

**PJN**

ISSN 1680-5194

PAKISTAN JOURNAL OF  
**NUTRITION**

**ANSI***net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan  
Mob: +92 300 3008585, Fax: +92 41 8815544  
E-mail: [editorpjn@gmail.com](mailto:editorpjn@gmail.com)

## Food Processing and Nutrition: A Vital Link in Agricultural Development

Omo Ohiokpehai

Global Net Consultants, P. O. Box 2647, Gaborone, Botswana

E-mail: omohio@botsnet.bw

---

**Abstract:** Development in agriculture must combine with processing to reduce food losses and improve nutrition. Further this combination was necessary to give agriculture the boost it needs. When food processing issues have been discussed the necessary training of women must be paramount for success. Food processing provided more value to crops as compared to the sale of raw materials themselves. Therefore food processing was capable of double effect at household level by improving nutrition and also a vehicle of industrialization.

**Key words:** Food processing, food security, food losses

---

### Introduction

In most countries in Africa agriculture was considered as the first stage of development while food processing on the other hand was neglected. Also, the full benefit of food processing and the improvement of the nutritional status of food is not appreciated by some countries. However, the extent of food losses associated with post harvest food losses is significant to affect food supply.

Some of the developing countries today, the amount of wastage due to post harvest losses are very high. FAO, World Food Summit (1996) reported that the world estimates of post-harvest losses ranged from 13 percent (cereals) to 30 percent (perishable commodities). However, the food production situation in Africa will push these figures higher, where no adequate harvesting, consumer information, processing methods, marketing and distribution techniques are available (Oganga, 1996).

Market oriented development and diversification in agriculture combined with processing, distribution and marketing can considerably contribute to reduction of food losses, improvement in nutrition and overall stimulation of agricultural production which remains the backbone of the economy of countries in Sub-Saharan Africa (Wurdemann and Meerendonk, 1998).

Oganga stated that the goal of universal food security would not be attained if problems associated with post harvest food losses are not prevented. Okezie (1998) went further to explain that the prevention of post-harvesting food losses is a challenge for Governments, Non-Governmental Organizations, International Development Organization. Food processing is an important element in this fight. The efficient improvement of food processing at household level will improve food safety and nutrition.

This paper is to create an awareness of the important interrelationship between agriculture and nutrition vis-à-vis food processing, and the need to target any intervention programs to suit a particular group(s) for

better and sustainable food/nutrition security.

**Definition of Food Security:** FAO (1997) defined food security as ensuring that all people at all times have access to nutritious and safe food they need, for a healthy and active life. Furthermore, Duncan (1998) defined food security as being a function of agricultural output, access, and nutrition, relating to poverty, and promoting and supporting policy dialogue and consultation, including the identification and transfer of best practices.

The SADC (1997) regional conference agreed that the working definition of food security should be:

Food Security = Food Availability + Access and Acquisition + Food Use

Further, SADC depicted the role of agriculture in food security concept as shown in Fig. 1.

Duncan (1998) explained that SADC Food Security at national level is ensured national availability of food to meet per capital minimum requirements during a reference period. At national level food security is derived from food balance sheets and other aggregate national accounts of food production, stock movement, external trade, non-food use and food for human consumption.

Consistent with this classification, Duncan said that the SADC paper sets out the framework for government food security action at three levels. These are:

At the national and regional levels.. ensuring food availability through production, trade and food aid ..... which affect food prices

At the household level ..... access to and acquisition of food, determined by income and prices

At the individual level. Food use, affected by nutritional practice.

A household is food secured when there is access to food, all the time, and the whole year round and with a possibility of food in future. Therefore, analysis of macro and micro economic policies governing the food production and how these policies affect the lives of poor

## Omo Ohiokpehai: Food Processing and Nutrition

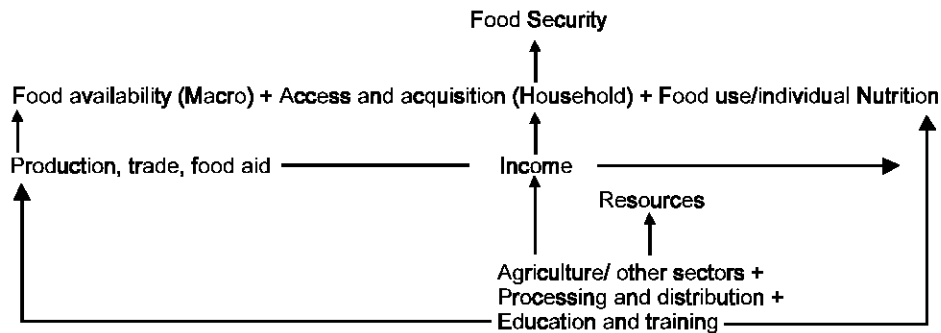


Fig. 1: Food Security

farmers must be looked into to alleviate food/nutrition insecurity, malnutrition and poverty.

By the above explanation, it means that food losses have a direct effect on the nutritional state of the people and a major factor in poverty and underdevelopment.

For Botswana increase in food production is vital, because the country is prone to drought with a big dry land area. These conditions make agricultural practices and livelihoods of most of the farmers (men, women, the elderly and youths) difficult especially in the rural areas. However, the Botswana Government had put in place a broad policy framework, which deals with food security concerns. This is the National Food Strategy (NFS) of 2000.

Food security is defined by the NFS as the 'stable and sustainable, physical and economic access for all the people to basic supplies of safe and nutritionally adequate food for an active and healthy life'.

The need for the strategy came about due to the following reasons:

Country's need to rely on foreign sources of food supplies because of the prevailing political unrest in the region and the uncertainties of the diamond market, problems of drought, the dependence of most households on Government transfers and malnutrition, which is associated to poverty and aggravated by the presence of drought. However, the NFS was revised to focus on the newer problems as seen emanating with the times to combat some issues that were not covered. Therefore, the revised National Food Strategy has the following aims:

To encourage a sustainable increase in food production, promoting nutrition-oriented and consumer programs, improving drought relief planning and implementation, facilitating speedy post-drought recovery, establishing a strategic grain reserve; and improving the database of the food economy.

In explaining the aims of the modified National Food Strategy we realized that agriculture is inter-related with nutrition vis-à-vis food processing. This factor must be stressed in the working definition of food security in order to capture the importance of agriculture, both at

macro and micro level (Fig. 1).

Also, the special position of women in food security through agricultural production, processing and care of the family cannot be overemphasized. FAO (1997) reported, "Women produce more than half of all the food that is grown and most of what is processed."

The under valuation of women was identified as both a cause and an effect of (overall) under development, closely linked to such global (and regional) problems as poverty, overpopulation, illiteracy, food shortages, malnutrition and poor health conditions (Mwagiru, 1998). Therefore, if this anomaly was to be corrected, then training must be extended to both men and women.

**Training Needs of Women:** In the study of Gender Equity and Access to Economic Opportunities in Agriculture in Botswana, 1997, it was shown that women farmers lacked opportunities to access loan easily, labour and more especially extension delivery and training.

In this same report, it was shown that half (47 percent) of the households are headed by women and they account for more than 50 percent of the rural population. Therefore, encouraging gender equity in agricultural production, processing and making sure that the extension message is relevant and effective is imperative. Also a suitable way of delivery of extension message other than the Kgotla (the chief's palace) must be encouraged. Women cannot effectively participate at the Kgotla (Ministry of Agriculture, 1997). One of the kinds of training that can be effective at household level is food processing. Food processing has been successfully introduced in Thailand, Bangladesh, Tanzania and in the case of Botswana training materials (Battcock *et al.*, 1998; Scott and Ohiokpehai, 1995) were modified to suit extension workers and farmers. The extension workers were trained to identify potential farmers who can undergo the necessary awareness program through the participatory methods.

Furthermore, the Ministry of Agriculture, 1997 recommended that additional training in food processing through business development and marketing should be encouraged among women

## Omo Ohiokpehai: Food Processing and Nutrition

farmers to help improve nutrition and income at household level. The Botswana exercise also incorporates these topics.

Women are used to food processing traditionally, and tend to use their income in the betterment of the family. Food processing provides more value to crops as compared to the sale of the raw materials themselves. This makes food processing a provider of sustainable livelihoods to improve nutrition and health especially of children, pregnant and lactating mothers and improves food/nutrition security at the household level.

**Promotion of Food Processing:** Food processing improves food nutritionally by removing toxic substances, extending shelf-life and making it more palatable (Ndi, 1993). Furthermore, food processing adds value and so it is a source of income generation and increases the demand for raw materials i.e. promotes crop production. Some of the processes carried out are as follows: fermentation, drying, smoking, salting, canning, freezing, etc. (Ngoddy, 1996). Most times two or three methods can be combined for maximum effect. These processes are well known at household level by most women. Therefore, with good training and financial support women are able to follow through the series of processes, which enables food to be transformed from a raw commodity (from the farm) to the table, hygienically.

Ndi further explained that integrating processing into the food chain is self-catalytic and can effectively improve food production. He reiterated that 'the notion that food self-sufficiency should be attained before agro-industrialization in Africa is analogous to believing in saving money only after getting rich'.

In Botswana, it is important that food processing is looked upon as a means of increasing the availability of and access to food all the year around. Also, the timely supply of food of varied sources will definitely improve nutrition for all, especially the vulnerable groups. Also, by being able to sell some to neighbours and friends can generate income, which can be utilized to purchase those items, which the individual was lacking. Therefore, agricultural processing is capable of double effect at household level. However, our experience has shown that training in technology and business is a vital component in the improvement of food security and nutrition. Also, food processing is best carried out where the raw materials are found. Therefore, this close integration allows food processing to be a vehicle of industrialization of the rural life.

Improving nutrition at household level means that young children will have balanced diet that is the key to good health. Henon (1998) explained that malnutrition is usually considered to be a direct consequence of poverty, but malnutrition itself is actually also a cause of poverty. The following are three main reasons for infant

malnutrition:

Low nutrient density energy of traditional weaning foods. Occurrence of malnutrition related diseases caused by contamination and diarrhea infection, and lack of agriculture and nutrition education among the very poor farmers.

Ngoddy (1996) divided the African weaning foods into the following three groups:

- Cereal group
- Legume and oil seeds and
- Roots, tubers, plantains and bananas.

**Weaning Foods:** Weaning period is that time when an infant gradually goes from taking breast milk exclusively to that of adult food. This period is about 18-24 months, during which time mothers must gradually introduce weaning foods. However, when the mother is poor, sick and/or ignorant of the needs of the infant nutritionally then the infant can be given solids. Local weaning foods are usually porridges, but these can be improved through fortification if the mother has the know-how.

Improved weaning foods must have the following nutritional requirements:

- High energy content
- Low viscosity, i.e. of an acceptable thickness/consistency
- Balanced protein (containing all essential amino acids)
- Vitamins (particularly A, D and B group)
- Minerals (iron, folic acid, calcium)
- No anti-nutritional components
- Pleasant taste/palatable.

Inclusive of the above, weaning foods must have the following physical requirements, due to the fact that women are usually very busy and also on the "run". The physical requirements are as follows:

- Easy and quick to prepare
- Easy to consume
- Adequate shelf-life
- Made from local ingredients
- Affordable and
- Safe microbiological quality.

For everyone and especially young children a balanced diet is very important. The cereals proteins are limiting in the amino acid lysine, on the other hand pulses (e.g. beans) are rich in lysine and methionine. Therefore they compliment each other. However, for maximum effect, both type of food component must be taken together at the same time. So most mixes are made from cereals and pulses (Ohiokpehai *et al.*, 1994). As previously explained processing improves the nutrition and taste. For example, heating and fortification (extrusion processing) is used during the production of "Tsabana". Tsabana is very popular in Botswana for the feeding of the under threes. Soybeans are added to sorghum and vitamins and extruded. Also another method of

## Omo Ohiokpehai: Food Processing and Nutrition

producing weaning foods is the addition of sprouted grains, which increases the vitamin content and reduces the viscosity of the porridge. During spouting the conversion of starch to simple sugars takes place. This process makes the porridge easier to digest.

Another example is - Fermentation, which is similar to what happens to sorghum flour to produce sour porridge (Ting). Fermentation also improves the shelf life, by causing an increase in acidity, which stops the growth of pathogenic microorganisms. It is important to increase the awareness of weaning foods in the diets of the young children. Inadequate nutrition now at the weaning stage of life can be reflected by physical and mental development and achievement in later life.

In promoting food processing, caution should be exercised to give continuous training to farmers and the general public by trained experts. Also, the policy framework must be in place to militate against the problems associated with waste hazards and pollutants. This is because food processing can contribute undesirable pollutants given rise to hazardous wastage.

### References

- Battcock, M., Sue Azam - Ali, B. Axtell and Peter Fellows, 1998. Training In Food Processing - Successful Approaches - Intermediate Technology Pub.
- Duncan, A., 1998. The Food Security Challenge for Southern Africa. Paper prepared for SADC seminar on food security, May 25th.
- FAO, 1997. The State of Food and Agriculture. FAO Agriculture Series. Rome, Italy.
- FAO, 1996. World Food Summit. Rome, Italy.
- Henon, P., 1998. Malnutrition: An unrecognized Danger. The Courier #167, January – February 1998.
- Ministry of Agriculture, 1997. Gender Equity and Access to Economic Opportunities in Agriculture in Botswana, DAPS.
- Mwagiru, W., 1998. An Overview of Gender and Development Trends in Africa, with a Special Focus on Southern Africa and Botswana. A lecture given at the University of Botswana, Directorate of Research and Development.
- Ndi, E. E., 1993. Food Processing: A Vital Link in African Agro-Industrial Development African Technology Forum, Feb./ March, p: 19-21.
- Ngoddy P. O , M. J. R. Nout, P. J. Nche and W. van Zuilichem Stolp, 1996. Optimization Strategies for Eaning Formula Development for Tropical Areas. Document Presented at the ECSAFOST Conference on Food Products, Victoria Falls, Zimbabwe.
- Ohiokpehai, O., J. Jagow, J. Jagwer and S. Maruapula , 1994. Tsabana - Towards Locally Produced Weaning Foods in Botswana. Presented at the Nutrition Security Workshop 28 – 30 November.
- Oganga, M., 1996. Post-harvest food losses - a key dimension of increasing Africa's food supply. Paper presented at the first Africa-wide exhibition and workshop on Africa food processing technologies for commercialization. June, Kenya. Sponsored by Randforum and UNDP.
- Okezie, B. O., 1998. World Food Security: The role of Post harvest Technology. Food Techn. V. 52, #1, p: 64-69.
- Scott, A. and Ohiokpehai Omo, 1995. UNIDO - Training Programme For Women Entrepreneurs in the Food Processing Industry: Botswana Assessment. A Consultancy for UNIDO, Vienna.
- Wurdemann, W. and H. van de Meerendonk, 1998. Support to the development of food processing enterprise in Africa - An entrepreneur based approach. Agri. and rural dev. 2, P: 32-35.