# The impact of post-harvest losses on tomato production in Bal 'ad district, Middle Shabelle region, Somalia


## Abstract

**Aims:** The study was carried out in 2020 at Bal'ad District, Middle Shebelle, Somalia to investigate the post-harvesting losses on tomato production.

**Methodology:** The research used a descriptive survey research design particularly cross-sectional study, and it was quantitative in nature. From the population, the study selected 109 sample size as to represent the population by using Slovin formula with the maximum acceptable error of 5 %. The sampling procedure was non-probability particularly purposive sampling. Primary data were collected using questionnaire survey and field observations. Descriptive statistics such as frequent, figures and percentages were used and analyzed with the package of statistical package for Social Science technique (SPSS 22.0).

**Findings:** The results revealed that on-farm losses viz. too much irrigation after fruiting the tomato (96.3%), high winds (85.3%), improper harvesting stages (90.8%) and incidence pests and disease (93.5%) were affecting the tomato production in Bal' ad district accompanied by off farm losses occurred due to lack of good infrastructure (96.3%), delaying transportation vehicles long time during inspection check point leads decaying (90.9%)and lack of consistent market (86.2%). The study suggested that the farmers should be provided technical training on the management of post-harvest losses of tomato production.



**Keywords:** *Post-harvest losses, on-farm losses, off-farm losses, tomato production*


## 1. Introduction

Tomato is one of the most significant and common vegetables grown in the world [1]. In areas where it is being cultivated and consumed, it comprises a very essential part of people's nourishment. About 4.8 million hectares of arable land are under tomatoes production with an estimated production of 162 million tonnes [2]. Tomatoes can be eaten in many ways either raw in salads, in drink and cooked with foods [3]. Tomatoes that contained food items are available a wide range of nutrients and many medicinal and health benefits to the human body. Tomato contains higher amounts of lycopene, a type of carotenoid with antioxidant properties [4], which is favourable to reduce some chronic diseases [5].

Postharvest losses in tomato occur at the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing [6]. The occurrence of postharvest losses is one of the most important limitations in the tomatoes production and consumption value chain in all tomato producing countries in African continent [7]. FAO [8] reported that post-harvest losses in tomatoes to be more as 50% in Sub-Sahara Africa, a huge loss of appreciated nutrients, income, and employment

to millions of small-scale farmers along the chain [9].

With a continually growing population, there is a frequently increasing demand for tomatoes in Somalia. But unfortunately, the quantities of tomatoes produced locally cannot reach into the local market. To meet up with domestic needs, Somali merchants have resorted to the importation of tinned tomatoes. It does not only represent a huge loss of foreign earnings to these countries but equally, present a health risk dimension since cases of expired tomatoes importation have been stated in recent years.

Post-harvest losses are the most constraints that affect tomato production in Somalia which reduce quality, quantity and economic value of tomato. Post-harvest losses in quantity and quality happen between harvest and consumption because of immaturity harvesting, late harvesting or over-ripening, mechanical damage, and bruising. Post-harvest losses are either an on-farm or off farm losses. On-farm losses faced by tomato growers in Somalia include improper harvesting stages, excessive heat in field, improper harvesting containers, rough handling, poor farm sanitation and improper packaging materials which directly affect tomato produce after fruiting while off-farm losses faced by tomato farmers are lack of access roads in terms of roughness and security, inappropriate transportation system as most the most transportation hub is three legged motor cycle, lack of processing factories and lack of reliable market information.

Keeping in view with the above matters, this study concentrates on finding the grass root problems that affecting tomato production particularly post harvest related problems. For this reason, the researchers conducted a study entitled the impact post-harvest losses on tomato production in Bal'ad district, middle Shabelle region, Somalia.

## 2. Methods and materials

The study was carried out in Bal'ad District, Middle Shebelle, Somalia. The area located about 36 kilometres northeast of the capital city of Mogadishu, it has an area of 4,400 square kilometres (1,700 sq. miles) with an estimated population of 642,000 and 82 villages (and passes one of the Somalia's permanent rivers (Shebelle) which passes through the city of Bal'ad District , this locality was chosen because it constitutes an essential agricultural pole and tomato production. the study was conducted from 26 October 2019 to 28 August 2020. The research used descriptive survey research design particularly cross-sectional study and it was quantitative in nature.

The estimated target population was 150 farmers came from Mohamed Hajji and Barwaqo farm. From the population, the study selected 109 sample size as to represent the population by using Slovin formula with maximum acceptable error of 5 %.

$$n = \frac{N}{1+Ne^2}$$

N: Stands for the population
n. Stands for the sample
e. Stands for acceptable error

$$\frac{150}{1 + 150(0.05)^2}$$

$=\frac{150}{1+150(\mathbf{0.05})^2}=$ $\frac{150}{1.375}=$ 109. So, the sample was 109

The sampling procedure was non-probability particularly purposive sampling. Primary data were collected using questionnaire survey and field observations. In the questionnaire four-point Likert scale *viz*. 1= strongly agree, 2= agree; 3= disagree; 4= strongly disagree were measured the variables. Descriptive statistics such as frequent, figures and percentages were used and analysed with the package of statistical package for Social Science technique (SPSS 22.0).

## 3. Results and discussions

### 3.1 Demographic data

Table 1 describes the demographic information of the respondents. 70.64% of the respondents were male while 29.36% female. The result indicates that male dominates the production of tomato in Balad district. This may imply that the women grow other crops rather than tomato, it may also be that the women are busy with home activities as compared to men. In regard with the age, more than half of the respondents under study (52.29%) had the age group between 29-39 years followed by the age group of 40-45 years (30.28%) while the lowest (17.43%) were scored by 18-28 years of age group.

**Table 1. Demographic data of the respondents**

| Variables | Frequency | Percentage |
|---|---|---|
| **Gender** | | |
| Male | 77 | 70.64 |
| Female | 32 | 29.36 |
| **Total** | **109** | **100** |
| **Age** | | |
| 18-28 | 19 | 17.43 |
| 29-39 | 57 | 52.29 |
| 40-45 | 33 | 30.28 |
| **Total** | **109** | **100** |
| **Marital status** | | |
| Single | 26 | 23.85 |
| Married | 79 | 72.48 |
| Divorce | 4 | 3.67 |
| **Total** | **109** | **100** |
| **Experience** | | |
| 1-3 years | 16 | 14.68 |
| 4-6 years | 49 | 44.95 |
| Above 6 years | 44 | 40.37 |
| **Total** | **109** | **100** |

This indicates that most of tomato growers in Bal'ad district are juvenile and energetic and can pursue farming activities. Majority of the respondents were married (72.48%), (23.85%) of them were single while the remaining (3.67%) were divorced. According to the farming experience of the respondents, the most of them have more than 4 years of experience in farming (Table 1). Most of the respondents (44.95%) had 4-6 years of experience tracked by >6 years (40.37%) whereas (14.63%) of them had 1-3 years of farming experience of tomato crop. It shows that most of the farmers under study have enough experience in farming.

### 3.2 On-farm losses of tomato production in Bal'ad district.

According to table 2, 68.8% of the respondents denoted strongly agree, 27.5% of them agreed although 3.7% of respondents disagree that too much rain or irrigating the farm after the tomato crop became ready for harvesting or set the fruits was one of the losses of tomato harvest. Similar findings were reported by Aidoo [9]. In addition, high wind was attested to have high impact on tomato crop after fruiting. The majority of the respondents which near to half of the studied sample 48.6% indicated strongly agree, 36.7% of them specified agree that high velocity of wind affected tomato production and caused reduction at the maturity stage where 16.5% of them expressed agree and finally 4.6% of the respondents stated strongly agree. This result is in line with the findings of Sunil [13]

**Table 2. on farm losses of tomato production in Bal'ad district**

| | **On-farm losses** | **Level of agreement (%)** | | | | |
|---|---|---|---|---|---|---|
| **s/n** | **Statements** | **Strongly Agree** | **Agree** | **disagree** | **Strongly disagree** | **Total** |
| **1.** | Too much rain or irrigation after fruiting | 68.8 | 27.5 | 3.7 | 0 | 100 |
| **2.** | High wind causes fruit drop | 48.6 | 36.7 | 10.1 | 4.6 | 100 |
| **3.** | Late harvest causes losses | 44.0 | 34.9 | 16.5 | 4.6 | 100 |
| **4.** | Incidence of pests and disease | 59.6 | 33.9 | 3.7 | 2.8 | 100 |

As noted in the table 2 above, late harvest also severely impacted postharvest losses of tomato crop. 44.0% of the respondents claimed that late harvest with long-term exposure of sunlight made the fruits to shrink causes postharvest losses, 34.9% of them indicated agree, 16.5% of them revealed disagree whereas 2.8% of them pointed strongly disagree. Similar findings were stated by Toivonen [10]; Watkins [11]; Reid [12]

As shown in Table 2, incidence of pests and disease caused postharvest losses. It was shown that 59.6% of respondents strongly agree that the incidence of pests and disease caused postharvest loss, 33.9% of them stated agree, 3.7% of them disagree whereas 2.8% of them indicated strongly disagree. This result is in line with the results found by Kader [14]

**Figure 1: improper harvesting stages**

As indicated Fig1,the majority of the respondents 48.6 and 42.2% described strongly agree and agree respectively that improper harvesting stages of tomato leads huge post-harvest losses of tomato crop and this is almost nearly all the respondents under study although 7.3 and 1.9% stated disagree and strongly disagree respectively. This implies that tomato crop harvested pre or post maturity leads severe postharvest losses. Pre-maturity harvesting of tomato causes shrinkage of the fruits so which reduces the weight of the fruits.

### 3.3. Off-farm losses of tomato production in Bal'ad District.

**Table 3: Off farm losses of tomato production in Bal'ad district**

| | Off -farm losses | Level of agreement (%) | | | | |
|---|---|---|---|---|---|---|
| **s/n** | **Statements** | **Strongly Agree** | **Agree** | **disagree** | **Strongly disagree** | **Total** |
| **1.** | Lack of good infrastructures | 64.2 | 32.1 | 2.8 | 0.9 | 100 |
| **2.** | Lack of adequate ventilation | 51.4 | 31.2 | 14.7 | 2.8 | 100 |
| **3.** | Delaying transportation vehicles long time during inspection check point leads decaying | 50.5 | 40.4 | 8.3 | 0.9 | 100 |
| **4.** | Lack of consistent market | 46.8 | 39.4 | 11.0 | 2.8 | 100 |

As noted in the table 3 above, lack of good infrastructures such as bad roads which cause vibration of vehicles resulting internal bruising. 64.2% of the respondents which are nearly one third of the respondents indicated strongly agree, 34.9% of them showed agree, 16.5% of them revealed disagree whereas 2.8% of them pointed strongly disagree that lack of good infrastructures such as

bad roads which cause vibration of vehicles resulting internal bruising. Similarly, more than half of the respondents 51.4% denoted strongly agree that lack of adequate ventilation during transport caused significant losses of tomato crop, 31.2% of the respondents contributed agree, 14.7% of them stated disagree whereas 2.8% of the respondents strongly disagree.

Likewise, nearly half of the respondents 46.8% confirmed strongly agree that lack of consistence market for tomato crop is one of the constraints impacted tomato produce,39.4% of the respondents revealed agree, 11% of them confirmed disagree while 2.8% of them reported strongly disagree. The result also indicated the markets of tomato crop fluctuate its price and production and the both are dependent to each other i.e. dry seasons also always experienced low volume of tomato supply due to water shortages and its price skyrocket while.

Furthermore, half of the respondents 50.5% stated strongly agree that Delaying transportation vehicles long time during inspection check point leads decaying, 40.4% of the respondents completed agree while 8.3 and 0.9% of them denoted disagree and strongly disagree correspondingly.

**Figure 2: lack of storage facilities**

As displayed in the above figure 2, most of the respondents 51.4% indicated strongly agree that lack of storage facilities was another driver of post-harvest losses of tomato crop, 25.27% of the respondents described agree, 16.5% of them noted disagree although 6.4% of them indicated strongly disagree.

## Conclusion

The study investigated the impacts of post-harvest losses on tomato production in Bal ‘ad district, Middle Shabelle region, Somalia. According to the present findings, it has been concluded that on farm losses viz. too much irrigation after fruiting the tomato, high winds, improper harvesting stages and incidence pests and disease were affecting the tomato production in Bal’ ad district accompanied

by off farm losses occurred due to lack of good infrastructure, delaying transportation vehicles long time during inspection check point leads decaying and lack of consistent market.

## References


1. Grandilo, S., Zamir, D. & Tanksley, S.D. (1999) Genetic improvement of processing tomatoes: A 20 years perspective. Euphytica 110: 85–97.
2. FAOSTAT (2014). Global tomato production in 2012. Rome, FAO
3. Alam, T., Tanweer, G. and Goyal, G.K. (2007). Stewart Postharvest Review, Packaging and storage of tomato.
4. Arab L. And S. Steck. (2000). Lycopene and Cardiovascular Diseases, American Journal of Clinical Nutrition, Vol. 71(6), and PP: 1691 - 1695.
5. Basu A. and V. Imrhan. (2007). Tomatoes versus lycopene in oxidative stress and carcinogenesis: conclusions of clinical trials, European Journal of Clinical Nutrition, Vol. 61(3), and PP: 295-303.
6. Jideani, Afam I.O.; Anyasi, Tonna A.; Mchau, Godwin R.A.; Udoro, Elohor O.; Onipe, Oluwatoyin O. (2017). "Processing and Preservation of Fresh-Cut Fruit and Vegetable Products". Postharvest Handling. InTech. doi:10.5772/intechopen.69763. ISBN 978-953-51-3533-3.
7. Arah I.K., E.K. Kumar, E.K. Anku and H. Amaglo. (2015). An overview of losses after harvest in tomato production in Africa: Causes and possible prevention strategies, Journal of Biology, Agriculture and Healthcare, Vol. 5(16), PP: 78-88.
8. Food and Agriculture Organization (2008). Basic Harvest and Post-harvest Handling Considerations for Fresh Fruits and Vegetables. Postharvest Training on Food Processing/FAO manual food handling and preservation/CHAPTER 2. FAO, Rome.
9. Aidoo, Robert, Rita A. Danfoku, and James O.M. (2014): "Determinants of postharvest losses in tomato production in the Offinso North district of Ghana." Journal of Development and Agricultural Economics 6.8 338-344
10. Toivonen, P.M.A. (2007) Fruit maturation and ripening and their relationship to quality. Stewart Postharvest Reviews 3:1–5.
11. Watkins, C.B. (2006) The use of 1-methylcyclopropene (1-MCP) on fruits and vegetables. Biotechnology Advances 24(1):389–409.
12. Reid, M.S. (2002) Maturation and Maturity Indices. University of California, Agriculture and Natural Resources Publication 3311, Oakland
13. Sunil P. 2016. Postharvest ripening physiology of crops. Chapter 1 ,Ripenining an overview. pp 1-33.
14. Kader, A. A. 1992. Post-harvest technology of horticultural crops. 2nd Ed. Univ. of California, Div. of Agri. and Natural Resources.