EFFECTS OF POSTHARVEST LOSSES ON FARM INCOME AND MARKETING MARGIN OF COCOYAM FARMERS AND MARKETERS IN NSUKKA LOCAL GOVERNMENT AREA OF ENUGU STATE, NIGERIA.

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ABSTRACT

This study investigates the effects of post-harvest losses on the farm income and marketing margins of cocoyam farmers and marketers in the Nsukka Local Government Area of Enugu State, Nigeria. A multi-stage sampling technique was used to select 80 respondents, comprising 40 farmers and 40 marketers. Data were collected through structured questionnaires and analyzed using descriptive statistics, multiple regression analysis, and mean scores from the Likert scale. The results reveal average post-harvest losses of 25% for farmers and 5.8% for marketers. While farm income was significantly influenced by access to credit ($P<0.01$) and farm size ($P<0.05$), post-harvest losses did not show a significant effect on farm income or marketing margin. Marketing margin was positively influenced by years of education ($P<0.1$). Farmers primarily stored cocoyam in well-dug holes (70%), while marketers stored theirs in empty rooms (97.5%). Key constraints faced in preventing losses include inadequate information, limited capital, poor infrastructure, and insufficient storage facilities. The study concludes that although post-harvest losses are prevalent, their direct effect on income and margins is limited, with socio-economic factors playing a more significant role. The study recommends targeted financial interventions, investment in storage infrastructure, farmer education on post-harvest handling, and support through cooperatives to enhance cocoyam value retention and improve rural livelihoods.

Keywords: Postharvest management, Agricultural marketing, Rural livelihoods, Supply chain efficiency, smallholder farmers.

INTRODUCTION

Agriculture remains a cornerstone of Nigeria's economy, contributing over 24% to the Gross Domestic Product (GDP) and serving as a primary livelihood source for rural households (FAO, 2024; NBS, 2021). With a population exceeding 200 million, more than 70% of Nigerians engage in agriculture, primarily at the subsistence level (FAO, 2025). Despite its vital role in food security and poverty reduction, Nigeria's agricultural sector is challenged by systemic inefficiencies, especially high postharvest losses.

Postharvest loss refers to the measurable decline in both the quantity and quality of agricultural produce from the time of harvest to the point of final consumption. In Sub-Saharan Africa, these losses are especially severe due to poor infrastructure, lack of access to storage technology, limited knowledge, and weak market linkages (Sugri et al., 2021).

According to the Food and Agriculture Organization (2021), nearly 14% of the world's food is lost postharvest, with losses in Sub-Saharan Africa disproportionately high, particularly for root and tuber crops. This represents not only a loss of food but also a significant reduction in farmers' income and market supply (Rutta, 2024).

Cocoyam (*Colocasia esculenta* and *Xanthosoma sagittifolium*) is a significant food and income crop in Nigeria, ranking third among tuber crops after yam and cassava. It is nutrient-rich, drought-tolerant, and widely consumed across many households. In many tropical areas, cocoyam plays major role in the lives of many as a food security crop, mainly for smallholder farmers (Wada et al., 2019). Nigeria remains the largest producer of cocoyam in West Africa (CGAIR, 2020). However, cocoyam is highly perishable and sensitive to temperature and humidity, making it vulnerable to rapid spoilage when postharvest systems are inefficient. The potential of the crop remains underutilized due to high postharvest losses and weak market systems (Azubuike et al., 2023). These losses affect both production and marketing, leading to low profitability for farmers and traders, especially women who dominate the cocoyam value chain (Banks, 2023).

Poor postharvest handling, inadequate storage, weak logistics, and low awareness of improved preservation techniques have been identified as critical factors contributing to losses in root and tuber crops (Sugri et al., 2021). Moreover, in the absence of storage facilities, smallholder farmers are often compelled to sell their harvests immediately at low prices to avoid spoilage, reducing their bargaining power and earnings. Meanwhile, traders face challenges in preserving the product during transport and retail, which affects marketing margins. Moreover, with growing concerns over food security and increasing urban demand, reducing postharvest losses is now widely recognized as a cost-effective strategy to increase food availability and stabilize rural livelihoods (FAO, 2018; Willett et al., 2019).

While postharvest losses have been extensively studied for major staples like rice, maize, and tomatoes (Ibrahim et. al., 2022; Eze, 2023), limited research exists on the specific economic impact of these losses on cocoyam, particularly at the subnational level. This study addresses that gap by assessing the extent of postharvest losses and their effect on farm income and marketing margins among cocoyam farmers and marketers in Nsukka Local Government Area of Enugu State.

The study is guided by the following research questions:

1. What are the estimated postharvest losses incurred by cocoyam farmers and marketers annually?
2. What is the effect of these losses on farm income and marketing margins?
3. What preventive strategies are employed by farmers and marketers?
4. What constraints hinder effective postharvest loss reduction?

By answering these questions, the study contributes to policy and practical interventions aimed at reducing losses, increasing profitability, and enhancing food system resilience in Nigeria. Addressing postharvest losses in cocoyam production is critical not only for improving income and market efficiency but also for enhancing food availability and sustainability in the face of increasing population and demand. Thereby achieving the SDG 2 goal, which targets to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture (Ogundele, 2022).

RESEARCH METHODOLOGY

The study area is the Nsukka Local Government Area (LGA) of Enugu State, Nigeria. The area is made up of sixteen towns, which consist of Opi, Ede-Oballa, Lejja, Obimo, Edem, Alo-Uno, Eha-Ndiagu, Ibagwa Ani, Okutu, Okpaligbo, Nsukka, Anuka, Ehalumona, Okpuje Obukpa and Igbwa Agu (Ozor et al., 2015).

Multi-stage sampling was used in selecting respondents for the study. In the first stage, two communities were randomly selected from the sixteen communities that make up the Nsukka local government. In the second stage, twenty cocoyam farmers and twenty cocoyam marketers were randomly selected from each of the two communities, giving a total of forty cocoyam farmers and forty cocoyam marketers. The total number of respondents for the study is eighty (80).

Primary data was used for this study. The data were obtained using a structured questionnaire. The questionnaire was administered to the farmers and marketers. The questionnaire captured information on areas such as: socio-economic characteristics of cocoyam farmers and marketers, quantities of cocoyam lost by farmers and marketers in a year, inputs and outputs information, marketing costs and prices, measures used by farmers and marketers to prevent post-harvest loss and the constraints faced by farmers and marketers in preventing post-harvest losses.

The collected data was analyzed using descriptive statistics such as frequency distributions, percentages, and inferential statistics. Objectives i, ii, iv and v (Likert scale rating techniques) were achieved using descriptive statistics, objective iii was achieved using multiple regression analysis, but first cost benefit analysis and market margin analysis were done to get the farm income and market margin that was imputed into the regression model as the dependent variable.

Model Specification

The market margin is calculated by finding the price variations at different segments of the market value chain and comparing them with the final price to the consumer. The consumer price is the base for all market margins. The formula is stated as follows:

MM=RP - FS

Where MM= Market margin;

FS= Farm share;

RP=retailers price

Cost benefit analysis can be explained as a procedure for estimating all costs involved and possible profits to be derived from a business; it is calculated by comparing two parameters, which are the total expected cost of each option with its expected benefits. (Norton, 2013). Using benefit cost ratio, the net benefit will be divided by the total cost, and if at the end of the calculation, the benefit-cost ratio is greater than 1; it means that the business is in good sharp but if the benefit-cost ratio is less than 1 then the business is in bad condition.

Benefit Cost Ratio = Net Benefit/Total Cost

Where BCR = Benefit cost ratio

C=Total cost incurred

B=Total benefit received

Multiple Regression Model

The multiple regression model was used to analyse the effect of post-harvest loss on farm income and market margin. The implicit form of the regression model to be used is:

Model 1

$$Y = f\left(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8\right) + U$$

Where:
Y= farmer's income/ revenue (₦)

X1= Sex (l if male, 0 if female)

X2= Age (in years)
X3= Marital status (1 if married, 0 otherwise).
X4= Education level (Years of schooling)
X5= House hold size (number)
X6= Primary occupation (Farming=1, otherwise=0)
X7=Farm size (Hectare)
X8=Farming experience (in years)
U=Stochastic error term

Model 2

$$Y = f\left(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8\right) + U$$

Where:

Y= market margin (₦)

X1= Sex (l if male, 0 if female)

X2= Age (in years)

X3= Marital status (1 if married, 0 otherwise).

X4= Education level (Years of schooling)

X5= Primary occupation (Farming=1, otherwise=0)

X6=Farming experience (in years)

X6=Years of experience marketing

U=Stochastic error term

Assuming a linear relationship, the explicit form of the model becomes:

$$= f\ (\beta_0 + \beta_1 X_1 + X_2 X_2 + X_3 X_3 + X_4 X_4 + X_5 X_5 + X_6 X_6 + X_7 X_7 + X_8 X_8) + U$$

Where

Y = dependent variable (Farm income or market margin)

$X_1 - X_8$ = independent variables

β_0 = intercept

β_i = coefficients

U = error term

Table 1 Description of explanatory variables used in the multiple regression models and apriori expectation.

Explanatory variable	Parameter	Variable	Expected sign (apriori expectation)
Sex (dummy1=male, 0=female)	β_1	X_1	$\pm$
Age (years)	β_2	X_2	$\pm$
Marital status (dummy1 if married, 0 otherwise)	β_3	X_3	$\pm$
Educational level (years of schooling)	β_4	X_4	$\pm$
Household size (number of persons in the Household)	β_5	X_5	$\pm$
Primary occupation (dummy 1 if crop farming Otherwise)	β_6	X_6	$\pm$
Farm size (hectares)	β_7	X_7	$\pm$
Farming experience (years)	β_8	X_8	$\pm$
Income (naira)	β_9	X_9	$\pm$

Likert Scale Rating Technique

A 5-point Likert scale was used in this study to assess the constraints faced by farmers and marketers in preventing post-harvest losses. The scale followed this order: Strongly Agree (SA) = 5; Agree (A) = 4; Neutral (N) = 3; Disagree (D) = 2; Strongly Disagree (SD) = 1. The total value of the scale added up to 15, which, when divided by 5, yielded a mean score of 3.0 (i.e., 5 + 4 + 3 + 2 + 1 = 15; 15 ÷ 5 = 3.0), serving as the cutoff point. The mean score for each response item was calculated, and any value equal to or greater than 3.0 was interpreted as agreement with the constraint, while a score below 3.0 was interpreted as disagreement.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The result in Table 2 shows that a greater proportion of the farmers were males, while females accounted for 45%. On the other hand, the majority of the marketers (95.0%) were females while males accounted for only 5.0%. This shows that females mostly dominate cocoyam marketing. The average age of farmers is 54.55, meaning that many farmers are adults, and the average age of marketers is 45.9. The respondents' ages are important because they give an indication of how the respondents will likely reason and contribute physically to production.

The majority of both farmers and marketers had household sizes ranging from 4 to 6, with an average of 5 members. This suggests that most respondents operate within moderately sized households, which may influence labor availability for postharvest activities, especially in contexts where family members contribute to farming and marketing operations. Household size, in this context, reflects the number of individuals living together and sharing resources such as food, shelter, and income. The results also show that 42.5% of farmers interviewed attained secondary education, while 58.55% of marketers attained secondary education, and 12.5% of the farmers had no education. This implies that most of the respondents were literate and could learn any new technology involving production and can adopt any marketing technology if brought to them. The majority of the respondents (85%) sourced their capital from their savings, which is regarded as no access to credit, while the remaining 15% sourced their capital from cooperatives, banks, friends and family, which is regarded as access to credit.

A greater proportion of the respondents interviewed had farming (82.5%) and marketing (95%) as their primary occupation. On average, the farmers had a farming experience of 21years while the marketers had marketing experience of 10years. Half of the marketers were wholesalers and the remaining half were retailers. The results also show that most of the farmers (80%) had a farm size of less than or equal to 0.5. This implies that most of the farmers are subsistence farmers. The size of land a farmer controls at a given period of time will practically determine to some extent the input range, cropping pattern he will adopt and the quantity of output he is expected to obtain.

Table 2. Socioeconomic characteristics of cocoyam farmers and marketers

	Farmers (N = 40)			Marketers (N = 40)		
Variables	Frequency	Percentage	Mean	Frequency	Percentage	Mean
Sex						
Male	22	55.0		2	5.0	
Female	18	45.0		38	95.0	
Age (years)						
21-40	8	20			42.5	
41-60	16	40			40	
61-80	16	40	54.55		17.5	45.9
Marital status						
Married	37	92.5		39	97.5	
Others	3	7.5		1	2.5	
Household size						
1-3	9	22.5		12	30.0	
4-6	19	47.5	5.0	22	55.0	5.0
>6	12	30.0		6	15.0	
Year spent in formal education						
No education	5	12.5		0	0	
Primary	15	37.50	8.28	14	38.89	9.64
Secondary	17	42.5		21	58.55	
Tertiary	3	7.5		1	2.78	
Sources of capital invested						
Personal savings	34	85.0		34	85.0	
Loan from cooperatives	1	2.5		3	7.5	
Loan from bank	2	5.0		3	7.5	
Friends and relatives	3	7.5		-	-	
Primary occupation						
Farming	33	82.5		2	5.0	
Trading	6	15.0		-	-	
Hired labour on farm	1	2.5		-	-	
Marketer	-	-		38	95.0	
Years of experience in primary occupation						
1-10	9	22.5		28	70.0	
11-20	14	35.0	21.40	10	25.0	10.02
21-30	8	20.0		1	2.5	
>30	9	22.5		1	2.5	
Level of marketing chain						
Wholesaler	-	-		20	50.0	
Retailer	-	-		20	50.0	
Size of farm (hectares)						
≤ 0.5	32	80.0				
0.6-1	6	15.0	0.42			
>1	2	5.0				

Source: Field survey, 2021

Quantity of Cocoyam Lost by Farmers and Marketers

Quantity of cocoyam lost by farmers

As presented in Table 3, half of the surveyed farmers reported experiencing postharvest losses of between 1% and 20% of their total annual cocoyam harvest. An additional 12% indicated losses ranging from 21% to 40%. While the minimum reported loss was 2.6%, the maximum reached as high as 66.7%, highlighting the wide variability in postharvest loss levels among respondents.

These findings suggest that postharvest losses are a significant issue for cocoyam producers, even if the majority report relatively moderate losses. Such losses reduce both the quantity of food available and the potential income that farmers could generate. The variation in loss percentages may be attributed to differences in access to storage facilities, preservation knowledge, and infrastructure across farming households.

This result aligns with the findings of Sugri et al. (2021), who reported that postharvest losses in root and tuber crops are often exacerbated by poor handling practices, inadequate storage, and limited market access. Similarly, Rutta (2024) highlighted that such losses represent a substantial economic burden for smallholder farmers, particularly those dealing with perishable crops like cocoyam.

Table 3. Quantity of cocoyam lost by farmers

Quantity lost in (%)	Freq	Percent	Minimum	Maximum	Mean
1-20	20	50			
21-40	12	30	66.67	2.63	25.20
41-60	7	17.5			
61-80	1	2.5			

Source: Field survey, 2021

Quantity of cocoyam lost by marketers

As detailed in Table 4, the majority (70%) of cocoyam marketers reported annual postharvest losses between 0% and 5% of the total quantity purchased, while 17.5% experienced losses ranging from 6% to 10%. The maximum reported loss was 25%, and the minimum was 0.3%, with an average loss of 5.8%.

These findings indicate that cocoyam marketers experience relatively lower postharvest losses compared to farmers. This disparity may be attributed to factors such as shorter handling periods, better access to local markets, and the adoption of improved storage and transport practices. The lower loss rate among marketers could also reflect their economic motivation to reduce spoilage and maximize profit margins.

However, these results contrast with earlier findings by Ugwu and Umeh (2015), who reported postharvest losses as high as 40–60% among cocoyam producers. The discrepancy may be due to differences in geographic scope, market structure, or recent improvements in postharvest management among traders in the study area.

Recent studies support the notion that postharvest losses remain a significant concern in Nigeria. For instance, the Food and Agriculture Organization (FAO) (2024) reported that Nigeria loses approximately 50% of its agricultural produce postharvest, primarily due to inadequate storage and transportation facilities. Similarly, the Nigerian Society of Engineers (NSE) (2024) highlighted that about 40% of Nigeria's agricultural output is lost to postharvest activities, emphasizing the need for improved storage facilities, cold chains, and transportation networks.

Furthermore, innovative approaches are being explored to mitigate these losses. A study by Fru and Vange (2023) demonstrated that the use of organic plant extracts, such as neem and alligator pepper, effectively extended the shelf life of cocoyam during storage, suggesting potential low-cost preservation methods for traders .

The relatively low average loss (5.8%) observed among marketers in this study underscores the effectiveness of certain postharvest handling practices and highlights the potential benefits of adopting improved storage and transportation methods. However, the persistence of losses, even at lower levels, indicates the need for continued investment in postharvest infrastructure and training to further reduce waste and enhance profitability within the cocoyam value chain.

Table 4. Quantity of cocoyam lost by marketers in a year

Quantity lost in (%)	Freq	Percent	Minimum	Maximum	Mean
0-5	28	70			
6-10	7	17.5			
11-15	1	2.5	0.3	25	5.8
16-20	1	2.5			
21-21	3	7.5			

Source: Field survey, 2021

Effects of Post-Harvest Losses on Farm Income and Marketing Margin

Effects of post-harvest losses on the farm income of cocoyam farmers

Table 5 presents multiple regression results assessing the effect of postharvest loss and other socio-economic factors on farm income.

Table 5: A multiple regression result showing the effect of post-harvest loss on the farm income of cocoyam farmers (Linear functional form).

Variables	Coef.	St. Err.	P-value	Mean	Std.
Sex	-262696.5	205900.1	0.212	1.45	0.50
Age	-18899.34	9698.937	0.061	55.03	16.34
marital status	127637.2	331282.4	0.703	1.97	0.28
household size	46196.14	50503.19	0.368	5.15	2.47
Years of education	6480.436	26261.23	0.807	8.27	4.368
Years of experience	8740.923	7509.19	0.254	0.13	0.335
Size of farm in hectares	862720.1	315839	0.010**	21.40	13.36
Total quantity of cocoyam lost	3175.388	5788.628	0.587	0.4185	0.35
Access to credit	648989.9	223635.7	0.007***	25.20	15.83
Cons	937762.9	731867.2	0.210	660962.7	589237.6
Number of the obs = 40					
F (9, 30) = 3.20					
Prob > F = 0.0078					
R-squared =0.4900					
Adj R-squared =0.3370					
Root MSE=4.8e+05					

Note: *** and ** indicates significance level of 1% and 5% respectively.

Source: field survey, 2021

The model yielded a coefficient of determination (R^2) of 49.0%, indicating that nearly half of the variability in farm income is explained by the explanatory variables included in the model. The F-statistic ($F = 9.30$, $p = 0.0078$) confirm that the model is statistically significant, suggesting that the included socio-economic factors collectively exert a meaningful influence on farm income.

Among the variables, access to credit emerged as a significant ($p < 0.001$) and positive determinant of farm income. This finding underscores the critical role that financial access plays in enhancing farmers' income-generating capacity. Limited access to credit can constrain farmers' ability to invest in proper storage infrastructure, such as well-ventilated rooms, which can exacerbate postharvest losses, particularly in perishable crops like cocoyam, and ultimately reduce income. This result aligns with the findings of Opata and Ogbonna (2015), who reported that 75% of farmers required credit to improve their storage practices. This is further supported by more recent studies such as Assouto and Houngbeme (2023) and Boansi et al. (2024), who found that access to finance significantly improves agricultural productivity and income through better resource use and risk mitigation. The consistency between our results and previous studies highlights the persistent and widespread nature of credit constraints in smallholder farming systems.

Furthermore, farm size was found to significantly and positively influence farm income. This is expected, as larger farm sizes typically enable higher production volumes, translating into increased income. This finding corroborates earlier studies from Noack and Larsen (2019) and Omotilewa et al. (2021) that have linked larger landholdings with improved agricultural productivity and income. The implication here is that policies that facilitate land consolidation or more secure access to cultivable land could enhance the income potential of smallholder farmers.

Interestingly, postharvest loss itself was not found to have a statistically significant effect on farm income in the model. This may suggest that while postharvest losses are a concern, their direct impact on income might be mediated by other factors such as credit access, storage practices, or crop type. Alternatively, the lack of significance could be due to underreporting or the inability of farmers to quantify their losses accurately. The finding contrasts with some earlier studies (e.g., Affognon et al., 2015, Wongnaa et. al., 2023) that reported a direct income effect of postharvest loss, but is in agreement with research by Chegere (2018), which suggests that the economic impact of postharvest loss can vary widely depending on the crop, market conditions, and mitigation practices in place.

Effects of post-harvest losses on the marketing margin of cocoyam marketers

Table 6 shows the multiple regression result of the effect of postharvest loss on the marketing margin of cocoyam marketers.

Table 6. Multiple regression result showing the effect of post-harvest loss on marketing margin of cocoyam marketers (Linear functional form).

Variables	Coef.	St. Err.	P value	Mean	Std. Deviation
Sex	20.78	19.03	0.28	1.95	0.22
Age	-0.02	0.36	0.97	45.9	14.10
household size	-0.54	2.16	0.81	5.0	1.71
Years of education	2.01	1.16	0.09*	9.64	3.08
Access to credit	-4.47	5.03	0.38	10.20	11.29
Total quantity of cocoyam lost	-0.31	0.71	0.66	0.13	0.34
Years of experience	0.29	0.63	0.65	5.81	6.41
Cons	-33.82	46.85	0.48	18.05	15.91
Number of the obs = 36					
F (7, 28) = 0.71					
Prob > F = 0.67					
R-squared =0.15					
Adj R-squared =0.06					
Root MSE=16.98					

Note: * indicates significance level of 10%.

Source: field survey, 2021

The regression analysis showed a coefficient of determinant (R^2) of 15.0%, indicating that the socio-economic variables included in the model explain only 15.0% of the variation in market margin among the marketers. Additionally, the F-statistic value of 7.28 was not statistically significant (p = 0.6668), suggesting that, collectively, the socio-economic variables do not have a significant overall effect on market margin in this context. Interestingly, postharvest loss itself was not found to have a statistically significant effect on the marketing margin in the model. This may suggest that while postharvest losses are a concern, other unobserved factors, such as market infrastructure, transportation costs, price volatility, or informal market dynamics, may play a more dominant role in influencing market margins than the socio-economic variables considered in the model.

Despite the model's low overall explanatory power, years of education were found to have a statistically significant and positive influence on market margin. This result aligns with theoretical expectations and suggests that education enhances marketers' ability to access, process, and apply market-related information effectively.

. Educated marketers are more likely to adopt improved business strategies, understand pricing trends, engage in record keeping, and take advantage of digital marketing tools, all of which can contribute to higher profit margins. This finding is consistent with recent studies such as Koner, N., & Laha, A. (2024) and Sam et. al., (2024), which report that higher educational attainment improves marketing efficiency and increases returns in agricultural trade. Therefore, the positive relationship between education and market margin reinforces the importance of investing in capacity-building and adult education for small-scale agricultural marketers.

Different measures farmers and marketers use to prevent postharvest losses

Table 7 presents the results of the different measures employed by farmers and marketers to handle cocoyam and prevent post-harvest losses.

Table 7: Different measures farmers and marketers use to prevent postharvest losses

	Farmers		Marketers	
Prevention of post-harvest losses	Frequency	Percentage	Frequency	Percentage
Implement for harvesting				
Hoe	40	100	-	-
Measures used to prevent postharvest losses				
Store in empty room	10	25.0	39	97.5
Sun drying	2	5.0	-	-
Storage in hole	28	70.0	1	2.5
Time for harvesting cocoyam				
Early morning	35	87.5	-	-
Evening	4	10.0	-	-5
Mid afternoon	1	2.5	-	-
Transportation of cocoyam to store				
Use of well ventilated vehicle	19	47.5	39	97.5
Use of wheel barrow	20	50.0	1	2.5
Use of head pan	1	2.5	-	-
Storage of your product				
Use of mud silos	1	2.5		
Well dug hole	30	75.0		
Use of basket	9	22.5		
Processing and packaging products	-	-	40	100

Source: Field survey, 2021

The findings reveal a continued reliance on traditional methods among cocoyam farmers, particularly in harvesting and storage practices. All farmers used hoes for harvesting, indicating limited mechanization at the farm level. While hoes are affordable and widely accessible, their use also reflects the labour-intensive nature of cocoyam production, which may affect efficiency and productivity, especially for larger farm sizes.

In terms of storage, 70% of farmers stored cocoyam in pits, 25% in empty rooms, and only 5% practiced sun drying. This corroborates the findings of Olayemi et al. (2012), who reported that farmers use the traditional method of storage for all produce. These conventional storage methods are often inadequate for prolonging shelf life and preventing spoilage. The limited use of improved storage facilities underscores the knowledge and infrastructure gap that contributes to postharvest losses. This aligns with findings by Obi-Egbedi and Ifoga (2023) and Sugri et al. (2021), who reported that root and tuber farmers in Nigeria and other parts of Sub-Saharan Africa continue to rely on inefficient postharvest practices due to poor access to modern preservation technologies.

In contrast, nearly all marketers (97.5%) stored cocoyam in empty rooms, and only a few (2.5%) used pit storage. This suggests that traders, unlike farmers, may have better access to indoor storage spaces and are more conscious of minimizing spoilage to protect market value. However, the absence of proper processing and packaging among marketers is a missed opportunity. These value-adding practices are essential for extending shelf life, enhancing market appeal, and reducing losses, especially during transportation and retail.

Transportation practices also revealed notable differences. While 50% of farmers used wheelbarrows to move harvested cocoyam, likely due to affordability and poor rural road conditions, marketers predominantly used well-ventilated vehicles (97.5%). This not only suggests that marketers operate over longer distances but also demonstrates their greater investment in loss-reducing practices. This is supported by Ayandiji et al. (2011), who emphasized that the use of ventilated vans significantly reduces spoilage compared to more rudimentary means like bicycles or motorcycles.

Regarding harvest timing, most farmers (87.5%) harvested cocoyam early in the morning. This practice helps reduce heat-induced spoilage and physical damage, as tubers harvested during cooler hours are less susceptible to deterioration. Proper timing of harvest is thus a critical component of postharvest management, as emphasized in previous studies (FAO, 2021).

Overall, the findings suggest that while marketers are more likely to adopt postharvest loss-reducing strategies, farmers still depend on traditional practices, which may limit their income and reduce the quality of produce entering the market.

Constraints faced by farmers and marketers in preventing postharvest losses

Table 8 presents the results of the constraints faced by farmers and marketers in preventing post-harvest losses.

Table 8: Constraints faced by farmers and marketers in preventing postharvest losses

Constraints	Farmers Mean	Std. deviation	Marketers Mean	Std. deviation
Lack of information	4.42*	0.931	3.77*	1.368
Lack of capital	4.25*	0.809	4.02*	1.310
Lack of infrastructures	4.08*	0.997	4.40*	0.744
Lack of storage facilities	3.75*	1.171	3.17*	1.647
High degree of perishability	2.82	1.412	2.93	1.289
High rate of pest and diseases attack	2.68	1.457	2.20	1.363

Source: Field survey, 2021

The findings highlight that a lack of information on postharvest loss prevention is the most pressing constraint for farmers, while marketers are most hindered by inadequate infrastructure. This suggests that farmers are not adequately reached by extension services, limiting their awareness of modern storage and handling practices. The high mean score for lack of capital among both groups also indicates that financial constraints hinder investment in improved technologies and facilities. Marketers' emphasis on infrastructural deficiencies reflects the logistical challenges they face in accessing rural markets, especially during the rainy season when roads become impassable. This finding aligns with Abbas et al. (2018), who reported that poor road networks significantly affect cocoyam marketing and that 17% of producers identified infrastructure as a key barrier to production. The weak link between farmers and extension services exacerbates this problem, as most farmers are not exposed to innovations that could reduce postharvest losses. Overall, the limited access to information, finance, and physical infrastructure constrains efforts to upgrade the cocoyam value chain and reduce inefficiencies that lead to losses.

CONCLUSION AND RECOMMENDATIONS

This study revealed that although postharvest losses in cocoyam production and marketing are prevalent, they do not have a statistically significant direct effect on farm income or marketing margins in the study area. Instead, socio-economic factors such as access to credit, farm size, and years of education were found to significantly influence income and profitability. These findings suggest that improving financial access, land productivity, and education are more critical for enhancing economic outcomes than focusing solely on postharvest losses.

Nonetheless, the continued reliance on traditional storage and handling methods, alongside constraints like limited capital, inadequate infrastructure, and lack of information, highlights the need for integrated interventions. Enhancing rural credit schemes, securing land access, and investing in adult education and extension services can boost both income and marketing efficiency. Similarly, upgrading rural roads and storage infrastructure and promoting cooperative membership will improve access to inputs, markets, and information. While postharvest loss reduction remains relevant, it should be embedded within broader support strategies that address the structural limitations faced by smallholder farmers and marketers. Strengthening these areas will not only improve livelihoods but also support sustainable food systems and rural development.

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