



# Desk study of nutritional and economic issues of Africa RISING target populations in Ghana

**Bussie Maziya-Dixon**

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The Africa Research In Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the U.S. government's Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.



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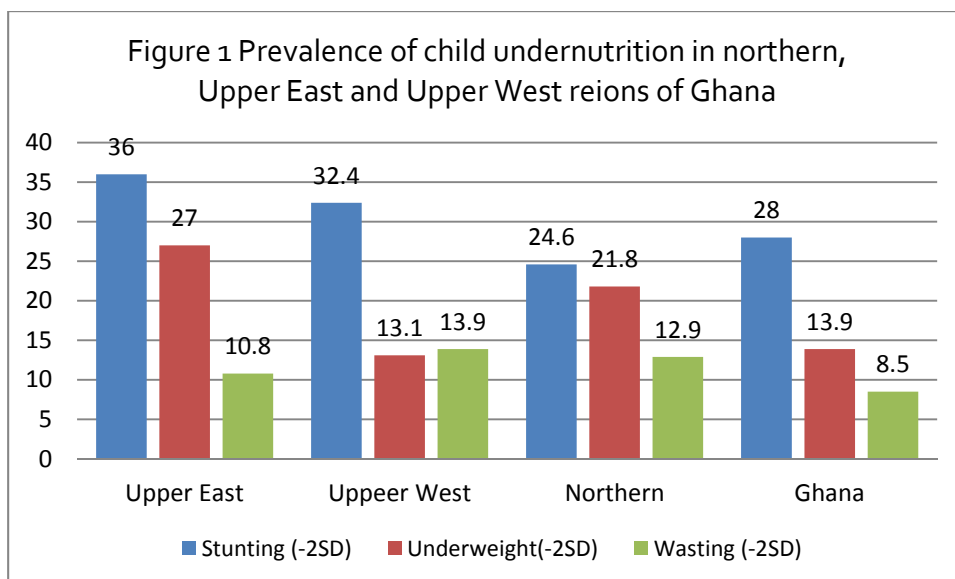
## **Review on nutritional status, quantity and quality of foods consumed, macro (energy and protein) and micronutrient intakes (vitamin A, iron, zinc and folic acid); nutrient retention during processing, infectious diseases and other factors affecting nutritional status**

A desk review on nutritional status, quantity and quality of foods consumed, macro (energy and protein) and micronutrient intakes (vitamin A, iron, zinc and folic acid); nutrient retention during processing, infectious diseases and other factors affecting nutritional status was conducted. The objective of the review was to: a) provide information on the magnitude of the nutrition related problems and to specify the age-groups at risk due to high prevalence to be utilized as a baseline for planning and implementing appropriate activities towards reducing the prevalence of malnutrition; b) Identify the types and quantities of foods consumed by the various age groups and to the adequacy and rich (in terms of quantity and quality) of their nutrient intake; c) document available estimates of the prevalence of nutrition indicators, prevalence of certain nutrition related chronic diseases and their risk factors; d) identify common characteristics of individuals and population groups at risk of each of the above adverse exposures and outcomes; and e) draw recommendations that will promote changes in nutrient intakes, or food consumption pattern, and healthy lifestyle.

All available published and unpublished data on the nutritional issues including interventions, strategies and outcomes and impacts of such interventions were considered. The search methodology included all available electronic reference libraries of indexed medical/nutrition journals and analytical reviews, non-indexed journals not available in electronic libraries, pertinent books, monographs, and theses, and project documents and reports. In addition, nutrition related organizations and agencies such as Catholic Relief Services, Association of Church Development Programs, Christian Children Fund of Canada, the United Nations Children's Fund (UNICEF), and World Food Program (WFP) among others were visited.

From the review, Ghana Health Services together with its development partners have prioritized the reduction of maternal and child morbidity and mortality as a key step to achieving Ghana's health related Millennium Development Goal targets (Goal 4 &5). Accordingly, efforts have been and are still being made to improve maternal and child health. The nutritional status of women in their reproductive age and children under five is a reflection of their overall health status.

While there was a steady improvement of nutritional status in recent years, the prevalence of under-nutrition is still unacceptably high with the three northern regions being the most affected. The burden of malnutrition in these regions has been illustrated by high rates of underweight (-2SD) (21.8% in NR, 13.1% in UWR and 27% in UER and stunting (-2SD) (32.4% in NR, 36.0% in UER and 24.6% in UWR) as compared to the national average of 13.9% and 28% for underweight and stunting respectively (**Figure 1**). These results thus paint an awkward trend for Ghanaian children in general and children of the three northern regions in particular. Such an awkward scenario poses a challenge to meeting the nutrition-related MDGs (1, 4 and 5) and places Ghana among the 36 countries with high burden of malnutrition. Infant and young feeding is a key issue in the nutrition of children in Ghana.



A nation-wide study established that most Ghanaian children experience poor nutritional status months following exclusive breastfeeding. The study identified a problem which starts when exclusive breastfeeding is over and complimentary feeding period sets in – under-nutrition. They also noticed sub-optimal growth of children from birth to 23 months old. The problem is attributed not to continuous breastfeeding by mothers, but inappropriate complementary feeding practices that negatively affect the nutritional status of children in this age group. Complementary foods are introduced either too early before 4 months or too late and irregular after 6 months. Similar studies have reported a number of factors all of which bother on nutritional adequacy (quantity, quality and feeding consistency) and timing of the complimentary foods as well as exposure of children to insanitary environments. Yet, this review could not find any quantitative data on children’s nutrient intake during complementary feeding across the 3 northern regions.

The degree of adequacy of dietary energy intake (in comparison with appropriate norms) for the health, growth, and activity of all individual household members is one measure of household food security. The 2008 GDHS report highlighted households of the three northern regions less food secured especially during the lean season of the year. This is consistent with the findings of a study on food security situation in 45 communities across northern regions of Ghana. The study also established that almost all (97%) of the households interviewed experienced food insecure periods within the year. On the average staple foods produced lasted for only seven months. Household food insecure periods span between three and seven months. Upper East Region (UER) was the worst affected experiencing the longest food shortage period of six months. The Northern and Upper West regions recorded five months of food inadequacy. For all the three northern regions combined overall months of inadequate household staple food provisioning was five. Months of inadequate household cereals provisioning were maize (four months), sorghum (five months), and rice (six months). Months of inadequate household legumes provisioning were five months for groundnuts and cowpea and six months for soybean.

From the desk review, information available indicates that malnutrition, especially maternal and child under nutrition is a major public health issue across the three northern regions. All of these underlying factors directly or indirectly impact on the persistent high rates of acute malnutrition in the three northern regions. However, it is clear that high morbidity, poor hygiene, lack of a clean portable water supply, and care practices, particularly infant feeding practices, are significant contributors to acute malnutrition. Nutrition has not been given the prominence that it deserves and

no national policy is yet in place hence planning for effective nutrition intervention may take the next few decades to get off the ground. Several broad based recommendations are made in the report and are loosely categorized into three areas: a) nutrition coordination, information and capacity; b) surveillance and monitoring; and c) programming.

## **Desk review of food safety issues including aflatoxin, water quality used during processing, pesticide residues, chemical and physical contaminants, and microbiological pathogens**

The increased incidence of food-borne diseases is due to a number of factors, that include changes that are taking place in food production on the farm, new systems of food processing, longer distribution chains, and new food preparation and storage methods. Changing lifestyles around the world are leading to a far greater reliance on convenience foods that are prepared outside the home. The food chain has become longer and more complex, and opportunities for the contamination of food have increased. International trade in foods has expanded dramatically over recent decades as a result of the globalization of world markets. Therefore, a desk review of food safety issues including aflatoxin, water quality used during processing, pesticide residues, chemical and physical contaminants, and microbiological pathogens was conducted to inform possible interventions related to food safety in project sites.

In Ghana, Sanitary and Phytosanitary (SPS) and food safety issues play an important role in the export sector of perishable products such as fruit, vegetables and fish. With an estimated one in forty Ghanaians suffering each year from serious foodborne disease, poor food safety poses an important drain on the economy. Similarly, with production and post-harvest losses of 10–30 percent, poor agricultural safety conditions significantly affect rural livelihoods. The inability to meet safety standards has had a serious impact on the domestic economy with major losses caused through a reduction in work output and an increase in medical costs from food-borne diseases and through losses in the production and post harvest food chain due to poor agricultural practices. A very approximate, but conservative estimate shows that total losses from human disease and production and post harvest losses because of pests and diseases exceed US \$ 300 million per year. Thus, the importance of SPS and food safety in domestic agricultural production, processing and marketing as well as for consumers can be expected to increase as the Ghanaian economy continues to grow, and more emergent affluent consumers demand safer products.

Diarrhoeal diseases from fresh foods are closely linked to poor hygiene in vegetable, fruit, meat and fish production and processing, including street foods. The food-borne diseases include diarrhoea, hepatitis, typhoid and cholera. The total number of outpatient cases reported with these diseases is about 420,000 per year, with an annual death rate estimated at 65,000 and a total costs to the Ghanaian economy at US \$ 69 million. Other figures give a total number of 84,000 deaths per year, with 25 percent being children under five years. Figures varying from 15 to 75 percent of diarrhoeal diseases due to food-borne pathogens are cited, as attribution of diarrhoeal diseases to food-borne diseases is difficult, as they are partially caused by poor sanitary quality of drinking water. If a 50 percent attribution is assumed, this would imply more than 200,000 Ghanaian cases annually of diarrhoea caused by food borne diseases, with a loss to the economy of about US \$ 35 million.

Mycotoxin poisoning from poor maize drying is closely linked with mould development because of inadequate and delayed drying of maize. A number of studies by the Food Research Institute have confirmed the presence of myco-toxins in maize and maize products at unsafe levels, varying from 20 to 355 µg/kg aflatoxin from silo-stored maize and from 0.7 to 313 µg/kg aflatoxin in fermented maize-dough collected from major processing sites. These high levels have carcinogenic effects (liver), stunt growth and cognitive behaviour in children, and weakens the immune system, thus increasing, for example, the risk of HIV infection. While the exact impacts of these high levels of mycotoxins on human health in Ghana are not known, it is reported that 40 percent of the productivity lost to diseases in developing countries is due to diseases exacerbated by aflatoxins. More specifically, figures from one district in Western Kenya with a similar level of maize

consumption, and, incidental myco-toxin levels similar to the current levels reported in Ghana, show an incidence of 16.718, with a mortality of 33 percent.

Poisoning from improper pesticide use is caused by poor knowledge, inadequate equipment and storage, application of unregistered and non-approved pesticides and the use of an excessive dosage. While, with an average annual use over the period 1995 – 2000 of 814 tons the use of pesticides and herbicides is relatively moderate in Ghana, most are in the highly and moderately hazardous category, and there are pockets of high use, such as in tomatoes, cabbage, onion and okra. In a survey, about 90 percent of the farmers interviewed indicated that they used pesticides. Of these, 45 percent stored the pesticides inside their homes, which constitutes a major health risk. Almost all farmers interviewed experienced some health complaints and on average spent between US \$ 1- 1.50 per year on pesticide-related health problems. The inappropriate use of pesticides is also reflected in the pesticide content on vegetables. A survey in three major cities, showed up to 80 percent of the vegetables contaminated, often with residue levels exceeding the MRLs. With an estimated 400,000 households using pesticides, and assuming seven day of lost labour per case, this would amount to losses of about US \$ 5 million per year.

Although the number of actions needed to support the provision of safer food lies in the public domain, it is, nevertheless, incumbent upon the Government of Ghana (GOG) to provide the necessary framework and to take the initiative. Therefore, over the last ten years, the GOG with support from World Bank and FAO and other development partners has undertaken a number of studies covering key aspects of the food safety system. These include the original Food Safety review prepared by Abigail Andah (2002), a series of commodity studies on maize (Plahar, 2005), Fisheries (Akande, 2005), a commodity survey on vegetables (Graffham, 2005), and an initial project identification report (Gagnon et al., 2005). Useful information has also been prepared by USAID. These documents and others have been used as a basis for consolidation into an overall investment plan by the Task Force on Food Safety established under the Ministry of Food and Agriculture (MOFA). This task force is chaired by the Plant Protection and Regulatory Services Directorate (PPRSD) of MOFA and includes the main stakeholders of the public and the private sectors.

Based on the review and analysis of various documents relevant for assessing the food safety and plant and phytosanitary situation in the country the Task force made some pertinent recommendations. The recommendations covered the legislative and institutional frameworks, as well as the necessary infrastructure.

At the legislative level, a regulatory framework needs to be established, which clearly and unambiguously stipulate the mandates of the institutions involved, and eliminates overlaps. More specifically:

- The pending Standards Decree and Food and Drug Law, need to be harmonized to eliminate any duplication between the Ghana Standard Board and the Food and Drugs Board
- The revised drafts of several new food safety, standards and agricultural health laws, now pending Parliament approval, according to the authorities interviewed do not yet adequately address these weaknesses. Detailed reviews and revisions are needed before these laws and regulations are approved.

At the institutional level, the following adjustments are recommended:

- Granting FDB the status as the Central Food Safety Agency for Ghana, in charge of the coordination of all activities related to the regulation of food safety. In this capacity, FDB would implement the policy decisions from the concerned Ministries (MOFA, MOH, and MLGRDE) and enforce the standards set by GSB, either directly or through relevant agencies,

such as the districts and municipalities. This enforcement responsibility would include all inspection, certification and conformity assessments.

- Focusing GSB's functions on standard setting and product registration, and, in line with its public sector status, on those standards where there is a moral hazard and/or asymmetry of information. In the domain of food safety standards this concerns the standards for inputs (pesticides, feed additives, fertilizer, etc) and all food-borne contaminants with a potential risk for public health, such as microbiological, heavy metals and other contaminants.



## Needs assessment of cottage, small and medium scale processors of maize, sorghum soybean, groundnut and cowpea.

A baseline study was conducted to: a) document information on maize, soybean and cowpea processing b) examine activities of cottage, small and medium scale processors (including costs and returns associated with processing), and c) determine constraints and poverty level of cottage, small and medium scale processors in the three project target regions of northern Ghana (Northern Region, Upper East and Upper West). The Northern Region is the largest area of Ghana and it is divided into 20 districts.

*Sampling technique and data collection:* Simple random technique was used to select processors of maize, soybean and cowpea in project target sites. A listing of potential respondents was done which formed the sampling frame. A total of 100 respondents were selected for the study. A structured questionnaire was used to elicit information on socio-economic characteristics of processors, varieties cultivated and available in the area, quantities and costs associated with their crop processing, major constraints to their processing and how to address them, marketing of the products, and access to credit facilities.

*Analytical techniques:* data collected were subjected to different analytical techniques and included descriptive statistics using frequency tables and percentages, graphical presentation as well as budgetary and poverty analyses using Lorenz curve, Gini coefficients as well as Foster-Greer-Thorbecke.

*Socio-economic characteristics of respondents:* Presented in **Table 1** is the socioeconomic characteristic of investigated processors disaggregated by region. When the data were pooled, almost all the investigated processors were individual processors and only 1 was an association. Upper East region had the highest number of processors that belonged to an association. The processing sector is dominated by married women (>70 percent) in all the regions. In all the regions, a large proportion of the processors had no formal education and had income level lower than €5000 per annum.

Table 1: Socio-economic characteristics of respondents

Variable	Pooled	Northern region	Upper East	Upper West
<i>Type</i>				
Association	1		3	
Individual	98	100	97	100
<i>Sex</i>				
Male (%)	1		3	
Female(%)	99	100	97	100
<i>Marital status</i>				
Married (%)	82	73	81	89

Single (%)	6	17	3	-
Widow(er) (%)	9	7	13	8
Divorced (%)	3	3	3	3
<i>Education level of the processor</i>				
No formal education (%)	67	73	52	76
Primary education (not completed) (%)	17	10	23	19
primary education(completed)	5	7	7	3
Secondary education (not completed) (%)	7	7	16	-
Secondary education (completed) (%)	3	3	3	3
Post secondary (%)	-	-	-	-
<i>Estimated monthly income</i>				
Less than C 5000	86	100	65	95
C5000 -10000	4		3	5
10000 above	10		32	

*Crops grown and available to processors:* The ranking of crops grown and available to processors showed that maize, soybean and cowpea were staple crops and are important food security crops. Maize is processed and consumed as TZ, banku, kenkey, kaafa, gaare, porridge, kakpolo, and kaakula. The food types from soybean are soya khebab, soya kose, soya milk, soya soup, tubani soybean and dawadawa. While those from cowpea are tubani, gbalob, kose, beans, kare and kaakala. TZ (*Tuo Zaafi*) is the most important food in the survey area; maize products (TZ, banku and kenke) were common in Northern region, cowpea in Upper East and TZ in Upper West, when regionally disaggregated. Fifty three percent (53%) of the available varieties of maize and 67% of cowpea varieties were local varieties. It is worthy to note that improved soybean varieties (64 percent) were grown the region.

*Marketing:* Men and women were involved in farm gate marketing especially in Northern and Upper East regions. Marketing at all levels (local market, wholesaling, intermediary and retailing) was dominated by women.

*Processors needs:* Two significant problems confronting processors in the study area were low crop yield and no access to credit facilities and access to portable water (**Table 2**).

Table 2: Important needs and problems of processors in the northern regions

	Pooled	Northern region	Upper East	Upper West

<i>Nutrition information</i>				
Very important (%)	64(63)	80(24)	94(29)	26(10)
Fairly important (%)	5(3)	7(2)	3(1)	-
Adaptable varieties (%)	5(5)	-	13(4)	3(1)
More fruits varieties (%)	3(2)	3(1)	3(1)	-
<i>Importance problem</i>				
Low yield (%)	26(17)	27(6)	29(9)	(15(2)
No access to credit facilities (%)	39(26)	37(7)	48(15)	31(4)
Low soil fertility (%)	9(6)	5(1)	10(3)	15(2)
Lack of labour (%)	11(7)	14(3)	-	31(4)
Lack of good market	15(9)	23(5)	20(3)	8(1)
Clean water (%)	15(10)	9(2)	13(4)	33(4)
Good toilet facilities (%)	19(12)	23(5)	23(7)	-

Figures in parenthesis represent the number of respondents

*Cost-benefit analysis of important food product per processor per day:* **Table 3** shows the cost-benefit analysis of each of the most important food products processed by the respondents in the study area per day. The results showed that cost of raw materials represented the highest cost (>40 percent) items in all the regions. The net benefit was highest in the northern region followed by Upper East. An average processor has a net benefit of €4.30, €4.54 and €4.33 from processing Banku, Dawadawa, and Kose respectively. On a regional basis, an average an average processor of foodstuff has a net benefit of €6.32, €5.09, and €6.53 in the northern region. The figures for the Upper West are the lowest. Although, the results indicate positive net benefits in the study area but the cost benefit ratios are not that high (<2) in most regions. This is an indication that the processors in the study area are not making great profits in the sectors. This suggests need for improvement in the system.

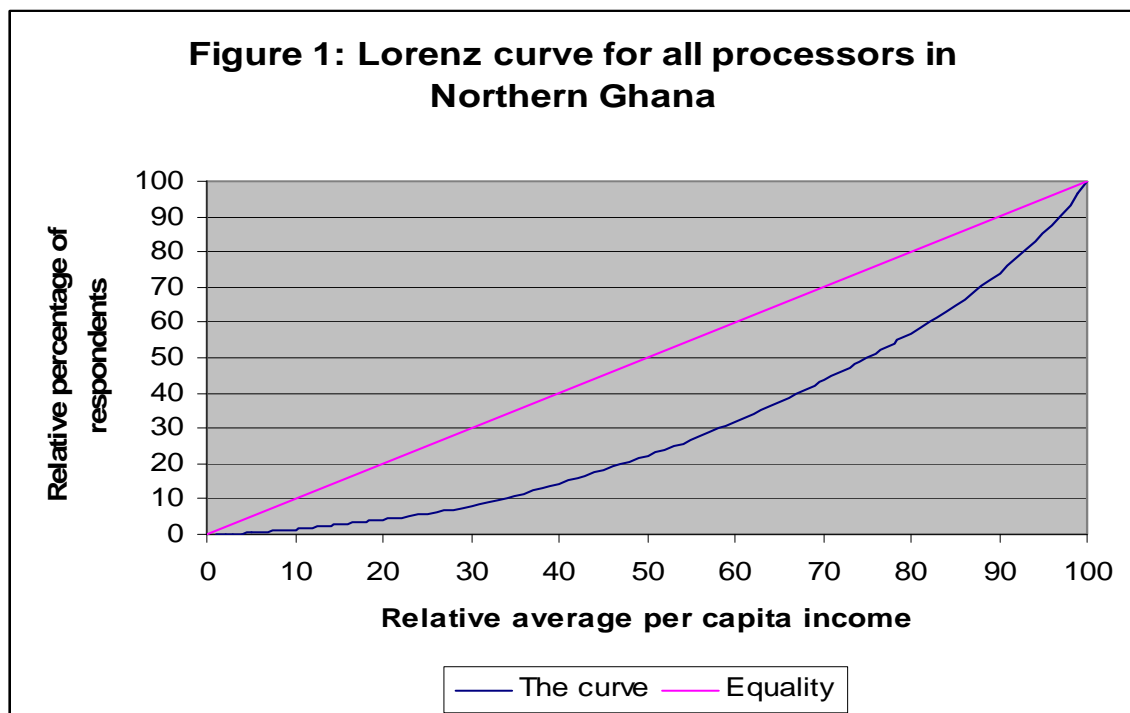
Table 3: Cost-benefit analysis of important food product per processor per day

	Processing of Tz				Processing of soya kheba				Processing of Tubani			
	Pooled	Northern	Upper East	Upper West	Pooled	Northern	Upper East	Upper West	Pooled	Northern	Upper East	Upper West
Cost of raw material (€)	5.11	9.22	3.72	2.66	4.55	4.21	4.94	6.42	6.41	7.86	6.95	5.73
Cost of processing (€)	2.40	3.15	1.45	2.57	1.02	0.96	0.82	1.92	1.29	0.78	0.83	1.84
Cost of transportation	3.47	7.87	0.85	0.96	0.67	4.21	4.94	6.42	0.66	0.11	1.79	0.19
Total variable cost(€)	8.98	17.61	5.11	5.23	6.24	5.66	5.97	11.43	6.22	3.43	8.15	6.91
Total sale	13.28	23.97	9.67	6.90	10.78	10.75	9.88	12.84	12.81	15.72	13.90	11.45
Net benefit(€)	4.30	6.36	4.14	1.68	4.54	5.09	3.91	1.41	4.33	6.57	4.80	3.50
Cost-benefit	1.48	1.36	1.89	1.32	1.73	1.90	1.66	1.12	2.06	4.59	1.71	1.66

*Poverty level among investigated processors:* The moderate poverty line for the whole northern region was computed as €1381.00 while the core poverty line was computed as €920.67. The moderate poverty line for Northern region, Upper East and Upper West were €1724.80, €1503.96 and €993.55, respectively. This shows that poverty was highest in Upper West. Based on moderate poverty line of €1381, poverty incidence ( $P_o$ ) was computed to be 0.54.00, which indicates that 54 percent of the processors in the study area lived in poverty. The computed poverty depth was 0.26 which implies that the average income of the poor in the area was 26 percent less than the moderate poverty line. This is an indication that the average poor household in the area would have an increase of 26 percent in its annual income to escape from poverty. There is an estimate of 0.53 degree of dispersion in the distribution of poor household around the moderate poverty line. On a general note, the results indicate that 46 percent and 67 percent of the processors were non poor based on moderate poverty and core poverty line, respectively. The results indicated that Gini Coefficient for this study was 0.40 indicating only some degree of inequality in per capita income distribution. The results implied that the processors in the study area have similar socio-economic characteristics.

*Income Inequality among processors Using Lorenz Curve:* The Lorenz Curve used in this study is based on an ordering of all processors from the least to the highest per capita income. Thereafter, examination of the cumulative income share as a function of their cumulative population share was carried out. **Figure 2** presents graphical representation of the pattern of income inequality among the investigated processors. The curve shows that from the bottom to top, processors' share of total income increases.

The curvature of the Lorenz curve indicates some level of inequality of income distribution among the processors. The curve was close to equality line. The figure shows that the bottom 30 percent of the processors have 8 percent of the area income while the top 30 percent have about 60 percent of the total income area.



## **Household processing and utilization of maize, soybean and cowpea in project target communities using Focus Group Discussion**

Maize, soybean and cowpea are important staples to people living in the Northern, Upper East and Upper West regions of Ghana, as they ranked first, third and fifth respectively among the staples cultivated in the study regions. The purpose of the focus group discussions (FGD) baseline study was to document information on maize, soybean and cowpea processing and utilization, to determine the community's knowledge on nutrition and health of children and women of childbearing age with objective of informing training activities and interventions. A total of 12 guided focus group discussions were conducted with an average of 25 participants per group.

The results show that maize is an important crop in terms of contribution to household food security while soybean and cowpea contribute most in term of volume of sales and income in the region. Men, women and children participate in the delivery of these crops in the production, processing and marketing chain. Generally, either improved or local variety is not the consideration of the community in selecting which variety to plant but certain attributes such as high and better yield, high flour yield, and early maturity/harvest, acceptable colour, resistant to shattering, easy of processing, better taste, good price, and low pest infestation.

Maize, soybean and cowpea is processed into primary (flour) and secondary products (maize dough, soy paste, dawadawa, and soy khebab; and cowpea paste. On a daily basis, more maize based foods were consumed; follow, by cowpea and soybean respectively.

Participants highlighted problems such as inadequate milling machines, inadequate water availability, and transportation of grain from farms and homes to milling centres in the area surveyed.

Losses are witnessed in every stage of crop production and processing. Processing losses identified include: pounding, winnowing, milling, drying, livestock consumption losses; the most prominent was that of milling losses. In general, most of the communities are prone to hunger between June and July.

The communities defined nutrition as 'the consumption of various varieties of quality food at the right time for strength, growth and maintenance of a healthy body'. The paper reveals that energy giving food like carbohydrate is more in the communities' diets followed by food that make people stay healthy like fruits and vegetables. Growth foods are the most limited compared to others. All responding groups agreed that there was malnutrition in the communities and listed signs that can be seen in children and women that are malnourished. Malnourished children can be identified with the following signs: pale or shrink skin, kwashiorkor, stunted growth, very slow inhalation, whitish eyes, and reduction in body weight, dullness, and change in hair colour to a grey-like one, loss of hair and withdrawal from social gatherings. . Women that are malnourished can be identified by shrink, pale or scaly skin, presence of oedematous feet, dizziness, high temperature, appears anaemic, falls sick frequently and looks weak in appearance. The participant stated their food, nutrition and health needs and challenges and solicited for government interventions in subverting these challenges.