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SYNOPSIS OF [ESSP WORKING PAPER 93](#)

Synopsis: How big are post-harvest losses? Evidence from teff

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Based on a large-scale data set on the production and marketing of teff, Ethiopia's biggest cash crop, we study post-harvest losses in rural-to-urban value chains, specifically between producers and urban retailers in the capital, Addis Ababa. We analyze the structure of the value chain and rely on self-reported losses by different value chain agents – farmers, wholesale traders, and retailers. We estimate that post-harvest losses in the most prevalent pathway in this value chain amount to between 2.2 and 3.3 percent of the total quantity harvested. The variation in this figure depends on the storage facilities used and on assumed losses during transport at the farm. These losses are significantly lower than is commonly assumed for staple foods, possibly because of the rather good storage characteristics of teff due to its small size and low moisture content. These findings, nonetheless, point to the need to gather further solid evidence on the magnitude of post-harvest losses in staple foods in these settings to ensure appropriate policies and investments.

INTRODUCTION

Wastage and post-harvest losses in food value chains are a growing topic of debate, along with the design of policies to try to reduce this waste. The debate is receiving increasing attention for reasons relating to food security and environmental issues. However, despite the presumed importance of food waste, there is large variation in estimates of its actual importance and volume. Post-harvest losses differ according to the type of food, being higher for fresh produce. Kader (2005) estimates global losses of fresh produce at around one-third of the total produced, with different estimates for other food types. The actual amount of food wastage at different stages of food value chains, however, is unclear.

Current estimates of post-harvest losses have come under some criticism, suggesting that: (1) the methods used are based on experts' hypotheses rather than on detailed field survey estimates; (2) they are biased toward perishables and, thus, far over-state losses; and (3) they are not focused on the products that make up the bulk of calories consumed, like grains, tubers, or pulses.

Our analysis focuses on these critiques by specifically examining in Ethiopia the level of post-harvest losses of an important staple crop, teff. By conducting large scale surveys with different agents in the teff value chain, from farmers to urban retailers, we are able to evaluate post-harvest losses at all stages of the value chain, except for consumption. Our results challenge conventional views on presumed large post-harvest losses in staple value chains. We estimate losses of between 2.2 and 3.3 percent of the quantity of teff grain produced, depending on the type of storage facilities used and on the level of losses occurring during transportation of the grain by farmers.

BACKGROUND

Teff is the most important crop in Ethiopia's agricultural economy based a number of indicators. In 2013/14, the Central Statistical Agency (CSA) estimated that teff made up 22 percent of all area cultivated by private smallholders in the main Meher cropping season, covering about 3 million hectares. Teff makes up 31 percent of all the cultivated land in the cereal sub-sector, the most important sub-sector in Ethiopia's agricultural economy, accounting for 72 percent of all cultivated land.

Teff is consumed more by urban households than by rural ones and it is consumed in greater quantities by the rich than the poor. The fast economic growth and rapid urbanization of the country suggests sharp increases in the role of teff in Ethiopian food systems in the future.

DATA

We collected information from major teff producing areas and along the teff value chain to Addis Ababa, the capital of Ethiopia. We interviewed key informants who were engaged in the teff value chain during September and October 2012. Using this information, we then designed questionnaires for each set of actors in the value chain, fielding these surveys in November and December 2012. These surveys were implemented upstream in the value chain with teff producers and communities (1,200 teff farmers), midstream with rural (205) and urban (75) wholesalers and truckers, and downstream with cereal shops, mills, and cooperative retail enterprises (282 retail outlets in total).

Procurement information within the teff value chain formed the basis of our investigations. We categorize the different teff value chains by the number of connections between the urban retailer and the teff farmer. The most prevalent value chain structure from the major teff production zones to Addis Ababa flows from **producer to regional trader to urban trader/broker to urban retailer** – this structure is used in 48 percent of the teff supply transactions to Addis Ababa. In 28 percent of cases, urban retailers obtain their products directly in rural areas, bypassing the urban wholesale markets and making the value chain shorter. Teff value chains serving Addis Ababa can also be longer.

ESTIMATES OF POST-HARVEST LOSSES

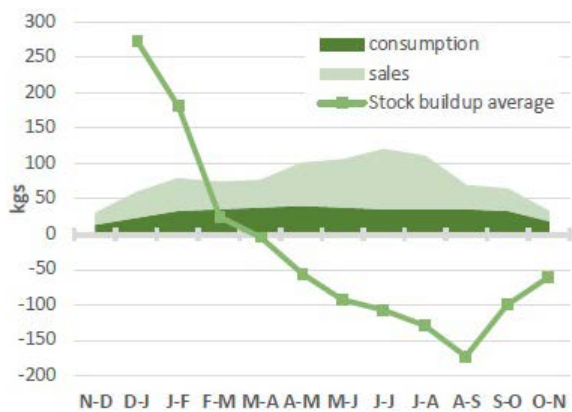
We estimate post-harvest losses using the most prevalent structure of the value chain from farmer to rural wholesaler to urban wholesaler to urban retailer. We enquired at each level in the chain how much teff grain was lost at harvest (if applicable), in storage, and during transportation. Using a sum of these figures, we estimated the total post-harvest losses occurring in the teff value chain.

Losses at farm level – In Ethiopia, threshing is carried out almost exclusively by traditional methods. 57 percent of farmers reported to have lost grain during the teff threshing process, amounting to

25 kg on average, with a median of 15 kg. This equates to a loss of 3.1 percent of the total harvest for those who reported a loss. For all teff farmers combined, we estimate 1.8 percent of the total teff harvest is lost during threshing.

Losses during storage – Household teff stocks are built up between November and March (Figure 1). Net withdrawals of teff from these stocks occurs mainly between March and October and is highest in July and August. The teff stocks are largely consumed or sold, with a strong seasonal pattern noted in the sales of teff.

Figure 1: Average monthly use of teff by households, kg



Source: Teff producer survey.

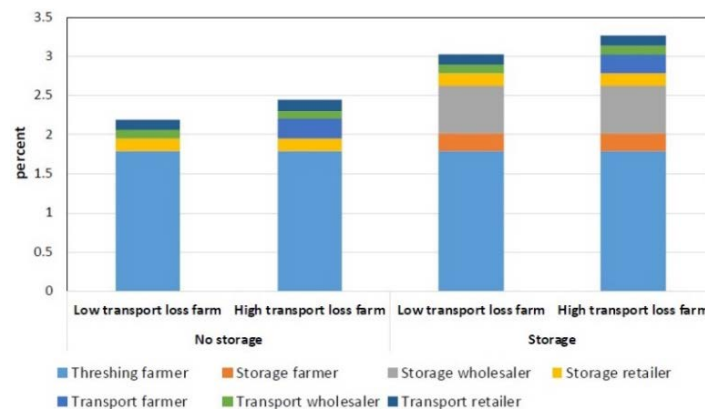
Farmers were asked about the timing of their sales to identify any storage implications. Only 32 percent of the farmers indicated that they sell teff immediately after harvest. 60 percent stated that they sell mainly between the two harvest periods, while 9 percent report selling mainly before the next harvest.

Very few modern storage facilities are used. Most farmers store teff in their house in *dibignets* (mud-plastered storage jars) or alternatively in traditional *gotera* granaries at the farm household. Few farmers reported losses during storage. We estimate that a low 0.2 percent of all teff harvested is lost during storage at the farm level. In addition we explored losses in storage experienced by traders, brokers, and urban retailers. We find in aggregate 0.3 percent is lost by wholesalers and 0.2 percent at retail level.

Losses during transportation – Most teff plots are located close to the farmer's house, with the grain transported from plot to house by donkey in most cases. Our analysis reveals that the distance teff is transported by farmers is not large, and that losses farmers experience transporting teff are likely to be minimal. In the case of transportation from wholesalers to retailers, the aggregate amount computed as lost in transportation was 0.1 percent by both wholesalers and retailers.

Aggregate losses in the value chain – Self-reported losses bring a degree of scientific uncertainty. Yet, they warrant due consideration. Using what we know, we created scenarios that included two extremes in both storage and transportation to illustrate losses (Figure 2). We find that these self-reported losses vary between 2.2 and 3.3 percent depending on assumptions on storage facilities and losses during transportation on the farm.

Figure 2: Aggregate losses in the teff value chain in Ethiopia, results from four scenarios, percent of grain harvested



Source: Authors' calculations based on teff value chain surveys.

CONCLUSION AND POLICY IMPLICATIONS

Storage losses are presumed to be less important with teff due to teff's lower moisture content, which is an important factor for storability. From our analyses of post-harvest losses in cereals in Ethiopia using two different datasets, teff has the lowest reported losses of any grain from farmers' observations. However, losses reported for other cereals are only slightly higher. Survey data from urban retailers show relatively low losses for cereals generally.

The results from these surveys challenge the conventional wisdom that traditional supply chains for staples are mired in high rates of post-harvest losses. In contrast with these studies, which mostly rely on key informant information rather than on primary surveys, our survey results show that post-harvest losses in teff are significantly lower than previously assumed. We find that these self-reported losses vary between 2.2 and 3.3 percent depending on assumptions on losses in storage and during transportation.

Our lower than expected post-harvest losses might be influenced by previous bad measurements of such losses or by improvements in the value chain due to better road and communication networks. Moreover, post-harvest performance in Ethiopia might be better than in developed countries, where quality and cosmetic criteria are more severe, resulting in lower quality food being completely discarded.

From a policy perspective, while it is important to keep post-harvest losses low, achieving such reductions in losses entails cost. It is therefore important to look at the rate of returns to investments in facilities that might reduce losses, and the potential benefits of such facilities, and then compare these with alternative options for investment.

Further investigations into post-harvest losses are needed. We note shortcomings in this study in that the producer surveys were conducted only in the well-connected production areas. Moreover, no consumer-level details on wastage were obtained.

REFERENCES

Refer to **ESSP Working Paper 93** for references used in this study.

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