture (MOA) primarily focuses on production, the Home Economics Department within the ministry undertakes training activities on food utilization, value addition (for example oil extraction), preservation (for instance use of solar driers) and home sanitation.

### ***Activities of Other Stakeholders in Nyanza Region***

Scientific Ideological Group of Kenya (SIGOK) is a research institution whose activities are aimed at horticultural development and integration of nutrition through value chain activities. It also helps the communities to identify resources and turn them into income generating activities. The institution participates in community agricultural shows, district field days and trainings on how to harness resources. In its effort to build the capacity of members of the community, the institution has developed fourteen micro-irrigation systems. It has also promoted the use of the kitchen irrigation system in household kitchen gardens to facilitate the production of horticultural produce for subsistence. SIGOK carries out its activities through Common Interest Groups (CIG'S) that visit the community. Activities undertaken include promotion of kitchen gardening, provision of clean drinking water and value addition including juice making and production of snacks and foods from the local indigenous food varieties in ways that preserve their nutrient content. The institution also carries out outdoor training on processing, parking and marketing of the grain amaranth.

The African Medical Research Foundation (AMREF) in Nyanza targets orphans and vulnerable children and is also involved in the funding of members of groups aiming at improving the nutritional status of vulnerable community members (women, children and people with HIV and AIDS). AMREF also encourages Income Generating Activities (IGA's). In collaboration with the Ministry of Agriculture, AMREF provides expertise and builds capacity among the youth in the field of agriculture.

MOPHS is involved in addressing the nutritional needs of the community at District level through the District Nutritional Officer. The district nutrition office is involved in running the *Malezi Bora Week* once a year, during which health campaigns are conducted and information on nutritious foods that community members can consume to improve their nutritional status is disseminated to the community.

The Ministry of Agriculture in Nyanza is involved in addressing community nutritional problems through capacity building. This involves the training of community members on methods of food preservation to conserve the nutritional value and food balancing to make up for lost nutrients. Other activities include promoting the establishment of kitchen gardens with a variety of vegetables, fruits and carbohydrate rich foods and value addition of nutritious food produce. For instance, the orange-fleshed sweet potato and cassava have been preserved through chipping, sun drying and milling to produce flour that can be consumed by the household. The ministry also offers extension services including demonstrations on how to prepare the African green leafy vegetables (spider plant, black night shade, and amaranth) and proper preservation of food items while retaining their nutritional values.

Community Mobilization Against Desertification (CMAD) is a dependent non-governmental organization that focuses its activities on three areas; capacity building of farmers through training on new production technologies, income generation to improve the welfare of its beneficiaries and food security. The food security component is addressed through mobilization of community members against desertification. The organization, also builds on previous projects, for example, the orange fleshed sweet potato project and partners with other stakeholders to provide technology that is useful in value addition activities. To improve the nutritional status of the community, the organization has employed the use of kitchen gardens to produce vegetables for household consumption, promoted household utilization of horticultural food crops and in collaboration with the Ministry of Agriculture, promoted utilization methods that retain vitamins in food.

Medicines Sans Frontiers (MSF) is a non-governmental organization whose activities aim at improving the overall health of the community. Its activities are largely curative.

#### ***Activities of Other Stakeholders in Western Region***

Appropriate Rural Development and Agricultural Program (ARDAP) is a local non-governmental organization based in the Western region. ARDAP focuses its activities on technology transfer to enhance food security, capacity building through trainings and post harvesting handling and production activities.

Kenya Agricultural Research Institute (KARI) in Western region deals with tea, coffee, sugar cane, livestock and horticultural produce. It is involved in providing planting materials, capacity building through training of trainers and extension services through demonstrations on how to grow crops. The parastatal is also involved in the establishment of group farms that are focused on production for income generation rather than subsistence. It also creates awareness on the importance of horticultural produce and their nutritional values. However, KARI activities are hampered by community perceptions including the belief that vegetables are a preserve of the womenfolk. Kales

are consumed in the household whereas the African green leafy vegetables are sold into the local markets. The orange fleshed sweet potato is food for women and children. The white fleshed sweet potato is eaten by men. Women are involved in the production and sale of vegetables and the orange fleshed sweet potatoes.

Most of the work done at the district nutrition office of MOPHS is at the community level and includes activities carried about in health centres and dispensaries. The district nutrition officer undertakes the responsibility of updating healthcare workers at lower levels depending on policy guidelines. They update and train the severely malnourished and carers of infants and young children on nutrition. They are also involved in capacity building through the training of healthcare practitioners transferred from peripheral health care institutions. At the community level, the district nutrition office undertakes its activities through community health workers (CHWs). CHWs are trained on infant and young children practices, importance of recommended breast feeding practices, follow-up and referral of expectant mother to deliver in a health facility, interpretation of growth charts, administration of vitamin A supplements, de-worming of children, folic acid supplementation among other issues. The district office has in place Community Based Health and Information Systems useful for monitoring the progress of community health workers. This is done through the use of community health extension workers (CHEWS) including nurses and public health officers in peripheral institutions, to whom the community health workers report.

In the Western region, a private group is processing the orange fleshed sweet potato into flour and selling to other flour miller for blending purposes. This is aimed at increasing the shelf life of the product and income generation, as well as reducing the market gap.

#### ***Activities of Other Stakeholders in Rift Valley Region***

The Academic Model Providing Access to Health (AMPATH) is an integrated model of health care services targeting persons with HIV/AIDS in Rift Valley and Western Regions. AMPATH has a nutrition program whose objective is to reduce malnutrition among HIV infected persons. Its activities after enrolling vulnerable persons into food programmes include nutrition assessment, counselling and capacity building through education on the importance of good nutrition in improving the welfare of persons with HIV. The nutrition department is the entry point to other departments. Those who are food insecure are enrolled in the World Food Program (WFP) and the Heart Harvest Initiative (HHI) farms. WFP provides food aid while in the HHI people are encouraged to grow vegetables for subsistence use to improve their status of nutrition. HHI farms are introduced to the community through empowerment. AMPATH offers its support by providing farm inputs and capacity building. The initiative is aimed at:

- Improving the economic security of beneficiaries through the sale of produce to generate income
- Improving food security by ensuring that people consume food grown under the project
- Selling of vegetables to patients to ensure that they reap the nutritional benefits through consumption

While in food programs clients are referred to a social worker who assesses their socio-economic situation. For economic empowerment, the patients are referred to the Family Preservative Initiative (FPI) whose aim is to improve sustainability of patients and reduce dependency. Under the FPI, clients are trained on different skills. There are two sections in this initiative; the business and the agriculture sections. **The business section** focuses on economic empowerment of urban residents. It is aimed at establishing income groups that encourage members to save money. The section carries out microfinance activities and helps its members to obtain small loans to set up business enterprises. It encourages the selling of surplus produce to generate income that can be used in the

purchase of nutritious food items and promotes the acquisition of skills, for example, art and craft that benefits members through the sale of items. **The agriculture section** encourages the practice of agriculture among members by empowering farmers to grow vegetables for subsistence. It undertakes capacity building activities and trains its members on the practice of agriculture. It targets both rural and urban residents. While rural residents have farming land on which they can grow crops, urban residents are encouraged to adopt sack and kitchen gardening to grow vegetables to be consumed by the household. The business component also enrolls its members in a Purchase for Progress (PFP) programme under WFP where groups that grow crops sign a contract with PFP and delivers the food items on contract. PFP liaises with several groups to ensure that there are sufficient amounts of food.

The impact of AMPATH on nutrition is achieved through capacity building that is done by nutritionists that disseminate information and advice on the nutritional benefits of consuming indigenous fruits and vegetables. Malnourished clients are enrolled in an eight months feeding program. The monitoring of adult clients is done through a food security assessment (amount planted and harvested; whether consumed or sold) and a measurement of the body mass index (BMI) while that of children is done through an analysis of their anthropometric measurements and an analysis of their food security situation. Business activities undertaken by members are monitored by assessing business stock. The main challenge faced by this organization is the refusal of patients to eat nutritious foods provided by the programme. This stems from their cultural background of food items that they should or should not eat.

The Department of Home Economics in the MOA in the Rift Valley is supposed to address issues of nutrition by building the capacity of communities on optimal and beneficial utilization of the produced food. The department has embarked on working with farmer groups for capacity building. Community empowerment is carried out during field days in which members are trained and demonstrations carried out. It also involves the dissemination of any new information in the field of agriculture. MOA encourages farmers to grow cash crops and sell them as a means of generating income. It also undertakes value addition activities that include the promotion and selling of passion juice in local centers. It has engaged MACE foods, a private processing firm, to take part in the value addition activities through the processing of vegetables. MOA also targets to improve food security through the diversification of food crops and production using the resources available, promote the adoption of kitchen gardens to grow crops for subsistence and encourage farmers to grow horticultural and consume food crops thereby improving their nutritional status.

The ministry promotes the growth of high value food crops including passion fruits and summer flowers as a means to improve living standards through income generation. The impact on nutritional status is expected to be achieved through the acquisition of income that enables members to purchase nutritious food items for household consumption. The Ministry of Agriculture has collaborated with KHCP in provision of clean seedlings, construction of nurseries and shared field days as a platform for the provision of clean seeds for passion fruits. The ministry has also partnered with Canken International (in Lessos) to promote the growth of French beans, baby corn, snow peas, garden peas, summer flowers, morbidic, and Arabica for export. It has also promoted the growth of Asian and indigenous vegetables for sale in the local market. The promotion of sweet potato has been done through sourcing of seeds and capacity building of farmers through training to sensitize them on the nutritional benefits of the orange fleshed sweet potato ( a few adapted). MOA collaborates with KHCP on field days to promote clean seedlings But there is little collaboration on aspects of utilization.

An example of a community based organization (CBO) within the USAID-KHCP region is the Chepterit Horticultural Organization that was started in the year 2010. Its main target is idle youth and women

involved in brewing and selling of illegal liquor, and also indirectly addresses issues off HIV/AIDS. The main objectives of the group include reducing poverty, improving food security and reducing alcohol consumption. The organization is involved in income generating activities that includes buying seedlings, roasting maize, selling vegetables, starting nurseries and planting passion fruit. The group also takes part in capacity building activities through public meetings, field days, shows and demonstrations on product utilization. Value addition and utilisation enterprises include the making of passion and mango juices to improve nutrition through household consumption and welfare through their sale in the local market, as well as blanching and drying of amaranth green leaves. The organization collaborates with the Medical Services Department through Ante-Natal Clinics and promotes cultivation of orange fleshed sweet potatoes, vegetables and livestock for improvement of welfare and the nutrition.

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