Economic Analysis of Post-Harvest Losses among Pawpaw Marketers in Osun State, Nigeria

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Abstract: The study analyzed the channels by which the youths in pawpaw marketing reduce post-harvest losses in Osun State. Multi-stage sampling technique was used to select 75 pawpaw marketers. Data were gathered through well-structured interview schedule and analyzed using descriptive statistics, mean, standard deviation and diagram. The results showed that majority (93%) were females, 91 percent were married and 44 percent of the respondents were within the age bracket of 31 - 40 years with a mean age of 39 years. Results further revealed that majority (64%) had a household size range of 5 to 10 members, more than half (59%) are literate and 47 percent had marketing experience range of 7 to 11 years. Three marketing channels were identified for pawpaw marketing in the study area. It was concluded that pawpaw marketing is a viable business among resource poor. It is therefore recommended that marketers should be educated on fruit handling and transportation standard as it give good returns on investment in order to reduce post-harvest losses of their goods.

Key words: Economics · Pawpaw · Marketers · Post-Harvest Losses

INTRODUCTION

Fruits are natural staple food of man that contains all the necessary nutrients in sufficient proportion such as vitamins, sugars, essential minerals, fibers, antioxidants, little hormone precursors in addition to protein and energy in human daily diet that can help to keep a good and normal health [1]. Fruits and vegetables are in great demand as they form part of the diet of millions of people in the world [2].

Pawpaw fruits (*Carica papaya L.*) is the most economically important fruit in the Caricaceae family [3]. Pawpaw (*Carica papaya*) is one of the major fruit consumed worldwide. Pawpaw is cultivated in tropical and subtropical regions of the world. Till date, Nigeria (Osun State inclusive) is the second largest producer of paw-paw globally. Baiyewu and Amusa [4] asserted that the fruit is one of the most nutritional and cheapest fruit grown and consumed in Nigeria. The ripe fruit of papaya is usually eaten raw with or without skin or seeds while the unripe green fruits can be eaten cooked, usually in curries or salads. Tietze [5] reported that a mature green papaya fruit contains more vitamin A than carrots, more vitamin C than oranges and abundant vitamin B factors and vitamin E.

The short shelf life of fruit in general is a germane factor that has adverse effect on the economic value which makes their handling during distribution, transportation and marketing a special problem particularly in the tropics. Losses has been seen to be part of marketing, hence marketing play a very important role in determining the level of income to the marketer for his saleable, commodity. Marketing is the process which involves all aspect structure, both functional and institutional based on technical and economics consideration and includes operations like assembling, grading, storage, transportation and distribution. Post-harvest losses (PHLs) of perishable produce are however not easy to quantify. In some instances the marketer are forced to sell at a ridiculous amount and losses depending on the type of fruits, period of harvesting and post-harvest handling activities.

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PHLs of fruit is the quantitative and qualitative loss at any stage along the commodity value chain which includes the change in the edibility and wholesomeness which prevents its final consumption [6, 7]. PHLs tend to hinder sufficient distribution of and accessibility to fresh agricultural produce, thereby leading to a rise in the price of such produce. Post-harvest losses of perishable fruits occurring during handling, transport, storage, distribution and marketing are the major problems in agrarian economy. Besides resulting in low per capita and huge monetary losses, it also increases transportation fees hence marketing costs which serve as double loss to farmers and traders (marketers).

Not only are losses clearly waste of money, they also result to wastage of human effort, farm inputs, livelihoods, investments and other scarce resources. The most important aim of post-harvest handling is to preserve the products freshness by preventing loss of moisture, slowing down unwanted chemical changes and to avoid physical damage such as bruising.

FAO-World Bank [8] revealed that PHLs are high - thirty percent in cereals, fifty percent in roots and tubers and up to seventy percent in fruits and vegetables. From this statistics it can be seen that, post -harvest losses are higher for fruits and vegetables than for cereals and other root and tuber crops. This can be attributed to the highly perishable nature of fruits coupled with its short shelf life. This loss tends to make farmers poorer [9]. Fruit marketers are faced with a major problem of losses which reduces their revenue. In Nigeria, losses in fruits such as pawpaw are very huge due to the marketing system of fruits, the burden of about 75 percent of these losses is placed on the fruit marketers as reported by Ahmed [9]. These losses are caused by a lot of factors like poor storage facilities of fruit, poor infrastructural facilities like good roads which affect transportation cost of the fruits and certain environmental factors such as temperature, humidity and solar radiation [7, 10]. This loss is currently posing a great challenge to the marketers who are constrained to offer it for sale at ridiculous price to avoid further spoilage. Yusuf *et al.* [11] asserted that at the market, the seller is faced with problems of loss as the fruits have to be sold within the shortest time possible before they get spoilt.

The pattern of marketing channels for pawpaw in Nigeria (Osun State) evolved in response to the food production pattern characterized by a large number of peasant farmers with small, often less than one hectare, non-contiguous holdings. After harvest, marketers are faced with the problem of storage on the farm, market and transporting from farm to the nearby markets.

Objectives of the Study: The general objective of this study was to assess of post-harvest losses among pawpaw marketers in Osun State, Nigeria. Specifically:

- Describe the socio- economic characteristics of pawpaw marketers;
- Appraise the channels involved in marketing of pawpaw and
- Estimate the marketing margin to fruit marketers

MATERIALS AND METHOD

The study was conducted in Osun State, Nigeria. The state was created on 27th August, 1991, situated in the Southwestern region of the country and lies within the co-ordinates of latitude 7°30′N of the equator and longitude 4°30É of the Greenwich meridian. It is bounded by Ogun State in the South, Kwara State in the North, Ondo and Ekiti States in the East and Oyo State in the West. The State has 30 Local Government Areas (LGAs) which spread across the six administrative zones. Prominent fruits produced in the state include sweet oranges, grape, lemon, tangerine, plantain, banana, mango, pineapple, pawpaw, walnut, *albidium* (agbalumo), *chrysophyllum*, *Invingia gabonensis*. The choice of Osun State was premised on the high number of fruits marketers in the state [12]. The selection of pawpaw was based on the importance of the fruit in the study area. Data were gathered through well-structured interview schedule administered on 75 pawpaw marketers. A multi-stage sampling technique was employed. The first stage was the purposive selection of one LGA from each of the six administrative zones of Osun State Agricultural Development Programme (OSADEP) based on high concentration of community markets where fruits are prominently sold, making a total of six LGAs. The second stage involved a random selection of one community market from each of the LGAs where there was availability of many fruit marketers, making a total of six (6) community markets. At the last stage, 75 pawpaw marketers were randomly selected for the study. Descriptive statistics such as frequency counts, percentages, mean and standard deviation.

In order to estimate quantitative the post-harvest losses in Objective 3, descriptive statistics such as percentage and average were used to present the post-harvest losses during fruit marketing along the channel. In this study, post-harvest losses was measured at the market stage. The loss was estimated to find out the level of losses the channel. Quantitative losses are the thrown away/rotten or bruised or injured or attacked by

diseases and the ones eaten by rodents and pests spoilt fruits. In assessing the PHLs at the market stage, losses was measured as the difference between fresh and damaged. Following [13], quantitative post- harvest loss was determined as:

$$Percentage = \frac{Q_l}{Q_t} \times 100 \qquad (1)$$

where;

Q_l = cost of quantity lost (₦)

Q_t = cost of total quantity bought (₦)

Total quantity bought = cost of the net quantity + cost of discarded quantity

$$Cost\ of\ total\ quantity\ of\ fruits\ bought = \frac{Cost\ of\ total\ quantity\ loss}{Cost\ of\ total\ quantity\ bought} \times 100\%$$

$$(1)$$

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents: Results of analysis in Table 1a showed that majority (93.33%) of the pawpaw marketers interviewed were females. This indicated that fruit marketing and post-harvesting handling is in the domain of female gender in Osun State, Nigeria. The dominance of the females in fruit marketing activities might be because it requires small capital to start. This affirms [14] findings that women dominate pawpaw marketing. The mean age of the marketers was 39.35 ± 8.37 years. About (44%) of the respondents were within the age of 31 and 40 years. The import of this finding is that the marketers are in their active age and they can do their business with youthful strength. This is when they are likely to be more energetic and willing to take risks that are related with marketing with the hope of improving their socio-economic status conditions. This is in agreement with Wahab *et al*. [15] findings that majority of fruits marketers are middle aged. The results in Table 1a also indicated that majority (90.67%) were married. The import of this finding is that most of the marketers have responsibilities and fruit marketing serve as source of earnings for the running of the family. This is in line with Wahab *et al*. [15] which states that majority of fruits marketers in Osun State were married. The household size distribution revealed that majority (64%) had between 5 and 10 persons living with them with a mean household size of 6.05 ± 3.03.

Table 1a: Distribution of socio-economic characteristics of pawpaw marketers(n = 75)

Variables	Marketers	
Gender	Frequency	Percentage
Male	5	6.67
Female	70	93.33
Age (years)		
20 – 25	3	4.00
26 – 30	10	13.33
31 – 35	13	17.33
36 – 40	20	26.67
> 41	29	38.67
Mean	39.35	
Standard deviation	8.37	
Marital Status		
Single	4	5.33
Married	68	90.67
Widowed/Widower	-	-
Divorced	3	4.00
Household size		
< 5	22	29.33
5 – 10	48	64.00
11 – 15	3	4.00
> =16	2	2.67
Mean	6.05	
Standard deviation	3.03	
Years of formal education		
< =6	44	58.67
7 – 11	13	17.33
12–16	18	24.00
Mean	6.2	
Standard deviation	5.27	

Source: Field survey, 2018

Table 1b: Distribution of socio-economic characteristics of pawpaw marketers (contd.) (n = 107)

| Variables	Marketers	
Years of marketing experience	Frequency	Percentage
≤ 6	22	29.33
7 – 11	35	46.67
12 – 16	8	10.67
> 16	10	13.33
Mean	2.08	
SD	0.97	
Annual Income from fruit marketing (N)		
≤ 50, 000	24	30.67
50, 000 – 200, 000	26	34.67
201, 000 – 250, 000	2	2.67
≥ 251, 000	23	30.67
Mean	668.97	
SD	5773.23	
Distance of farms or sources of fruits to the market (Km)		
≤ 6	59	78.67
6 – 10	8	10.67
11 – 15	4	5.33
16 – 20	2	2.67
> 20	2	2.67
Mean	1.38	
Standard deviation	0.96	

Source: Field survey, 2018
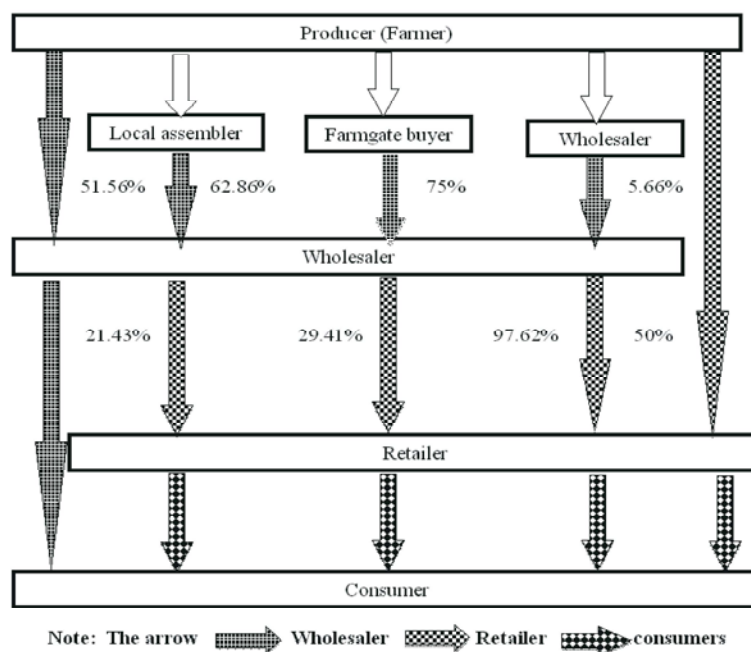
Fig. 1: Marketing channel for pawpaw in Osun State, Nigeria
Source: Field survey, 2018

Table 2: Percentage distribution of post-harvest losses along the marketing channel of pawpaw

Category of fruit marketers	Cost of total quantity of pawpaw spoilt/bad	Cost of total quantity bought	Percentage loss (%)
Pawpaw marketer	68, 212	781, 601	8.73

Source: Field survey, 2018

The finding showed that the marketers have larger household size. This supports the findings of Mbuk *et al.* [16] who stated that fruit marketers had a large household size in Nigeria (Osun state inclusive). The results in Table 1a further showed that half (58.67%) had primary school education. This finding is in agreements with Mulualem *et al.* [17] that reported that fruit marketers have primary level of education meaning that literate traders find it relatively easier in their dealing with people, more especially, in the exchange process.

Results in Table 1b revealed that the mean years of pawpaw marketing experience was 2.08±0.97 years. About (47%) had been in pawpaw business for 7-11 years implying that they have practical marketing experience on pawpaw handled. The more experienced they are, the lesser the losses and the more profit returned would be when compared to the less experienced ones since they can utilize the acquired experience to make important handling decisions as well as make quick contacts with customers to ensure that fruits are sold quickly. This finding agrees with Busari Ahmed, Idris-Adeniyi *et al.* [10, 18] that revealed marketing experience of fruit marketers range from 7 to 11 years.

The Table also revealed that the mean annual income was N668.97 ± 5773.23. About half percent (45.34%) earned the range of N50, 000 – N200, 000 per annum. This implies that pawpaw marketing is a profitable business. In Table 2, the mean distance travelled by retailers was 1.38±0.96 km. Majority (78.67%) travelled less 6 Km. It implies that the marketers travelled shorter distance to purchase fruits and bring to the market. This supports the findings of Ayandiji *et al.* [19] that reported that the smaller the distance of the farm/source to the market, the shorter the time it will take the produce to get to the market and this would reduce postharvest losses and increases the returns to marketers.

Marketing Channel for Pawpaw: Channels of distribution or marketing channel is a set of individuals which facilitate the transfer of good title (pawpaw) from producer to the final consumer. The analysis of pawpaw marketing channel was meant to provide systematic knowledge of how pawpaw flows from its place of production to the final consumers. It should be that the producer and the final consumer both perform some activities they are also part of every channel but are not under study for

this paper. Four marketing channels were identified for pawpaw at the retail stage. Channel comparison for pawpaw was done based on the percentages of the products that passed through each channel. However, it should also be well-known that each of the percentage shows the amount of pawpaw (in %). sold; they move through each of the channels from the producers to consumers (Figure 1).

The channel of Producer Wholesaler Retailer Consumer measured 87.62% as the highest, followed by Producer Retailer Consumer which measured 50% in that order.

Estimation of Post-harvest Losses at the Market Level along the Marketing Channel: The post-harvest loss was estimated by calculating the percentage loss of pawpaw fruits along the marketing channel, respectively. This is done by separating the damaged/spoilt/rotten fruits from the total quantity bought. The percentage of the price of spoilt fruits was calculated at the market level. Table 3 depicts the post-harvest losses for pawpaw fruits in Osun State. Post-harvest losses was low for pawpaw. The type of loss experienced mostly by the pawpaw marketer were mechanical loss and physiological.

In summary, it was observed that the pawpaw marketers handled mostly greener and fresher fruits which were responsible for the low percentage loss (8.73%). Rough handling during loading and offloading, over-piling of these fruit in vehicle while in transit to the markets and delayed storage are some of the causes of PHLs at this market level.

CONCLUSION

Pawpaw is a prominent fruit marketed by female in Osun State. They adopt the method of buying from wholesalers and producers in order to reduce losses, bring good returns which improve their welfare. Marketers should form groups like co-operative and also construct new ones, which will in turn bring about reduction in the cost of transportation and minimization of fruit loss

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