

Global Food Waste: A Primer

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ABSTRACT

Food waste is a major, highly visible global problem. It has recently attracted much attention in the world and has become a priority in the global political agenda. Food waste occurs at different stages of a food value chain, including agriculture, post-harvest, processing, distribution, retail, and consumption. Regardless of the causes, we can all pitch in to combat the global challenge and turn waste into worth. This paper provides an introduction on global food waste.

KEYWORDS: food waste, global food waste, food loss

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INTRODUCTION

Food is basically necessary for survival. The world is facing a serious challenge of feeding its people sustainably. To meet this challenge, global food supply must significantly increase. There are two options: (1) increasing food production; and (2) decreasing food losses and waste [1]. Much food is lost and wasted in the world today. The issue of food waste is of high importance in the efforts to combat hunger and improve food security.

From farm to table, food is lost or wasted at every stage. Along the food chain process, food is wasted in production, post-harvest, processing, distribution, and consumption. Food waste is regarded as the food removed from the food supply chain, which once was fit for human consumption. This is partly due inefficient food systems. Food losses and waste amounts to roughly \$680 billion in developed nations and \$310 billion in developing nations. One-third of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tons per year, according to the Food and Agriculture Organization (FAO) of the United Nations. The global community is currently experiencing constraints imposed by our resource system, which drives industry to find ways of improving existing processes or finding new uses for waste. Food waste has a significant impact on the environment and achieving the sustainability goals. It has been well said that if food waste were to be a country, it would be the third largest producer of greenhouse gases in the world, after China and US [2].

Strategies to reduce food waste include infrastructure development, market improvements, and innovations, public awareness, and legislative action. The United Nations food agency encourages companies and organizations to join global food waste initiative and contribute their expertise. The United Nations Food and Agriculture Organization (FAO) called on companies and organizations around the world to join in SAVE FOOD , a global initiative designed to cut down on food losses and waste. SAVE FOOD is the global initiative on food losses and waste reduction, established in 2011.

GLOBAL FOOD WASTE MANAGEMENT

Waste is increasingly becoming a national and international concern. Food waste can be reduced significantly through effective management at every stage of the food supply chain since the food supply chain determines the sources where food loss actually takes place. The two primary global waste management goals are: (1) to ensure, by 2020, access for all to adequate, safe and affordable solid waste collection services; and (2) to stop uncontrolled dumping and open burning [3]. Waste management includes the actions of collection, transport, recovery, and disposal of waste. The preferences in which waste is being managed follows a certain hierarchy shown in Figure 1 [4].

New technologies and better practices contribute significantly to reducing food losses and waste. Food waste management includes different techniques

which are responsible for the conversion of food waste into valuable products such the production of chemicals, materials and fuels. Planning for food shopping is one of the most effective tools in preventing overbuying.

The waste type is classified into cereals, dairy products, fruits and vegetables, meat, etc. Fruit and vegetable segment dominates the market as it has a low shelf life. Four technologies are most commonly used for food waste management: Landfilling, composting, anaerobic digestion and incineration/combustion.

Landfill is disposing waste materials by burying them; it is the oldest means of waste treatment. Anaerobic digestion process generates environmental friendly products and by-products. Combustion or incineration, when properly done, can be used as a waste-to-energy facility to generate electricity. Some of these technologies are shown in Figure 2 [5].

DEVELOPED NATIONS

Food waste is a pressing challenge faced by developing and developed nations alike. In developed nations, food waste dominantly occurs at the retail and consumer levels, such as in hospitals, restaurants, and homes due to a "throw-away" mindset. A typical food waste at home is illustrated in Figure 3 [6]. Another the root cause for food waste is overproduction. With the abundance of food everywhere, a general attitude exists that people can afford to waste food.

Public awareness campaigns and taxation are the major means of reducing food waste in retail and consumer-related losses. Food waste education campaigns, like this one in Canada, are necessary in changing consumer attitudes and behaviors. Supermarkets can donate unsold goods.

In the United States a substantial number of businesses and organizations have committed themselves to reducing food loss and waste by 50 percent in their business activities by 2030. Feeding America is a network of 200 food banks. The network fights hunger and poor nutrition by working with food companies, retailers, and farmers to gather food before it is wasted and distribute it to local food banks across the country. It combines economics and technology to create an efficient food recovery and anti-hunger network. Food pantries, soup kitchens, backpack programs, and shelters rely on food provided by the food bank to serve thousands of people

In other developing countries, several policies were proposed to reduce food waste. The food waste issue is currently high on the political agenda in Europe. The European Commission aims at cutting down food waste to one-half by 2020 [7]. The commission recommends a set of policies that could help achieve their food waste reduction goals. These policies include food waste reporting, standardization of food date labeling, setting clear targets to prevent food waste, and design of awareness campaigns [4].

There are five dominant informal food waste disposal routes used by Australian households: home composting, feeding scraps to pets, sewer disposal, giving to charity, and dumping or incineration. This informal food waste represents a significant proportion of total household food waste that has been "invisible" to policy makers [8]. The food

and drinks industry is a major economic asset in the United Kingdom, being the largest manufacturing sector in the country. The UK food chain is working to become more resource efficient in order to remain competitive. A 2016 food waste law in France makes it illegal for supermarkets to throw away edible food.

DEVELOPING NATIONS

Although food losses occur at all stages of the food supply chain, the causes and their impact around the world vary from place to place. In developing countries, food losses hit small farmers the hardest. Inefficient processing and drying, poor storage and insufficient infrastructure, poor equipment, managerial and technical limitations are instrumental factors in food waste in Africa.

Various governments of developing countries are introducing stringent rules to reduce food waste. Once governments and organizations set ambition, the ambition will motivate action. The World Bank is addressing the issue through loans and by coordinated food waste management. Measures to reduce food waste may involve investment in infrastructure and transportation, including in technology for storage and cooling.

Innovations to create low-cost storage methods may reduce food waste caused by poor storage and lack of cold storage. Mobile technology and social media can be used to minimize household-level food waste. Citrus peel, waste cooking oil, and cashew shell nut liquid are used in countries such as China, the UK, Tanzania, Spain, Greece, and Morocco. The main drivers of changes in the food patterns in Brazil are associated with changes in the regional agricultural base, the availability of new foods and new cultures, and the change in the income of the population, which affects dietary habits [9].

BENEFITS AND CHALLENGES

The reduction of food waste leads towards the reduction of hunger and malnutrition, consequently, improving food security in all nations of the world. Food retailers, restaurants, cafes, hospitals, and hotels can benefit from minimizing food waste. Food waste deprive the poor living in developing regions of opportunities to access food, cause significant depletion of resources such as land, water, and fossil fuels, and increase the greenhouse gas emissions associated with food production [10]. Food waste impacts food security by reducing the availability of food at national and global levels. No "one size fits all" when it comes to food waste reduction strategies.

One major challenge to food waste reduction strategies is the limited evidence on the effectiveness of the strategies. Future research on strategies for food waste reduction will provide valuable information on what works [11]. Measurement-based studies are lacking for developing nations for better policy making and mitigation strategies on the environmental impacts.

CONCLUSION

Food waste has serious social, economic, environmental, and nutritional consequences. It is a major threat to global sustainability. It represents a noticeable inefficiency in the global food system. It amounts to a major needless squandering of resources, including water, land, energy,

labor, and capital. It poses a major challenge to food security, food safety, the economy, and environmental sustainability.

A common trend is the positive attitude towards food waste prevention. Effective reduction in food waste requires a coordinated effort involving effective policies and technologies. Globally, a number of public-private organizations and consumer campaigns address food waste, but their efforts are far from comprehensive. More information on food waste can be found in the books in [12-13] and journals on food waste such as *British Food Journal*.

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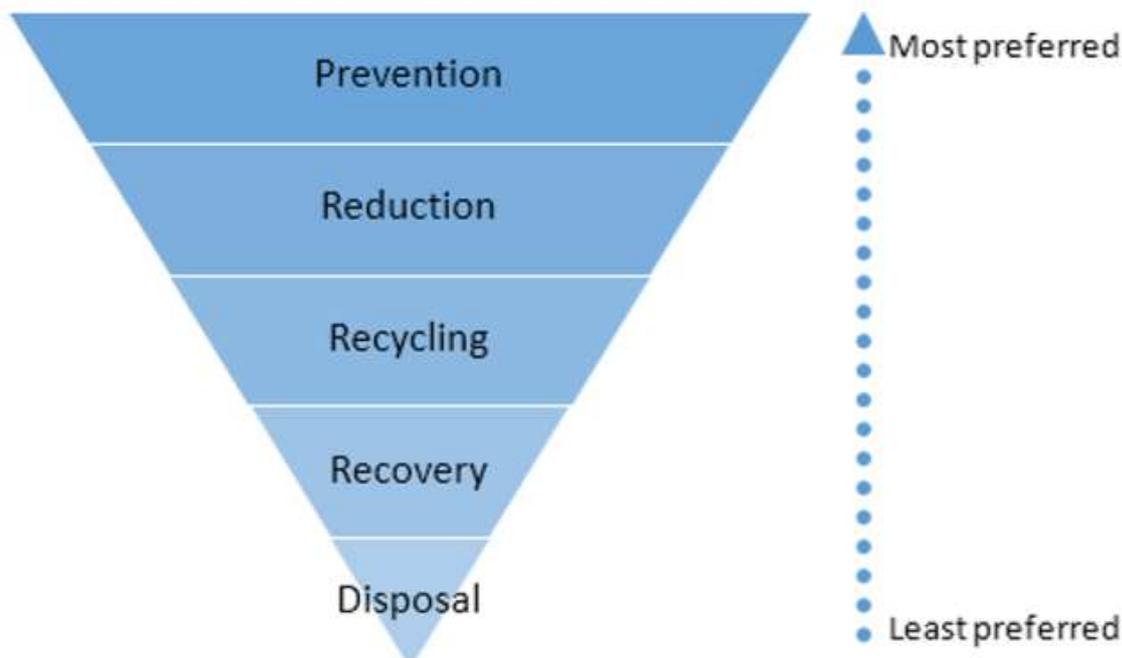


Figure 1 Waste management hierarchy [4].

Food recovery hierarchy

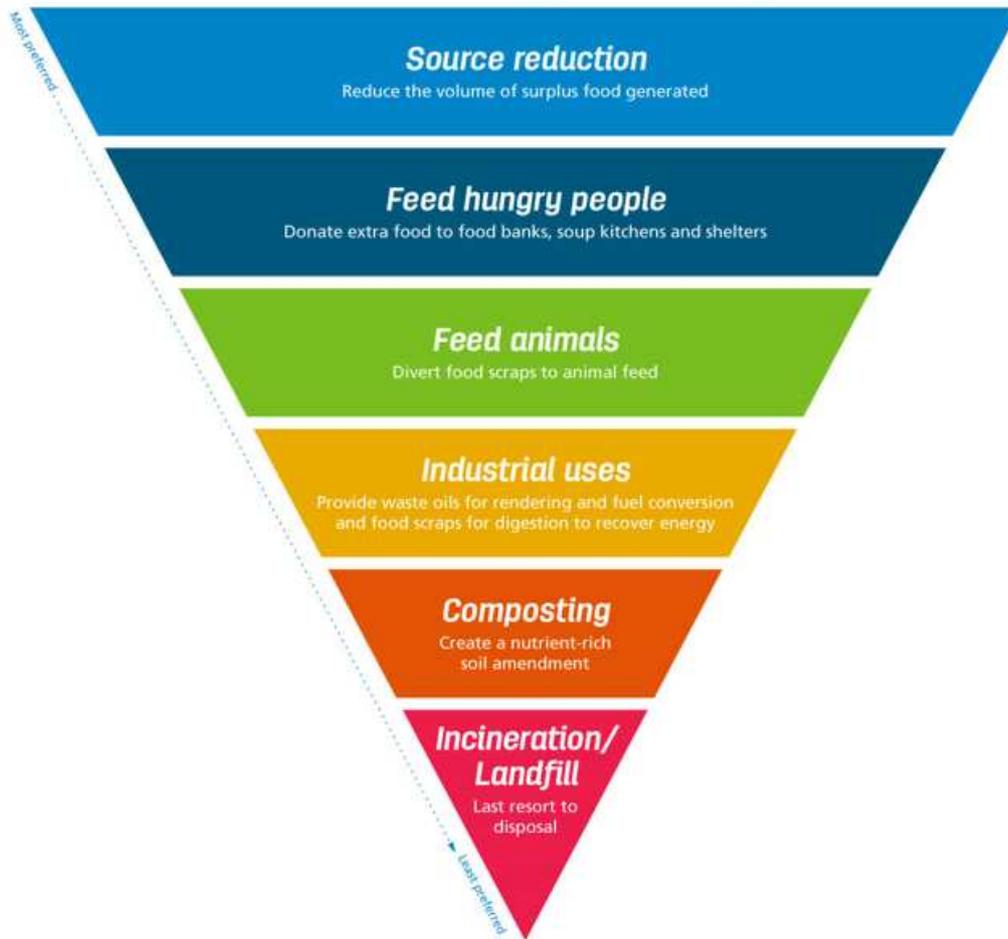


Figure 2 Food waste recovery hierarch [5].



Figure 3 A typical food waste at home [6].