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Review of Postharvest Loss Effects, Magnitudes, Challenges and Management Practices in Ethiopia

Daniel Daka Godebo
School of Nutrition, Food Science and Technology, College of Agriculture, Hawassa University

Abstract
This review was aimed to recognize the effect, challenge, magnitude and management practices of postharvest losses in Ethiopia. Global efforts in fight against hunger to raise income and improve food security especially in world poorest country should give priority to the issue of postharvest loss. Postharvest loss is major problem to persistence food insecurity to meet food demand of rapidly growing population. An average magnitude of postharvest losses along value chain of selected (horticultural and cereal) crops has been estimated 10 to 50 % in Ethiopia. Major challenges facing in postharvest handling include lack of: - awareness, communication, targeted policies and strategies, evidence-based postharvest loss assessments, institutional and organizational arrangements, targeted financing and investment in postharvest handling to ensure food security of Ethiopia. Hence, improved postharvest handling practices, better education to farmers, improved infrastructure in order for products to reach markets, developed value chains, collaboration between actors in supply chains and improved technologies must give attention to reduce postharvest loss to achieve improved food security in Ethiopia.
Keywords: - postharvest loss, effects, challenges, magnitudes, management practices
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Introduction

Global efforts in fight against hunger to raise farmers' income and improve food security especially in world poorest country should give priority to the issue of crop loss/ postharvest loss (FAO, 2010). This is due to the adverse effect of crop loss on food quality, environment and generally on economic development. Crop loss/ postharvest loss indicate a waste of productive agricultural resource such as land, water, labor and managerial skills. In consequence, postharvest loss has been identified as one of determinants of food problem in most of developing countries (Abimbola, 2014).

Ethiopia is the second most highly populated countries in Africa with about 99.4 million people, which is projected to reach 125 million by 2025. Agriculture employs 80% of population, forming basis of Ethiopia's economy (European Union Delegation to Ethiopia, 2018). Contrary, in last few decades, several million people required immediate food assistance in Ethiopia. As a result, Ethiopia has been the largest recipient of food aid in Sub-Saharan Africa, because of unsecured food (Melak and Birgit, 2014).

Thus, despite of significant increases in area of land under cultivation and yield per acre over last two decades, food security in Ethiopia remains fragile (Dubale, 2018). According to Dubale (2018) in Ethiopia an estimated 40% of population still remains less than minimum daily requirement of calories while postharvest loss in a country is quite high. So that, food insecurity has been a serious problem for decades in Ethiopia (Melak and Birgit, 2014) might be due to postharvest food loss. Hence, postharvest loss after harvest is highly contributing factor to food insecurity and under-nutrition of Ethiopia. In fact, to achieve sustainable goals of food security; food availability should be increased through reductions of postharvest loss at farm, wholesaler, retailers and consumer levels.

Postharvest loss is major emerging problem to persistence food insecurity to meet food demand for rapidly growing population in addition to climate change and land use for non-food crop production intensify concerns of increasing food demands in Ethiopia(Melese, 2016). However, reduction of postharvest loss is the neglected issue in country to increase food and nutrition Security (Dubale, 2018; Ali, 2017). Moreover, except to some literature (Minten *et al*., 2019; Dejene, 2017; Dubale, 2018) written on postharvest loss, there is no enough information on postharvest losses to ensure food security in Ethiopia. Hence, this review is mainly intended to address information gaps on effects, challenges and management practices of postharvest loss in Ethiopia.

1.2. Objectives

The main objective of this was review to identify effect, magnitude, challenge and management practices of postharvest losses in Ethiopia.
Specifically, the review was trying:

- To elaborate effect of postharvest losses in Ethiopia
- To describe magnitude of postharvest losses in Ethiopia
- To indicate challenges of postharvest losses in Ethiopia
- To identify management practices of postharvest losses in Ethiopia
- To reveal benefits of reducing postharvest losses in Ethiopia

2. Methodology

The review was conducted in Ethiopia based on intensive literature review of published materials such as journals, articles and book materials to identify effect, challenges, magnitude, and management practices and to show benefits of reducing postharvest loss of agricultural products in food security of Ethiopia. Primary data was obtained from experts in agricultural areas to have advanced information on effect, magnitude, challenge and management practices of post-harvest losses in Ethiopia and secondary data was collected from published material sources to accomplish this review.

3. Literature Review

3.1. Effect of Postharvest Losses in Ethiopia

Farmers growing crops in Ethiopia facing high economic loss, because they have been no methods of increasing crops shelf life. In addition, to loss of economic value of food produced have been faced waste of scarce resources such as labor, land and water, as well as non-renewable resources such as fertilizer and energy, all of which are used to produce, process, handle and transport food(feed the future, 2016). Similarly, FAO (2017) reported the impact (effect) of postharvest loss can be discussed from high loss a source of disappointment and moral damage for farmers. Low or fluctuating market price, together with high rate of loss make farmers less motivated to produce more crop in subsequent seasons.

Similarly, FAO (2011) reported that Ethiopia is not getting foreign exchange from crops due to low levels of postharvest technology, which makes product of inferior quality, with no chance of competing in world market. Therefore, such losses after harvest are a major effect of food loss and could be seen from food security and poverty reduction aspects in country as such losses have direct effect on peoples livelihood and economy of country as whole (Gebru and Belew 2015; Dejene, 2017).

3.2. Magnitude of Postharvest Losses in Ethiopia

According to feed the future (2016) and Africa Union Commission (2018) globally, one third (1/3) of food produced for human consumption is lost approximately, 1.3 billion tons of food each year, worth nearly one trillion USD. Magnitude of cereal losses in Sub Saharan Africa alone has been estimated to exceed value of total food aid region received over past decade, roughly equivalent to annual caloric requirement of 48 million people. Moreover, Ashenafi *et al.* (2017) reported that postharvest loss ranges from about 21% for cereals up to 66% for fruits and vegetables in Sub-Sahara-African food value chains.

According to Africa Union Commission (2018) total postharvest losses in Ethiopia stood at 2.04 million tons of grain at a time when Ethiopia's import requirement stood at 1.16 million tons. Similarly, Gebresenbet *et al.*(2016) studies conducted on seven fruit and vegetable crops (tomato, cabbage, onion, potato, mango, banana and avocado) revealed that total average postharvest losses range from 14 to 60% in Ethiopia. Similarly, European Union Delegation to Ethiopia (2018) stated that magnitude of postharvest loss estimates for major cereal crops range between 15% and 30%, such grain losses might be arise from poor postharvest handling systems in Ethiopia. Research conducted by Dubale (2018) table1, represented that average postharvest loss along value chain of selected crops have been estimated between 10 to 50 % in Ethiopia. Also similarly, Melese (2016) reported that Ethiopian postharvest loss rate ranged from 30 to 50% depending on crop type.

In Ethiopia, magnitude of postharvest losses increasing in food value chains are being debated among food system analysts and policy makers, along with design of policies to reduce losses (Minten et al., 2019). This might be due to variation among commodities, production areas and seasons. As a product moves along postharvest chain, several loss may be caused due to factors such as improper handling or bio-deterioration by microorganisms, insects, rodents or birds damage. Besides, losses could be attributed - to other factors such as high moisture content of grain before storage; traditional methods of harvesting, drying, threshing and storage as well as practices of leaving grains in field for extended period exposing it to rain, rat, insect pests infestation, pathogen infection, wild and domestic animals damage (FAO, 2017). Hence, even if magnitude of postharvest loss Ethiopia is variable, it has great impact on food security (Gebru and Belew, 2015) of Ethiopia.

3.3. Challenges of Postharvest Losses in Ethiopia

Ensuring food security remains a challenge in a worldwide with a growing and more demanding population. Dejene (2017) reported that the challenges of losses are lack of market to absorb production, large number of middlemen in marketing system, absence (weakness) of marketing institutions safeguarding farmers' interest and rights over their marketable produces, lack of coordination among producers to increase their bargaining power and imperfect pricing system of traders as major problems(challenges) to producers in postharvest loss.

Similarly, Murthy *et al.*(2009); Africa Union Commission (2018) reported that the key challenges facing in postharvest loss including lack of: awareness and communication on consequences of postharvest losses; awareness of standardized postharvest loss measurement methodologies; targeted policies and strategies at national levels on postharvest loss; appreciation of economic value of postharvest loss and its impact on food

security; research and development of evidence-based postharvest loss assessments; institutional and organizational arrangements support for generation and dissemination of postharvest loss best practices and knowledge; targeted financing and investment in postharvest loss activities to ensure food security in Ethiopia. Hence, postharvest loss matters more, due to inefficient operational activities within supply chains, such as storage, transportation, harvesting, handling techniques, packaging facility, marketing situation, disease and pest.

3.4. Management Practices of Postharvest Losses in Ethiopia

Farmers in Africa predominantly use traditional methods in the management of stored product. Some farmers are also attracted to the use of synthetic insecticides (Dubale, 2018). In order to minimize postharvest losses, appropriate and feasible agricultural techniques such as general principles of extending shelf life of crops must be put in place (Misrak *et al*., 2014).

Reduction of postharvest losses could be achieved by use of storage structures with well-designed aeration system, use of improved small scale hermetic storage containers like pics bags (Perdue improved cowpea storage) and metal silos and use of pit linings that restrict moisture and subsequent development of mold (Dubale, 2018). In some parts of Ethiopia, 70% of farmers treated their grains with synthetic chemicals to reduce grain losses that would result from pest (weevil) attack. Chemicals are usually used to treat maize and wheat since these crops are most susceptible to weevils' attack (Tadesse *et al*., 2000).

It needs better education for producers, improved infrastructure in order for products to reach markets, developed value chains, collaboration between actors in supply chains and improved technologies in order to lower postharvest losses (Hodges *et al*., 2011). Similarly, Parfitt *et al*. (2010) reported that postharvest loss occurs within whole supply chain due to limited resources such as postharvest technology, knowledge and infrastructure. Hence, so as to reduce postharvest losses, proper handling, good sorting and cleaning, good packaging, adequate transportation and good storage facilities (Dejene, 2017) are important to increase food security in Ethiopia.

3.5. Benefit of Reducing Postharvest Loss in Ethiopia

Reducing food losses could be a major contribution to satisfying anticipated higher global food demand and to improve food security and for efficient use of resources (Hengsdijk, 2017). It could increase the amount of food available for human consumption and enhance global food security (Trostle, 2010). Its reduction could also mitigate against import-export requirements by improving food availability. According to World Bank (2011) its reduction could improve food security by increasing real income of consumers and producers. Reducing food losses requires fewer resources and applies less pressure to environment in maintaining quantity and quality of food; in addition, it could alleviate environmental concerns (Ali, 2017; Hengsdijk, 2017; Kummu *et al*., 2012). Therefore, it could be a major contributor to satisfy higher global food demand to improve food security in Ethiopia.

4. Conclusion

Ethiopia has been renounced as a food insecure country for decades. However, the postharvest loss has received little attention, despite having key effects, magnitudes and challenges those contribute to the food gaps in a country. So that further understanding about postharvest losses and its importance for food security, its domestic demand and export earnings and all stakeholders like farmers, researchers, investors and government should give attentions to reduce postharvest losses for improved food security of Ethiopia.

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