

Can The Soum Dam Contribute to Sustainable Food Security for The Local Population (Burkina Faso)?

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Abstract

Large dams were built to address local and regional development issues in Burkina Faso. Socio-economic life is punctuated by the impoundment of the large soum dam in central-western Burkina Faso. The aim of this study is to assess the sustainability of food security following the impoundment of the soum dam. To this end, a methodology based on surveys coupled with observations was used. The data collected were processed using descriptive statistics, food consumption scores and household food diversity scores. The study revealed that, as a result of the multitude of agricultural activities around the dam, local residents have a high level of household food availability. What's more, with the financial resources derived from the sale of market garden produce, many producers buy cereals to bolster food availability. As a result, the diet of local residents is diversified. This improves the diet. However, the drop in the price of market garden produce during the sales period could jeopardize the sustainability of food security for local residents, because the fall in income undoubtedly reduces the purchase of meat and dairy products. All this will reduce the diversity of food consumed by people living near the Soum dam.

Keywords: Food Diversity, Diet, Income, Soum Dam, Food Availability

INTRODUCTION

Agriculture is the nerve center of the economic activities that improve the social living conditions of the people of Burkina Faso. More than 80% of the working population is employed in this sector. What's more, the sector is characterized by a low level of mechanization, strong demographic pressure on farmland and low yields. Since the droughts of the 1970s and 1980s, agricultural policies, particularly in Burkina Faso, have focused on the construction of hydro-agricultural dams in order to free themselves from natural determinism (MAHRH, 2011, ACF-I, 2013, Dipama, 2016). The main objective of this water development policy is to increase agricultural production through irrigated agriculture, drinking water

supply, livestock, fisheries and fish farming (Yanogo, 2006, Skinner et al, 2009). With this in mind, the Soum dam was built in 2006 in Nanoro, Boulkiemdé province in the central-western region of Burkina Faso. The dam is expected to produce 7,500 tonnes of rice and 2,500 tonnes of maize per year in the developed areas (MARHASA, 2015). Other socio-economic activities around the dam include fishing and livestock. Through its various activities, the main objective of the dam is to meet the food needs of the local population and the country as a whole. Therefore, can the presence of the Soum dam contribute to the achievement of sustainable food security? The main hypothesis of the study is that the Soum dam, by virtue of its size, contributes to the achievement of sustainable food security for riparian households. The main objective of the study is to assess the impact of the Soum dam on the achievement of sustainable food security.

THEORETICAL FRAMEWORK

Conceptual analysis

Food security has undergone several definitions in recent decades. These changes are the result of climatic, economic and political upheavals in the world. In 1974, the FAO based its definition of food security on the availability of food, then in 1983 it focused more on the economic accessibility of food, and finally in the 2000s food security focused on food hygiene, health and nutritional status (Xie et al., 2021). In summary, food security today takes into account the different aspects mentioned above.

Hydro-agricultural development is a water management tool and a means of carrying out an irrigation operation. The objective of a hydro-agricultural development is to create "a technical and economic unit allowing the optimal use of the available water (river, natural or artificial lake) for the purpose of intensifying agricultural production, with the constraint of the financial and economic profitability of the development, ensuring, among other things, its reproduction" (Funel and Laucoin, 1980 cited by Daré, 1999). In the context of this work, a hydro-agricultural development such as that of the Soum is an area developed to diversify and intensify agricultural activities in order to promote economic, social and environmental development.

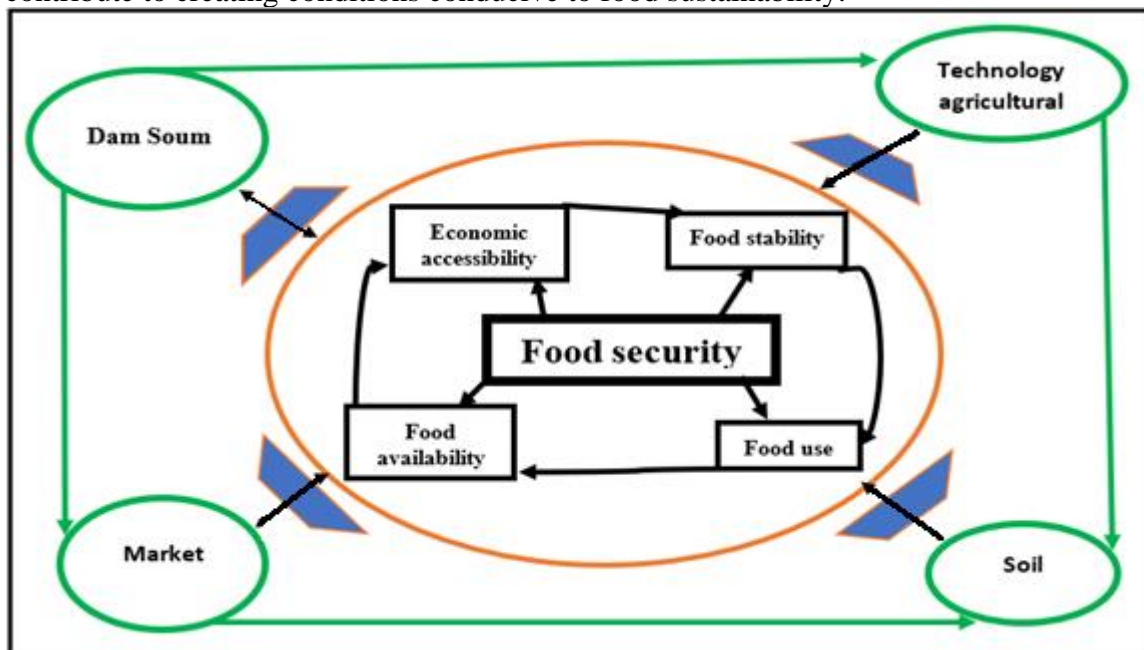
Literature review

Many studies have been conducted on food security. Most of them focus on analysing the concept of food security (Diallo et al., 2022, Afzal et al., 2023). Assessment methods (family approach based on gender model, mixed approach, food security index) have also been discussed by Ayanga and 2023 in Sierra Leone, Mbunga et al. 2023 in Democratic Republic of the Congo (DRC) and Cui and Nie, 2019 in China. Factors affecting food security have been analysed by Premanandh, 2011, Twari & Joshi, 2012 in Asia, Abu & Soom, 2016, Amao et al, 2023, Tambe et al, 2023 in Africa. However, few studies have examined the sustainability of food security in West Africa and Burkina Faso.

Theoretical model

The systems approach has been adopted in this study. Sustainability of food security means maintaining a system that ensures food security in the region over time. To achieve this, the system must be a set of dynamically interacting elements organised around a goal (De Ronay, 1975). Figure 1 below illustrates this. The Soum dam is the central element that maintains the sustainability of food security. Indeed, the presence of the dam has brought new agricultural

production technologies and new markets, especially in urban centres and in neighbouring countries such as Ghana. This has allowed the country to be developed. All these factors contribute to creating conditions conducive to food sustainability.



Source: Designed by Yaméogo Joseph, 2022

Figure 1: Theoretical model of a food security sustainability system

GEOGRAPHICAL CONTEXT OF THE STUDY

The Soum dam is located in the commune of Nanoro, Boulikieumé Province, between the communes of Kordié, Nanoro and Soaw (Figure 2). The dam has a 12 m high and 1,517 m long embankment with a 150 m long spillway and a capacity of 155 million m³.

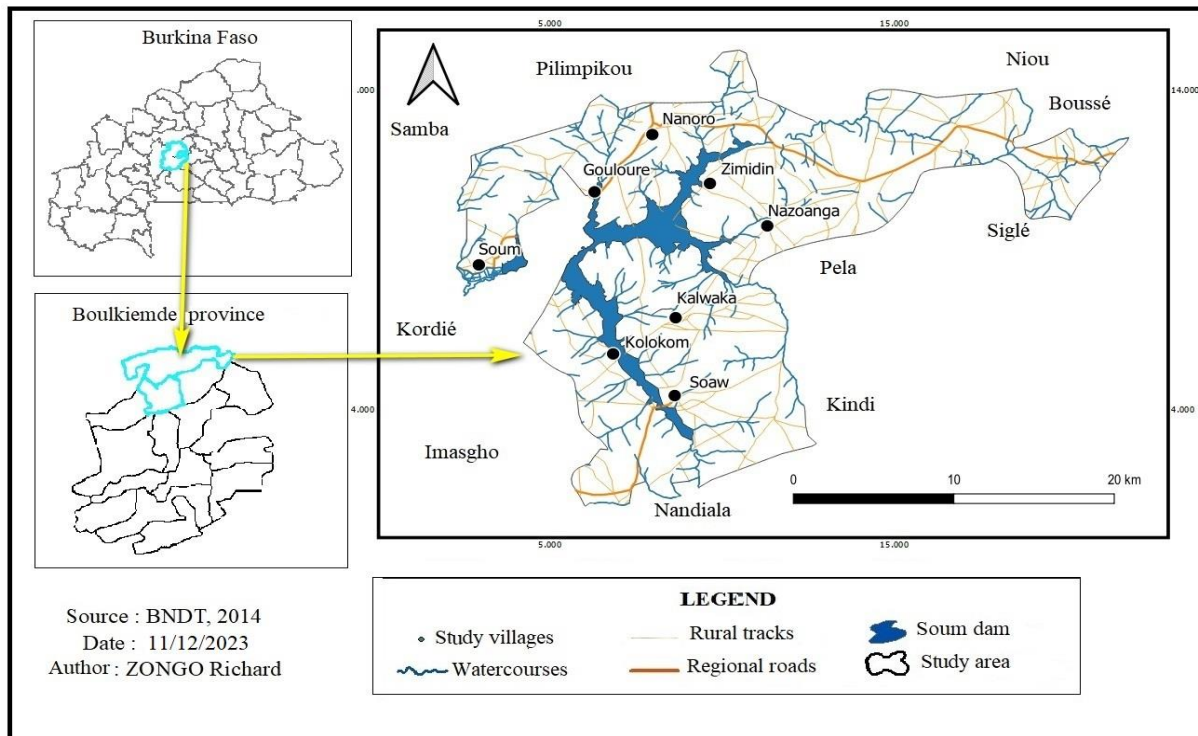


Figure 2: Geographical location of the Soum dam

METHODOLOGICAL APPROACH

Data collection methods

Two types of data were gathered for this study. These were secondary data and primary data. A literature review was used to collect secondary data. The literature review was mainly used for secondary data. It was used to assess the state of food security in different countries around the world.

For primary data, field surveys were conducted. Based on purposive sampling using three criteria:

- less than 300 m from the dam,
- engaged in socio-economic activities,

In this way, we succeeded in interviewing 165 households out of 1,000 households.

Data processing and analysis methods

Descriptive statistics such as sum and mean were used to process the survey data. In addition, available food production and useful food production were calculated to assess the food availability of households living near the dam. Available food production is the quantity of harvested produce. Useful food production is the amount of produce intended for consumption. The FAO Food Consumption Score (FCS) was used to assess the nutritional quality of the food consumed. This involves multiplying the food groups consumed by households by the weight and frequency of consumption over a 7-day period. The FCS can be interpreted as follows:

If FCS <21, the household has poor food consumption;

If 21.5 < FCS <35, the household has borderline food consumption.

If FCS >35, the household has acceptable food consumption.

The Household Food Diversity Score (HFDS) was used to measure household food access. This involved summing up the food groups. Thus, when a household has a score between 0 and 5, this means that the HFDS is low, and if the score varies between 5 and 7, the HFDS is acceptable, and when the HFDS is greater than 8, it is very high.

FINDINGS AND DISCUSSION

Soum dam and its effect on local food security

Four variables are associated with food security (FAO, 1996, ACF-IN, 2001). These variables are food availability, food affordability, food utilization, and price stability. The analysis of the impact of the dam on the food security of the population is therefore based on these variables.

Food availability induced by the presence of the dam

To assess food availability, available food production (AFP) and useful food production (UFP) were calculated. Over the period 2022-2023, during the rainy season, three cereals were produced around the dam. Available and useful food production are recorded in Table 1.

Table 1: Available and useful food production at the end of the rainy season

| Description (in kg) | AFP | Farm loss | UFP |
|---------------------|-------|-----------|-------|
| Maize | 12800 | 500 | 12300 |
| Sorghum | 28000 | 100 | 27000 |
| cowpea | 1300 | 100 | 1200 |
| Total | 42100 | 700 | 40500 |

Source: Field surveys, December 2022-October 2023

The table shows that households using the dam have grain in their granaries. This confirms the availability of food within the households. During the dry season, market gardening has become obligatory. Onions, tomatoes and eggplants are widely grown by households. This provides the household with vegetables (Table 2).

Table 2: Available and useful food production in the dry season

| Description (in kg) | AFP | Sales | UFP |
|---------------------|-------|-------|-------|
| Tomato | 25000 | 20000 | 5000 |
| Onion | 35000 | 25000 | 10000 |
| African aubergine | 950 | 750 | 200 |
| Total | 60950 | 45750 | 15200 |

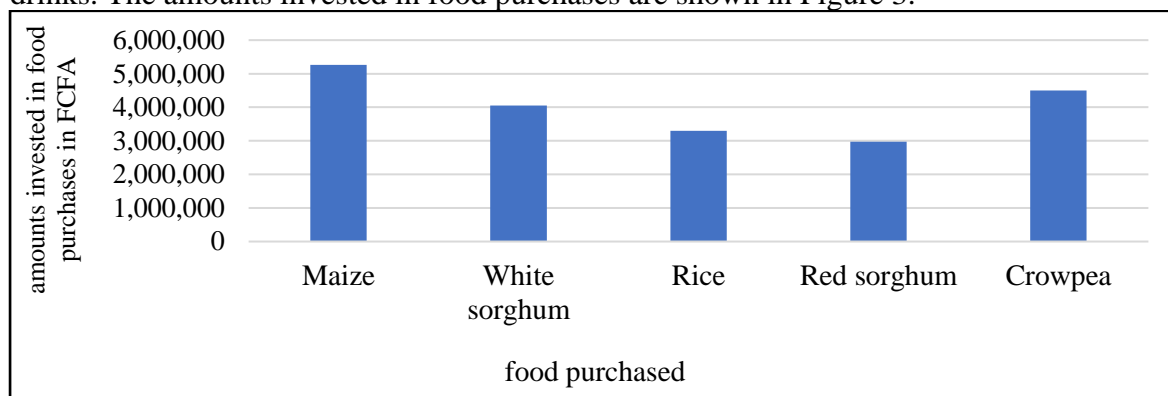
Source: Field surveys, December 2022-October 2023

Table 2 shows that household sales are very high. However, the useful food production is 15200 kg per year. This could be explained by the fact that the household uses cereals as condiments to prepare sauces accompanied by sorghum flour, maize or rice.

Rain-fed cereals play an important role in the family's food self-sufficiency, as they are mainly produced for own consumption (Bazin et al., 2017). According to Sanou (2015), the use of dams for agricultural production provides local populations with tools to combat food insecurity.

Economic accessibility to food

As rainfed farms are more dependent on rainfall, rainfed cereal harvests fluctuate with the seasons. These fluctuations result in low yields that are unable to meet the population's long-term food requirements. Farmers therefore use the income from the sale of market garden produce to buy off-season cereals to compensate for the shortfall in rain-fed production. They buy maize, white sorghum, red sorghum and cowpea in the provinces of Sissili and Ziro, as well as imported rice. In addition to cereals, 75% of farmers buy food supplements such as sweetened condensed milk, sugar, salt, cooking oil, biscuits, tins of sardines and sweetened drinks. The amounts invested in food purchases are shown in Figure 3.



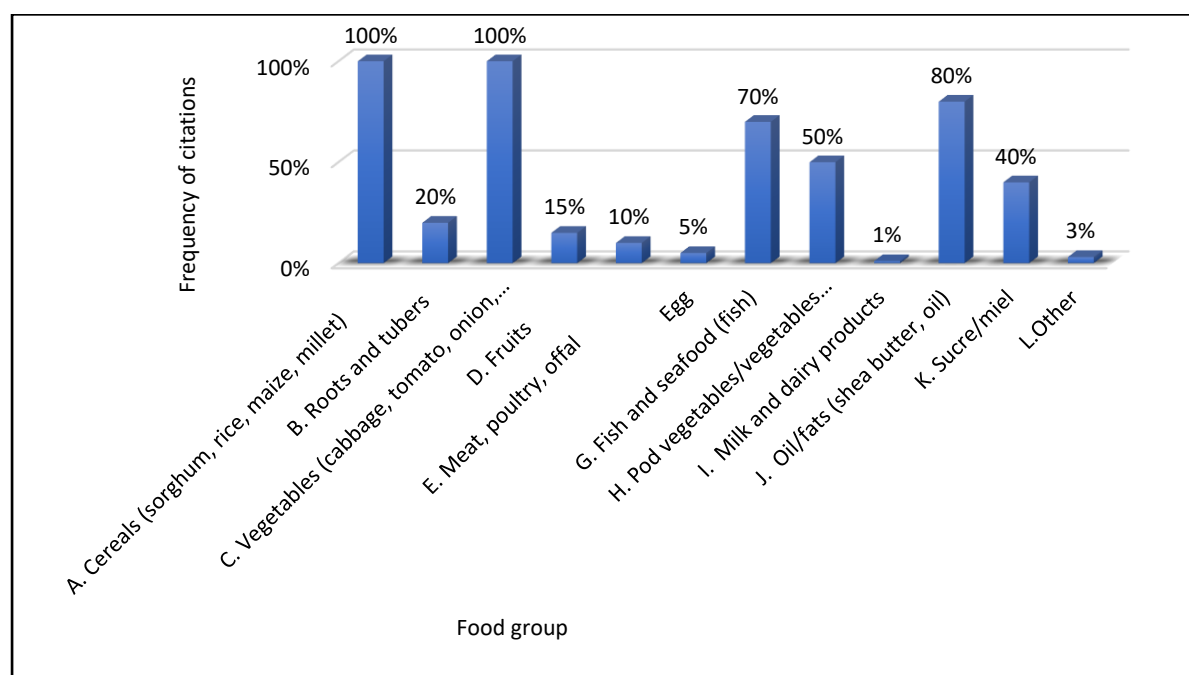
Source: Field surveys, December 2022-October 2023

Figure 3: Amounts invested in food purchases

In addition to the cereal deficit, the 250 farm managers bought 120,592.05 kg of foodstuffs, mainly cereals and pulses, to feed their families. These cereals are, in order of need, maize, millet, white sorghum and rice, red sorghum and cowpea, which is a legume. They bought 32,906.25 kg of maize, 3,138.5 kg of white sorghum, 21,960 kg of rice, 19,833 kg of red sorghum and 14,754 kg of cowpeas. A total of 20,081,970 FCFA, or 13.37% of the income from the profit margin on market garden produce, was invested in the purchase of food. It should be noted that 63% of the amount invested in these foodstuffs was used to supply maize, white sorghum and rice, which are the most widely consumed. In addition to the cereals and pulses they buy, the market gardeners have invested 548,000 CFA francs in food supplements such as salt, dried fish, fresh fish, bread, sugar and oil. While the activities of these market gardeners give them access to food, this is not the case in the areas of the Indian hydro-agricultural dams. According to Roy, 1999, quoted by Morel, 2007, the cereals produced in Indian hydro-agricultural schemes are not accessible to the local population. In fact, the high price of cereals means that local people are unable to obtain food.

Food usage

Food diversity and food consumption indices were used. SDAM shows that producers living near the Soum dam consume a diversity of foods, since they consumed 10 food groups compared with 12 food groups (Figure 4).



Source: Field surveys, December 2022-October 2023

Figure 4: Diversity of food consumed by people living near the soum dam

Household dietary diversity has an effect on the food consumption score. The FCS incorporates the frequency of consumption of the food groups. Table 3 below shows that FCS is acceptable, since 80% of households surveyed around the dam have FCS =58 points.

Table 3: Food consumption score for local residents

| Food | Food consumed by producers (80% of respondents) | Food group | Weighting (A) | Number of consumption days (B) | Score (A*B) |
|--|---|--------------------|---------------|--------------------------------|-------------|
| sorghum, rice, maize, millet | sorghum, rice, maize, millet | Cereals and tubers | 2 | 7 | 14 |
| Cassava, potatoes and sweet potatoes | - | | | | |
| Beans, peas, peanuts | Beans, peanuts | Dried vegetables | 3 | 4 | 12 |
| Vegetables, condiments, leafy vegetables | Cabbage, onion, cabbage, tomato, eggplant | Vegetables | 1 | 7 | 7 |
| Beef, goat, poultry, eggs, pork and fish | fish | Meat and fish | 4 | 5 | 20 |
| Milk, yoghurt and other dairy products | - | Milk | 4 | 2 | 0 |

| | | | | | |
|---------------------------|---------------------|-------|-----|---|-----|
| ssugar and sweet products | sugar sold in shops | Sugar | 0.5 | 3 | 1.5 |
| Oil/fats | Oil in shops | Oil | 0.5 | 7 | 3.5 |
| FCS | | | | | 58 |

Source: Ndiaye, 2014; Field surveys, December 2022-October 2023

According to this table, farmers' food consumption is good. This is the result of the diversity of activities carried out, such as market gardening, cereal growing and fishing (photo 1). The variety of foods eaten therefore reflects a high calorie and vitamin intake. This is in stark contrast to the monotonous diet of the surrounding villages, where the main staples are cereals and green leaves. According to Yaméogo (2016), the diversification of agricultural production allows households to vary their diets.



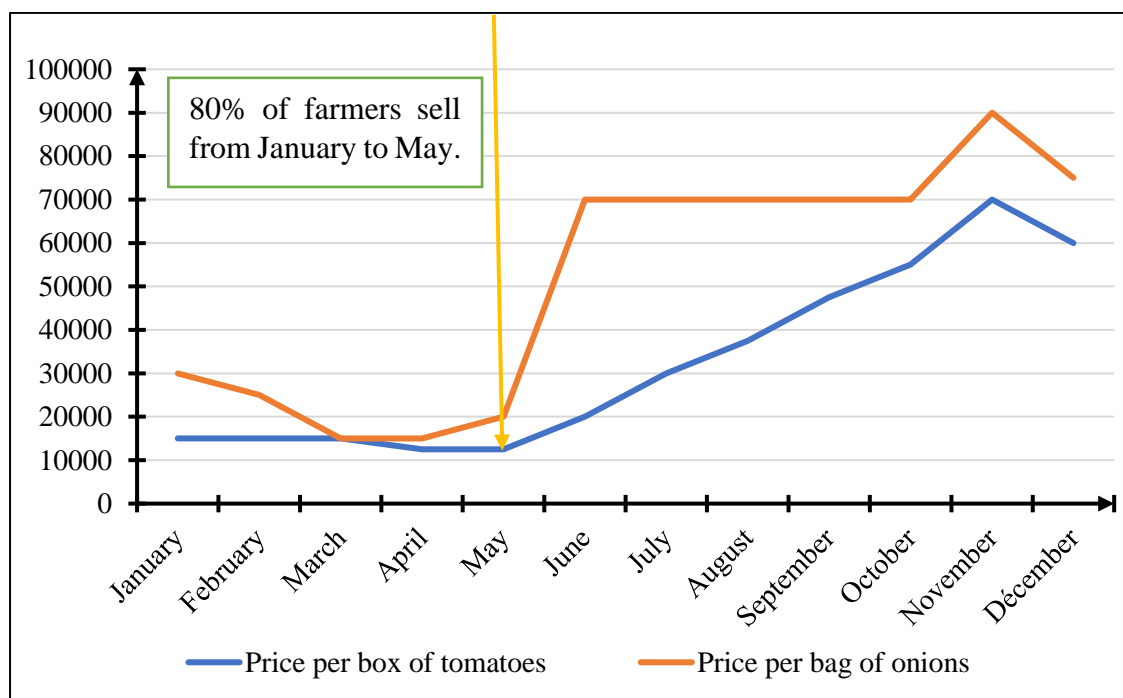
Image: ZONGO Richard, October 2022

Photo 1: exhibition of small catfish and small dry carp for sale around the dam

This improvement in nutritional status was also observed in Sri Lanka following the rehabilitation of an irrigation system, and in The Gambia in an irrigated rice project (Parent et al., 1997). The use of irrigated land has increased energy consumption and improved the nutritional status of children (Zoungrana, 2002). In addition to cereals, farmers consume meat, especially from goats, pigs, sheep and cattle, as well as local and imported fish. These meat products have different nutritional values that have a positive impact on food security.

Price stability and its impact on Economic accessibility to food

Price stability for the most widely consumed vegetables is low and seasonal. Prices for market garden produce such as onions and tomatoes, which are widely consumed by farmers, fluctuate throughout the year (Figure 5).



Source: Field surveys, December 2022-October 2023

Figure 5: Fluctuations in tomato and onion prices over the year

Difficulties in preserving market garden produce mean that 80% of growers sell their produce at harvest. Onion and tomato prices are unstable and fluctuate throughout the year. These prices are more accessible to local and urban consumers from January to May. During this period, producers, local residents and buyers have access to the produce and consume tomatoes, onions and other market garden produce. They also use the income from these products to buy cereals and food supplements. However, fluctuations in the price of market garden produce are having a negative impact on this trend. The consumption of market garden produce and the availability of food are affected by price fluctuations throughout the year. This situation reduces people's purchasing power for everyday products, which has a negative impact on the diversity and quantity of food consumed. Authors such as Kibora (2014) and Traoré and Diop (2021) find that price volatility affects purchasing power and therefore access to food in both Burkina Faso and Senegal. Work by the Ministère de l'Agriculture et du Développement Rural (2009) in Cameroon and Bognini (2010) also show that volatile food prices have a negative impact on food security. The FAO (2005) considers price instability to be one of the indicators of food insecurity, as was the case for 33% of the population in sub-Saharan Africa in 2005. In Canada, 18% of families, or 6.9 million people, were food insecure in 2022, largely due to unstable food

prices (Uppal, 2023). As a result, volatile prices create problems of food accessibility. This situation affects the food and nutritional security of people in the Soum Dam area of responsibility.

Conclusion

Rain-fed agriculture, market gardening and fishing are practised around the Soum dam. These activities provide a large quantity and variety of food for the local population and the country's major cities. Local residents consume a variety of products such as cereals, fruit and vegetables and meat products. Consumption of these products effectively combats food and nutritional insecurity in the region where the dam is located. This dietary diversity makes the dam a fundamental tool for promoting and achieving sustainable food and nutritional security.

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