

Food Waste in the Global North and South

Jacob Moorman, Kristine Birkeli, Susanne Meister, Camilla Zernichow, Tim Staubert



In the **global North**, harvest, transport and processing make for **21% of Total Food Loss** ⁽¹⁾

Soil erosion degenerates **75 billion tons** of soil yearly ⁽²⁾

During processing food waste mainly occurs due to **high consumer demands** and **multiple processing stages** ⁽³⁾



Retail and the **consumer** in the **global North** make for **32% of Total Food Loss** ⁽¹⁾

In retail and the consumer stage **best-before dates**, **aesthetic expectations**, **damaged packaging**, **impulse buying** and **leftovers** lead to avoidable waste ⁽⁴⁾

With better **education**, a lot of **food waste could be avoided**



Harvest, **transport** and **processing** in the **global South** make for **31% of Total Food Loss** ⁽¹⁾

Food losses during harvest and transport **could be avoided** through **better technology** and **infrastructure**

During harvesting **bruist fruit** and vegetables, **leftover grains** and **discarded fish** are common ⁽¹⁾

During transport **poor cooling**, **pests**, **rodents** and **livestock death** make the most impact ⁽⁵⁾



In the **global South**, **retail** and the **consumer** make for **14% of Total Food Loss** ⁽¹⁾

The **lack of cooling systems** is the dominant driver for the losses ⁽⁶⁾

See accompanying article for full references

(1) Lipinski et al., 2013 (2) Myers, 1993 (3) Bond et al. 2013 (4) Garrone et al., 2014 (5) Papargyropoulou et al., 2014 (6) Godfray et al., 2010 Pictures taken from cleanpng.com



Food Waste in the Global North and South

Introduction

One third of all food produced globally is eventually lost or wasted (Gustavsson et al., 2011) and does not contribute to the human diet. Losses occur at all parts of the food value chain, harvesting, transport, processing, retail and finally the consumer. Food losses refer to lost calories in harvesting, transport and processing, because they would often be avoidable, given the right technology, while food waste refers to calories lost at retail or consumer stage.

When food is wasted, the resources e.g. water and energy used in each previous stage of the production chain also go to waste (Gustavsson et al., 2011). This waste contributes to unnecessary desertification, loss of biodiversity and nutrient depletion (Thyberg and Tonjes, 2016). Further indirect effects involve the production of greenhouse gases as a byproduct from the industry processing and transporting food (Thyberg and Tojes, 2016).

As food demand is set to increase for the next 40 years, following the global population trend (Godfray et al., 2010), there is a need for a more effective and less wasteful handling of food. Reducing food waste is imperative for sustainable development and will contribute directly to SDG 2, 12, 13, 14 and 15, and indirectly to many others. But as we will demonstrate in this paper, food waste is not evenly distributed at each level for the global North and South.

Harvesting

The first step in the food value chain is the harvesting of food, which is estimated to contribute 24% of the food waste in 2009 (Lipinski et al., 2013). The FAO's report shows that 58% of that occurred in the global South while 42% stem from the global North. The drivers of loss during harvest are influenced by a net of different factors, that vary with climatic conditions and infrastructural availabilities, which might explain the slight difference between the global North and the global South.

During harvest it is not only human faults that cause losses. One of the biggest natural causes to food loss is soil erosion. Each year about 75 billion tons of soil are lost due to soil erosion, thus reducing the cropland available for food production (Myers, 1993). Soil erosion often occurs because of natural influences like soils exposure to rain or wind, but also direct and indirect human influences such as land use change or climatic changes (Myers, 1993; Oldeman, 1997).

Transportation

One of the main problems of estimating food losses during transportation is that it is often only registered at either the previous or the later stages. This is true for Godfray et al. (2010), which combined transport and processing to get a more reliable percentage. They found that for the global South, transport and processing accounts for 40% of its food waste, while in the UK it only accounts for 20%. (Godfray et al., 2010).

For the global South the lack of functional transportation is the main driver of food losses. Research done in Mexico has shown that if it would be possible to reduce food loss by 78% just by reducing the waiting time for refrigerated goods (Villarreal et al., 2009). For developed countries, food is often grown in geographically distant areas from where it is consumed, especially seasonal foods with certain requirements (Wakeland et al., 2012). This causes transportation of food over long distances to supply the global North. To reduce the food waste caused by long distance transportation a good enough packaging would reduce the waste substantially (Verghese et al., 2013).

Processing

During processing the raw product goes through different stages of handling such as cutting, grinding and cooking that contributes to food loss. The following step is a quality control, where products that do not fulfil certain requirements are thrown away. Furthermore, manufacturers generally produce

more than needed, in case more food must be delivered spontaneously than normally expected. However, if this does not occur, food waste is created (Parfitt et al., 2010).

If one looks at the difference between the global North and the global South, differences in the proportions of food loss becomes obvious. In the global South, packaging is a major problem in contrast to the global North. Simple packaging such as small bags is still used, from which food can be damaged much easier through crushing and bruising. In addition, the insufficient storage facilities contribute to the loss (Bond et al. 2013).

In the global North, a high-quality standard is a huge cause of food waste. A lot of food is unnecessarily sorted out due to aesthetic deficiencies, such as non-perfect coloring or size. This amounts to 25-30% of food waste in the global North. Another source of food waste is the food manufacturing where excessive waste is generated by automated or manual trimming. (Bond et al. 2013).

Retail

The penultimate stage of the food value chain is the retail sector. Here, most food waste occurs as a result of damaged packaging, reaching the sell-by date or poor storage, all degrading the aesthetics of the food (Garrone et al., 2014). Other contributors to the waste are unpredictable demands for products. This leads to stores ordering more food than they usually sell (Chicatiello et al., 2016). According to European commission predictions, 5% of EU food waste occurs at the retail stage with 4.4 million tons of food wasted in total each year (European Commission, 2011). In the UK, retail food waste has been predicted to be a mere 3% but this still represents >350,000 tons of food waste per year (Bond et al., 2013). One of the highest reported retail-related food wastes comes from the US, where up to 10% of food was wasted at the retail stage in 2008 (Gunders and Bloom, 2017).

Due to the nature of the retail sector in the global South, it is much harder to get a clear statistic for food waste. This is because, unlike the global North, the vast proportion of food is sold by individual street vendors in outdoor markets etc. and these retailers lack the resources to be able to accurately monitor food waste. However, Gustavsson et al. (2011) state that 17.4% of fruit and vegetables were wasted at the retail stage in a study in Ghana and a 10% retail-stage waste of milk in Uganda. These losses may be a result of a lack of technology for appropriate storage. For instance, 35-40% of fresh produce is wasted in India due to lack of cold storage (Godfray et al., 2010). The lack of organization within the markets could be another factor. Therefore, despite an overarching figure for food loss in the global South, it could be assumed that the percentage of waste is the same if not slightly higher than in the global North.

Consumer

The consumer level in the food value chain has shown to be a substantial contributor to food waste and the stage where differences between the global North and South becomes clear. Taking a global spatial average, 35% of all waste and loss occurred within households and the food service sector in 2009 (Lipinski et al., 2013). While consumer food wastes make up 52% of all waste within the value chain in Europe and 61% in North America and Oceania, it is only 5% for Sub-Saharan Africa and 13% for South- and Southeast Asia (Lipinski et al., 2013). In the United States in 2008 this translated to 124 kg of food lost per capita (Buzby et al. 2011). This is driven by impulse buying and tossing of perfectly fine food, which has passed its expiration date. This makes up for roughly two thirds of household food waste in Central Europe (Lipinski et al., 2013).

Within the Finnish food service sector, which includes canteens, restaurants and takeaways, between 19% and 27% of handled food was wasted (Silvennoinen et al., 2015; Katajajuuri et al., 2014). One study found that in the Swedish food service sector, the amount of wasted food sums up to 1.5% of all food coming from cultivated land in Sweden (Engström and Carlsson-Kanyama, 2004). Due to the small-scale nature of the food service sector in the global South, the monitoring of food waste demands considerably more effort and therefore only educated guesses exist. According to the Taiwan Institute of Economic Research the food waste produced in Taiwanese hotel kitchens accounts for 36% of total hotel waste. (Pham Phu, 2018).

Further research is needed to derive better data for food waste on the consumption level in the global South, in order to effectively find strategies to minimize waste in this sector. This is important, especially now that more consumers in the global South adopt the consumption patterns of the global North. It needs to be urgently avoided that they adopt the same wasting habits as well.

Conclusion

As seen, the structure of food loss and waste within the food value chain follows different patterns in the global North and the global South. While the consumer and his high demands lead to easily avoidable food wastes in the global North, it is the lack of technology and infrastructure that makes up the food losses early on in the food value chain in the global South.

It is difficult to assess the global situation in detail due to the immense size of the global food value net. We identified a lack of quantitative studies concerning food waste at the retail and consumer level in the global South.

References

- Bond, M., Meacham, T., Bhunnoo, R. & Benton, T.G., (2013) Food waste within global food systems. A Global Food Security report. www.foodsecurity.ac.uk
- European Commission, (2010). Preparatory study on food waste across EU 27. Technical Report.
- Garrone, P., Melacini, M. and Perego, A., (2014). Opening the black box of food waste reduction. *Food policy*, 46, 129-139.
- Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., ... Toulmin, C., (2010). Food security: The challenge of feeding 9 billion people. *Science*.
<https://doi.org/10.1126/science.1185383>
- Gunders, D. and Bloom, J., (2017). Wasted: How America is losing up to 40 percent of its food from farm to fork to landfill. New York: Natural Resources Defense Council.
- Gustavsson, J., Cederberg, C., Sonesson, U. and Emanuelsson, A., (2013). The methodology of the FAO study: Global Food Losses and Food Waste-extent, causes and prevention"-FAO, 2011.
- Katajajuuri, J.-M., Silvennoinen, K., Hartikainen, H., Heikkilä, L., & Reinikainen, A., (2014). Food waste in the Finnish food chain. *Journal of cleaner production*, 322-329.
<https://www.sciencedirect.com/science/article/pii/S0959652613009116>
- Lipinski, B., Hanson, C., Waite, R., Searchinger, T., Lomax, J., & Kitinoja, L., (2018). Reducing Food Loss and Waste. Working Paper, Installment 2 of Creating a Sustainable Food Future. Washington, DC: World Resources Institute. <https://www.wri.org/publication/reducing-food-loss-and-waste>
- Meyers N. 1993. Gaia: an atlas of planet management. Garden City (NY): Anchor/Doubleday
- Parfitt, J., Barthel, M., & Macnaughton, S., (2010). Food waste within food supply chains: quantification and potential for change to 2050. The royal society publishing.
<https://royalsocietypublishing.org/doi/10.1098/rstb.2010.0126>
- Pham Phu, S.T.; Hoang, M.G.; Fujiwara, T., (2018). Analyzing solid waste management practices for the hotel industry. *Glob. J. Environ. Sci. Manag.*, 4, 19–30.
- Silvennoinen, K., Heikkilä, L., Katajajuuri, J.-M., & Reinikainen, A., (2015). Food waste volume and origin: Case studies in the Finnish food service sector. *Waste Management*, 140-145.
<https://www.sciencedirect.com/science/article/pii/S0956053X15301197>
- Thyberg, K.L. and Tonjes, D.J., (2016). Drivers of food waste and their implications for sustainable policy development. *Resources, Conservation and Recycling*, 106,110-123.
- Vergheze, K., Lewis, H., Lockrey, S., & Williams, H., (2013). The role of packaging in minimising food waste in the supply chain of the future. RMIT University.
- Villarreal, B., Garcia, D., & Rosas, I., (2009). Eliminating transportation waste in food distribution: A case study. *Transportation Journal*.
- Wakeland, W., Cholette, S., & Venkat, K., (2012). Food transportation issues and reducing carbon footprint. *Food Engineering Series*. https://doi.org/10.1007/978-1-4614-1587-9_9

