

POSTHARVEST LOSSES OF TOMATOES AND PUMPKIN: THE WOMEN FARMERS SOCIO-ECONOMIC MIX IN BENUE STATE, NIGERIA.

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Abstract

Benue State is the food basket of Nigeria and farmers invest hugely in the cultivation of vegetables, but what usually ensued postharvest is disheartening. A drive through popular markets or farming communities during harvest period is usually site of abandoned heaps of vegetables and spoiled tomatoes. This paper examined the socio-economic factors influencing postharvest losses of tomato and pumpkin among women farmers in Benue State, Nigeria. This paper was guided by utility maximization theory. Survey research design was adopted and the major instrument for data collection was questionnaire. Multi-stage sampling procedure was used to select a sample of 390 tomato and pumpkin vegetable farmers. Descriptive statistics such as frequency count, mean score, percentage and regression analysis were used in analyzing data. The findings revealed that 76% variation in postharvest losses is explained by farming experience, education, marital status, income and number of dependants. This informs that socio-economic profile of women farmers have significant influence on postharvest losses in tomato and pumpkin. This paper concluded that there is prevalence of postharvest losses in tomato and pumpkin vegetables among women farmers in Benue State. It recommended among others that women farmers should be availed the opportunity of acquiring more education, especially on agribusiness. This can be done by BERNARD through adult education programme and help enlighten the farmers on best ways to preserve their produce.

Keywords: Loss, Postharvest, Socio-economic, Tomatoes, Vegetables.

Introduction

Agriculture is a major sector of the Nigeria economy that contributes more than 30% of the total annual Gross Domestic Product (GDP), employs about 70% of the labour force, accounts for over 70% of the non-oil exports and, most importantly, provides over 80% of food needs in the country in a bid to ensure food sufficiency (Adegboye, 2004). This is predicated on when everyone will have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs

and food preferences for a healthy and active life (FAO, 2001). However, there seem to be continued losses in different places due to poor and ineffective postharvest handling operations.

In Nigeria, a wide range of agricultural products are being produced and mostly lost at postharvest stages, leading to wastage in human effort, farm inputs and investments (Olayemi, Adegbola, Bamishaiye & Awagu, 2012). Recently, the Director of the Centre for Food Technology and Research (CEFTER), Makurdi, Benue State revealed that over 50% of the food crop produced in the country was lost due to poor handling (Duru, 2017). It is also believed that up to 40% of the harvested crops got lost during distribution (Olorunda, 2000). However, post harvest losses result not only in the loss of the actual crop but also losses in the environment, resources, labour in producing the crop and livelihood of individuals involved in the production and marketing processes (Adeniyi & Ayandiji, 2014; Ugwa, et. al. 2019; Okonkwo, et. al. 2019).

Statistics have shown that developed countries like United States losses only 2 to 23% of fruits and vegetables produced at postharvest level, while the figure is as high as 7 to 70% loss in developing countries (Saha & Maynard, 2013). It was estimated that China produces more than 583 million tons of vegetables per year (nearly 50% of world's production) and losses about 25-30% at postharvest. These points to how best developed societies have been able to curtail the menace of postharvest losses and bring to bay the magnitude of wastage in developing world. A survey carried out on post harvest losses in some communities in Nigeria revealed that as much as 20–30% of total grain production, 30–50% of root and tuber and usually high percentage of fruits and vegetables are lost with a substantial amount recorded during storage (Mijinyawa, 2002).

Nigeria produces about 1.8million tons of tomatoes per annum (FAO, 2005). This accounts for about 68.4% of West Africa, 10.8% of Africa's total output and 1.28% of world output. Over 50% of these are lost due to poor storage system, poor transportation and lack of processing facilities and enterprises (Ogunbiyi, 2016). In Benue state, proper post-harvest storage and handling techniques seem not in place for perishable crops, thereby causing considerable loss in human efforts and income generation.

This has been traced to poor level of education, as most of the farmers are illiterates that reside in the rural villages (Nwosu, Onyeneke & Okoli, 2012). Many of them also are aged and appears weak to the runaround from farm to different markets as to sell their produce. Buyers, especially those from far urban centres are usually constrained by lack of access or motorable road to the interior villages where the farmers dwell (Ayandiji in Adepoju, 2014; Odoanyanwu, et. al. 2017; Onwuka, et. al. 2017). Again, the income level of majority of those farmers could barely feed them and their dependants, hence, insufficient to use in acquiring handling or processing skills. Due to lack of access to

information, many of these farmers are left without benefits of being in cooperative societies. As a result their economic livelihood level remains low even after years of farming. It is against this background that this paper examines the socio-economic factors influencing postharvest losses of tomato and pumpkin among women farmers in Benue State, Nigeria

Problem Statement

Benue State is the food basket of Nigeria and farmers invest hugely in the cultivation of vegetables, but what usually ensued postharvest is disheartening. A drive through popular markets or farming communities during harvest period is usually site of abandoned heaps of vegetables and spoiled tomatoes.

Evidence has shown that the State is lacking post-harvest preservative facilities, thus, making farmers human and financial investments a waste (Oketola, 2016). He noted that peasant tomato and vegetable farmers abandoned their produce in various markets due to poor pricing and non-existence of storage and processing facilities. This is worsened by the deplorable geographic location of these peasant farmers which constrain buyers from far places (Ayandiji in Adepoju, 2014). This informs of the bad and inaccessibility of many rural roads in Nigeria where bulk of farming activities are being carried out. In spite of the great impact of these agrarian communities to the nation's Gross Domestic Product (GDP), due developmental attention has not been accorded to social amenities in those areas.

More so, gender appears to be a determinant factor to the extent a farmer can go in agricultural production in the country. Ironkwe and Ekwe (2000) argued that more than 60% of agricultural production in Nigeria is being carried out by women in the rural or traditional setting. A report by the Africa Human Development (2016) indicates that gender inequality is inhibiting women and costing sub-Saharan Africa an average of \$US95 billion a year, equivalent to 6% of the region's GDP. As a patriarchal society, women lack independent rights to land. Land rights are only allocated through men who are either sons or husbands and heads of household (FAO, 2011; Kabane, 2010; Okonkwo, et. al. 2017). Despite cooperative membership, where the women are not preoccupied and sometimes overwhelmed by domestic demand of care-giving to their dependants, they appear to be limited by illiteracy or age. It is in view of the aforementioned issues that this paper examines the socio-economic factors influencing postharvest losses of tomato and pumpkin among women farmers in Benue State, Nigeria.

Objective

1. To identify the socio-economic factors influencing postharvest losses of tomato and pumpkin among women farmers in Benue state.

Hypothesis

H_{01} : Socio-economic profile of women farmers has no significant influence on postharvest losses of tomato and pumpkin.

Literature Review

The Concept of Postharvest Losses

Bolarin and Bosa (2015) describe post-harvest losses as the agricultural wastages at harvest, processing and handling stages. In another effort, postharvest loss is being defined as the degradation in both quantity and quality of a food production from harvest to consumption (Kiaya, 2014). He argues that quality losses include those that affect the nutrient/caloric composition, acceptability and edibility of a given product. Postharvest losses refer to measurable quantity and quality loss of food crops at harvest, storage, transportation, processing, marketing and preparation before consumption (Buzby, Farah-Wells & Hyman, 2014 in James & Zikankuba, 2017). These losses are generally more common in developing countries (Kader, 2002), Nigeria inclusive.

Postharvest losses is said to be making Nigerian farmers poorer and their lamentation over the situation has not gotten meaningful assistance (Ahmed & Mesfin, 2017; Mada, Hussaini, Medugu & Adams, 2014). Vegetable farmers such as those that grow tomatoes and pumpkin often record great amount of produce loss which translates to waste of resources, reduction in income and ultimately their welfare (Adepoju, 2014).

In developing countries like Nigeria, post-harvest losses have been highlighted as one of the determinants of food problem (Babalola & Agbola, 2008). Proper post-harvest storage, packaging, transport and handling technologies are practically insufficient for perishable crops, thereby allowing for considerable loss. Cutting the losses could presumably add a sizable quantity to the global food supply, thus reducing the need to intensify production in the future (Kiaya, 2014). This can only be achieved when the factors leading to wastage are properly controlled.

Tomato

Tomato is an important vegetable that is widely eaten and used for many delicacies or purposes world over. As economical and nutritional important fruit vegetable, it is highly perishable and best used

while fresh. This tends to prevent adequate supply and accessibility when fresh, thereby causing an increase in the price (Mbuk, Bassey, Udoh & Udoh, 2011).

In Nigeria, tomato is cultivated in most Northern States such as Jigawa, Katsina, Zamfara, Sokoto, Benue, Kaduna, Bauchi, Gombe and Taraba. Interestingly, Benue and Kano are amongst the leading States that cultivate this vegetable in commercial quantity (Shankara et al., 2005). This is due to the dry season cultivation of over 30,000 hectares of irrigated tomato in the area.

Aside from being tasty, tomato promotes healthy nutritional balance as it is a good source of vitamins A and C (Ascorbic Acid which aids the healing of wound, strengthening of blood vessel walls, etc.). One medium sized tomato provides 57% of the Recommended Daily Allotment (RDA) of Vitamin C, 25% RDA of Vitamin A and 8% RDA of Iron, yet it has only 35 calories (Joana, 2015). It is also an excellent source of Lycopene (a very powerful antioxidant) that helps to prevent carcinogenic cell growth. It is considered as an important cash and industrial crop in many parts of the world (Babalola et al., 2010). Although tomato has numerous benefits and can improve the livelihoods of farmers, studies have shown that the full potential of the crop has been under exploited because of many challenges among which are postharvest losses (Arah, Kumah, Anku & Amaglo, 2015). This is usually caused by lot of factors which range from environmental (excess heat, soil texture), technical (covering with polythene bags, punches from baskets) and handling methods.

Pumpkin Vegetables

Pumpkin (*Cucurbita moschata* Duch) is a tropical species whose production is favored by high temperatures. The origin of pumpkin has been traced to the central region of Mexico. Pumpkin is a seasonal crop that has traditionally been used as both human and animal's food. It is grown in all tropical and sub-tropical countries (Cortez-Vega, Piotrowicz, Prentice & Borges 2014).

Pumpkin is a resilient traditional crop that adapts to diverse climatic conditions and rich in various nutrients. Its production could contribute to improved household food security and livelihoods (Ndegwa, 2016). Fluted pumpkin is a most important and extensively cultivated food and income generating crop in many parts of Africa, including Nigeria (Adebisi-Adelani, Olajide-Taiwo, Adeoye & Olajide-Taiwo, 2011). According to Mohammed in Abu and Asembler (2011), it can give high yield per unit area of land and hence generate high income for farmers and marketers.

The area where pumpkin is cultivated is expected to have maximum sunshine to maximize the photosynthetic process and therefore produce the largest leaves and fruits. The crop grows best with

altitude up to 2000m and temperature of 22-25°C, though some are well adapted to high temperatures. Low humidity reduces the incidence of diseases such as mildew. Heavy rain adversely affects flowering and delays development (Pumpkin Cultivation & Postharvest Handling, 2016). It posits that pumpkins grow well on soil that is high in organic matter, with good moisture retention capability and is easily drained. In Benue State, pumpkin is grown for consumption and commercial export. It has been one outstanding source of income to many farmers in the State.

Maturity rates of pumpkin are influenced by plant stresses during the growing season, such as pest pressure and soil moisture conditions. If vines die before the pumpkin reaches full maturity the flesh quality and stem health will be compromised leading to premature leaves and fruit breakdown (Virginia Cooperative Extension, 2009). It posits that the storage quality of a pumpkin is influenced by harvest and post-harvest handling as it is by care and management while growing. A poor quality pumpkin at harvest will not improve thereafter, but a high quality pumpkin can be maintained with proper post-harvest handling techniques, otherwise it deteriorates.

Socio-Economic Determinants of Postharvest Losses of Tomato and Pumpkin

Farming households have differences in their demographic and socio-economic characteristics (Ndegwa, 2016). To a great extent socio-economic factors can determine the success or development of an enterprise (Guzman & Santos, 2001). Extant studies on tomato and pumpkin vegetables have shown various determinants to postharvest losses. Nwosu, Onyeneke and Okoli (2012) analyzed the socioeconomic determinants of fluted pumpkin leaf production in Ezinihitte Mbaise LGA of Imo State, and their study revealed that production status, source of land, labour household size, educational level, farming experience, farm size and production objective were the major determinants of output and loss. In Kenya Ndegwa (2016) observed that household size and distance to market were statistically significant with negative influence on marketing of pumpkin among farm households.

In another effort to identify the socio-economic characteristics and determinants of losses among smallholder vegetable farmers in Umbumbulu area of KwaZulu-Natal province, South Africa, Garikai (2014) writes that tomatoes were topmost fruit vegetables with high postharvest losses and were significantly influenced by farmer's experience, group membership, farm size, hand washing, packaging and distance to market. Similarly, a study by Babalola, Makinde, Omonona and Oyekanmi (2010) infers that postharvest losses in tomato production in Imeko-Afon local government area of Ogun State were as a result of distance from farm to the market, age of fruit at harvest, size of farm and number of baskets that were harvested. Moreso, Aidoo, Danfoku and Mensah (2014) posits that gender, household size, farm size, days of storage, membership of Farmer Based Organization (FBO)

and type of tomato variety cultivated significantly influenced postharvest losses incurred by tomato farmers in the Offinso North district of Ghana. This informs the argument of Ayandiji in Adepoju (2014) that only 2.2% of vegetable farmers in Ife, Osun State had tertiary education.

Theoretical Framework: Utility Maximization Theory

The term ‘utility maximization’ was first introduced by morale philosophers like, Jeremy Bentham and John Stuart Mill in 1929. It was later expatiated and redefined by modern economists like John Von Neumann and Oskar Morgenstern in 1987. The theory posits that producers maximize utility against constraints in production resources. It is also based on the premise that farm households were rationale in using production resources and choosing the market that maximizes their utility (Ndegwa, 2016). In other words, when there are post-harvest losses it affects or diminishes the profit maximization of farmers. This is a pointer to the need to always strife to minimize wastage as to maximize income generation.

In application, farmers’ primary objective of producing or selling agricultural commodities is to maximize profit. In this context it is assumed that tomato and pumpkin farmers’ participation in the venture was influenced by perceived utility value or net benefit from produce. To maximize profit, it is expected that interfering influences that are affecting produce or hindering full potential of women famers be minimized. For instance, availability of small or inadequate farm land could impede large production, while illiteracy or inability to read and write could hinder adoption of right technologies for prevention of post-harvest losses.

Research Method

This paper adopted survey research design and the major instrument used for data collection was a structured questionnaire. This study was conducted in Benue State, which is one of the 36 States of Nigeria. The state is located in the North-Central (Middle-Belt) region of the country, with 23 Local Government Areas (LGAs). The State is named after the famous River Benue and was created in 1979 from the former Benue-Plateau State and some part of Kwara State. The State has abundant land estimated to be about 5.09 million hectares and its motto is ‘*food basket of the nation*’. It is predominantly rural with an estimated 413,159 farming population (Benue State Agricultural and Rural Development Authority - BNARDA, 1998).

The study population was eighteen thousand, four hundred and six (18,406) registered tomato and pumpkin vegetable farmers in the state. This was comprised of 8,401 and 10,005 tomato and pumpkin vegetable farmers, respectively (BNARDA, 2018). A sample size of 390 was generated using Yamane

(1964) formula. Multi-stage random sampling procedure was employed in selecting respondents. The State was first stratified into its three agricultural zones of Benue East (Zone A), Benue West (Zone B) and Benue South (Zone C). Thereafter paper balloting was used to randomly select two LGA's from each of the three zones. That gives Katsina-Ala and Ukum LGA's from Zone A, Buruku and Tarka from Zone B, and Obi and Otukpo LGAs from Zone C. The selection of respondents saw 65 farmers being selected from each of the LGAs. Thereafter, purposive sampling method was used to select 29 tomato and 36 pumpkin vegetable farmers from each of the six LGA's.

Descriptive statistics such as frequency count, mean score, percentage and regression analysis were used in analyzing data.

Results and Discussion

Socio-Economic Factors Influencing Postharvest Losses in Tomato and Pumpkin

The regression analysis on socio-economic factors influencing postharvest losses in tomato and pumpkin among the women farmers are presented on table 1.

Table 1: Regression analysis of socio-economic factors influencing postharvest losses of tomato and pumpkin

	<i>Coeff.</i>	<i>t-value</i>	<i>Sig.</i>
Constant	571.430	4.926	0.000
X ₁ Age	-2.251	-0.413	0.322
X ₂ Farming experience	164.035	2.005*	0.010
X ₃ Education	4.006	1.372*	0.000
X ₄ Marital status	31.830	3.114*	0.031
X ₅ Income	2.109	0.325*	0.001
X ₆ Savings	-053.271	-0.010	0.261
X ₇ Number of dependants	301.143	223.006*	0.000
R ²		0.762	
Adj. R ²		0.685	
F		42.410	
N		341	

Field Data, 2020; *Significant at 5% level; Dependent Variable: Postharvest losses

Table 1 reveals that all the variables have positive coefficient significance in influencing postharvest losses of the vegetables except age and savings. This implies that it may not necessarily be savings

issue that impedes the control of postharvest losses. The coefficient significance of farming/marketing experience and level of education infers that the more education a farmer acquired the more control she may exercise over some controllable postharvest losses. Also, marital status, income and number of dependants are statistically significance in influencing postharvest losses. This suggest that shortage of income could militate against the possibility of saving adequately to be able to acquire requisite managerial knowledge or even buying of improved technologies and processing facilities that would aid reduction in losses.

H₀₁: Socio-economic profile of women farmers have no significant influence on postharvest losses of tomato and pumpkin.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Change	Square Change	F Change	df1	df2	Sig.
1	.857 ^a	.762	.685	14.76382	.762		42.410	4	336	.000 ^a

a. Predictors: (Constant), age, farming exp., education, marital status, income, savings, dependants

b. Dependent Variable: postharvest losses

Field Data, 2020. $R^2 = .762$; $R = .857$; $P\text{-value} = .000$ (i.e. <0.05 level of significance)

Table 2 indicates that R^2 of the regression model summary is 0.762. This suggest the extent to which dependent variable is explained by independent variables. That is, 76% of variation in postharvest losses is explained by farming experience, education, marital status, income and number of dependants. Again, the adjusted R^2 which is .685, implies that 69% of postharvest losses was influenced by changes in the socio-economic profile of the women farmers. However, the coefficient result of the regression points that the significant socio-economic variables influenced postharvest losses at 5% level and with p-values less than 0.05, except age and savings that were not. Thus, the study rejects the null hypothesis and accept the alternate, implying that the socio-economic profile of women farmers (farming experience, education, marital status, income and number of dependants)

have significant influence on postharvest losses in tomato and pumpkin in Benue state. This align with the findings of Nwosu, Onyeneke & Okoli (2012) that household size, farming experience and marital status had positive significant on fluted pumpkin production in Ezinihitte-Mbaise, Imo State.

Conclusion

This paper concludes that there is prevalence of postharvest losses in tomato and pumpkin vegetables among women farmers in Benue State. This is partly influenced by socio-economic factors such as farming experience, education, marital status, income and number of dependants of women farmers. The significance of farming experience and level of education infers that the more education a farmer acquires, the more control she may exercise over some influences leading to losses. The significance of marital status, income and number of dependants suggest that shortage of income as a result of family needs or expenses could militate against the possibility of saving to acquire requisite managerial knowledge or even buy processing facilities that would aid reduction in losses.

Recommendations

The following recommendations are made in line with the findings;

1. Women farmers should be availed the opportunity of acquiring more education, especially on agribusiness. This can be done by BERNARD through adult education programme and help enlighten the farmers on best ways to preserve their produce.
2. The government should intensify her efforts in agriculture by providing preservative and processing facilities that will help minimize losses and increase income generation.

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