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SOCIO-ECONOMIC CHARACTERISTICS OF MAJOR VALUE CHAIN ACTORS AND ANALYSIS OF POST-HARVEST LOSS ON SELECTED VEGETABLES PRODUCTION IN ADAMAWA STATE, NIGERIA

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ABSTRACT

This studied the socio-economic characteristics of major value chain actors and analysis of post-harvest loss on vegetable production in Adamawa State, Nigeria. A Multi-Stage sampling procedure was used to select 210 farmers. Data were collected using structured questionnaire and analysed using descriptive statistics. About 96.7% of the farmers were male and 90.5% were married. Similarly, 53.3% of the farmers had quranic education, 66.7% were engaged into farming and 81.4% had personal savings as the main sources of their capital. Furthermore, the mean ages of the farmers were 40.2 years, the mean household sizes of the farmers were 7 person and the mean years of experience of farming were 12 years. The result also shows that, the mean quantity and amount of loss per week of tomato farmers operations (harvesting, transportation, sorting, grading, packaging and storage) were between 130.33kg-405.22kg and between ₦2899.42-₦8983.72, for pepper farmers, were between 92.91kg-670.19 kg and between ₦3,096.69-₦22,337.40 and for okra farmers, were between 27.93kg-142.85kg and between ₦282.37-₦1,444.2 respectively. Furthermore, the result shows that, delay between buying and selling of the vegetable crops with the mean value of 4.9 was the major causes of vegetable crops loss perceived by the

Introduction:

Agriculture has been the main stay of Nigerian economy since in the early 1960s through provision of employment; increasing Gross Domestic Production (GDP) of the economy and provision of food crops, vegetable inclusive to its teeming population but post-harvest losses along food supply chains have far reaching consequences and affect the social and economic conditions of food supply chain participants, especially of those in developing countries (Iorzua *et al.*, 2020)

Post-harvest loss is defined as losses that occur during or after harvest, through the value chain until the crop reaches the consumer (Kate *et al.*, 2018). Post-harvest loss reduction strategies offer unique income and food security opportunities for the over 200 million people that face food insecurity in the sub-Saharan Africa (Kikulwe *et al.*, 2018).

Nigeria losses about $8.9 billion (₦ 2.7 trillion) annually to post-harvest (NSPRI, 2018). The estimate of global

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farmers. The studied concluded that, post-harvest loss during storage operations for the pepper farmers has the highest mean loss per week of 670.19 kg and mean amount loss of ₦22,337.4 and therefore recommended that, storage facilities be provided by the government/stakeholders and careful handling during/after harvesting of the vegetable crops be adhered by the farmers..

Keywords: Post-harvest lost, Value Chain Actors, Vegetable Crops

food loss and wastage is 32% while in Sub Saharan African; post harvest loss is estimated to be thirty seven percent 37% (FAO, 2019).

However, various government policies and programmes both in federal and state implemented, cantered on the increase in the volumes and marketing of vegetable crops with little or no attention is given in the areas of reducing post-harvest loss which has been a major threat in the post-harvest chain causing food insecurity (Yahaya and Mardiyya, 2019).

RESEARCH METHODOLOGY

The Study Area

Adamawa State was the study area and has abundant water bodies (River Benue, River Gongola and River Yedzaram) and favourable weather that promotes the cultivation of many crops especially vegetables. The State was created in 1991 from the defunct Gongola State and is located in the north-eastern part of Nigeria between Latitude 7^0N and $11N^0$ and Longitude 11^0E and 14^0E (National Geospatial Intelligence Agency, 2012).

The State is bordered to the north-east by Borno State, Gombe State to the west, Taraba State to the south-west and has a national border to the east with Cameroon. The State occupies land area of 36, 917 km^2. The State has a projected population figure of 4,502,155 people at a population growth rate of 30.00% annually (National Population Commission [NPC], 2018).

The State has two seasons, the tropical wet and dry climate and two ecological zones namely the Guinea and Sudan Savannah. Mean annual rainfall ranges from 700-1600 mm and average minimum and maximum temperatures of 25.9^0C and 39.4^0C (NIMET, 2019). Majority of the people in Adamawa State are farmers. Cattle rearing are also a major occupation, while village communities living at the banks of Rivers Gongola and Benue and their tributaries engaged in fishing and farming.

Sampling Procedure and Sample Size

The studied covered the four (4) Agricultural zones (Zone I, Zone II, Zone III and Zone IV) of Adamawa State (AADP, 2019). A multi- stage sampling procedures was used in the selection of the farmers. In the first stage, one LGA from Zone I and two LGAs from Zone II are selected. Similarly, four LGAs from Zone III and three LGAs from Zone IV were selected. The selection of the LGAs was purposive because of predominance of farmers that are engaged in vegetable crops production in those areas, thus, making a total of 10 LGAs.

In the second stage, random sampling procedure was used to select two villages from one LGA in Zone I, two and three villages from two LGAs in Zone II. Similarly, one village from a LGA, two villages from a LGA and three villages each from two LGAs from Zone III were selected. Moreover,

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two villages each, from two LGAs and three villages from a LGA in Zone IV were selected making a total of 23 villages (AADP.2019).

Yamane formula of determining sample size at 5% expected margin error and 95% confidence is used to determine the sample size of the farmers. A proportionate sampling allocation procedure was used to determine the number of farmers that were selected from each village. A total of 210 farmers were randomly selected for the study.

Method of Data Collection

Structured questionnaire were used to collect primary data by the researcher. Trained enumerators and extension agents were involved with the administration of the questionnaire. The questionnaire was designed to obtain information on socio-economic characteristics of the farmers in the post-harvest chain, quantity and amount of post-harvest loss of vegetable crops at different component of operations in the post-harvest chain and information on the causes of post-harvest loss of vegetable crops among the farmers.

Method of Data Analysis

Data for the study were analysed using descriptive statistics.

RESULTS AND DISCUSSION

Socio-economic Characteristics (Qualitative Variables) of the Actors

The result in Table 1 shows that, 96.7% were male and 3.3 % were female at farmers' level. This study agrees with the study of Barret *et al*. (2017) who reported that, 52% of the vegetable crop farmers had age range of between 40-60 years, 61.66% had primary education, 70% were male and 30% had 1-9 years of farming experience. The marital status of Table 1 shows that, 90.5 % of the farmers were married while 9.5% were single. This study agrees with Tsado (2015) who reported that 74.74% were married. The result also shows that, 53.3% of the farmers had quranic education. The result also revealed that, 66.7% were into farming as their major occupation and 81.4% of the farmers; get their finance from their own personal savings.

Table 1: Socio-economic Characteristics (Qualitative Variables) of the Value Chain Actor (Farmers) (n = 210)

Characteristics	Farmers	
	Frequency	Percentage
Sex		
Male	203	95.7
Female	7	3.3
Marital status		
Married	190	90.5
Single	20	9.5
Educational level		
Never Been to School	12	5.7
Quranic Education	112	53.3

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Primary Education	14	6.7
Secondary Education	47	22.4
Tertiary Education	25	11.9
Secondary Occupation		
Civil Servant	15	7.1
Farming	140	66.7
Marketing	27	12.3
Rearing	7	3.3
Fishing	7	3.3
Transportation	4	1.9
Artisan	10	4.8
Sources of capital		
Personal Savings	171	81.4
Bank (Loan)	15	7.1
Friends/Relatives	16	7.6
Cooperatives	6	2.9
Others	2	1.0

Source: Field Survey (2019)

Table 2: Socio-economic Characteristics (Quantitative Variables) of the Actor (farmers) (n = 210)

Actor		Age (yrs)	Household size	Experience (Yrs)
Farmers	Mean	40.16	7	11.5
	Standard Deviation	9.8851	4.2612	7.2923
	Minimum	19	1	2
	Maximum	68	22	49

Source: Field Survey (2019)

Table 2 shows that the mean quantitative age of farmers was 40.2 years, while the minimum and maximum ages of the farmers were 19 years and 68 years. This result agrees with Olubunmi *et al*. (2017) who reported age range of farmers was between 26-36 years. The result also shows that, the mean household size of the farmers was 7 persons, while the minimum and maximum household size was 1 person and 12 persons respectively. Similarly, the result also shows that, the mean years of experience for farmers was 11.5 years and the minimum and maximum ages of the farmers was 2 years and 49 years respectively. The study agrees with that of Samuel *et al*. (2016) reported that 30% of the respondents had business experience of between 5-10 years.

Table 3: Distribution of farmers according to quantity and amount of loss of vegetable crops base on farm operations (₦/week) (n = 210)

Operations	Tomato (100Kg/basket)	Amount (₦)	Pepper (50Kg/bag)	Amount (₦)	Okra (50Kg/bag)	Amount (₦)
Harvesting						
Mean	242.65	5,379.55	127.61	4,253.24.	45.91	464.42
Min.	5.0	110.85	3.0	99.99	2.0	20.22

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Max.	8.7	192.8	6.0	199.98	5.5	556.05
Transportation						
Mean	405.22	8983.72	148.72	4,956.83	142.85	1,444.2
Min.	4.5	99.76	1.5	49.99	10.11	102.21
Max.	17.40	385.7	7.2	239.97	50.0 1 2002	505.5
Sorting, grading and packaging						
Mean	130.33	2,889.42	92.91	3,096.69	27.93	282.37
Min.	5.0	110.85	5.0	166.65	2.0	20.22
Max.	40.80	9,045.35	45.56	1,518.5	9.0	90.99
Storage						
Mean	299.73	6,645.0	670.19	22.337.4	64.8	655.12
Min.	1.1	243.87	10.0	333.3	5.0	50.55
Max.	17.40	385.75	15.45	514.9	9.0	90.99

1kg Tomato = ₦22.17, 1kg Pepper = ₦33.33 and 1kg Okra = ₦ 10.11
Source: Field Survey (2019)
T
able 3 shows that, the mean quantity and amount loss per week of tomato farmers operations was between 130.33kg-405.22kg and between ₦2,889.42-₦8,983.72,for pepper farmers was between 92.91kg-670.19 kg and between ₦3,096.69-₦22,337.4 and for okra farmers, between 27.93kg-142.85kg and between ₦655.12-₦1,444.2 respectively. This agrees with the findings of Sultan and Chauchan, (2019) who reported that during transportation, 4.33kg of cabbage, 3.72kg of cauliflower and 3.42kg of broccoli were lost.

Table 4: Perception of value chain actor (farmers) according to possible factors responsible for post-harvest loss in vegetable crops (n = 210)

	Factors	Mean	Rank
		Farmers	
i.	Inadequate/poor storage facilities	4.9	1st
ii.	Delay between buying and selling of the produce	4.7	2nd
iii.	Poor transportation and roads	4.7	3rd
iv.	Lack of awareness and training in post-harvest handling technique	4.6	4th
v.	Pest and disease incidence	4.6	5th
vi.	Poor packaging of produce	4.5	6th
vii.	Destruction of the crops by animals	4.5	7th
viii.	Poor produce quality (under/over ripe)	4.4	8th
ix.	Poor handling during and after harvesting of the crops	4.4	9th
x.	Poor pricing and market for sales	4.3	10th
xi.	Poor harvesting/processing method	4.3	11th

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xii.	Adverse weather condition	4.2	12th
xiii.	Theft incidence	4.1	13th

Bench Mean Score = 3.0
Source: Field Survey (2019)

Table 4 shows that, inadequate/poor storage facilities for the vegetable crops had mean values of 4.9 for the farmers and ranked first. It can therefore be deduced that this factor cause post-harvest on the actors as their mean value is above the mean score of 3.0 and the implication is that marketers tend to loss valuable crops which they could have make some returns due to negligence's. This finding agrees with Arun and Kiran (2019) who reported that marketers of vegetable crops make huge loss of money due to post-harvest loss because of ignorance and the inability to use adequate technology in processing of the crops to preserve them for future use

Table 4 shows that delay between buying and selling of the produce had a mean score of 4.7 for the farmers ranked second. Since their mean score is above the bench mean score of 3.0, such factor has the capacity to cause post-harvest loss among the actors along the post-harvest chain. The study agrees with that of Mohammed and Afework, (2018) who reported that, the severe horticultural crop post-harvest loss and quality deterioration were recorded mostly during harvesting followed by marketing, transporting, storage and in some cases through the e and transpiration until its reserved food and water are exhausted. This physiological process is influenced by temperature, composition of surrounding air, and humidity of environment.

Table 4 shows that, poor transportation and roads had mean values of 4.7 for the farmers ranked third. Since the mean score of the actor is greater than the bench mean score of 3.0, such factor by implication is capable of causing loss along the post-harvest chain of the actors. This agrees James *et al*. (2017) who reported that poor nature of roads causes damage on fruits such as bruises an attracts no sales to the marketers

Table 4 shows that, lack of awareness and training in crops handling techniques by the extension agents had mean score of 4.6 for the farmers ranked fourth. Since the mean score of the actor are greater than the bench mean score of 3.0, such factor is capable of causing loss along the post-harvest chain of the actors. This agrees with the findings of Bello *et al*. (2018) who reported that the marketers lacked knowledge due to lack of training on how to handle carefully their vegetable crops by the extension agent

The result also shows that pest and disease incidence had mean values of 4.6 for the farmers ranked fifth. Since the mean score are greater than 3.0, such factor by implication is capable of causing loss along the post-harvest chain of the actors. Mbuk *et al*. (2011) reported activities of pest and disease that destroy most of the crop yield of the farmers in the study area.

Similarly, Table 4 shows that, poor packaging had mean score of 4.5 ranked sixth. From this indication, it can be concluded that this factor have a positive effect in the causing of post-harvest loss in the study area as the mean mark for the actors is above the bench mean score of 3.0. The result agrees with the findings of Jermal and Genet (2019) who reported that physical and quality losses are mainly due to poor temperature management, use of poor quality packages, rough handling, and a general lack of education regarding the needs for maintaining quality and safety of perishables at the producer, wholesaler and retailer level.

Table 4 shows that, destruction of the crops by animal had mean score of 4.5 for the farmers ranked seventh. The mean score of the actors is greater than the bench mean of 3.0 and by

implication such factor is capable of causing loss along the post-harvest chain of the actors. This agrees with the findings of Kunghur *et al*. (2015) who reported that stray animals destroyed valuable vegetable crops which could have been an additional income to the farmers in the study area.

Poor handling during and after harvesting of the crops had mean score of 4.4 for the farmers ranked eighth. Since the mean score of the actors are greater than the bench mean score of 3.0, such factor is capable of causing loss along the post-harvest chain of the actor to bruises that makes the crops un attractive for sale, this will lead to loss in finance to the marketers.

Similarly, poor produce quality (under/over ripe) had mean values of 4.4 for the farmers ranked ninth. Since their mean value is greater than the bench mean score of 3.0, the factor is capable of causing post-harvest loss among the actors along the post-harvest chain. The study agrees with the findings of Leelande *et al*. (2021) who reported as additional time of transit, exposure to physical and mechanical injuries and exposure to solar radiation and extreme weather (such as rain), all of which contribute to increase the degree of losses.. This is because fresh produce after harvest continues the process of respiration

Similarly, Table 4 shows that, poor pricing and market for the vegetable crops had a mean of 4.3 for the farmers ranked tenth. The implication of the result shows that, poor produce contributes positively as a cause of post-harvest loss among the major actors and also since their mean score was greater than 3.0, then such factors has a positive effect in causing post-harvest loss in the study area.. The study agrees with the finding of Tadesse *et al.*(2018) who reported that lack of technology, insufficient skills, knowledge and management capacity of supply chain actors and lack of markets, hence, most food losses are experienced by poor farmers who become greatly disadvantaged due to the losses as this has financial implications.

Table 4 shows that, poor harvesting/processing method/technique had mean score of 4.3 for the farmers ranked eleventh. Since the mean score of the actor are greater than the bench mean of 3.0, such factor by implication is capable of causing loss along the post-harvest chain of the actors. This agrees with Tsado (2015) who reported that poor harvesting methods had hampered the profit making of the farmers.

Table 4 also shows that, adverse weather condition had mean score of 4.2 for the farmers ranked twelfth It is concluded that this factor causes post-harvest loss on the actors as its mean score is above 3.0. The implication is that the quality of the crops handled are distorted and injuries to the fresh crop affects its marketing as a result it will command poor price as buyers go for crops that are free from any form of distortion. This agrees with the findings of Kasso and Bekele, (2016) who reported that poor harvest techniques can also cause losses.

Also, incidence of theft had mean values of 4.1 for the farmers ranked thirteenth as shown in Table 4. Since the mean values of the actor is greater than the bench mean of 3.0, such factor is capable of causing loss along the post-harvest chain of the actors by implications. This agrees with the findings of Isaac *et al*. (2016) who reported

CONCLUSION AND RECOMMENDATIONS

The studied concluded that, post-harvest loss during storage operations for the pepper farmers has the highest mean of operations loss per week of 670.19 kg and amount of loss of ₦22,337.4 and recommended that, adequate storage rooms, the use of modern packaging materials, training on post-harvest loss management practices should be provided to the farmers by

government/stakeholders and careful handling during and after harvesting of the vegetable crops be adhered by the farmers..

REFERENCES

Arun, G. C. and Kiran, G. (2019). Estimating post-harvest loss at farm level to enhanced food security : A case of Nepal. *International Journal of Agriculture, Environment and Food Science,* **3**(3):127-136.

Barret, C. B.; Christiansen, L. Sheshan, M and Shimless, A. (2017). On the transformation of rural Africa. *Journal of African Economies*, **26**(1):11-35.

Bello, O. G. ; Halidu, A. S,; Koloche, I. M.; and Gbadamasi, F. Y. (2018). Assessment of indigenous knowledge of farmers post harvest storage of tomato in Jigawa State, Nigeria. *Journal of Science*, **2** (2):145-152.

FAO (2019). The state of food security and nutrition in the World: Safeguarding against economic slowdowns and downturns. Rome:

Iorzua, D.A., Ikwuba, A.A., Aan, J. T. and Nwafor. S.C. (2020). Post-harvest loss of socioeconomic sustenance of yam farmers in Southern Zone of Nasarawa State, Nigeria. *Journal of Scientific Research and Report,* **26** (8):88-98 NPC (2018) National population census report, Adamawa State, National Population Commission, Adamawa State, Nigeria.

Issac, K. O., Gerald, K. A., Etarnam, K. A., Ernest, K. K. and Harrison, A. (2016). Post-harvest handling practices and treatment methods for tomato handlers in Developing Countries. *Journal of Advances in Agriculture*, **1**(1):1-8.

James, D., Bamishayi, O. M., Shamsudeen, J., William, O. and Zainab, M. (2017). Analysis of the level of post-harvest losses in orange marketing case study of yanlemo orange market in Kano State, Nigeria. *International Journal of Agriculture and Earth Science*, **5**(2):17-24.

Jemal, M. and Genet, G. T. (2019). Assessing factors affecting marketing of vegetable production. The case of Qewet Woreda, Ethiopia. *Journal of Business and Management*, **21**(4):82-93.

Kasso, M. and Bekele, A. (2018). Post-harvest loss and quality deterioration of horticultural crops in Dire Dawa Region, *Ethiopia. Journal of the Saudi Society of Agricultural Sciences*, **17**(1):88-96.

Leelananda, R., Guunathiaka, D .M. C. Pathirana, S. M. and Fernanado, T. N. (2021). Reducing post-harvest loss in fruits and vegetables for ensuring food security. *Journal of Food Processing and Technology,* **9** (1):7-16.

Olubunmi, A. D., Abdulazeez, M. L., Khadijat, B. O. and Tauheed, A. A. (2017). Assessment of dry season garden egg production among small-scale holder farmers in Edu Local Government Area of Kwara State, Nigeria. *Journal of Agricultural Science*, **62**(10):89-103.

Samuel, O. I., Abiodun, O. O. and Joel, O. I. (2016). Efficiency of vegetable marketing in Peri-Urban Areas of Ogun State, Nigeria. *Journal of Agricultural Science*, **8**(3):142-150.

Sultan, S. and Chauhan, S. K. (2017). Post-harvest losses in marketing cole crops in Himachal Pradesh, India. *Himachal Journal of Agricutural Research,* **43**(2):121-25.

NIMET (2019) Nigerian Metrological annual weather report.21Pp

NPC (2018) National population census report, Adamawa State, National Population Commission, Adamawa State, Nigeria.

NSPRI (2018): Nigerian Stored Products Research Institute Annual Report, 2018.

Yahaya, S. M. and Mardiyya, A. Y. (2019): Review of post-harvest losses of fruit and vegetables. *Journal of Scientific and Technical Research*, **13**(4):10193-10199.

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