

Affordable Nutritious Foods for Women (ANF4W): Value Chain

Agricultural Value Chain Analysis for Developing Affordable Nutritious Foods for Women in Ghana

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ANF4W
Affordable Nutritious Foods
for Women

Key messages

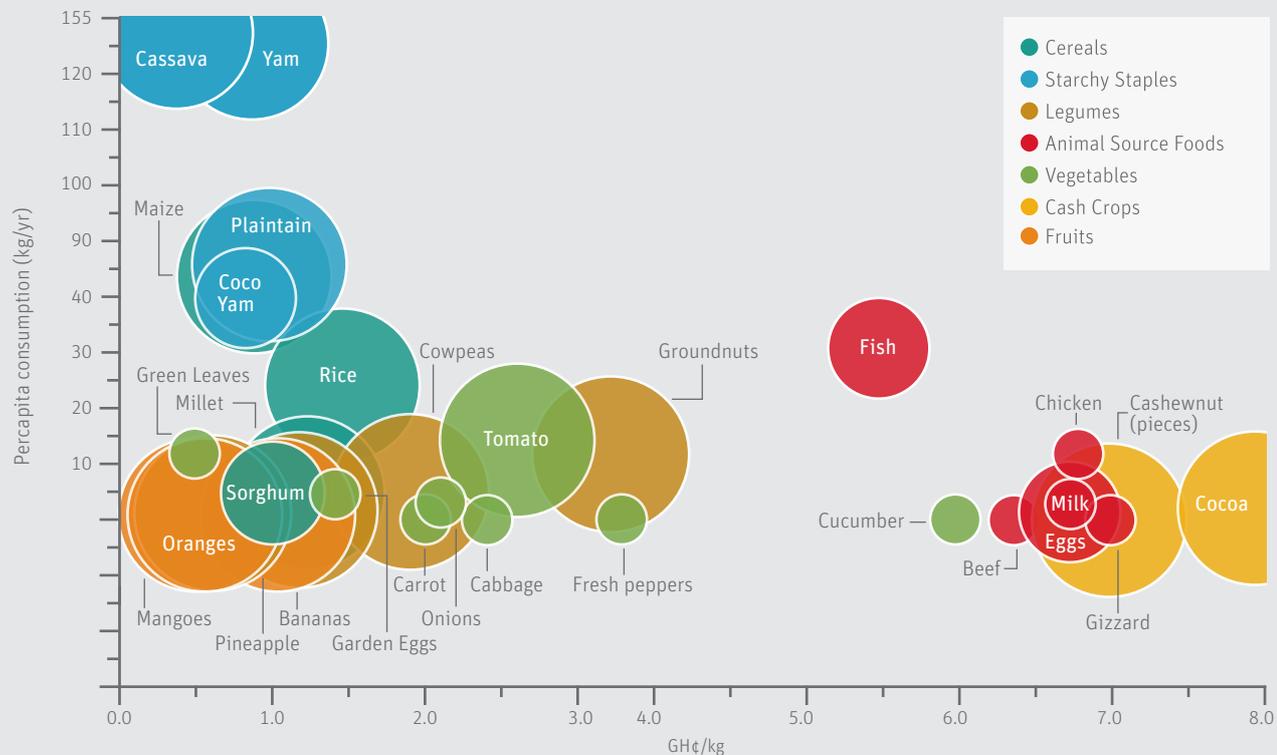
- > Affordable, nutritious foods are currently lacking in Ghana.
- > An agricultural value chain analysis (AVC) was conducted as one of various studies to identify elements that influence the ability of local food processors to create such products.
- > Affordable commodities were identified, and agricultural practices that affect the quantity and quality of food supply were explored.
- > The agricultural value chains traditionally developed to improve farmer incomes and food security are now assessed with human nutrition as a key criterion.
- > More than 31 commodities were evaluated.
- > A relative ranking of commodities was provided for a porridge or snack bar food concept.

Introduction

The Affordable Nutritious Foods for Women (ANF4W) project aims to improve the intake of micronutrients by women of reproductive age (WRA, 15–49 years of age), with a view to the critical window of opportunity represented by the first 1,000 days of a child's life. It uses market-based approaches, complemented by nutrition awareness activities, to create and promote a sustainable supply of nutritious foods and food products. The project is currently being implemented in four countries – Bangladesh, Ghana, Kenya and Tanzania – and its approaches include agronomic biofortification and staple and supplementary food fortification.

ANF4W is co-funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and the Bill & Melinda Gates Foundation. It is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), within the framework of development partnerships with the private sector (develoPPP.de). The current project phase runs from July 2013 to May 2017.

“The agricultural value chains are now assessed with human nutrition as a key criterion”

FIGURE 1: Map of agricultural commodities assessed in Ghana during phase 1

Note: Compiled by author based on expert interviews and statistics from MoFA, FAOSTAT (2011–2012). Size of the bubble depicts ease of procurement or availability for food processing. Affordability is measured in wholesale prices (Ghana cedi/kg) and per capita consumption in kg per annum. Size of bubble denotes availability of the commodity or ease of procurement for food processing.

In Ghana, ANF4W supports local food processors in the development of supplementary fortified food products. In identifying different elements that play a role in the ability of local food processors to create an affordable nutritious product, an agricultural value chain analysis (AVC) was conducted. The AVC's goal is to identify affordable agricultural commodities in Ghana, and to understand how agricultural practices affect the quantity and quality of food supply available to local food processors. This evaluation also adds understanding of value chain constraints, and of opportunities to encourage local production of commodities which improve the nutrition of vulnerable groups. In so doing, the agricultural value chains traditionally developed to improve farmer incomes and food security are now assessed with human nutrition as a key criterion.

The study blends secondary and primary research. The desk study utilized more than 100 sources followed by 51 stakeholder and expert interviews in the Brong-Ahafo, Greater Accra, Volta, Eastern, and Northern regions. Stakeholders included donor agencies, non-governmental organizations, entrepreneurs, food processors, farmers, market women, aggregators, traders, wholesalers and retailers.

Selection of commodities

Commodities were selected and screened in two phases. Criteria used for selection included nutritional quality (content of nutrients, anti-nutritional factors and contaminants), affordability, availability, accessibility and value chain dynamics. Out of 31 commodities selected in the first phase across 7 categories – cereals, legumes, tubers, cash crops, animal-source foods, fruits and vegetables (see Figure 1) – 15 commodities were evaluated in depth in the second phase. These are millets, rice, cowpeas, soybeans, yam, cassava, plantains, anchovies, mangoes, pineapples, oranges, cassava leaves, moringa leaves, tomatoes and garden eggs. Spices available in the open market were also assessed for their nutritional quality and affordability.

Findings

All plant-based commodities have a high level and a wide range of anti-nutritional factors. Anti-nutritional factors are food constituents that have a negative impact on the solubility or digestibility of required nutrients and thereby reduce the amounts of bioavailable nutrients and available energy in the foods. Climatic and edaphic factors such as temperature, moisture content, soil

TABLE 1: Definition of qualitative and quantitative indicators and variables

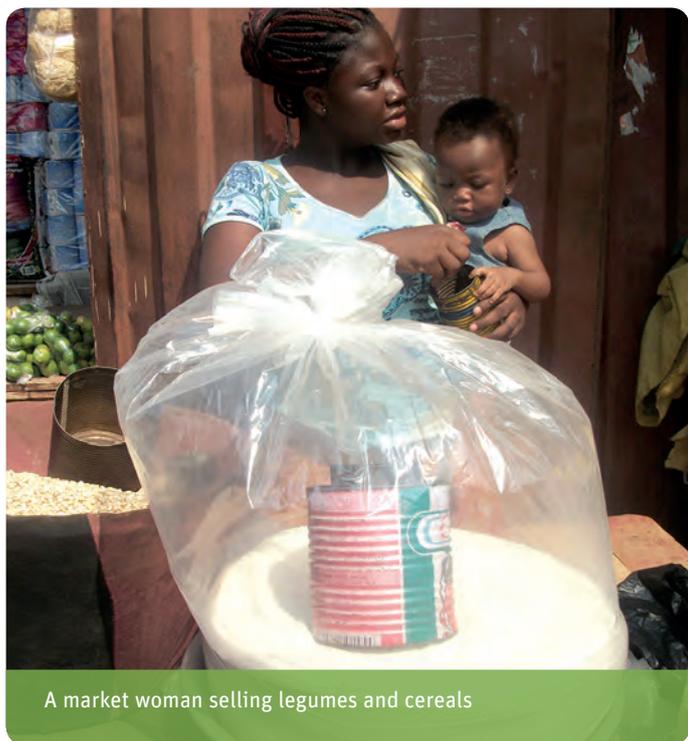
Indicator Variable	Description
Affordable nutrition (GHC/mg)	Affordability measured by wholesale price and nutrient density measured by amount of bioavailable protein, minerals and vitamins are combined into the criteria affordable nutrition. Its unit of measurement is bioavailable nutrients (mg) per unit wholesale price (Ghana Cedi or GHC). These criteria would be useful to assess amount of investment required to improve nutrition. Minerals include Ca, Fe, Zn, Cu, Se, P, Mg. Water-soluble vitamins include B ₁ , B ₂ , B ₃ , B ₆ , B ₉ , B ₁₂ , C. Fat-soluble vitamins include A, D and E. The higher the score, the more favorable is the outcome.
Commodity quality	This is measured by content of anti-nutritional factors and contaminants. Both these sub-criteria have equal weights. The lower the content, the better the quality of the commodity.
Accessibility	Accessibility is heavily drawn from information about value chain dynamics. Trends in production, consumption, import, export, cost of production, distribution and marketing influence access to commodities. This criterion is a composite score of availability, level of aggregation, wholesale price growth rates, and wholesale price volatility.
Availability	Availability accounts for trends in production, consumption and trade, whether production areas are widespread, and the seasonal nature of the crop.
Aggregation	Aggregation describes the level of aggregation of a commodity and whether market hubs are present where aggregators sell the produce to food processors. High availability and high level of aggregation are preferred, as they facilitate the easy procurement of raw materials.
Wholesale price CAGR	Growth rate and volatility of wholesale price have an effect on availability and access to commodities for low-income groups. Low wholesale price cumulative growth rate (CAGR) and volatility are preferred, as they stabilize the cost of raw materials and hence the final price of ANF4W.
Wholesale price volatility	Wholesale price volatility was calculated for four years, from 2009 to 2012. Here volatility is the standard deviation of returns, where the return is defined as the proportional change in price from one period to the next. The return is measured as the difference in the logarithm of prices from one period to the next.
Value chain dynamics	Favorable value chain dynamics are important to obtain a sustainable supply of raw materials for ANF4W as well as an opportunity to make the value chains gender-sensitive, to integrate smallholder women farmers and to be socially inclusive.
Poverty sensitivity	Poverty sensitivity is measured by the number of smallholder farmers. The number of smallholder farmers is a product of population, the percentage of the labor force involved in agriculture, the proportion of smallholder farmers, and the proportion of arable land allotted to selected commodities. Commodity value chains that have a high number of smallholder farmers are preferred.
Gender sensitivity	Gender sensitivity is measured by the level of participation of women in farming and small-scale processing. Field interviews indicated a high level of participation by women in small-scale processing of certain commodities such as plantains. These women can potentially be both producers and/or consumers of ANF4W.
Level of investment	The level of investment is determined by the number of public and private players investing in activities along the value chain.
Enabling environment	The enabling environment is a measure of infrastructure, industry bodies and policies that boost efficiencies along the value chain.

pH, mineral constituents and other factors can affect the levels of anti-nutrients. There is very limited information on precise levels of anti-nutrients in commodities produced in Ghana. Cereals are rich in the amino acid methionine but low in lysine, while pulses and legumes are rich in lysine and low in methionine. A blend of both flours is likely to have a higher Digestible Indispensable Amino Acid Score (DIAAS, a measure of protein quality) value than pure cereal or pure legume flours.

There is a loss in nutrients as the commodity moves through the value chain. Vitamin C loss is the most documented, ranging from 20% to 100% depending upon the type of commodity, storage time and exposure to heat, light and oxygen. Controlling growth and spread of mycotoxins continues to be a chal-

lenge in Ghana. Though aflatoxin is most prevalent in maize and groundnuts, aflatoxins were also detected in sorghum, soybean meal and cassava flour. Several studies indicated the presence of pesticide residues in vegetables and fruits.

Most of the commodities chosen, except for rice and pineapples, are thinly traded (imported and exported) between Ghana and other countries. There is a high demand for imported rice in urban areas and fresh pineapples for exports. However, imported rice has little relevance for ANF4W, as local rice can be used to make processed foods. Cassava and soybeans are being considered as important for food security, and as tradable crops they receive a high level of investment due to the increasing demand for them, both for human consumption and for industrial purpos-



A market woman selling legumes and cereals

es. The rising cost of energy, and hence of transportation, was cited as the key driver affecting the wholesale prices for most of the selected commodities. Storage, post-harvest losses exist for all the commodities. Poor infrastructure, extension services and agricultural practices affect the yields for most of the crops.

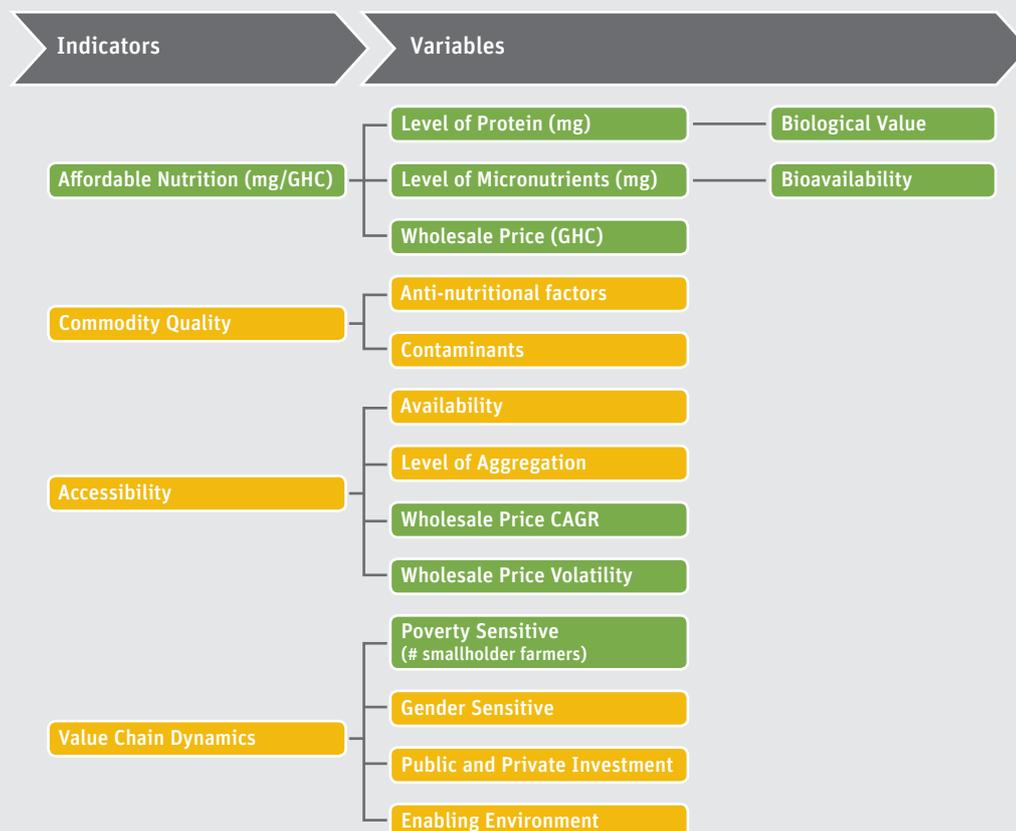
Open market retailers of the selected commodities are mostly women. Market power is chiefly concentrated at the wholesale levels for all the commodities except for anchovies. For this commodity, traders at landing sites, called “queen mothers”, have the most influence.

Recommendations

Commodities were ranked using a mix of qualitative and quantitative criteria – affordable nutrition, commodity quality, accessibility and value chain dynamics (see **Figure 2, Table 1**). The overall relative ranking of commodities that are recommended for making porridge or a snack bar are rice > soybean > cowpeas = anchovies > millets > yam > cassava > plantains.

The negative impact of anti-nutrients can be best minimized by various food processing techniques or through the addition of

FIGURE 2: Indicators and variables included in ranking commodities



Note: Equal weights were given to all indicators and variables so as to arrive at a composite score for ranking the commodities. **GHC** = Ghana Cedi



Plantains on sale at Techiman Central Market

additives such as phytase and vitamin C. Training and increasing awareness of the risk of contamination among actors along the value chain is required in respect of all of these commodities. Social marketing and the creation of a certification scheme with a logo on food products guaranteeing nutritional quality (density of macro- and micronutrients, low content of anti-nutritional factors and toxins or contaminants) could act as an incentive for processors to invest in traceable value chains and catalyze demand from consumers.

Legumes, soybean and cowpeas were recommended by several stakeholders, not only for their nutritional value and other uses but also for their attribute of nitrogen fixation, which can improve soil fertility and yield, and can reduce inputs.

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“Creating a certification scheme with a logo guaranteeing nutrition quality could act as an incentive for processors to invest in traceable value chains”

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It is recommended to partner with actors such as the Bill & Melinda Gates Foundation and USAID, who are actively developing rice value chains in Ghana to offer a “double dividend” investment. The majority of the rice production (> 90% by volume) comes from smallholders. Women who are dominant in the rice value chain are both income generators and consumers

of nutritious food products. This concept of “double dividend” investment could also be applicable to women farmers, “market queens” and “market women” who control wholesale and retail in open markets for most of the commodities. They could be suppliers of raw materials, processors, advocates and consumers of ANF4W.

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References

01. Fairbanks VF. Iron in Medicine and Nutrition. In: Shils ME, Olson JA, Shike M et al, eds. *Modern Nutrition in Health and Disease*. 9th ed. Philadelphia: Lippincott Williams & Wilkins, 1999:193–221.
02. Der T. Measuring Pulse Protein Quality. 2013 CICILS-IPTIC Convention. Pulse Canada. April 16, 2013.
03. Oberbeil K. *Fit durch Vitamine, Die neuen Wunderwaffen*. Munich: Südwest Verlag GmbH & Co. KG, 1993.
04. Rogers R. Overview of Rice Value Chain in Burkina Faso, Ghana, Nigeria and Tanzania. Bill & Melinda Gates Foundation Published on 18 September 2012. Accessed in December 2013.



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