

# Assessing Fruit Farmers' Perceptions of Post-Harvest Losses in the Ashanti Region of Ghana

Kofi Kyei<sup>1\*</sup>, Kenichi Matsui<sup>2</sup>

<sup>1</sup>Graduate School of Life and Environmental Sciences, University of Tsukuba, Japan

<sup>2</sup>Faculty of Life and Environmental Sciences, University of Tsukuba, Japan

**Abstract**— *Post-harvest loss reduces food availability. The need to examine post-harvest loss in Africa is recognized in one of 2030 SDG goals for sustainable consumption and production. This goal appears to be a tremendous challenge as Africa expects to double its population from 1.2 billion to 2.5 billion. This paper examines fruit farmers' perceptions about post-harvest loss in the Ashanti Region of Ghana. We interviewed 70 fruit farmers about the sources of post-harvest loss. We also assessed the relationship between their perceptions and socio-demographic characteristics. In revealing nuanced perceptions, we used the five-point Likert-scale in some questions. To determine the relationship between farmers' perceptions and their socio-demographic characteristics, we conducted the multiple linear regression analysis. We found that the respondents were most concerned about their loss at market centers and storage. Loss during transportation was the least source of post-harvest loss perceived by the fruit farmers. The results from the regression analysis also showed that age, gender and farming experience were significantly associated with their perceptions. This paper then makes some recommendations to help reduce post-harvest loss for farmers.*

**Keywords**— *Post-Harvest Loss, Fruit Farmers, Market Center, Ashanti Region, Ghana.*

## I. INTRODUCTION

The past studies on post-harvest loss of fruit crops tended to focus on estimating the amount of loss occurring on farms. Reference [1], for example, estimated the amount of post-harvest loss of mango fruits in Benin. After interviewing the farmers, they found about 50% of harvest was lost at the end of the crop year. A similar study in Costa Rica found 14.1% of post-harvest loss of the same fruit during the dry season, and 84.4% during the rainy season [2]. Using the questionnaire survey, [3] in Brazil found 28% of post-harvest loss of mangoes. Another study in Pakistan found that 31% of mangoes lost in the transportation process from farm to market centers [4].

Other fruits also had estimation studies on post-harvest loss. Studies on bananas tend to suggest that long distance for transportation and poor road conditions led to more losses in Kenya [5]. In Sri Lanka, a questionnaire survey revealed that 20% of post-harvest loss of banana occurred from farms to distribution centers [6]. In Fiji, 4% to 10% of post-harvest loss of fruits in general occurred at municipal markets [7].

These studies provided some valuable information about the varying amount of post-harvest loss by types of fruits and areas, but they are remarkably silent about the main causes of post-harvest loss. Considering this research gap, this paper attempts to identify the main sources of post-harvest loss. In particular, it examines fruit farmers' perceptions about the sources of post-harvest loss in the Ashanti Region of Ghana. It also assesses the correlation between farmers' perceptions and their socio-demographic characteristics to determine the factors that influence their perceptions.

## II. METHODOLOGY

### 2.1 Data Collection and Analysis

Considering the importance of fruit production for Ghana and western Africa, we selected Sekyere-Kumawu District of the Ashanti Region. With a population of about 65,402 people, it is one of the most productive agricultural districts in the Region. Over 81.8% of households in this district are engaged in agriculture. The most prominent fruits grown here include orange, banana, avocado, pear, guava, pawpaw, pineapple and mango [8].

Before conducting the survey, we conducted field observation to better design the questionnaire. We selected a total of 70 fruit farmers by purposive sampling in five communities (Abotanso, Besoro, Domeabra, Woraso and Banko) in the district for in-person interviews. The farmers selected were engaged in orange, banana, avocado and mango production. The survey was administered in March 2019 with approval and support from two national service personnel at Sekyere- Kumawu District of Agriculture.

The questionnaire had two-sections. The first section focused on fruit farmers socio-demographic characteristics. The second section attempted to clarify farmers' perceptions about sources of post-harvest loss. We evaluated the perceptions by using five-point Likert-scale. We then applied the multiple linear regression analysis to assess the relation between fruit farmers' perceptions and their socio-demographic characteristics, such as age, gender, education, farming experience and household size.

### III. RESULTS AND DISCUSSION

#### 3.1 Socio-Demographic Characteristics of Fruit Farmers

The result of farmer's socio-demographic characteristics shows that the average age of the respondents was approximately 50years old with average farming experience of 15 years (Table 1).The minimum and maximum age was 25 years and 66 years old, respectively. This indicates a trend of aging population among fruit farmers in the region. Most farmers had completed senior high school education. The average household size was eight persons. These are smallholder farmers as they had less than two acres of farmland.

**TABLE 1**  
**SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS**

| Variables                          | Mean  | Standard Deviation | Minimum | Maximum |
|------------------------------------|-------|--------------------|---------|---------|
| Age                                | 49.68 | 14.33              | 25      | 66      |
| Gender<br>0=Female<br>1=Male       | 0.78  | 0.42               | 0       | 1       |
| Years of Education<br>(Cumulative) | 9.7   | 4.63               | 0       | 15      |
| Experience<br>(Year)               | 15    | 6.55               | 5       | 32      |
| Household Size                     | 7.93  | 3.34               | 2       | 12      |
| Land Size<br>(Acre)                | 1.3   | 0.56               | 1       | 3       |

#### 3.2 Farmers' Perceptions about Sources of Post-Harvest Loss

The second section of our questionnaire survey aimed to understand farmers' perceptions about sources of post-harvest loss. As past studies showed different amounts of loss by types of fruits, we first looked at orange harvest (Table 2).The results show that the respondents perceived loss at market centers as the most serious problem. At markets, these farmers experienced rejection from market traders because of the shape and size of their orange products. Loss by pest infestation, such as fruit flies, was the second highest concerns. Interestingly, the respondents perceived loss during transportation as the least serious problem. They said that they normally make transportation arrangements to market centers a day or two in advance before harvesting their products. These arrangements help drivers to do a proper maintenance of their vehicles before coming to the production centers.

The result about banana harvest appears somewhat different from that of orange harvest. The respondents perceived loss at storage as the most serious problem (Table 3). Farmers in this area normally keep harvested bananas in storage bags before sending them to various market centers. They store both matured and unmaturred bananas together in these bags. This mixing tends to ripen the bananas faster. The second highest concern was loss at market centers. Bananas are exposed to direct sunlight at market centers. The prolonged exposure to direct sunlight causes the bananas to ripen faster.

For mango harvest, loss occurring at market centers was the most serious problem (Table 4). The respondents explained that this loss was most concerning as mangoes tend to be rotten relatively quickly after harvest. Mangoes are also fragile to damages caused by the weight of other fruits during the transportation. Loss at storage was the second highest concern. Many of the harvested mangoes are often left rotten because of lack of refrigeration at market centers. Harvested mangoes are normally placed in bags that tend to speed up the ripening process. Farmers we interviewed did not pay much attention to the kind of bags they used in storing mangoes. Surprisingly, however, loss during transportation was perceived as the least concern by farmers. This result does not correspond with the study by [4] who found that 31% of mangoes were lost due to transportation from farm to the market centers.

The result about avocado harvest is similar to that of orange and mango harvests, as loss at market centers was the most

serious issue (Table 5). The respondents said that lack of a sustained ready market to sell their products led to the loss. The loss at storage was the second highest concern. The respondents said that they stored their harvest on their farms or homes. Losses occurred when market traders failed to come to their farms to buy. When this happened, the respondents buried the harvested fruit crops in the soil.

**TABLE 2**  
**DESCRIPTIVE STATISTICS OF SOURCES OF LOSS (ORANGE HARVEST)**

| Sources of Loss            | Mean | Standard Deviation | Minimum | Maximum |
|----------------------------|------|--------------------|---------|---------|
| Loss during Harvest        | 2.65 | 1.16               | 1       | 5       |
| Loss by Pest Infestation   | 3.54 | 1.21               | 1       | 5       |
| Loss at Storage            | 3.18 | 0.91               | 2       | 5       |
| Loss during Transportation | 1.15 | 0.82               | 1       | 5       |
| Loss at Market Center      | 4.04 | 1.12               | 2       | 5       |

**TABLE 3**  
**DESCRIPTIVE STATISTICS OF SOURCES OF LOSS (BANANA HARVEST)**

| Sources of Loss            | Mean | Standard Deviation | Minimum | Maximum |
|----------------------------|------|--------------------|---------|---------|
| Loss during Harvest        | 2.15 | 0.96               | 1       | 5       |
| Loss by Pest Infestation   | 3.33 | 1.19               | 2       | 5       |
| Loss at Storage            | 4.31 | 1.11               | 1       | 5       |
| Loss during Transportation | 1.66 | 0.93               | 1       | 5       |
| Loss at Market Center      | 3.58 | 0.89               | 2       | 5       |

**TABLE 4**  
**DESCRIPTIVE STATISTICS OF SOURCES OF LOSS (MANGO HARVEST)**

| Sources of Loss            | Mean | Standard Deviation | Minimum | Maximum |
|----------------------------|------|--------------------|---------|---------|
| Loss during Harvest        | 2.36 | 1.00               | 1       | 5       |
| Loss by Pest Infestation   | 3.05 | 1.31               | 2       | 5       |
| Loss at Storage            | 3.59 | 0.86               | 1       | 5       |
| Loss during Transportation | 1.65 | 0.94               | 1       | 5       |
| Loss at Market Center      | 4.35 | 1.09               | 2       | 5       |

**TABLE 5**  
**DESCRIPTIVE STATISTICS OF SOURCES OF LOSS (AVOCADO HARVEST)**

| Sources of Loss            | Mean | Standard Deviation | Minimum | Maximum |
|----------------------------|------|--------------------|---------|---------|
| Loss during Harvest        | 2.36 | 1.00               | 2       | 5       |
| Loss by Pest Infestation   | 3.14 | 1.37               | 1       | 5       |
| Loss at Storage            | 3.71 | 0.91               | 1       | 5       |
| Loss during Transportation | 1.65 | 0.94               | 1       | 5       |
| Loss at Market Center      | 4.14 | 1.14               | 1       | 5       |

### 3.3 Correlation between Perceptions and Socio-Demographic Characteristics

After finding the above results, we attempted to establish the correlation between farmers' perceptions and their socio-demographic characteristics (Table 6) by using excel. Here, perception results on the four fruits were aggregated together mainly because we did not find substantial differences in respondents' perceptions by fruits. So, we grouped farmers' perceptions about loss during harvest for all fruits as dependent variables. The same approach was made for pest infestation, storage, transportation and market centers.

The result indicates that age was significantly associated with loss during harvest and transportation. This implies that older farmers in Sekyere-Kumawu District regarded loss during harvest ( $p$ -value  $< 0.05$ ) and loss during transportation ( $p$ -value  $< 0.05$ ) more seriously than younger farmers did. This result is consistent with a 2018 study by the University of Illinois College of Agricultural, Consumer and Environmental Science [9].

Although years of farming experience had significant association with storage loss ( $p$ -value  $< 0.05$ ), it did not seem to have any significant association with loss during transportation ( $p$ -value  $> 0.05$ ). Experienced farmers tend to make transportation arrangements to market centers in advance before harvesting. However, they tended to care less about types of bags to be used for storage. This led to the loss during the storage period.

As past studies emphasized the importance of women's roles in rural food security, we attempted to find out how the gender affected post-harvest loss perceptions. Our finding confirms [10] that gender had no significant association with their perceptions.

**TABLE 6**  
**RESULTS OF FARMERS PERCEPTION AND THEIR SOCIO-DEMOGRAPHIC CHARACTERISTICS**

| Variable            | Loss During Harvest | Loss by Pest Infestation | Loss at Storage | Loss During Transport | Loss at Market center |
|---------------------|---------------------|--------------------------|-----------------|-----------------------|-----------------------|
| Age                 | 0.03*               | 0.28                     | 0.65            | 0.00*                 | 0.76                  |
| t-stat              | 2.21                | 1.10                     | 0.45            | -4.36                 | 0.30                  |
| Gender              | 0.21                | 0.92                     | 0.57            | 0.04*                 | 0.64                  |
| t-stat              | 1.27                | 0.10                     | -0.58           | -2.03                 | 0.47                  |
| Education           | 0.33                | 0.53                     | 0.24            | 0.10                  | 0.72                  |
| t-stat              | -0.97               | -0.64                    | -1.20           | 1.68                  | 0.36                  |
| Years of Experience | 0.06                | 0.81                     | 0.01*           | 0.76                  | 0.41                  |
| t-stat              | 1.91                | -0.24                    | -2.52           | 0.30                  | -0.84                 |
| Household Size      | 0.38                | 0.45                     | 0.19            | 0.58                  | 0.70                  |
| t-stat              | -0.89               | 0.76                     | 1.33            | -0.56                 | 0.38                  |
| Land size           | 0.89                | 0.57                     | 0.70            | 0.18                  | 0.75                  |
| t-stat              | 0.14                | 0.57                     | -0.39           | -1.37                 | 0.32                  |
| Adjusted R Square   | 0.09                | -0.01                    | 0.19            | 0.32                  | -0.05                 |

\* $P$ -value  $< 0.05$

#### IV. CONCLUSION

This study examined the sources of post-harvest loss as perceived by fruit farmers in the Ashanti Region of Ghana. Our findings revealed that, overall, the respondent's perceived loss at market centers as the most serious issues. They also emphasized loss at storage and pest infestations. Contrary to some of past studies, loss during transportation was not urgent concern for the respondents as they could make a previous arrangement for transportation to minimize loss. However, the respondents appeared to have neglected to care about types of bags or containers that may help store harvested fruits for a longer period of time. From the regression analysis, we found that age and experience had significant correlations with respondents' perceptions about post-harvest loss. Interestingly, gender, educational level, land size and household size had no significant correlations with the perceptions of loss.

Considering these results, we recommend that the Ghana government or market associations install refrigeration facilities at markets to help preserve fruit crops. Extension officers at the Ministry of Food and Agriculture need to educate farmers about the type of bags or containers suitable for storing harvested fruit crops. Also, market traders may start marketing seasonal crops such as mangoes to consumers before it gets to the market centers.

#### ACKNOWLEDGEMENTS

We are grateful to all the farmers at the Sekyere-Kumawu district in the Ashanti Region of Ghana who agreed to take part in this research. We express our gratitude to the reviewers for their suggestions and comments that helped improved this research.

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