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## Post Harvest Losses in Tomato in the Esikuma Odoben Brakwa District of Ghana

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**Abstract:** The aim of this study was to investigate factors influencing post harvest losses in the Esikuma Odoben Brakwa District of Ghana. The simple random procedure was used to select the operational areas and accidental sampling procedure used to select sixty tomato growers. Results on the socio economic characteristics of farmers revealed that, the majority of the farmers, 61.7% were men, 48.4% were in the active workforce of 25-40, 60.0% married and 71.7% had farm sizes ranging from 1-3 hectares. 51.7% of the farmers had education up to the primary level, 71.7% had household size between 2-8 and 86.7% of the farmers had less than 15 years experience in the crop production. Consequently, all the identified factors have proved to have significant impact on post harvest losses and that when managed well, food security would be ensured without cultivating an extra hectare of land.

**Keywords:** Post harvest losses; preservation methods; storage facilities; tomato varieties.

### 1. Introduction

The quality and nutritional value of fresh produce is affected by post harvest handling and storage condition [1]. Fresh vegetables are extremely perishable and have relatively short shelf lives. They are living, respiring tissues that start senescing immediately at harvest [2].

Many factors contribute to post harvest losses in fresh fruits and vegetables. These include environmental conditions such as heat or drought, mechanical damage during harvesting and handling, improper postharvest sanitation, and poor cooling and environmental control. Efforts to control these factors are often very successful in reducing the incidence of disease. For example, reducing mechanical damage during grading and packing greatly decreases the likelihood of post harvest disease because many disease-causing organisms (pathogens) must enter through wounds [3].

World Tomato production in 2001 was about 105 million tons of fresh fruit from an estimated 3.9 million hectare. [4]. Post harvest losses are highest for tomatoes and lettuce which record up to 20% after 5 years of harvesting. Out of the 510,000 metric tons of fresh tomato fruits produced annually in Ghana, the country losses about 153,000 metric tons (30%) [5].

Reduction in post harvest losses, if it can be avoided, would be of great significance to growers and consumers alike. It is believed that post harvest losses are higher in less industrialized countries, this generalization may not be true and higher losses may occur in developing countries for lack of good facilities and technologies. However, these losses may be lower in less urbanized regions, where the products need to be transported a shorter distance to market, and there is a shorter time lag period between harvesting and consumption [6].

In Ghana, storage and transport facilities to extend the shelf life of produce are not available and this causes considerable losses after harvest. In effect these losses lead to decrease in the returns of the farmers. Keeping in view the above facts, this research study was planned to find out factors influencing the post harvest losses in tomato.

The specific objectives were:

- 1) To identify socio economic characteristics of tomato farmers in the study area.
- 2) To identify the major post harvest factors influencing losses in the tomato crop.
- 3) To ascertain farmers' knowledge about how to preserve the tomato produce.

### 2. Materials and Method

#### 2.1. The Study Area

The study was carried out in the Esikuma Odoben Brakwa district of the Central Region of Ghana. Breman Asikuma is the administrative capital of the district and it covers an area of 884.84 square kilometers and can be found between latitude 50.51" and 50.52" North and longitude 10 50" and 10 5" West . The population of the district according to the 2010 population and housing census is 89,395 with an annual growth rate of 4.0%.The areas of

economic activities in the district are agriculture 76%, industry 14.2% and service 9.8% of the labor force. With agriculture, Asikuma-Odoben Brakwa abounds in much potential that can be enhanced. Apart from being one of the major cocoa growing districts in the Central Region, the district is blessed with large arable lands that support different food and cash crops. Among them include citrus, pears and oil palm and food crops like cassava, maize, cocoyam and tomato. Livestock also produced may include small ruminants such as goat and sheep. The main goal of these farmers is to produce enough to feed their families and communities and to make income.

## 2.2. Data Collection and Analysis

A case study design was used in this research to find the factors influencing post harvest losses of tomato in the Esikuma Odoben Brakwa district of the Central Region. A simple random sampling was used to select five villages including: Kuntanase, Kojokrom, Bedeum, Durban and Ayipey. Accidental sampling was used to select 60 farmers in the study, 12 from each village. Questionnaires were used to ensure anonymity of response which minimizes bias and to reduce personal time. The questionnaire was structured with both open and closed ended questions. Items in the questionnaires were explained in the local language to the respondents and their responses recorded by translation into the English language for easy use by the researcher during analysis and interpretation. With the help of SPSS software, the collected data was subjected to the right statistical analysis. For easy comparison, descriptive statistics was used to get the data summary. The tools used in the mentioned statistics included frequencies and percentages.

## 3. Results and Discussion

This section deals with the results and discussion of the analysis of data in the light of the objectives set forth at the start of the study.

### 3.1. Socio Economic Characteristics of Farmers

#### 3.1.1. Gender of Farmers

The study showed that tomato farming in the district is male dominated with 61.7% male and 38.3 % female. The result is a true reflection of the fact that tomato production in the area is labour intensive and that male farmers are perceived to have more time and energy to carry out farm activities such as weeding, planting, spraying and harvesting of the crops than their female counterparts who may also have other household activities to do. A similar result was reported by [Tambo and Gbemu \[7\]](#) in the Dangme West District of the Greater Accra Region where it was found out that tomato farming is a male dominant activity with the men making up 88% of the respondents sampled.

Table-1. Gender of farmers

Gender	Frequency	Percentage (%)
Male	37	61.7
Female	23	38.3
Total	60	100.0

Source: Primary Data, 2015

#### 3.1.2. Age characteristics of Farmers

The study showed that 48.4% of the farmers were within 25-40 years age group while 10.0 % of the farmers were found above the age of 55. The results show the youth being the majority of the tomato farmers in the study area and this affirms the energy level needed in the production of the crop.

Table-2. Age characteristics of farmers

Age (years)	Frequency	Percentage (%)
18-24	14	23.3
25-40	29	48.4
41-55	11	18.3
55 and above	6	10.0
Total	60	100.0

Source: Primary Data, 2015.

#### 3.1.3. Education Level of Farmers

Table 3 shows that majority of the farmers 51.7% had their education up to the primary level, 23.3% of farmers had no formal education and 6.7% of the farmers in the minority had their educational status up to a diploma level. The low educational status of the majority of the farmers in the area is a major contributor to post harvest losses as these farmers can not appreciate good harvest and after harvest practices and technologies available to cut losses and increase yield. The low level of education again renders the farmers not to get access to basic information on post harvest practices on the radio, television, newspapers and the internet to improve yield.

**Table-3.** Education level of farmers

<b>Educational status</b>	<b>Frequency</b>	<b>Percentage (%)</b>
No formal	14	23.3
Primary	31	51.7
Secondary	11	18.3
Diploma	4	6.7
<b>Total</b>	<b>60</b>	<b>100.0</b>

Source: Primary Data, 2015.

### 3.1.4. Marital Status of Farmers

The results showed that 60.0 % of the farmers were married with 40.0 % being single or divorced. Married farmers having access to their spouse and children during harvesting helps to speed up the process.

**Table-4.** Marital status of farmers

<b>Marital status</b>	<b>Frequency</b>	<b>Percentage</b>
Single	24	40.0
Married	36	60.0
<b>Total</b>	<b>60</b>	<b>100.0</b>

Source: Primary Data, 2015.

### 3.1.5. Years of Experience in Tomato Farming

From the results 86.7% of the farmers had below 15 years of experience in the crop production where the rest of 13.3% had above 15 years of experience in the field. The low level of experience could be a leading cause of post harvest losses in the crop as these farmers might not be used to good harvesting techniques and after harvest practices that cut wastage.

**Table-5.** Years of experience in tomato farming

<b>Years of experience</b>	<b>Frequency</b>	<b>Percentage (%)</b>
1-5 years	18	30.0
6-10years	24	40.0
11-15years	10	16.7
Above 15	8	13.3
<b>Total</b>	<b>60</b>	<b>100.0</b>

Source: Primary Data, 2015

### 3.1.6. Description of Farming Activity by Farm Size

It can be observed from the results that 71.7% of the farmers had farm sizes ranging between 1-3 acres where 28.3% had farm sizes ranging between 4-6 acres. The results show that small-scale farmers prevail in the study area and it is suggested that these farmers use good harvest and post harvest practices to manage the crop so that the little output they get does not go waste.

**Table-6.** Description of farming activity by farm size

<b>Farm size (acres)</b>	<b>Frequency</b>	<b>Percentage (%)</b>
1-3	43	71.1
4-6	17	28.3
<b>Total</b>	<b>60</b>	<b>100.0</b>

Source: Primary Data, 2015

### 3.1.7. Household Size of Farmers

The result of the farmers household size showed that 28.3% of the farmers had only 1 household member where 71.7% had household sizes between 2-8. The larger household size means more labour to help during harvesting.

**Table-7.** Household size of farmers

<b>Household size</b>	<b>Frequency</b>	<b>Percentage</b>
1	17	28.3
2-4	20	33.3
5-7	19	31.7
Above 8	4	6.7
<b>Total</b>	<b>60</b>	<b>100.0</b>

Source: Primary Data, 2015

### 3.1.8. Tomato Varieties Grown by Farmers in the Study Area

It can be seen from Table 8 that 78.0% of farmers cultivate Roma variety, 66.0% cultivate Money maker variety and 22.0% cultivate Ife plum variety. It can be seen that almost all of the farmers cultivated more than one variety of the crop. The varieties were cultivated because of their high yielding quality, longer shelf life and good marketing quality.

Table-8. Tomato varieties grown by farmers in the study area

Tomato variety	Frequency	Percentage
Roma	39	78.0
Money maker	33	66.0
Ife plum	11	22.0

Source: Primary Data, 2015

### 3.1.9. Factors Influencing Post Harvest Losses

76.0% of farmers believed that bad roads leading to the farms and farm gates is a major cause of losses in the crop. The roads make it difficult for trucks and other carting equipment to ply and deterred drivers of trucks from going to the farms to convey produce to the market. A delay in conveying the produce to the market makes the produce deteriorate before getting to the market. Alliance for a Green Revolution in Africa (AGRA) [8] stated that poor road conditions and access cause transport delays and added post harvest losses. Kader [9] also stated that fresh produce is transported by road, from farmer to consumer and marketing centres and that fresh produce should be of the highest quality and should be kept in the best condition during transportation. He further pointed out that minimizing losses during transportation causes that special attention is given to roads, vehicles, equipment, infrastructure and handling.

62.0% of farmers associated losses to lack of ready market or lack of alternative market avenue for the produce. The said cause could be because of the glut season where the produce becomes so abundant that there are no alternative markets for the excesses to be sold outside the production region or neither can the produce be processed into other forms like paste, jams and puree as there are no processing facilities. To prevent losses farmers decrease prices and increase quantity of produce bought.

64.0% of the farmers mentioned lack of processing unit to process the produce into other forms as a major cause of losses in the crop. Farmers explained a processing unit would have been an incentive to cultivate and produce more as they know the glut of the produce could be turned into forms like pulp, juice, paste or puree.

86.0% farmers attributed the greatest losses in the crop to lack of storage facilities to increase the storage life of the produce. Farmers explained they could only store the produce by covering it with grasses or with jute sacks and this only last for a few days. Lack of good storage facility in the area therefore exposes the produce to harsh weather, insects and pest attacks. According to Kitinoja and Gorny [10], in developing countries there is a lack of storage facilities on farm or at wholesale or retail markets and lack of ventilation and cooling in the few existing on farm facilities.

56.0 % of farmers also attributed losses to lack of technical support on post harvest management of harvested produce. Post harvest training on management of harvested produce by post harvest experts, Agricultural extension officers and agriculture related NGO's would go along to reduce losses and make more food available on the table. The farmers would be carried through the cooling of the produce after harvest, means of storage, preservation as well as processing into other forms.

38.0% of the farmers also attributed losses to labour used during harvesting. The unskilled labourer lacks the necessary skills and techniques to be used during the harvesting process. As a result the produce suffers bruises and damages leading to early deterioration and subsequent losses.

### 3.1.10. Knowledge of Tomato Preservation

Almost all farmers interviewed said they preserve the tomato produce by pouring it on the bare floor covered with grasses and store in shallow baskets. They explained the methods keep the produce for a shorter time and that the alternative solution is to keep by refrigerators but per the expensive nature of the facility they cannot afford it.

## 4. Conclusions and Recommendations

### 4.1. Conclusions

The study was conducted to investigate the factors influencing the postharvest losses in tomato crops produced in Esikuma Odoben Brakwa District of the Central Region. Three varieties, Roma, Money maker and Ife Plum were grown in the research area. Most of the farmers had grown these varieties on their fields because of their high yielding quality, longer shelf life and good marketing quality. During the survey, it was observed that all the identified socio economic characteristics of the farmers have significant impact on post harvest losses. The major causes of post harvest losses in tomato indicated by the farmers in the area include lack of storage facilities followed by bad road networks, lack of processing facilities and lack of ready markets. Preservation methods used by farmers in the study area include pouring produce on the bare cemented floor covered with grasses and storing in shallow baskets.

## 4.2. Recommendations

Based on the findings of the study the following recommendations are made:

- Storage facilities are to be provided to store produce that do not have a ready market. This will go a long way to prevent the produce from going bad reducing losses in the crop.
- Road networks in the study area should be improved and made more accessible to all kinds of trucks. This would help to solve problems associated with carting or transportation of harvested produce from the farm gates to the various market centres.
- A tomato processing factory should be established in the area to process the produce into ketchup, juice and purees.
- Access to credit facilities by farmers should be made easier by financial institutions as it will help the farmers to get access to more funds to buy equipment like refrigerators to keep the produce.
- Farmers should form co-operatives or farmer groups to get access to post harvest experts and organizations for education on good harvest and after harvest practices that cut losses and increase profit margins.

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