

Effects of Post Harvest Losses in Cassava Production in Okpe Local Government Area of Delta State, Nigeria

Mgbakor Miriam N¹, Ugwu J N¹ and Ukerun J¹

Department of Agric. Economics and Extension, Enugu State University of Science and Technology, Enugu, Nigeria.

Corresponding Author: Mgbakor Miriam N.mmamngo2000@yahoo.com

ABSTRACT

This study was embarked upon in order to investigate the effects of post harvest losses on cassava production in Okpe Local Government Area Delta State. Eight communities were randomly selected and ten cassava farmers were selected to give a total sample size of eighty respondents. The primary data were obtained by the use of structured questionnaire, oral interview, while secondary data were collected by the use of text books, journals and magazine etc. Data analysis was accomplished by means of descriptive statistical tools like the mean, percentages and tables etc. Findings indicate that cassava production in the study area suffers many limitations, which includes post harvest losses through peeling and root deterioration spoilage, which results mainly to economic losses and price discounts. It also showed from the findings, the farmers has the hand and manpower to produce on medium and large scale, and if post harvest losses are minimized, farmers will be encouraged to produce more and in turn, contribute to economic development. These can be done by educating farmers on processing and storage techniques and on how to harvest and handle their harvest with care.

Keywords: Cassava production, Post harvest losses, Farmers, Journals and Agriculture

INTRODUCTION

Cassava (*Manihot esculenta*) also called manioc, tapioca, yucca is a member of the family of *Euphorbiaceae* and it is one of the oldest crops cultivated by human beings, although the early history of cassava is still a mystery [1, 2 and 3]. Under the near subsistence farming condition in which most of the Nigeria cassava farmers are producing, the normal method of overcoming this difficulty is to leave the plant in the ground until needed [4, 5, 6 and 7].

It was also estimated by the University of Georgia (1972) that about 30% of the harvested cassava is lost through manual peeling. To this effect [8, 9, 10, 11, 12 and 13] highlighted on its important role and called on the government to pursue policies to ensure its rapid expansion and minimization of post harvest losses, so as to ensure adequate food domestic uses arid improve income generation. IITA (International Institute of Tropical Agriculture) Research briefs (Sept. 1990) highlighted that improvement of Post

harvest processing and utilization techniques in cassava would greatly increase labour efficiency and productivity raise incomes and standard of living for cassava farmers, as well as help the urban poor. It would also enhance the shelf life of products, make their opportunities and upgrade their nutritional value. Internal contribution from environment and international agencies have come to support cassava and other root crop production and processing within the country. Contributions to agricultural development (IFAD) has made significant contributions to agricultural development programme, especially cassava post harvest minimization programmes. In spite of the efforts and financial commitments to expand the production of this crops and make it readily available and affordable, and in spite of the fact also that the crop is well adapted to diverse traditional storage and processing systems, post-harvest losses are still abound in some

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communities. One of such areas is Okpe Local Government Area in Delta State.

Cassava (*Manihot esculenta* crants) is one of the most important staple food crops grown in tropical Africa [14, 15, 16, 17 and 18]. Its importance has grown crop in Nigeria. It provides food/feed for humans and animals as well as raw materials for Agro industries. Both the federal and other international organization have put a lot of research and financial supports, to enhance its production.

In spite of the above, some localities like Okpe Local Government Area are still experiencing post-harvest losses. One of the major constraints affecting utilization of this crop is the high perish ability of the tuberous root and unless special storage procedures are adopted, deterioration commence soon after harvest [19, 20, 21 and 22].

Moreover, problem of losses due to manual peeling is also uncounted in the area. It was estimated by the University of Georgia (1972) that about 3% of the harvested root is lost during peeling. In

MATERIAL AND METHODS

THE STUDY AREA

The study area was Okpe Local Government Area. The Local Government is one of the twenty-one Local Government Areas that made up Delia State. Okpe Local Government has a territory of about 500 square kilometer (about 200 square miles) and it is the largest of the Ui hobo language, yet the Okpe Language is very distinct. The cocentral capital city of Okpe people is Orerokpe Okpe Local Government with headquarter at Oreropke and a population of 128,398 according to 2006 census. In the north, River Ethiope separates Okpe territory from Urhobo of Oghara, Mosogar Idjerhe (Jesse) communities. To the north west, Okpe share boundaries with Itsekiri community by Okpe settlement of Ugbokodo and Ughoton on the side of the river and the Itsekiri village of Omadino on the other side of the river. The communities are: Adagbrassa, Otta, Agbalokpe, Ugolo, Orerokpe, Oviore, Omiegwa, Oghoton and Ugborhen. In the north, River Ethiope separates Okpe territory from Urhobo of Oghara, Mosogar and Idjerhe (Jesse) communities. To the

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view of the fact that cassava is extensively cultivated in the area, it is therefore necessary to carry out a study of post harvest losses of cassava in the area, for possibly ways of minimizing such losses.

OBJECTIVES OF THE STUDY

The broad objective of this research study was to investigate the effects of post harvest losses on cassava production in Okpe Local Government Area of Delta State.

The specific objectives were to;

1. Determine the socio-economic characteristics of cassava producers and processors in the area.
2. Identify the causes of post-harvest losses in cassava.
3. Examine the techniques and methods of cassava storage and processing in Okpe Local Government.
4. Analyze the possible ways of minimizing post harvest losses in cassava.

North West, Okpe share boundaries with Itsekiri community by Okpe settlements of Ugbokodo and Ughoton on the side of the river and the Itsekiri village of Omadino on the other side of the river.

PHYSICAL ENVIRONMENT AND CLIMATE

The physical features of Okpe territory include: being characterized by lowlands, swampy forest with evergreen trees of mangrove type of vegetation. There is a network of rivers, streams and creeks. It is agriculturally important for its roots and vegetable crop production.

SAMPLING TECHNIQUES

The multi-stage random sampling technique was used to select 8 communities out of the nine (9) communities, from which 10 respondents was selected doing sample random techniques to arrive at a total sample size of 80 respondents. The eight (8) communities selected were Adagbrassa, Oha, Aghalokpe, Ugolo, Orerokpe, Oviore, Omiegwa and Oghoton.

DATA COLLECTION

The data was collected from two major sources which were the primary and secondary sources. The primary data was

those first hand information which was got from distributed structured questionnaires, oral interviews as well as personal observation and experience of the researchers who also came from the study area. The structured questionnaires were administered to eight (8) farmers that made up the sample size. Data relating to personal information of the respondents input and output data were collected, as well as data on problems of post-harvest losses in cassava. Any data collected through the structured questionnaires was then sourced through

the oral interview and supplemented with the personal observation.

The secondary sources entail researching for information to the research from relevant literatures, textbooks. Journals, annual reports of the state Agriculture Development Programme (ADP) and others.

DATA ANALYSIS

Data collection from the sources outlined above is analyzed using simple statistical tools like measure of central tendency, frequency distribution table, percentage, pie-chart and bar-charts. Objectives 1-4 were analyzed using descriptive analysis.

RESULTS AND DISCUSSION

Socio-economic Characteristics of

Respondents

The socio-economic characteristics of the respondent farmers include their age distribution, gender, marital status, level of education, family size, of farm holdings and source of farm labour. The results of the findings are presented in the table below:

From Table 1 above, greater number of respondents falls within the age interval

of 36 -50, with 50%, while only very few 6.25% representing 5 farmers falls above 65 years of age, 25% of the farmers fall between 20-35 years, while 18.75% falls within 51-65 years. The above implies that cassava production and processing in the area is in the hand of active farmers. This further implies that the productivity of the crop was enhanced in Okpe Local Government Area of Delta State.

Table 1: Distribution of respondents according to age

Age	No of respondents	Percentage (%)
20-35	20	25
36-50	40	50
51-65	15	18.75
Above	5	6.25
Total	80	100

In Table 2 above, 56.25% of the total respondents are male, while 43.75% of the respondents are female. The above shows that although men are in majority,

cassava production in Okpe Local Government Area is not restricted to any gender.

Table 2: Gender Distribution of the Respondents

Gender	No of respondents	Percentage (%)
Male	45	56.25
Female	35	43.75
Total	80	100

From Table 3 above, 62.5% of interviewed respondents were married, 25% of the respondents were unmarried, while only 12.5% were married, but widowed. This

shows that both the married and the unmarried are involved in cassava production in Okpe Local Government Area. It shows more of a family

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enterprise, as majority 62.5% and 50
farmed people due to its high labour

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demand, which can be easily supplied by
the family.

Table 3: Distribution of respondents according to marital status

Marital status	No of respondents	Percentage (%)
Married	50	62.5
Unmarried	20	25
Widow	10	12.5
Total	80	100

According to Table 4 above, only 6.25% of the respondents had no formal education at all, 31.25% of the respondents had only primary, while 43.75% had up to secondary education. It also shows that 18.25% of the respondents had above secondary education. Above secondary were included all those that had teacher

training certificates, OND, NCE and other such high certificates. A collection of these people are retired public servants. From the above, it shows that a greater number of cassava growers and processors in Okpe Local Government Area are educated in one level of education or the other

Table 4: Distribution of respondents according to their level of education

Types of Occupation	No of respondents	Percentage (%)
No of formal education	5	6.25
No of primary education	25	31.25
Secondary education	35	43.75
Above secondary	15	18.75
Total	80	100

From table above, it could be seen that 62.5% of respondent are full time farmers. This means they have no other occupation apart from farming. 437.5% of the respondents are however, part-time who combine farming with other business. The researcher from further

enquiry learnt that these people were mainly petty traders and primary, secondary school teachers. This is a good development implying that cassava production in Okpe Local Government has gone beyond the pre-occupation of professional farmers.

Table 5: Distribution of respondents according to their type of farming occupation

Types of Occupation	No of respondents	Percentage (%)
Full time farmer	50	62.5
Part time farmer	30	37.5
Total	80	100

Table 6: Distribution of respondents according to family size

No of Children	No of respondent	Percentage (%)
1-3	22	27.5
4-6	48	60
Above 6	10	12.5
Total	80	100

According to the above, 27.5% of the respondents have between 1-3 children, 60% have between 4-6 children, while only 12.5% of the respondents have moderate family size. This is however expected because of the high level of enlightenments of the farmers.

From Table 7 above, 15% of the respondents have less than 1 hectare. 50%

have between 1-2 hectares, while 35% of the respondents have 2 and above hectares, some of these farms are not close to each other, but are scattered. The above shows that the majority of the farmers have 1-2 hectares of land. It could be seen that they are mainly small holders.

Table 7: Distribution of respondents according to farm size

Farm Size	No of respondent	Percentage (%)
Less 1 ha	12	15
1-2ha	40	50
Above 2 ha	28	35
Total	80	100

In the table above, majority of the farmers rely on family labour for their operations (37.5%) only. 27.5% use hired labour, 1596 utilizes exchange labour, while 20% of the respondents are those who don't rely on one source only, but a combination of other sources. This implies that family labour is the most popular in Okpe Local Government Area, as it is the most readily available followed by hired labours. It also shows that exchange labour is the least in popularity. Distribution of

respondents according to what they understand as post harvest losses.

Table 9, gives the awareness to what is post harvest losses. It could be seen that only 27.5% of the respondents believe that losses via peeling is the only post harvest losses, while 72.5% of the respondents understand it to be losses due to deterioration or root spoilage. The above results show that the major problem cassava production is facing in Okpe Local Government Area is root deterioration.

Table 8: The sources of farm labour

Type of farm Labour	No of respondent	Percentage (%)
Family	30	37.5
Hired labour	22	27.5
Exchange labour	12	15
Combination of sources	16	20
Total	80	100

Table 9: Causes of Post Harvest Losses in Cassava

Post Harvest Labour	No of respondent	Percentage (%)
Losses from peeling	22	27.5
Losses due to deterioration	58	72.5
Total	80	100

From Table 10 above, only 7,5% of the respondents peel their cassava tuber mechanically. 77.5% of the total respondents perform their peeling mechanically using knives, while 15% of the respondents, soak tubers in water before peeling. The above results show that the most popular method of peeling

cassava is manually, using knife and other related materials. This implies that some of the harvested tubers are lost during manual peeling, which results to low productivity. This qualifies University of Georgia 1972 report that above 30% of harvested roots are lost during peeling.

Table 10: Distribution of respondents according to how they peel their cassava tubers

Method of Peeling	No of respondent	Percentage (%)
Mechanical	6	7.5
Manual	62	77.5
Stocking before manual	12	15
Total	80	100

From the above, 67.5% of the respondent indicated primary deterioration as their major loss, while 32.5% of the respondents said that it was secondary deterioration. The above results show that the most popular type deterioration affecting the people of Okpe Local Government Area is primary deterioration.

From table above, 33.75% respondents harvested their cassava root at the age of

6-10 months, only 3.75% of the respondents harvest at the age of 11-15 months, while 50% of the respondents, those that leave cassava in the ground for more than 20 months before harvesting. The results above show that the people in Okpe Local Government Area usually harvest their cassava roots at the age interval of 16-20 months. This usually leads to harvesting of more fibrous tubers.

From the table above, 15% of the respondents said they harvested when the soil is still wet, 7.5% of the respondents harvested when the soil is dry, while 77.5% of the respondents does not consider soil prior to harvesting. This shows that the farmer's in Okpe Local

Government Area does not consider the soil type before harvesting. Here, the researcher concluded that those that do not consider soil prior to harvest, usually harvest during the dry season (dry soil) because the period is when the greatest harvest are recorded in the area.

Table 11: Distribution of respondents according to the type of deterioration affecting them.

Type of Deterioration	No of respondent	Percentage (%)
Primary deterioration	54	67.5
Secondary deterioration	26	32.5
Total	80	100

From the table above, 17.5% of the respondents said they harvested their cassava tubers whenever the need arises, 27.5% of the respondents indicated harvesting before New Year. 47.5% of the respondents said they harvested their cassava roots at the start of the next planting season; while 7.5% of the respondents said they harvested their cassava tuber after new year but before the next rain. The above result shows that the highest period of cassava harvesting in Okpe Local Government Area is during the harmattan period of January to April before the rains. This implies that majority of the harvested cassava will

have bruises and will be damaged severely.

From Table 15 above, only 6.25% of the respondents harvest mechanically. The researcher observed that respondents are those that had more than two hectares of farm land, 35% of the respondents said they use hoe and machetes for harvesting, while 58.75% of the respondents said they pull the tubers from the ground with hand. The above result shows that hand pulling of cassava roots from the ground is the most popular method of harvesting cassava in the studied area. This implies that majority of cassava harvested in the study area are expected to have one type of mechanical damage or the other.

Table 12: Distribution of respondents based on the age at which they harvest their cassava tubers

Age of harvest (month)	No of respondent	Percentage (%)
6-10	27	33.75
11-15	3	3.75
16-20	40	50
Above 20	10	12.5
Total	80	100

Table 13: Distribution of respondents according to the nature of soil they harvest on

Soil	No of respondent	Percentage (%)
Wet soil	12	15
Dry soil	6	7.5
Does not consider	62	77.5
Total	80	100

Table 14: Distribution of the respondents based on the time they harvest their tubers

Period of harvest	No of respondent	Percentage (%)
Whenever you need cassava	14	17.5
Before the year end	22	27.5
At the starting of the next Farming season	38	47.5
After the new year and Before the first rain.	6	7.5

Table 15: Distribution of respondents according to the method they use in harvesting cassava

Method of harvesting	No of respondent	Percentage (%)
Mechanical harvesting	5	6.25
Use of hoe and machetes	28	35
Hand pulling	47	58.75

TECHNIQUES AND METHOD OF CASSAVA STORAGE AND PROCESSING

From table 16 above, 25% of the respondents said they sell their cassava in tubers, only 12.5% of the respondents said they stored their cassava tubers. 95 of the respondents indicated processing their cassava tubers to another form. This

implies that the most popular ways of utilizing cassava tubers in Okpe Local Government Area is to process it to another form. This research observed may be due to lack of storage facilities.

Table 16: Distribution of respondents based on what they do with their harvest

Utility	No of respondent	Percentage (%)
Sale	20	25
Store	10	12.5
Process	76	95

Table 17: Distribution of respondents according to where they sell their tubers

Area of sale	No of respondent	Percentage (%)
At farm gate	16	20
In markets	38	47.5
To government and other agencies	26	32.5

From Table 17 above, 20% of the respondents sell their cassava tubers at the gate, 47.5% sell at the markets, while 32.5% of the respondents sell to government and other international agencies. The above shows that majority of cassava producers in the studied area take their cassava roots to market for

sale. This implies that the post harvest deterioration is likely to occur in the area as a result of the fluctuation of market demand.

From Table 18, 27.5% of the respondents store their cassava tubers using traditional methods,

Table 18: Distribution of respondents based on the method of storage

Method of storage	No of respondent	Percentage (%)
Cultural	42	2.552.5
Traditional	22	27.5
Modern	16	20

Table 19: Distribution of respondents based on the storage techniques they use

Storage techniques	No of respondent	Percentage (%)
Re-burial	38	47.5
Coating with paste of mud	16	20
Placing under water	8	10
Refrigerator	-	-
Coating with wax	-	-
Dipping in fungicide	4	5
Box	38	47.5
Field clamp	44	55
Trench	52	65

Table 20: Distribution of respondents based on the product they process cassava tubers into.

Cassava product	No of respondent	Percentage (%)
Garri	75	93.75
Starch	5	6.25
Cassava flour	16	20
Tapioca	20	25
Fermented cassava	32	40
Chips and pellets	24	30

Table 21: Reason for choice of processing forms

Reasons	No of respondent	Percentage (%)
Easy storage	52	65
Easy marketability	34	42.5
Easy consumption	22	27.5
To enhance the shelf	14	17.5

52.5% of the respondents store their products culturally by leaving the crop in the ground until needed while 20% of the respondents use modern methods of storage. The above shows that the most popular method of storing cassava roots in Okpe Local Government Area is to the crop in the ground until it needed. In terms of popularity form of processing 93.75% of the respondents rates garri as the most popular, followed by fermented cassava, with 40% of the respondents, chips and pellets 30% and 25%, while cassava flour and starch was indicated by 20% and 6,25% of the respondents. The reason for choosing processing form by farmer's response were given below:

From the Table 21 above, 65% of the respondents choose particular processing form for case of storability of the

product, 42,5% of the respondents process to ease marketability, while 27.5% and 17.5% of the respondents indicated easy consumption and enhancement of products shelf life respectively. That is to say the major reason why farmers process their cassava tubers into various forms is to make room for better storage. From table 22 above, 55% of the respondents procured cassava cutting from their old farm stead, while 5% of the respondents indicated that they bought from the market. 17.5% of the respondent indicated that they bought from ADP contract growers, while 22.5% of the respondents procure cutting from friends and neighbors. The above shows that majority of cassava farmers in the studied area are conservatives, which rely on the old cassava stem for their cutting.

Table 22: Distribution of respondents based on procurements of cassava cutting

Procurement	No of respondent	Percentage (%)
From old farm stead	44	55
From market	4	5
From ADP contract power	14	17.5
From friends and neighbor	18	22.5
Total	80	100

Table 23: Distribution of respondents based on quality of tubers they store

Quality stored	No of respondent	Percentage (%)
All harvested tubers	6	80
Few selected undamaged ones	16	20
Total	80	100

Table 24: Distribution of respondents based on their opinions on how to minimize post harvest losses

Ways of minimizing losses	No of respondent	Percentage (%)
Provision of processing and storage centers	40	50
Provision of processing facilities at subsidized rate	30	37.5
Provision of extension service on post harvest losses	65	81.25
Provision of markets for cassava and its products invitation of foreign	15	18.
Experts to assist in solving PHL	5	6.25

From the table above 80% of the respondents store all harvested cassava roots without differentiating them, while only 20% of the respondents said they

store only selected undermanaged roots, The above result shows the majority of the respondents, store all their harvested tubers without differentiating them. This

implies that care should be exercised during harvesting and handling to reduce damage to a minimum and should be selected for storage, since severely damaged roots have been shown to deteriorate more rapidly. As with all agricultural produce the success or failure of cassava storage method depends to a large extent on the condition of the product entering storage.

From the table above 50% of the respondents said the government should provide processing and storage centers,

37.5% of the respondents indicated provision of processing facilities to farmers at subsidy rate. 81.25% of the respondents said that government should provide extension services with message content of post harvest losses on cassava. Provision of the respondents, while 6.25% of the respondents think government should invite foreign experts.

The result above shows that there is more or less extension technical information on cassava production, storage and processing in the studied area.

Table 25: Distribution of respondents based on constraints to cassava post harvest losses

Constraints	No of respondent	Percentage (%)
Lack of capital	8	10
Lack of storage equipment	26	32.5
Lack of processing equipment	24	30
Lack of education on PHL	48	60

From Table 25 above, 10% of the respondents said that inadequate capital is their major constraints to post-harvest losses, 32% and 30% of the respondents indicated lack of storage and processing equipment respectively, while 60% of the respondents indicated that they lack education on and how to minimize post losses on cassava (*Manihot esculenta*). The above shows that the major constraints the respondents *an*-facing are lack of extension education on what are cassava post harvest and ways of minimizing it.

From the table above 32.5% and 40% of the respondents indicated that they encounter losses and price discount respectively as a result of post harvest losses, 22.59-6 of the respondents indicated poor quality products as their consequences of postharvest losses, which only 17.5% of the respondents indicated little output. This shows that economic losses and price discounts are the major consequences cassava farmers are facing in Okpe Local Government

Area, because there is no market for poor quality product, these have qualified CIAT 2006 report, which stated that post harvest deterioration of cassava causes a reduction in roots quality, which can result in roots, been sold at a discount price. In addition, to direct physical losses in the crop, post harvest deterioration cause a reduction in root quality, which leads to price discount and contributes to economic losses. Cassava production and processing in Okpe Local Government Area is not the occupation of only one gender, as both men and women were equally practicing it. It is more or less a family enterprise as majority of the farmers are married with moderate farms and are within the active years. Cassava productivity in the area is hindered by mainly primary deterioration, while losses through peeling goes unnoticed. Cassava harvesting in Okpe Local Government Area is done via hand pulling and are usually at its peak after New Year and before the rains.

Table 26: Distribution of respondents based on their consequences due to PHL

Consequences of PHL	No of respondent	Percentage (%)
Economic losses	26	32.5
Price discount	32	40
Poor quality products	18	22.5
Little output	14	17.5

Majority of the farmers (52%) believe that leaving cassava tubers in the ground until needed is the safest method of storage. Among the constraints of post harvest losses me lark of extension education on post harvest losses and lack of extension education on post harvest losses and lack of storage equipment and consequences of economic losses arid price discounts.

Cassava is an important staple food in the sustenance of the economy. Since it is consumed by every family in one form or the other. It could be a good avenue of curtailing hunger and poverty among the people. Since Okpe Local Government Area is an agrarian place, the government arid the farmers must work hard to minimize post harvest losses on this all-

CONCLUSION

To help minimize cassava post harvest losses in the area, the farmers strongly believe that government of the day has a lot to do in providing the storage center, recruitment and posting of extension agents to the areas as well as provision of processing equipment to farmers at subsidized price among other things.

important crop in the area. A lot of farmers in the study area known about many technologies in cassava production and processing, yet the impact of extension activities are not felt by the farmers, hence, the researchers should go into the problems and prospects of agricultural extension activities in Okpe Local Government Area.

RECOMMENDATIONS

Based on the above findings, the following recommendations are made:

- Government should see cassava production as a priority project to bring about poverty alleviation among the people and as such should do all things possible to minimize post harvest losses. This could be inform of assistance, by providing improved and encourage marketing of cassava and its products.
- Government should provide processing and storage centers within the farming communities or provide processing facilities to farmers at subsidized rate.
- All organs of agricultural extension delivery to farmers like the Agricultural Development Programme (ADP) should be

strengthened to enable them cope with packaging and delivery of extension technologies to the farmers.

- Government of the day should continue to implement all existing Agricultural policies, like roots and tubers extension programme, Fadama three programme, food security programme etc to sustain adoption.
- On the other hand, care should be exercised by the farmers during harvesting and handling to reduce mechanical damage to the minimum and the least damage roots should be selected for storage. Harvesting should be done when the soil is wet.

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