



Tropentag 2024
September 11-13, 2024

Conference on International Research on Food Security, Natural Resource
Management and Rural Development
organized by the University of Natural Resources and Life Sciences, Vienna
(BOKU), Austria

Preserving Resources, Securing Livelihoods: Reducing Food Loss and Waste for Sustainable Development in Ghana.

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Abstract:

Food loss and waste represent significant challenges to sustainable development worldwide, impacting both food security and environmental sustainability. In Ghana, a country with a rich agricultural heritage and diverse food systems, these challenges are particularly pronounced in most rural farming communities. Despite considerable progress in agricultural production and food distribution, a substantial portion of the food produced in the country is lost or wasted each year, increasing poverty among rural farmers. This problem not only undermines efforts to improve food security and nutrition but also represents a significant economic loss for farmers and other stakeholders along the supply chain. Moreover, food loss and waste contribute to environmental degradation, including greenhouse gas emissions and resource depletion. Addressing this issue requires a comprehensive understanding of the factors contributing to food loss and waste in Ghana and developing effective strategies and interventions to mitigate it. This study aims to systematically review the causes of food loss and waste, its impact on the livelihood of farmers, and environmental sustainability in Ghana. This study delved into the collaborative efforts to minimize food loss and waste throughout the food supply chain. These include initiatives such as improved postharvest handling practices, local food processing innovations, sustainable livelihood programs, and community-based food recovery programs. These efforts have contributed to improved livelihoods, increased resilience, and enhanced social cohesion within communities by preserving valuable resources, reducing economic losses, and enhancing food security. Through collaborative partnerships, policy support, and grassroots initiatives, Ghana can lead the way towards a more resilient and prosperous future for its communities.

Keywords; Food loss, food waste, sustainable livelihood, resources.

Introduction

Achieving food security in all regions has recently become a global concern due to population increase. Food Loss and Waste (FLW) represent significant challenges to sustainable development worldwide, impacting both food security and environmental sustainability. Sustainable Development Goal (SDG)12.3 stipulates a clear direction for halving food waste and loss by the end of 2030. This goal is critical because when food is wasted, the resources and capital used in its production, such as water, energy, money, and land, are also wasted, contributing to environmental degradation, economic hardship, and climate change through the release of methane from decomposing food in landfills. FLW contributes significantly to food insecurity and environmental challenges in Africa, with about one-third of the world's hungry population residing there (Obayelu, 2014). Most farmers located within this region experience high levels of post-harvest losses, with over 29% loss of primary food equivalent (Aragie, 2021). Moreover, this wastage is linked to a substantial wastage of resources with 21% of total water use and 15% cropland used (Aragie, 2021). In Ghana, a country with a rich agricultural heritage and diverse food systems, challenges associated with food loss and waste are particularly pronounced in most rural farming communities which happens to be the 'food basket' of the country. Due to the lack of essential technological resources in these communities, farmers stand a higher chance of losing food crops from harvesting to post-harvest. Not only does this inadequate resource reduce food security, but it also increases poverty among rural farmers. Further studies have demonstrated that Ghana loses 20-25% of crops after harvesting, with an estimated one-third lost before it ever reaches consumers' mouths (Darfour & Rosentrater, 2016). However, greater food loss and waste are experienced during post-harvest. Kansanga et al., (2023) revealed that smallholder farmers within the semi-arid region of Ghana lose 20% of their crops during post-harvest. The study established a significant association between post-harvest loss and food insecurity. Key factors contributing to these losses include difficulties in market accessibility, lack of knowledge and technology, inadequate storage facilities, poor packaging, and poor road networks (Dovlo et al., 2021). Studies have revealed that a 50% reduction in food loss across various supply chains by 2025 could lead to a 0.8% increase in GDP, improved welfare, and higher calorie intake (Rutten & Verma, 2014). This study therefore aims to systematically review the impact of food loss and waste on food security, the livelihood of farmers, and environmental sustainability in Ghana. This study delves into the causes, prevention, and community-led efforts to minimize food loss and waste throughout the food supply chain.

Material and Methods

The study employed secondary data for the review following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Caulley et al., 2020), the study conducted a comprehensive search of multiple databases using predefined search terms. First, a thorough search for articles in Google Scholar (<https://scholar.google.com/>), Connected Papers (<https://www.connectedpapers.com/>), and Semantic Scholar (<https://www.semanticscholar.org/>) using the search algorithms "food loss" AND "food waste", "Sustainable livelihoods" AND "Post-Harvest loss in Ghana", "Food insecurity", and "natural resources". Journals, articles, conference proceedings, and other relevant reports were selected. Since the topic under consideration is a current and global phenomenon, papers and reports published after 2015 were duly selected. Following a review of the abstracts of selected papers, full-text documents were downloaded for those related to Food waste and loss, natural resource management, sustainable rural livelihoods, and food loss and waste reduction. Each paper's abstract was carefully assessed to ensure relevance to the topic under study.

Secondly, most of the selected papers reported on food loss and waste, the causes of post-harvest loss, reducing food loss and waste, and the effect of FLW on the livelihoods of farmers. In total,

25 articles and papers were scanned. However, after the initial screening, 10 were removed because they did not meet the inclusion criteria, and after removing duplicates, 8 articles were screened, of which 2 were excluded, and 10 articles fully met the inclusion criteria of the study. However, 6 were selected based on their year of publication thus after 2014. The core findings of these papers were then integrated, synthesized, and compiled into a cohesive body of knowledge.

Results and Discussion

From the farm to the table, several factors contribute to FLW, undermining the potential for agricultural productivity to meet the growing demands of Ghanaians. This discussion explores the major causes of food waste and loss in Ghana, focusing on the systemic challenges faced at various stages of the food supply chain and their broader impacts on the nation's food system.

Table 1: Causes of Food Loss and Waste

Causes of FLW	Studies
Poor storage facilities, inadequate processing techniques, and improper handling practices by farmers, transporters, and warehouse managers	<i>Alhasan et al., 2018</i>
Inadequate infrastructure, market imbalances, consumer behavior, poor post-harvest handling, poor waste management systems, climate, and environmental factors	<i>Addai, 2021</i>
Poor post-harvest handling, economic factors, value chain inefficiencies, poor consumer behavior	<i>Agyepong, 2015</i>
Production issues, supply chain problems, poor consumer behavior, high market standards	<i>Rutten & Verma, 2014</i>

Source: Authors

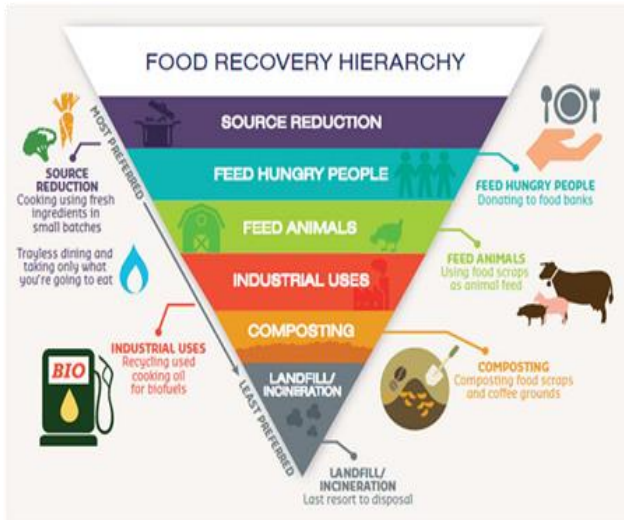
At the production level, poor agricultural practices, inadequate storage facilities, and inefficient harvesting methods lead to significant losses as shown in *Table 1*. Smallholder farmers, who make up the majority of Ghana's agricultural sector, often lack access to modern technology and resources. Therefore, greater investment in indigenous and foreign technology, storage facilities, and better education on proper harvesting methods could reduce the rate of FLW in Ghana. These findings are consistent with Badmus (2022) and Quan-Baffour (2017) who revealed that implementing technologies can significantly minimize post-harvest losses and communities without agro-industries using their indigenous knowledge and skills to preserve food and create jobs. In the post-harvest and distribution stages, inadequate infrastructure, such as poor transportation networks and insufficient cold storage facilities, contribute to food waste. Many rural areas lack proper roads, leading to delays and spoilage during transportation to urban markets. Moreover, poor market systems, including inefficient pricing mechanisms and limited access to markets for smallholder farmers, result in excess produce being unsold and eventually wasted. Consumer-level waste is also a concern, with cultural practices and a lack of awareness about proper food handling and storage playing roles in discarding edible food. In most cases, consumers purchase food stuffs more than necessary which may lead to wastage of food.

Ghana, just like many other countries around the world is increasingly experiencing unpredictable weather patterns, including irregular rainfall, prolonged droughts, and extreme temperatures, which directly impact crop production. These climatic variations disrupt planting and harvesting schedules, leading to reduced yields and, in some cases, complete crop failure. For

instance, unexpected heavy rains can cause flooding, which damages crops ready for harvest, while droughts can lead to stunted growth or the outright destruction of crops, leaving farmers with little to no harvest.

Reducing Food Loss and Waste

Figure 1: Food Recovery Hierarchy



Source: Niedeck & Krajewski, 2021

The food recovery hierarchy prioritizes reducing food waste at its source, followed by redirecting surplus food to feed people and animals. If food is unsuitable for consumption, it can be used for industrial purposes or composted to enrich soil. Landfilling is the least preferred option due to its negative environmental impact. This hierarchy is the most effective because it provides a structured approach to minimizing food waste, prioritizing actions that have the most significant environmental, social, and economic benefits.

Reducing FLW to improve the livelihood of farmers, smallholder farmers can be enrolled in additional or sustainable livelihood programs to support them financially during extreme loss (Gyan et al., 2024). By minimizing food waste and losses, farmers can maximize the quantity of their produce that reaches the market, increasing their income and improving their economic stability. When more of what is grown is successfully sold, farmers are better positioned to invest in improved agricultural practices, purchase quality seeds, and adopt technologies that enhance productivity regardless of geographical location. This cycle of reinvestment not only boosts individual farmers' profitability but also contributes to the overall resilience of the agricultural sector, making it less vulnerable to shocks such as price fluctuations or climate-related disruptions. Reducing food loss and waste strengthens food security at both the household and community levels. When less food is wasted, there is a greater supply available to meet the nutritional needs of both farmers and consumers, which is particularly important in rural areas where food insecurity can be prevalent (Agyepong, 2015).

Conclusions and Outlook

Addressing food loss and waste in Ghana is essential for enhancing food security, supporting sustainable livelihoods, securing resources, and fostering economic growth within the agricultural sector. The factors contributing to food waste, such as poor agricultural practices, inadequate infrastructure, and the impacts of climate change, highlight the need for comprehensive solutions that span the entire food supply chain and ensure food security. Ways of reducing Food loss and waste include farmers' and consumers' education, exploring climate change adaptation strategies, technology investment, investing in storage facilities, and many others. By reducing losses at each stage—from production to consumption—farmers can increase their income, reinvest in their operations, and contribute to a more resilient and sustainable agricultural system. Tackling food loss and waste not only benefits individual farmers but also strengthens the nation's food security and promotes long-term development. To achieve these goals, it is highly recommended

that farmers and stakeholders implement strategies that address both the systemic and environmental challenges facing Ghana's food system

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