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AN ASSESSMENT OF THE IMPACT OF FOOD INSECURITY IN KATSINA STATE: THE PRE AND POST HARVEST LOSSES IN VIEW

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ABSTRACT
This study assesses the impact of food insecurity in Katsina State, focusing on the critical aspects of pre- and post-harvest losses. Food insecurity remains a pressing challenge in Nigeria, with Katsina State being one of the most affected regions due to its predominantly agrarian economy and vulnerability to environmental and security challenges. The research adopts a qualitative research, thereby, employing both primary and secondary sources of data. The primary data are majorly the key informant interviews while the secondary data are online articles and print books, which are relevant to the discourse. Furthermore, the research employs a descriptive and analytical methods in its presentation of facts. The research evaluates how factors such as climate variability, poor agricultural practices, inadequate storage facilities, and insecurity affect food production and distribution in the state. Pre-harvest losses are explored in the context of pest infestations, erratic rainfall, and inadequate extension services, while post-harvest losses are attributed to inefficient handling, transportation bottlenecks, and the absence of modern storage solutions. The study finds that the pre and post-harvest losses significantly contribute to food shortages, price volatility, and economic hardships for local farmers, thereby exacerbating poverty levels in rural communities. Additionally, the research highlights the compounding effect of insecurity, particularly banditry and communal clashes, which hinder farming activities and disrupt food supply chains. The implications for food security in Katsina State are far-reaching, affecting not only nutritional outcomes but also the livelihoods of agricultural-dependent households. To mitigate the impact of food insecurity, the study recommends adopting climate-smart agricultural techniques, strengthening rural infrastructure, providing modern storage technologies, and enhancing security measures to protect farming communities. The study urged policy makers to invest in public-private partnerships that will foster innovation and efficiency in food production and distribution systems. Ultimately, addressing the pre- and post-harvest losses will be crucial for enhancing food security, improving rural livelihoods, and fostering sustainable agricultural development in Katsina State.

Keywords: Pre-Harvest Loss, Post-Harvest Losses and Food Insecurity

INTRODUCTION
Food insecurity has become a significant concern in many parts of Nigeria, particularly in Katsina State, a State, highly reliant on agriculture for sustenance and economic activities. Food insecurity refers to the inability of individuals or households to access sufficient, safe, and nutritious food to meet their dietary needs for an active and healthy life (Food and Agriculture Organization [FAO], 2021). In Katsina State, the challenge of food insecurity is exacerbated by various factors, including climate variability, inadequate agricultural practices, poor infrastructure, and the prevalence of insecurity in the region. Pre- and post-harvest losses remain central to the food insecurity problem, contributing significantly to the inability of households to access adequate food supplies.

Pre and post-harvest losses are often linked to factors such as erratic rainfall patterns, pest and disease outbreaks, insufficient access to quality seeds and fertilizers, and a lack of extension

services to guide farmers on best practices. These issues result in reduced agricultural productivity, which directly affects food availability in the state. For instance, studies have shown that climate-induced droughts and flooding have significantly reduced yields of staple crops such as maize, millet, and sorghum in Katsina (Abdulkarim, Yusuf & Gambo, 2020). Additionally, the absence of adequate storage facilities and poor post-harvest handling practices, such as inefficient drying and preservation methods, lead to substantial food losses after harvest. These losses not only reduce the quantity of food available for consumption but also create economic hardships for smallholder farmers who rely on agriculture for their livelihoods.

Insecurity in Katsina State, including banditry, kidnapping, and communal clashes, further complicates the food insecurity challenge. Insecurity disrupts farming activities, discourages farmers from cultivating larger fields, and interrupts the transportation of produce to markets (Mustapha, Bello & Mohammed, 2022). This creates a vicious cycle where food becomes scarcer, prices escalate, and vulnerable households are unable to afford sufficient food. The ripple effects of these challenges are reflected in malnutrition, stunted growth among children, and increased poverty levels, especially in rural areas.

This study attempts to examine the extent to which pre- and post-harvest losses contribute to food insecurity in Katsina State, highlighting their impacts on food availability, affordability, and accessibility. It also aims to provide recommendations for policymakers, development partners, and other stakeholders to mitigate these losses and enhance food security. Understanding the dynamics of food insecurity through this lens is essential for fostering sustainable agricultural practices, improving rural livelihoods, and achieving long-term food sufficiency in Katsina State.

DEFINITION OF TERMS

Pre-Harvest Losses; Pre-harvest losses refer to the reduction in potential crop yield that occurs before the harvest process is completed. These losses are caused by a variety of factors, including climatic conditions, pest infestations, weed competition, disease outbreaks, and improper crop management practices (Singh, Kumar & Rao, 2020). Weather-related issues, such as erratic rainfall patterns, drought, and floods, significantly impact crop growth and development, leading to yield reduction. Additionally, poor agronomic practices, such as inadequate land preparation, inappropriate planting techniques, and insufficient fertilizer application, further contribute to pre-harvest losses (FAO, 2018).

Post-Harvest Losses; Post-harvest losses refer to the decrease in quantity or quality of agricultural produce that occurs after the crop has been harvested. These losses can happen during various stages, including handling, storage, transportation, processing, and distribution (Affognon, Mutungi, Sanginga &Borgemeister, 2015). Post-harvest losses not only affect food availability but also have economic implications for farmers, traders, and consumers.

Physical losses, such as spoilage and shrinkage, are common due to poor handling and inadequate storage facilities. Perishable crops like fruits, vegetables, and tubers are particularly vulnerable if not properly stored (Kitinoja&AlHassan, 2012). In developing regions, inadequate infrastructure, such as lack of cold storage and poor road networks, exacerbates post-harvest losses during transportation and distribution. Additionally, contamination by toxins, pests, and diseases during storage further reduces the market and nutritional value of the produce (Affognon et al., 2015). Quality losses, on the other hand, may not affect the physical appearance of the produce but reduce its nutritional value, taste, and shelf life. For instance, improperly dried grains may develop molds that produce aflatoxins, making them unsafe for consumption (Kitinoja&AlHassan, 2012).

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METHODOLOGY

This is a qualitative study that depends on both primary and secondary source of information to dissect, analyze, and synthesize the impact of pre and post-harvest losses on food security in Katsina State.

HISTORICAL CONTEXT OF FOOD PRODUCTION AND AGRICULTURE IN KATSINA STATE

Katsina State, which is located in the northwestern region of Nigeria, has a rich agricultural heritage that has significantly shaped its socio-economic development over time. The state's agricultural traditions date back to pre-colonial times, when subsistence farming was the primary occupation of its inhabitants. The region's fertile lands and favorable climate facilitated the cultivation of various crops, establishing Katsina as a prominent agricultural hub in the Sahelian zone. This section will be discussed through the lenses of three historical epochs. The pre-colonial period, the colonial period and the post-independence era.

The pre-colonial period; Katsina State, a Hausa Bakwai state, had agriculture central to its people's lives. Its favorable climate and fertile lands supported thriving agriculture. Subsistence farming, communal land tenure, and diverse crops were common. Agriculture was the foundation for food production and trade in the region. The social, political, and religious structures influenced farming practices.

The Colonial Period; the colonial period brought significant changes to Katsina's agriculture. British conquest in 1903 led to agricultural policies serving colonial interests. Policies focused on raw materials for British industries and revenue generation. This era saw changes in food production, land tenure, and labor dynamics. The colonial administration's economic goals reshaped Katsina's agricultural landscape.

The Post-Independence Era; the post-independence era, beginning in 1960, ushered in a period of both opportunities and challenges for agriculture in Katsina State. Nigeria’s political independence brought hopes for economic diversification, rural development, and self-sufficiency in food production. However, political instability, inconsistent agricultural policies, and environmental challenges significantly influenced the agricultural landscape of Katsina.

PRE AND POST-HARVEST LOSSES AND ITS IMPACT ON FOOD SECURITY IN KATSINA STATE

Pre and post-harvest losses refer to the reduction in the quantity and quality of crops that occur during the stages leading up to harvesting and after harvest. These losses can be caused by a range of factors, including pest infestations, diseases, adverse weather conditions, and poor farm management practices (Oerke, 2006). In Katsina State, pre and psot-harvest losses have emerged as a significant threat to food security. The state's agricultural sector, dominated by small-holder farmers, faces persistent challenges that undermine crop productivity and contribute to widespread food insecurity (Ahmed & Usman, 2019). This section of the work is an attempt to understand the dynamics of pre-harvest losses and their implications on sustainable food production in the Katsina State.

In a personal communication with Professor Ibrahim, he noted that; Pre harvests losses are the losses that happen right on the farm before harvest which could be due pest infestations, diseases, theft... Post-harvest losses are the losses that happen to farm produce after harvest as a result of theft, fire outbreak etc, while food insecurity is when a person lacks adequate food in the right quantity and quality for a healthy living. It could be for a period of time may be for a day, two days, one week … At every point, one is expected to have access to food, once it is not

there, then, there is food insecurity. Not just to eat, but, it must be in the right quantity and quality (Personal Communication with, Prof Ibrahim, 2024).

In a similar vein, Dr Rimi (2024) in an interview attempted to define pre and post-harvest losses and food insecurity. In his our opinion claimed that: … the concepts of pre and post-harvest losses and food insecurity are relative terms, but in their simplest forms, pre and post-harvest losses connote losses of farm produce or reduction in the quantity and quality of farm produce that take place prior to harvest or after harvest along the value before it reaches the final consumer while food insecurity connotes a situation in which there is no enough food that would meet the dietary needs and food preferences for an active and healthy life for all… (Personal Communication with Dr Rimi, 2024).

Among the factors contributing to pre-harvest losses in Katsina State are ;

Pest and Disease Infestations; Pests and plant diseases are among the primary causes of pre-harvest losses in Katsina State. Common pests such as locusts, grasshoppers, and stem borers destroy crops during their growth stages (Oerke, 2006). Additionally, fungal diseases like rust and blight affect staple crops such as millet and sorghum, leading to reduced yields (Bello, 2018).

Climate Change; Katsina State experiences erratic rainfall patterns and prolonged droughts due to its location within the Sahel region (Ahmed & Usman, 2019). These climatic challenges negatively impact crop development, causing premature wilting and poor germination rates. Hailstorms and strong winds also damage crops, further contributing to pre-harvest losses.

Poor Farm Management Practices; the use of traditional farming techniques and inadequate knowledge of modern agricultural practices exacerbate pre-harvest losses in Katsina (Yusuf, 2017). Many farmers lack access to improved seeds, fertilizers, and pest control measures. Limited adoption of mechanized farming techniques also hampers productivity.

Soil Degradation and Desertification; Soil fertility decline and desert encroachment are significant issues affecting agricultural productivity in Katsina State (Bello, 2018). The overuse of farmland without proper soil management practices leads to nutrient depletion, making it difficult for crops to thrive.

Inadequate Agricultural Extension Services; the availability of agricultural extension services plays a crucial role in equipping farmers with the knowledge and resources needed to minimize pre-harvest losses. However, the limited reach of extension services in Katsina has left many farmers without guidance on best practices for pest management, soil conservation, and crop protection (Ahmed & Usman, 2019).

Some of the chief causes of Post-Harvest Losses in Katsina State include:

Poor Storage Facilities; one of the primary causes of post-harvest losses in Katsina State is inadequate storage infrastructure. Traditional storage methods, such as thatched granaries and mud silos, are still widely used despite their vulnerability to pest infestations, humidity, and temperature fluctuations (Yusuf, 2019). Without proper storage facilities, harvested crops deteriorate quickly, leading to significant losses.

Pest and Rodent Infestation; Pests such as weevils, grain borers, and rodents are notorious for causing post-harvest losses in Katsina. These pests attack stored grains, reducing both their quantity and quality (Ahmed & Sulaiman, 2020). The lack of effective pest control measures exacerbates this problem.

Poor Transportation Infrastructure; the poor state of rural roads in Katsina State hampers the efficient movement of agricultural produce from farms to markets (Bello, 2018). Crops often

spoil during long journeys due to rough roads and prolonged exposure to unfavorable weather conditions.

Improper Processing and Preservation Facilities; the limited availability of processing facilities for agricultural produce contributes to post-harvest losses. For instance, fruits and vegetables have short shelf lives and require immediate processing or preservation. The absence of cold storage facilities in Katsina further aggravates the situation (FAO, 2011).

Inadequate Farmer Knowledge; many farmers in Katsina State lack adequate knowledge of post-harvest handling techniques. Poor practices such as improper drying, rough handling, and mixing of crops during storage contribute to losses (Yusuf, 2019).

RELATIONSHIPS BETWEEN PRE AND POST–HARVEST LOSSES AS MAJOR DETERMINANT OF FOOD INSECURITY

The complex interplay between pre and post-harvest losses significantly influences food security, particularly in agricultural states such as Katsina. Both types of losses, though distinct in timing, are interconnected and cumulatively contribute to the reduction of food availability, economic instability, and nutritional deficiencies (Bello, 2018).

When pre-harvest losses occur, they immediately reduce the volume of harvestable produce, which sets the stage for diminished post-harvest outcomes. A smaller harvest means that farmers have less produce to store, process, and market, reducing their capacity to withstand market shocks and food supply fluctuations (Yusuf, 2019).

Furthermore, the effects of pre-harvest losses can exacerbate post-harvest losses. Crops weakened by pests or diseases during the pre-harvest stage are often more susceptible to spoilage during storage and transportation. For instance, grains affected by fungal infections before harvest are more prone to contamination by aflatoxins during storage, rendering them unsafe for consumption (FAO, 2011). Similarly, fruits and vegetables damaged during the growing phase are less durable and more likely to deteriorate quickly, leading to higher post-harvest wastage (Ahmed & Sulaiman, 2020).

The economic relationship between these losses further compounds the problem. Farmers who experience significant pre-harvest losses often lack the financial resources to invest in proper storage facilities or transportation logistics, increasing the likelihood of post-harvest losses (Bello, 2018). This financial strain not only affects immediate food availability but also undermines future farming activities, perpetuating a cycle of low productivity and food insecurity (Yusuf, 2019).

Additionally, the nutritional impact of the relationship between pre and post-harvest losses is significant. When both types of losses occur, the availability of nutritionally diverse foods, such as fruits, vegetables, and protein-rich legumes, diminishes (FAO, 2011). This situation contributes to poor dietary outcomes, particularly among vulnerable groups such as children and pregnant women, leading to malnutrition and related health complications (Yusuf, 2019).

During FGD with respondents in Jibia (2024), respondents unanimously agreed that there is a strong nexus between pre and post-harvest losses and food insecurity. They posited that: …of course there is a close relationship between pre and post-harvest losses and food insecurity in Katsina State owing to the fact that, the state is an agrarian state where majority of us rely on agriculture as a means of livelihood. However, with the activities of bandits especially in villages where food production is high, we are discouraged to actively participate in agricultural activities owing to the losses we experience on our farm produce and our lives… They further revealed that: …we are denied access to their farmlands to harvest or we are mandated to

collectively pay fine before we can harvest small quantities of our produce which are determined by the bandits… It is so serious that, prior to the banditry in our village, we were cultivating many hectares of land. But, now we only farm on small areas. This same incidence is not happening to only us, but also a lot of farmers in this area which have caused significant effect on food security in the state… (FGD at Jibia, 2024).

These claims are in line with the views of Ladan and Matawalli, (2021) when they posited that: Bandits stop farmers from harvesting their crops particularly in the months of October/November during the harvesting period. In some villages of Batsari LGA such as Garin Labo. Garin Inu, Shekewa, Shingi Sabuwa, Shingi Tsohuwa and Yar Larba bandits inspect farms to identify those where beans and guinea corn have grown well, they then come later to drive their cattle to eat up the crops and then move to other farms. In some villages of Faskari LGA, bandits impose taxes on farmers in order to be allowed to harvest their crops" (Ladan and Matawalli, 2021:21).

The opinion also corroborate with the work of Bozzoli and Brück, (2009); Hecht, Kandel, Gomes, Cuellar and Rosa (2006); Ordway, (2015); Kah, (2017) that: food security sustainability does not only suffer economic challenges but also social problems related to political and societal issues. For instance, the most detrimental shock to the land under cultivation in most developing economies is the prevalence of armed conflict. The fact is that conflicts compel significant changes in the utilization of land in various ways, such as abandoning the agricultural land due to internal displacement. The underutilization of land, loss of labour, and other inputs reduce investments into infrastructure because of doubts about the potential loss of capital in the conflict-affected regions. Despite laws enacted by the government to conserve forests, forest conservation is further forfeited because of occupation by non-state actors.

On the relationship between pre and post-harvest losses and food insecurity, Prof Ibrahim, (2024) in an interview posited thus:… the relationship is that when a farmer plants crops and if any of the losses occur on his farm produce, it would definitely affect availability… once, food is not available, it invariably affects affordability and utilisation… when food is not available, demand and supply will come in and the prices of commodities will rise… so there is a significant relationship between pre and post-harvest losses and food insecurity… (Personal communication with Prof Ibrahim, 2024).

The report of FAO (2014), re-enforced the above opinion when it reported that: … if food losses could be halved, the required increase of available food to feed the world population by 2050 would only need to be 25% and not 60% as currently projected, thus, reducing food loss can be part of broader systematic changes towards more sustainable food systems and global food security (FAO, 2014:31).

The above views clearly showed the nexus between pre and post-harvest losses and food insecurity; that is, the higher the pre and post-harvest losses, the lower the probability of a people being food secure.

RECOMMENDATION

From the above analysis, this study recommends the following points in order to mitigate the effect of pre and post-harvest losses in Katsina state.

a. Promote climate-resilient farming practices, such as drought-resistant crop varieties and water-efficient irrigation systems, to mitigate pre-harvest losses caused by erratic weather conditions.
b. Provide farmers with access to effective pest control measures, biological solutions, and early disease detection systems to reduce crop damage before harvest.
c. Organize training programs on modern agricultural techniques on pre and post-harvest handling, and storage practices to enhance farmers' skills and reduce losses.

d. Establish community-based storage facilities equipped with modern preservation technologies to minimize post-harvest losses.
e. Facilitate better access to markets for farmers through the development of rural road networks and digital marketing platforms to reduce post-harvest losses during transportation and distribution.
f. Provide farmers with access to affordable credit facilities to invest in improved farming technologies and storage solutions.

CONCLUSION

Food insecurity in Katsina State remains a critical challenge largely influenced by pre- and post-harvest losses. These losses, driven by factors such as pest infestations, plant diseases, poor agricultural practices, and inadequate storage and processing facilities, significantly impact agricultural productivity, food availability, and economic stability. Pre-harvest losses reduce the quantity and quality of harvestable crops, setting the stage for further deterioration during post-harvest stages. The consequences of these losses go beyond reduced food availability; they threaten the livelihoods of farmers, who form the backbone of Katsina's agricultural economy.

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