



Policy Brief

Food Losses along the Cassava Supply Chain in Ghana: Causes and Solutions

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Introduction

Food losses reduce the overall productivity of the food system, resulting in lower incomes for food producers and higher costs for consumers (Schuster & Torero, 2016).¹ The global crisis caused by the COVID-19 pandemic and the war between Russia and Ukraine have aggravated global food supply chain risks and food insecurity issues. Policies toward addressing these global food insecurity issues are therefore imperative.

There is consensus in the literature that food loss reduction could contribute significantly to food security and sustainability. Measuring food losses along supply chains and identifying critical loss points in the food system are essential first steps toward food loss reduction.

Cassava is a major staple crop in Ghana and contributes about 20.5% of Ghana's agricultural GDP (Sasu, 2022). The crop is the most widely produced and consumed root and tuber crop in the country. It is reported that cassava is produced by more than 90% of Ghanaian farmers, either as a main crop or in combination with other crops. In 2020, Ghana produced about 21.8 million metric tons of cassava, which was an increase of 22% from the 17.8 million metric tons produced in 2016 (Figure 1).

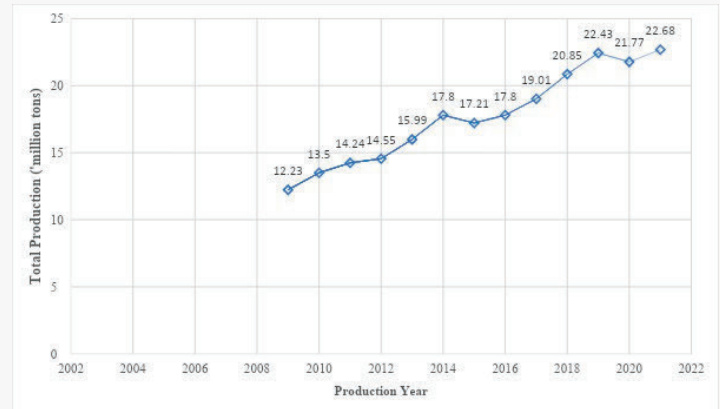


Figure 1: Cassava production series for Ghana
Source: Statista, 2023

In Ghana, cassava constitutes a major part of the diets of many households with an estimated annual per capita consumption of about 200 kg. It accounts for up to 40% of daily food intake (kcal per capita per day), serving as a good source of energy. Cassava roots are rich in carbohydrates while its leaves are of high nutritional value, containing up to 25% protein, iron, calcium, and vitamins A and C. The crop is mainly used for household consumption in Ghana, with about 85% of total production eaten as food across all 16 administrative regions of the country.

¹ Schuster, M., & Torero, M. (2016). Reducing food loss and waste. *International Food Policy Research Institute (IFPRI), IFPRI book chapters*, 9780896295827-03.



In recent years, commercial use of cassava in urban centers has increased as a result of the growing demand for high-quality processed cassava products and the increased awareness of its enormous industrial potential for the production of alcoholic beverages, industrial starch, cassava glue, and high-quality cassava flour. In addition, products derived from cassava are used to produce eco-friendly and recyclable plastics & textiles and used in the pharmaceutical industry to derive glucose and dextrin for syrups. In the Ghanaian food industry, cassava is processed mainly into cassava grits (commonly known as gari), cassava pellets, cassava flour, and cassava dough (agbelima).

Some of the traditional meals prepared from cassava include fufu, konkonte, akyeke, yaka, agbeli kakro, akyeke, banku, and akple, among others.

The cassava supply chain consists of producers, processors, collectors, wholesalers and retailers, consumers, influencers, and supporting organizations.

Apart from the food security role, activities along the cassava supply chain serve as sources of livelihood for all the actors in the chain, who are usually women.

Cassava has a huge potential to spur industrial development and raise rural incomes in Ghana. Its starch is processed into ethanol and other alcohol-based products, especially beer and hand sanitizers, as part of the cassava supply chain. Other parts of the plant (e.g., leaves, peel, etc.) can be used as animal feed for livestock.

Despite cassava's significant economic value, the crop suffers severely from poor storability after harvest; once the cassava root is unearthed, it has roughly a two-day shelf life when it is not treated or processed. The FAO (2018)² notes that fresh cassava roots are highly perishable under ambient conditions, becoming unmarketable in three (3) days or less. There is a growing challenge of post-harvest losses along the cassava supply chain in Ghana. However, with proper post-harvest handling and management practices, fresh roots could be stored for up to 30 days or more. Due to its bulky and highly perishable nature, fresh cassava roots are usually traded in derived or processed forms which also serve as intermediate products for human diet, animal feed, bioethanol production, and starch markets.

² FAO (2018). Food loss analysis: causes and solutions. Case study on the cassava value chain in the Republic of Guyana. A Technical publication by Food and Agriculture Organization of the United Nations (FAO)-Rome; ISBN 978-92-5-130583-6.



Figure 2: Cassava root which started rotting in the soil



Figure 3: Harvested cassava roots which have started to rot

Field Survey

The Center for Applied Research and Innovation in Supply Chain-Africa (CARISCA) at the Kwame Nkrumah University of Science and Technology undertook a study on supply chain capacity constraints and food losses in the Atebubu-Amanten and Sene West districts in the Bono East region of Ghana using cassava as a case study. Cassava was chosen for the study because of its critical role in the farming and food systems in the districts. The study relied heavily on primary data from 300 actors in the cassava supply chain to assess the extent of losses experienced at each node of the chain, to form the basis for possible solutions to be proposed to address the menace of post-harvest losses. The field data were collected through personal interviews, focus group discussions, and key informant interviews. Both descriptive and inferential analytical tools were employed to analyze the field data.

Food losses along the supply chain

Food losses are a measurable reduction in foodstuff which may affect either the physical quantity or quality of the commodity in question. Typically, food losses occur in three forms, physical quantity losses, quality losses, and economic losses. Quantitative loss is a loss in terms of physical substance, resulting in reduction in weight and volume of the commodity as it goes through the supply chain.

Loss in quantity can be assessed and measured. In contrast, qualitative loss deals with deterioration in the physical appearance or nutritional quality or sensory properties of the food commodity as a result of physical damage, disease and pest attack, metabolism, as well as other biotic and abiotic stresses. Unlike physical losses which can be quantified objectively, qualitative losses are usually difficult to measure due to the high level of subjectivity. It is the combination of physical quantity and quality losses that gives the economic loss, which is normally determined as the estimated loss in market value of the commodity because of the two types of losses.

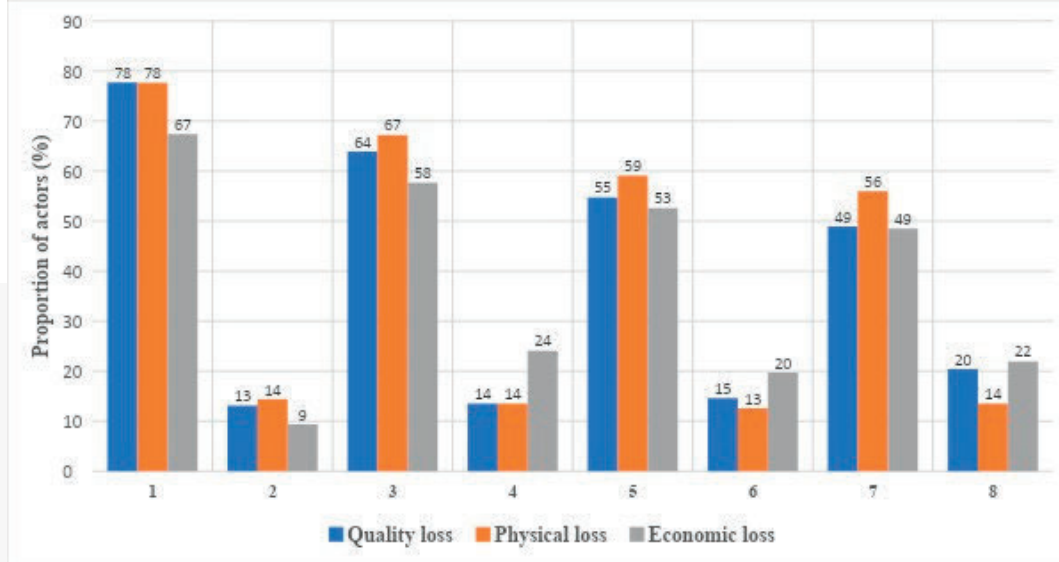


Figure 4: Extent of post-harvest losses experienced along the cassava supply chain
Source: Field Survey, 2022.

The nature and extent of food losses experienced at each node of the cassava supply chain are presented in Figure 2. Interactions with actors through focus group discussions and key informant interviews revealed that the extent of losses depends largely on the variety of cassava grown by farmers (82.3% of farmers in the study area hold this view). Consistent with a priori expectation, the study revealed that food losses occur at all stages of the cassava supply chain. However, at almost all stages of the chain, actors considered the losses as mild, implying that less than 10% of the volume or value of the commodity handled is lost. For instance, at the production stage, 78% of actors considered the physical quantity and quality losses to be mild.

In the case of economic losses, 67% of supply chain actors considered the loss at the production stage to be mild. At the processing stage, 58-67% of the actors considered quantity, quality, and economic losses to be mild. Between 52 and 60% of actors considered the losses at the transportation stage to be mild, compared to 49-56% rating the losses at the storage and warehousing stage as being mild.

Contrary to expectations, the study has revealed that quantitative losses are almost at the same level of severity across all the stages of the cassava supply chain. About 14% of actors indicated that physical quantity losses at each of the stages of the supply chain are severe. These physical losses along the chain could be occasioned by poor harvesting and post-harvest handling methods, inefficient equipment or technologies employed by actors as well as bad road network and poor transportation system used to cart the commodity from producing centers to consuming centers. It is evident from Figure 2 that qualitative food losses are highest at the storage and warehousing stage, followed by transportation and processing stages of the supply chain. About 20% of actors interviewed reported that quality losses are severe and thus beyond 10% of the volume of the commodity handled during storage and warehousing. Losses at this stage of the supply chain could mainly result from the short shelf life of cassava roots after harvesting. If fresh cassava roots are not sold within three days of harvesting, they begin to deteriorate in quality, which eventually reduces the physical quantity and economic value when rotten tubers are discarded completely or sold at discounted prices.



Our study also shows that economic losses are highest at the processing stage, followed by the storage and warehousing stage, and the transportation stage. Whereas only 9% of actors considered economic losses at the production stage to be severe, as high as 24% reported that economic losses at the processing stage are severe, and 22% considered economic losses during storage and warehousing to be equally severe. At the transportation stage, one in five respondents (20%) reported that economic losses experienced are severe.

The key informant interviews revealed that, for a ton of freshly harvested cassava, total quantity loss was about 10%. However, the economic loss was estimated at 25% of the market value; implying that a quarter of the potential revenue from cassava harvested is not realized due to post-harvest losses. Focus group discussants and key informants also reported that, during the peak season when cassava is in abundance, the commodity is priced at about GHS300 (USD\$26) per ton. However, during the lean/dry season (when harvesting of cassava is very difficult), the price experiences a marked increase, rising to GHS600 (USD\$52) per ton.

This 100% increase in economic value could be the result of reduced supply in the face of heightened demand and other environmental factors affecting cassava harvesting during this period. Such a pronounced price rise between seasons accentuates the critical importance of minimizing post-harvest losses, especially during the dry/lean season. It is significant to note that, during certain periods of the year, processors are compelled to import cassava roots from Ivory Coast to supplement the quantities obtained locally for gari production. The implications of this on prices of the derived cassava products on the domestic market are obvious.

Figure 3 shows that the cassava industry in Ghana has witnessed significant growth from 2009 to 2021, with data highlighting rising sales values, illustrating a thriving cassava market. However, in the shadow of this expansion, the country grapples with an average annual loss of GHS 177 million attributed to post-harvest losses. This persistent economic setback starkly contrasts with the industry's progress, suggesting a disparity where post-harvest practices and infrastructure have lagged.

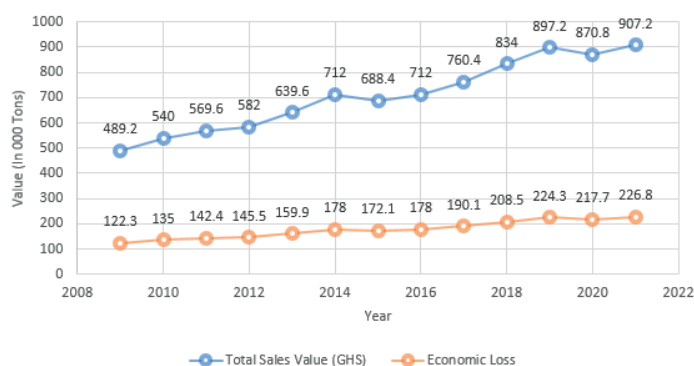


Figure 5: Cassava sales and economic losses
Source: Field Survey

Causes of food losses and options to reduce losses

Along the cassava supply chain, food losses occur because of many factors, including poor harvesting techniques, poor roads linking producing and consuming centers, inadequate transportation systems, inappropriate storage systems, limited access to market, as well as limited processing and value addition. During processing, losses arise from poor raw cassava quality, limited processing options, inadequate and inefficient facilities, as well as inconsistent supply of raw materials due to seasonality. Poor transportation exacerbates food losses, with major factors including poor road conditions, frequent vehicle breakdown, and theft of goods in transit. Notably, the absence of appropriate storage facilities and modern preservation technologies contributes to substantial losses. Despite the varied preservation methods used by farmers (67%), limited access to improved/modern storage techniques, as well as drying and processing challenges hinder effective cassava preservation in Ghana. It is common to see farmers drying cassava chips on the shoulders of tarred roads, exposing the products to pathogens and other contaminants, which eventually leads to quality losses.

To reduce post-harvest losses and unlock the full economic potential of cassava in Ghana, several interventions across the supply chain—from production to consumption—would be necessary (Figure 4).

The options include improved access to market through effective linkages, effective and efficient processing/value addition to extend the shelf life of cassava, and training of value chain actors on proper harvesting and post-harvest management techniques. Forward contract arrangements between industrial processors and farmer cooperatives could lead to ready markets to reduce losses after harvest. At the production level, farmers could stagger their planting periods to ensure that all the cassava plantation does not mature at the same time. Also, different cassava varieties with different maturity periods could be planted by farmers to spread the harvest period to regulate the supply of cassava on the market, especially during the peak period. This would go a long way to reducing losses at both production and marketing nodes of the supply chain. Simple on-farm methods such as good agronomic practices and farm hygiene, prevention of mechanical injuries during harvesting, loading, and offloading as well as private sector investment to leverage improved technology and innovative solutions, especially at the processing and storage stages of the supply chain, are viable options to reduce food losses. Applying state-of-the-art drying (e.g., solar dryers), packaging and warehousing strategies, and expanding the utilization base of cassava through efficient processing and value-addition technologies are necessary to reduce losses along the cassava value chain in Ghana. Provision of incentives to the private sector for expanded use of cassava in the alcoholic beverage, plywood, and pharmaceutical industries appears to be a more sustainable way to reduce losses of fresh cassava roots in Ghana, especially during the peak harvest season.

Further development of the export market for products derived from cassava (e.g., starch, chips, gari, etc.) has great potential to stimulate demand for fresh cassava roots by processors at both industrial and cottage levels to reduce post-harvest losses.

Periodic upgrading and resurfacing of feeder roads linking farming communities to consuming centers should be prioritized by local assemblies to reduce delays during transportation and vehicle breakdown that extend the supply chain lead time, thereby increasing food losses.

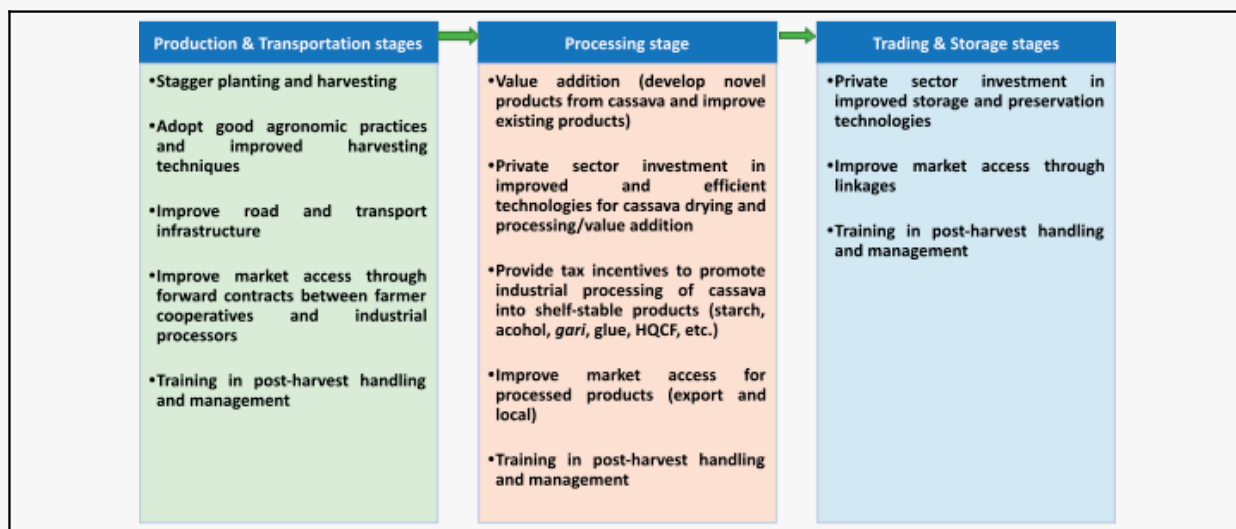


Figure 6: Proposed options to reduce post-harvest losses

Conclusion and way forward

The cassava supply chain in Ghana presents a huge opportunity for employment generation, food security, and improved livelihoods, especially for women and youths. However, the supply chain has been plagued by high levels of food losses, threatening household food security and the livelihoods of millions of smallholder farmers, processors, and traders in Ghana. The transportation, storage, and processing stages have been identified as the critical loss points for quantitative, qualitative, and economic losses. The key drivers of these losses have been identified as limited access to improved processing, storage, and road infrastructure, as well as limited knowledge of supply chain actors concerning modern post-harvest handling and management practices. The solution lies in massive private sector investment in improved technology to undertake critical supply chain activities such as drying, processing, and value addition, as well as storage and preservation.

The central government should explore the possibility of using tax and non-tax incentives to promote industrial demand for cassava to produce alcoholic beverages, glue for plywood companies, high-quality cassava flour for bakery companies, and starch for the pharmaceutical industry.

At the supply-chain-actor level, capacity building and sensitization will go a long way to reduce post-harvest losses. Sensitization efforts should make supply chain actors recognize the effect of food losses on their own household food security status and economic benefits, and the apparent need for value chain upgrading for better business performance.

In addition to sensitization, training and capacity building focused on post-harvest handling and management of cassava and its derived products will go a long way to change perceptions, attitudes, and practices of supply chain actors, especially regarding how losses along the chain impact their profit margins, competitiveness, and long-term business survival.

We call on stakeholders in the cassava industry (Ministry of Food and Agriculture, District Assemblies, cassava processors, trader and producer associations, NGOs, and private investors) to critically consider the cocktail of solutions proposed to drastically reduce losses along the supply chain in the medium to long term. Adoption of the proposed solutions has a greater chance to significantly reduce food losses along the cassava supply chain in Ghana to unleash the full potential of the crop to promote socio-economic development in the country.

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