

Assessment of Causes of Post-Harvest Losses of Vegetable Crops among Farmers in Benue State, Nigeria

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Abstract

The survey was conducted to assess causes of post-harvest losses of vegetable crops among farmers in Benue state, Nigeria. Questionnaire was used to collect data from a sample of 96 respondents. Data were analyzed using frequency, percentage, mean score and standard deviation. Results show that 57.3% of the respondents were females, married (80.2%), having a mean age of 36 years with farming being a major occupation (75.0%). Major causes of post-harvest losses as indicated by the respondents were pests and diseases infestation (M = 3.88), poor handling of produce (M = 3.59), poor storage facilities (M = 3.57), high moisture content of produce (M = 3.38), lack of road networks to link farmers to the markets (M = 3.38), technical limitation in harvesting, storage and packaging (M = 3.36), among others. Findings also indicate that reduction in income generation (M = 3.80), reduction in quality of produce (M = 3.66), unstable supply of produce (M = 3.39), high cost of vegetable crops (M = 3.30), decrease in nutritional content of the produce (M = 3.26), loss of investment made by the farmer (M = 3.25), among others were the major effects of post-harvest loss by the respondents. The study recommends the need for government at all levels to partner with private sectors in establishing agro-processing industries in rural areas for vegetable crops in order to reduce post-harvest losses and maximize profits. It also highlights that providing adequate transport facility for easy transportation of vegetable crops from point of production to markets for sale remains paramount.

Keywords: Post-harvest; Vegetable crops; Losses; Farmers; Nigeria

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Introduction

Vegetables are essential parts of human diets but are perishable in nature. They are universally known, widely consumed and one of the most important sources of minerals and vitamins in human diet in the world (Nasrin., *et al.* 2008; Babalola., *et al.* 2010). Vegetables are edible plant parts which include stems, stalks, roots, tubers, bulb, leaves, flowers and fruits, generally consumed raw or cooked with main dish (Vainio S., *et al.* 2003). Examples of vegetables include onion, tomato, okra, pepper, amaranthus, carrot, and melon, among others (Ibeawuchi II., *et al.* 2015).

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Due to the physiological form of fruits and vegetables, they deteriorate easily in transit and storage especially under conditions of high temperature and humidity resulting in heavy losses of these crops (Idah PA., *et al.* 2007). The main factors that are most consistently related to higher levels of post-harvest losses include rough handling, use of poor quality packages, high post-harvest handling temperatures and delays in marketing (Kitinoja and Al Hassan, 2012; Kitinoja and Cantwell, 2010). Losses for highly perishable leafy green vegetables have been measured to be as high as 70%-80% in West Africa and losses in fruits to be 50%-70%, especially during the rainy season. It is not unusual to find post-harvest losses reported to average 20% to 50% during the period between harvesting and final retail marketing. This amounts to an enormous waste of seeds and planting materials, land, energy, fertilizers, water, labour and other productive resources.

Post-harvest losses of vegetables are more serious in developing countries. In developed countries losses are generally small during processing, storage and handling because of the efficiency of equipment, good quality storage facilities and close control of critical variables by a highly knowledgeable cadre of managers. In contrast, in developing countries losses in processing, storage and handling tend to be rather high because of poor facilities and frequently inadequate knowledge of methods to care for the vegetables properly. Post-harvest loss of vegetables depend upon the specific marketing channel being assessed which includes variables such as amount of time it takes to market the crop (delays in marketing) as well as the distance to markets (Lisa and Adel, 2015). It therefore becomes necessary to carry out this study to assess causes of post-harvest losses of vegetables among farmers in Benue state, Nigeria.

Research questions that are pertinent for this study are what are socio-economic characteristics of vegetable crop farmers in the study area? What are causes of post-harvest losses of vegetable crops? And what are effects of post-harvest losses on vegetable crop farmers?

Specifically, the study sought to:

1. Describe socio-economic characteristics of vegetable crop farmers in the study area;
2. Identify causes of post-harvest losses of vegetable crops; and
3. Ascertain effects of post-harvest losses on vegetable crop farmers.

Methodology

The study was carried out in Benue State, Nigeria. Benue state was first created on February 3, 1976. The state has three geopolitical zones, namely; A, B, and C. Benue state has an area of 2,882 km² with a population of 4,253,641 people (National Population Census (NPC), 2006) having 204,138 males and 156,239 females. Benue state lies within the lower Benue trough in the middle belt region of Nigeria. Its geographic coordinates are longitude 7°47' and 10°0' east and latitude 6° 25' and 8° 8' north. It shares boundaries with other states namely; Nasarawa state to the north, Taraba state to the east, cross-river state to the south-west and kogi state to the west. The state also shares a common boundary with the republic of Cameroon on the south. Benue state occupies a landmass of 34,059 square kilometer. It has twenty three (23) local government areas. The state is populated by several ethnic groups, namely; Tiv, Idoma, Igede, Etulo, Abakpa, Jukun, Atausa, Akweya, and Nyifon. Tiv is the dominant ethnic group, occupying 14 local government areas while Idoma and Igede occupy the remaining nine (9) local government areas. Benue state experiences two distinct seasons, wet and dry season.

The rainy season lasts from April to October with annual rainfall in the range of 100-200 mm. The dry season begins in November and ends in March. Temperature fluctuates between 21 and 27°C in the year. The south-eastern part of the state adjoining the Obudu-Cameroon mountain range, however, has a cooler climate similar to that of the Jos Plateau. Agriculture is the mainstay of the people, engaging over 75% of the population. Benue state is the nation's acclaimed food basket because of its rich agricultural produce which include yam, rice, beans, cassava, sweet-potato, maize, soya bean, sorghum, millet, sesame, cocoyam, etc. The state accounts for over 70% of Nigeria's soya bean production. They also rear livestock such as pig, goat, sheep and chicken. Fishing is also a major activity in the state. Fruits such as mangoes and oranges of various species are also produced in commercial quantities.

The population of this study comprised farmers who are actively involved in vegetable crop farming in Benue State, Nigeria. Zone B was selected for this study out of the three zones using simple random sampling technique. Two local government areas were selected purposively for the study because of prominence of vegetable crop farmers in the area. Two (2) communities were selected from each of the local government areas using simple random sampling technique. In each of the local government areas, twenty-five (25) respondents were selected using simple random sampling technique. This gave a total of one hundred (100) respondents. Four copies of the questionnaire were not used for analysis because they were not filled properly. This gave a total of ninety-six (96) respondents used for the study.

Data were collected using questionnaire. Frequency, percentage, mean score and standard deviation were used for data analysis.

Results and Discussion

Socio-economic Characteristics of the Respondents

Sex: Data in Table 1 show that 57.3% of the respondents were females while 42.7% were males. This implies that females dominated vegetable farming more than males because it is less laborious and less tasking compared to cultivation of other crops such as yam. This disagrees with Fakayode, *et al.* (2012) who stated that about 71% of vegetable farmers were males while few (29.3%) were females.

Age (years): Results in Table 1 reveal that 46.9% of the respondents were within the ages of 31-40 years, 27.1% were within the ages of 21-30 years, 15.6% were aged 41-50 years while 10.4% were aged above 50 years. The mean age of the respondents was 36 years. This implies that the respondents were young and in their productive ages hence, greater involvement in vegetable crop production. This is in line with Ajayi, *et al.* (2008) who observed that the age range between 31 and 40 years accounted for 34.0% of the rural farming households whereas between 41 and 50 years accounted for 30.0%. The active group here is between the ages of 31 and 40 years which indicates the active labour force engaged in food production.

Marital status: Entries in Table 1 show that majority (80.2%) of the respondents were married while 19.8% were single. This shows that the respondents involved in vegetable crop farming were mostly married which helps them to sustain members of their households. This agrees with Ajayi, *et al.* (2008) who observed that 89.0% of the rural farming household were married while 11.0% were single. This implies that members of the families could serve as source of labour for farming activities.

Level of education: Data in Table 1 reveals that 43.8% of the respondents had secondary education, 21.9% had tertiary education, 20.8% had primary education while 13.5% had non-formal education. This implies that the respondents had formal education and were literate enough to be able to adopt any new innovation to boost their vegetable crop production. This agrees with Fakayode, *et al.* (2012) who reported that half of the vegetable crop farmers had up to secondary education, some had tertiary education, few had non-formal education while very few had primary education. This implies that most of the vegetable crop farmers had formal education in school which can enhance human capital development for better practices in vegetable crop production.

Household size (numbers): About 83% of the respondents had household size of 6-10 persons while 16.7% had household size of 1-5 persons [Table 1]. The mean household size was about 6 persons. This implies that the respondents had a relatively large household size which could serve as source of labour used in vegetable crop production. This agrees with Mbah (2016) who stated that large household size could provide labour for farming activities.

Major occupation: Results in Table 1 show that majority (75.0%) of the respondents had farming as a major occupation, 14.6% were civil servants while 10.4% were traders. This implies that farming is the major occupation of the people in the study area. This is in line with Mohammed (2011) who revealed that most of vegetable crop farmers were full-time farmers, while others engaged in other occupations such as civil service, petty trading, tailoring, etc.

Farm size (hectares): Majority (94.8%) of the respondents had farm size of 1-3 hectares while 5.2% had above 3 hectares for cultivating vegetables [Table 1]. The mean farm size was 2.0 hectares. This implies that the respondents had access to considerable size of farm land which they use in cultivation of vegetables.

Farming experience (years): Results in Table 1 show that a greater percentage (78.1%) of the respondents had 6-10 years of farming experience while 21.9% of respondents had 1-5 years of farming experience. The mean farming experience was 8 years. This is as a result of the fact that majority of the respondents were middle aged, with few years of experience in vegetable crop production. This disagrees with Fakayode, *et al.* (2012) who noted that the average year of involvement of farmers in vegetable farming was found to be 15.3 years.

Estimated annual income (naira): Data in Table 1 show that 45.8% of the respondents earned ₦50,001-₦100,000 from sale of vegetables, 36.5% earned less or equal to ₦50,000, 7.3% earned ₦100,001-₦150,000, 7.3% earned ₦150,001-₦200,000 while 3.1% earned above ₦200,000. This indicates that the respondents obtained reasonable amount of money from the sale of vegetables which empowered them economically.

Non-farm occupation: About 74% of the respondents were not involved in any non-farm occupation, 20.8% of the respondents were involved in trading, 2.1% were involved in hair dressing while 2.1% were involved in tailoring [Table 1]. This indicates that some of the respondents were engaged in non-farm occupations in order to be economically stronger to meet up with family responsibilities.

Major source of farmland: Results in Table 1 show that a greater percentage (62.5%) of the respondents obtained land through inheritance, 17.7% got through purchase, 9.4% got theirs through gifts, 6.2% of the respondents obtained land by rent while 4.2% had by lease. This implies that most of the respondents owned farm lands which enhance greater involvement in vegetable crop production. This agrees with Ajayi, *et al.* (2008) who stated that land is a major factor of production.

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Membership of organization: Entries in Table 1 show that 37.5% of the respondents were members of All Farmers Association, 36.5% belonged to Women Farmers Association, 9.4% belonged to Fruit Dealers Association while 7.3% were not members of any organization. This indicates that interaction they get from being members of organization could enhance access to information on credit facilities which will boost their vegetable crop production. This agrees with Lenis (2012) who stated that farmers' organization help them to participate in group activities as they tend to share ideas on profitable enterprises, adopt as well as engage in market activities of inputs acquisition or selling of produce thereby improving their profits. Consequently, organized farmer groups are promoted as useful avenues for increasing farm productivity and implementation of food security and other development projects.

Number of extension contacts: Results in Table 1 show that 69.8% had no extension contacts in the last one year, 28.1% had contact with extension agents 1-3 times, 2.1% had contact more than 3 times. This shows that the respondents were not exposed to new technologies in vegetable crop production since a large percentage had no extension contact for in the last one year.

Causes of Post-Harvest Losses: Major causes of post-harvest losses as indicated by the respondents were pests and diseases infestation (M = 3.88), poor handling of produce (M = 3.59), unavailability of storage facilities (M = 3.57), high moisture content of produce (M = 3.38), lack of road networks to link farmers to the markets (M = 3.38), technical limitation in harvesting, storage and packaging (M = 3.36), fluctuating temperature extremes (M = 3.30) and lack of appropriate marketing facilities (M = 3.30). Others include harvesting of produce at the wrong time (M = 3.27), inadequate processing facilities (M = 3.21), high cost of transportation (M = 3.18), delay in marketing of produce (M = 3.16), adverse climate (M = 3.15), poor packaging and grading facilities (M = 3.05) and poor extension services

to build skills in handling of produce (M=2.81) [Table 1]. The finding agrees with Kitinoja and Al Hassan (2012); World Food Logistic Organization (WFLO) (2010); Kitinoja and Cantwell (2010) who stated that the main factors responsible for higher levels of post-harvest losses include rough handling, use of poor quality packages, high postharvest handling temperatures and delays in marketing.

Socio-economic characteristics	Frequency	Percentage	Mean score
Sex			
Male	41	42.7	
Female	55	57.3	
Age (years)			
≤ 20	-	-	
21-30	26	27.1	
31-40	45	46.9	
41-50	15	15.6	
Above 50	10	10.4	36.3
Marital status			
Single	19	19.8	
Married	77	80.2	
Level of education			
Non-formal	13	13.5	
Primary	20	20.8	
Secondary	42	43.8	
Tertiary	21	21.9	
Household size (numbers)			
1- 5	16	16.7	
6-10	80	83.3	
11-15	-	-	6.6
Major occupation			
Civil service	14	14.6	
Farming	72	75.0	
Trading	10	10.4	
Farm size (hectares)			
1- 3	91	94.8	
Above 3	5	5.2	2.0
Farming experience (years)			
1-5	21	21.9	
6-10	75	78.1	
11-15	-	-	8.2
Estimated annual income (naira)			
≤ 50,000	35	36.5	
50,001-100,000	44	45.8	

100,001-150,000	7	7.3	
150,001-200,000	7	7.3	
Above 200,000	3	3.1	81,802
Non-farm occupation			
None	71	74.0	
Hair dressing	2	2.1	
Tailoring	2	2.1	
Trading	20	20.8	
Major source of farm land			
Inheritance	60	62.5	
Rent	6	6.2	
Lease	4	4.2	
Purchase	17	17.7	
Gift	9	9.4	
Membership of organization			
None	8	8.3	
Fadama User group	7	7.3	
Fruit Dealer association	9	9.4	
All Farmers Association	36	37.5	
Women Farmers Association	35	36.5	
Number of extension contacts			
None	67	69.8	
1- 3	27	28.1	
Above 3	2	2.1	1.9

Table 1: Distribution of Socio-economic Characteristics of the Respondents (n = 96).

Causes	Mean score	Standard deviation
Pests and diseases infestation	3.88	0.33
High moisture content of the produce	3.38	0.74
Poor handling of the produce	3.59	0.59
Fluctuating temperature extremes	3.30	0.73
Technical limitations in harvesting, storage and packaging	3.36	0.74
Unavailability of storage facilities	3.57	0.72
Lack of appropriate marketing facilities	3.30	0.71
Lack of good road networks to link farmers to the markets	3.38	0.73
Poor packaging and grading facilities	3.05	0.83
High cost of transportation	3.18	0.85
Inadequate processing facilities	3.21	0.85
Adverse climate	3.15	0.93

Poor extension services to build skills in handling of produce	2.81	1.14
Delay in marketing of produce	3.16	0.82
Harvesting of produce at the wrong time	3.27	0.96

Table 2: Mean score of causes of post-harvest losses.

Effects of post-harvest losses: Major effects of post-harvest losses as indicated by the respondents include reduction in income generation ($M = 3.80$), reduction in quality of produce ($M = 3.66$), unstable supply of produce ($M = 3.39$), high cost of vegetable crops ($M = 3.30$), decrease in nutritional content of the produce ($M = 3.26$), loss of investment made by the farmer ($M = 3.25$) and reduction on availability of vegetables for household consumption ($M = 3.24$). Others were scarcity of produce ($M = 3.22$), malnutrition ($M = 3.19$), reduction in market value of produce ($M = 3.18$), loss of farm inputs such as fertilizer, herbicides ($M = 3.13$), deterioration in appearance of the vegetable ($M = 3.00$), diversification into non-farm occupation ($M = 2.82$) and loss of scarce resources such as water used in production ($M = 2.60$) [Table 3]. The findings agree with Ukoh-Aviomoh and Okoh (2005) who reported that food losses lead to loss of income and food supplied to rural families, thereby threatening household food security which can result in malnutrition.

Effects	Mean score	Standard deviation
Reduction in income generation	3.80	0.45
Reduction in quality of the produce	3.66	0.74
Loss of farm input such as fertilizer, herbicides	3.13	0.98
Reduction on availability of vegetables for household consumption	3.24	0.87
Loss of scarce resources such as water used in production	2.60	1.19
Malnutrition	3.19	0.89
Diversification into non-farm occupations	2.82	1.04
Decrease in nutritional content of the produce	3.26	0.92
High cost of vegetable crops	3.30	0.85
Unstable supply of produce	3.39	0.77
Reduction in market value of the produce	3.19	0.84
Scarcity of the produce	3.23	0.86
Loss of investment made by the farmer	3.25	0.81
Deterioration in appearance of the vegetables	3.00	0.97

Table 3: Mean score of effects of post-harvest losses.

Conclusion and Recommendations

The study revealed that majority of the vegetable crop farmers were females, young, married, and had formal education with farming being their predominant occupation. Pests and diseases infestation, poor handling of produce, unavailability of storage facilities, high moisture content of produce, lack of road networks to link farmers to the markets, technical limitation in harvesting, storage and packaging, fluctuating temperature extremes, lack of appropriate marketing facilities, among others were major causes of post-harvest

losses of vegetable crops by the farmers. The study also show major effects of post-harvest losses of vegetable crops to include reduction in income generation, reduction in quality of produce, unstable supply of produce, high cost of vegetable crops, decrease in nutritional content of the produce, loss of investment made by the farmer, reduction on availability of vegetables for household consumption, among others. There arises the need for government at all levels to partner with private sectors in establishing agro-processing industries in rural areas for vegetable crops in order to reduce post-harvest losses and maximize profits. It is also paramount to provide adequate transport facilities for easy transportation of vegetable crops from point of production to markets for sale.

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