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Impact of food waste and its effect on environment

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Abstract
From an environmental aspect, food waste leads to a chemical usage such as fertilizers and pesticides, more fuel gets used for transportation, and the more food rots in landfills, the more methane gases created, which is one of the most harmful greenhouse gases that contributes to global warming and climate change. Methane is twenty-three times more powerful than carbon dioxide (CO2). There are two ways in which food waste contributes to greenhouse gas emissions: Decomposition of food waste after being dumped in landfills and the life cycle, which starts from production to consumption (distribution, retail, and consumer waste). Food waste increases the level of greenhouse gas emissions especially with the production of methane, one of the most potent gases. There is an increased need to reduce food waste as it affects the environment in regards to global warming and climate change.

Keywords: food waste, greenhouse gases, global warming, environment

Introduction

The FAO report was also able to discern a clear pattern in food waste at the global level. While middle and higher income regions showed greater food loss and waste during the downstream phase or at the consumption level, developing countries were more likely to lose or waste food at the upstream phase due to lack of proper harvest techniques and infrastructure.

Food waste that ends up in landfills produces a large amount of methane- a more powerful greenhouse gas than even CO2. For the uninitiated, excess amounts of greenhouse gases such as methane, CO2 and chlorofluorocarbons absorb infrared radiation and heat up the earth's atmosphere, causing global warming and climate change. With agriculture accounting for 70 percent of the water used throughout the world, food waste also represents a great waste of freshwater and ground water resources.

Fifty-four percent of the world's food wastage occurs "upstream" during production, post-harvest handling and storage, according to FAO's study. Forty-six percent of it happens "downstream," at the processing, distribution and consumption stages.

As a general trend, developing countries suffer more food losses during agricultural production, while food waste at the retail and consumer level tends to be higher in middle- and high-income regions -- where it accounts for 31-39 percent of total wastage -- than in low-income regions (4-16 percent). The later a food product is lost along the chain, the greater the environmental consequences, FAO's report notes, since the environmental costs incurred during processing, transport, storage and cooking must be added to the initial production costs.

Plant-based diets are not only healthier they are also sustainable and have lower environmental impact than meat-based diets. As the world progresses, more people are changing to meat diets, which include environmentally demanding products like beef, pork, fish and chicken, as their income levels increases and meat becomes more popular and less expensive, thus leaving traditional plant-based diets behind. This is, however, alarming as the production of meat-based diets has much greater negative impacts on our environment that plant based agriculture and practices.

Causes of Food Waste

1. Production

In developing and developed countries which operate either commercial or industrial agriculture, food waste can occur at most stages of the food industry and in significant amounts. In subsistence agriculture, the amounts of food waste are unknown, but are likely to be insignificant by comparison, due to the limited stages at which waste can occur, and given that food is grown for projected need as opposed to a global marketplace demand. Nevertheless, on-farm losses in storage in developing countries, particularly in African countries, can be high although the exact nature of such losses is much debated.

The use of machinery in harvesting can cause waste, as harvesters may be unable to discern between ripe and immature crops, or collect only part of a crop. Economic factors, such as regulations and standards for quality and appearance, also cause food waste; farmers often harvest selectively, preferring to leave crops not to standard in the field (where they can be used as fertilizer or animal feed), since they would otherwise be discarded later. In urban areas, fruit and nut trees often go un harvested because people either don't realize that the fruit is edible or they fear that it is contaminated, despite research which shows that urban fruit is safe to consume.

2. Food processing

Food waste continues in the post-harvest stage, but the amounts of post-harvest loss involved are relatively unknown and difficult to estimate. Regardless, the variety of factors that contribute to food waste, both biological/environmental and socio-economical, would limit the usefulness and reliability of general figures In storage, considerable quantitative losses can be attributed to pests and micro-organisms This is a particular problem for countries that

experience a combination of heat (around 30 °C) and ambient humidity (between 70 and 90 per cent), as such conditions encourage the reproduction of insect pests and micro-organisms. Losses in the nutritional value, caloric value and edibility of crops, by extremes of temperature, humidity or the action of micro-organisms, also account for food waste; these "qualitative losses" are more difficult to assess than quantitative ones. Further losses are generated in the handling of food and by shrinkage in weight or volume.

Some of the food waste produced by processing can be difficult to reduce without affecting the quality of the finished product. Food safety regulations are able to claim foods which contradict standards before they reach markets. Although this can conflict with efforts to reuse food waste (such as in animal feed), safety regulations are in place to ensure the health of the consumer; they are vitally important, especially in the processing of foodstuffs of animal origin (e.g. meat and dairy products), as contaminated products from these sources can lead to and are associated with microbiological and chemical hazards.

3. Retail

Packaging protects food from damage during its transportation from farms and factories via warehouses to retailing, as well as preserving its freshness upon arrival. Although it avoids considerable food waste, packaging can compromise efforts to reduce food waste in other ways, such as by contaminating waste that could be used for animal feed stocks.

Retail stores can throw away large quantities of food. Usually, this consists of items that have reached either their best before, sell-by or use-by dates. Food that passed the best before, and sell-by date, and even some food that passed the use-by date is still edible at the time of disposal, but stores have widely varying policies to handle the excess food. Some stores put effort into preventing access to poor or homeless people, while others work with charitable organizations to distribute food. Retailers also contribute to waste as a result of their contractual arrangements with suppliers. Failure to supply agreed quantities renders farmers or processors liable to have their contracts cancelled. As a consequence, they plan to produce more than actually required to meet the contract, to have a margin of error. Surplus production is often simply disposed.

Retailers usually have strict cosmetic standards for produce, and if fruits or vegetables are misshapen or superficially bruised, they are often not put on the shelf. In the United States, an estimated six billion pounds of produce is wasted each year because of its appearance. In a study done in 2009, it was estimated that nearly 20 to 40 percent of fruit and vegetables in the UK alone are rejected before they even reach retailers, as a result of high cosmetic standards.

4. Consumption

Empirical evidence show that drivers of consumer food waste, even in a low-middle income context, include

1. Stocking too much food
2. Over-preparing or not cooking it properly (e.g. burning food)
3. Leaving food on dishes after meals or not willing to consume leftovers
4. Decaying of prepared food after long or inappropriate storage.

Excessive purchasing, over-preparation and unwillingness to consume leftovers are some of the main antecedents of food waste. As author Gustavo Porpino states, "They are embedded in cultural practices such as hospitality, the good mother identity, taste for abundance, and food seen as wealth".

Table 1: Major Categories of Foods and Its Residues for Common Food Products

Food type	Major categories of processed food	Types of residues
Cereals and grains rice, wheat, corn,	Grains, flour, bread, cookies and crackers, cake, starch, flakes, bakery product	Straw, stem, leaves, husk, cobs, hulls and fiber, bran, germ, gluten, steep liquor,
Fruits and vegetables	Fruits and vegetable juice, preserved fruits and vegetables, vegetable oil, potato starch, sugars from beet	Rotten fruits, stem waste, pits, seeds, peel, pulp, pomance
Fish and sea foods	Canned fish, smoked fish, salted fish, processed fish	Scales, fins, shells, bones, gut, remains, fish oil
Meat	Processed red meat(beef, pork)and products, processed poultry and products	
Dairy products	Milk, butter, cream, yoghurt, cheese, ice cream	Sweet and sour whey, process waste water containing residual solids
Beverages	Cocoa, coffee, tea, fruit based alcohols, grain-based alcohols	Shells from cocoa and coffee beans, cocoa, molasses, steep liquors
Edible oil	Oils, hydrogenated fats, polyunsaturated fatty acids	Press solids and cakes, oil water emulsion, rancid oils, shells of oil seeds
Sugars	Sugars, purified sugars, confectionary, bakery products	Dilute sugar solutions

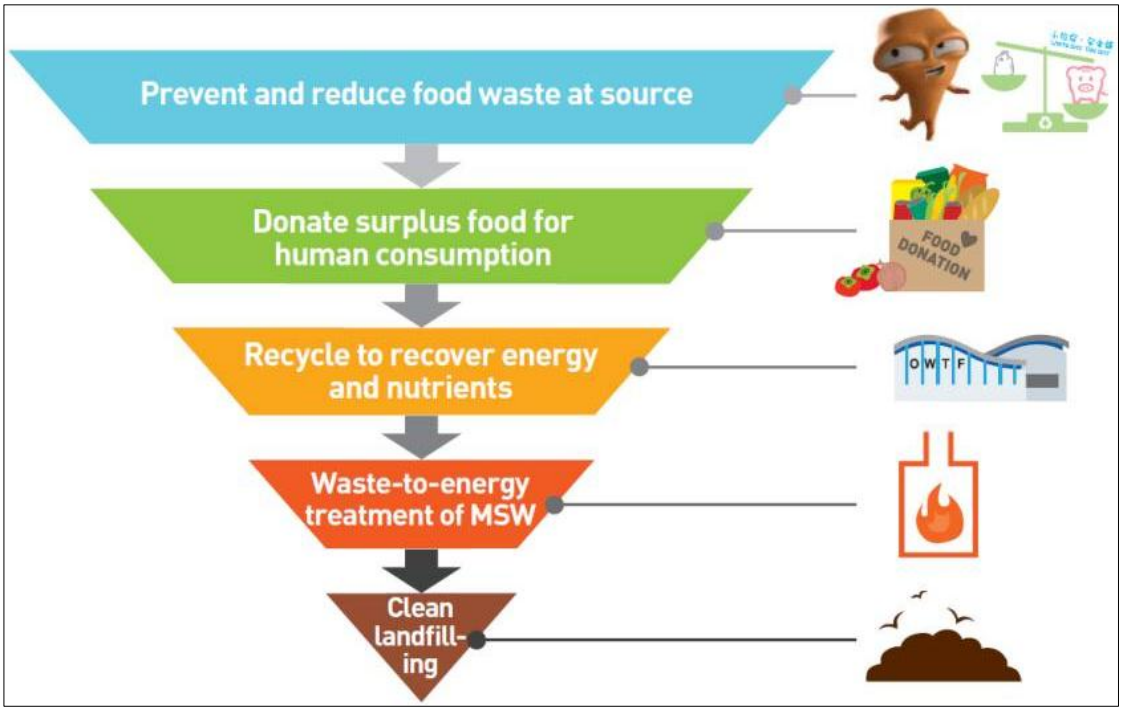

Fig 1: Food Waste Management Hierarchy

Measures to Control Food Waste

- To stop food waste, changes have to be brought in at every stage of the process – from farmers and food processors to supermarkets and individual customers.
- Priority should be given to balancing production with demand. This essentially translates to lesser use of natural resources to produce food which is not needed.
- More effort should developing better food harvesting, storing, processing and distributing processes.
- If oversupply happens, steps should be taken to redistribute the food or to divert it to people who are in need.
- If food production will have to increase by more than half to meet the demands of the growing population by 2050, the actual increase would be much lesser if food waste was reduced.
- Large restaurants, supermarkets, retail outlets and individual consumers can also reduce their "food footprint" by identifying where waste occurs and taking steps to tackle the same.
- Fruits which are misshaped or "ugly" are not necessarily bad and can still be bought and used in dishes like soups.
- Consumers should also try to buy food in accordance with a meal plan so that they don't end up wasting edible food.
- If the food still ends up unfit for human consumption, it can be used for feeding livestock, saving precious resources that would have otherwise been used for producing commercial feed.
- If the food cannot be reused at all, should at least try to recycle it in a responsible manner instead of sending it to the landfills where it continues to rot.
- Shop smart and realistically.
- When cooking, don't over-serve food.
- Store food in the right places.
- Avoid clutter in your fridge, pantry and freezer.
- Treat expiration and sell-by dates as guidelines.

Conclusion

This review provides evidence for an increased need to reduce food waste as it affects the environment in various ways from the increase in greenhouse gas emissions, climate change, all the way to global warming. Food waste also accounts for more than one quarter of total freshwater used in food and four percent of petroleum oil consumption, which all go to waste. Landfills that also contain organic materials are broken down by bacteria to produce methane and adding rotting food increases these emissions.

On food waste reduction, education and publicity are very important. The Government aims to promote public awareness of food waste problems and conduct various programs and educational campaigns to promote food waste reduction, source separation and recycling in different sectors.

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