Food Waste in Indian Restaurants: A Case Study of Delhi-NCR

Dr. Atiqua Tajdar
Post-Doctoral Fellow (ICSSR)
Department of Geography
Jamia Millia Islamia, New Delhi

Dr. Imtiaz Ahmad Ansari
Assistant Professor
Department of Sociology
Jamia Millia Islamia, New Delhi

Introduction

Food waste is a topic that is often overlooked or covertly ignored by the mainstream media and the general public. In many cases, general public is not even aware of the costs involved in food wastage. This wastage has a knock-on effect on the environment as well, as the efforts made to produce this generates greenhouse gases, uses water, and can lead to deforestation.

Food waste is not a new phenomenon. It has been an on-and-off topic of public interest for more than a century, but only during the past few decades has reducing and preventing food waste emerged as a sustained global priority. Failure to store or preserve food in times of plenty could result in hunger, famine and death in times of want. There are the ethical issues against wasting food while hundreds of millions of people suffer from hunger, malnutrition or food insecurity throughout the world and often in our own neighbourhoods. There are, of course, many reasons for global hunger, but an actual food shortage is not one today. Enough food is produced to adequately feed everyone in the world, with plenty leftover. If food that ends up as waste could be equitably distributed to those in need, global hunger and malnutrition could be eliminated.

Despite financial, environmental and ethical reasons to not waste food, about one-third (1.4 billion tons) of all food grown for human consumption is lost or discarded every year. Globally, this works out to about a trillion dollars of economic losses – or about 1.5 per cent of the total worldwide economy. Despite all the global clamour surrounding the topic, many people remain unaware of the harm that food waste needlessly causes, and many who are aware just don't see reducing or eliminating food waste as a priority in their lives.

Globally, nearly one third of food produced for human consumption is lost or wasted, equalling a total of 1.3. billion tonnes of food per year (Gustavsson et al., 2011). As the production of

food is resource-intensive, food losses and wastes are indirectly accompanied by a broad range of environmental impacts, such as soil erosion, deforestation, water and air pollution, as well as greenhouse gas emissions that occur in the processes of food production, storage, transportation, and waste management. Due to these growing environmental but also social and economic concerns, food waste is increasingly acknowledged as an urgent issue among governments, businesses, NGOs, academics, and the general public. Food systems are at the heart of the 17 UN Sustainable Development Goals (SDGs). The Food Sustainability Index (FSI), developed by Economist Impact and Fondazione Barilla, examines how food systems are performing across three pillars: food loss and waste, sustainable agriculture, and nutritional challenges. Its 38 indicators and 95 sub-indicators address societal, environmental and economic themes. The first edition of the FSI was published in 2016 and ranked the food sustainability of 25 countries. In 2017 this was expanded to 34 countries, followed by 67 countries in 2018. The 2021 Index examines the food systems of 78 countries. Countries performing well on the FSI also perform well on social and economic indicators such as human development, progress in achieving SDGs, income levels, gender equality, health expenditure and higher education. Achieving human and economic development or redressing social inequalities can have benefits for food sustainability, and vice versa. First let us try to make sense of what exactly is food waste and the severity of the problem making it one of the important agenda of the SDGs.

Food Loss and Waste: A Global Concern

United Nations Environment Programme (UNEP) came with the first Food Waste Index Report which measures food waste at retail and consumer level (households and food service). UNEP is the leading global authority on the environment. Its mission is to inspire, inform, and enable nations and peoples to improve their quality of life without compromising that of future generations. UNEP's core mission is to find solutions to the triple planetary crisis. As the leading global authority on the environment, the institution helps its Member States to foster climate stability, live in harmony with nature and forge a pollution-free future, supporting the achievement of all 17 SDGs.

The Food Waste Index tracks the global and national generation of food and inedible parts wasted at the retail and consumer (household and food service) levels. For the purposes of the Food Waste Index, "food waste" is defined as food and the associated inedible parts removed from the human food supply chain in the following sectors: retail, food service, households.

Although the issue of waste has been known a long time, the attempts to quantify it are very recent. In this sense, the first and most significant attempt has been that of FAO in 2011, with the publication of a global report (FAO 2011), followed by further studies to quantify the economic and environmental impact of food losses and waste.

Already in the early 1980s, the FAO had detailed a definition of food waste: "Wholesome edible material intended for human consumption, arising in any point in the food supply chain that is instead lost, degraded or consumed by pests" (FAO, 1981). Later on, many more definitions were developed by other organisations making the concept clearer which included a distinction between food losses and food waste. According to this definition, food losses are those that take place at production, post-harvest and processing steps; food waste, on the other hand, occurs during distribution, sale and final consumption (Lipinski et al., 2013).

Significance of the Study

Food waste has become a critical issue for sustainable development, global health, and climate action. In India, the restaurant sector constitutes a major source of food consumption, and, inevitably, waste also. The significance of conducting systematic research on food waste in Indian restaurants is multiple-touching upon environmental stability, economic efficiency, social equity, policy innovation, and behavioural transformation as well. Both household and restaurant represent the end of food supply chain where consumption and ultimately waste is produce. Compared to the research on household food waste, however, research on restaurant as a site of food waste study has been neglected. Therefore, this study is an attempt for fill this gap.

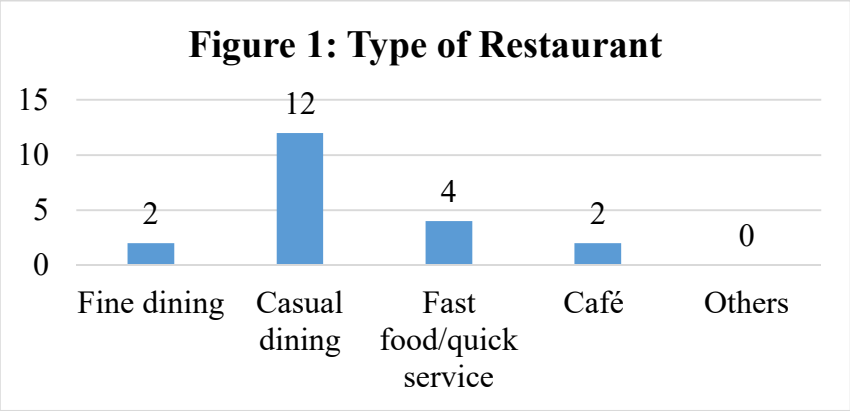
Research Methodology

The present study is based on my post-doctoral fellowship research work. The study was conducted in the Jamia Nagar and Defence Colony locality in the South East district of Delhi. Although both the localities offer different food experiences, the Jamia Nagar locality has emerged as one of the most sought after destinations for food lovers, especially offering Mughlai and Awadhi cuisine. Different neighbourhoods in both the selected localities are dotted with restaurants and roadside eateries offering multiple options to food lovers, fitting into everyone's budget. The study is mainly based on primary data collected from the restaurants/eateries located in these two neighbourhoods. Total 20 restaurants/eateries were selected for the data collection, 14 from Jamia Nagar and 6 from Defence Colony. More samples were taken from Jamia Nagar as it has more number of restaurants and offers variety

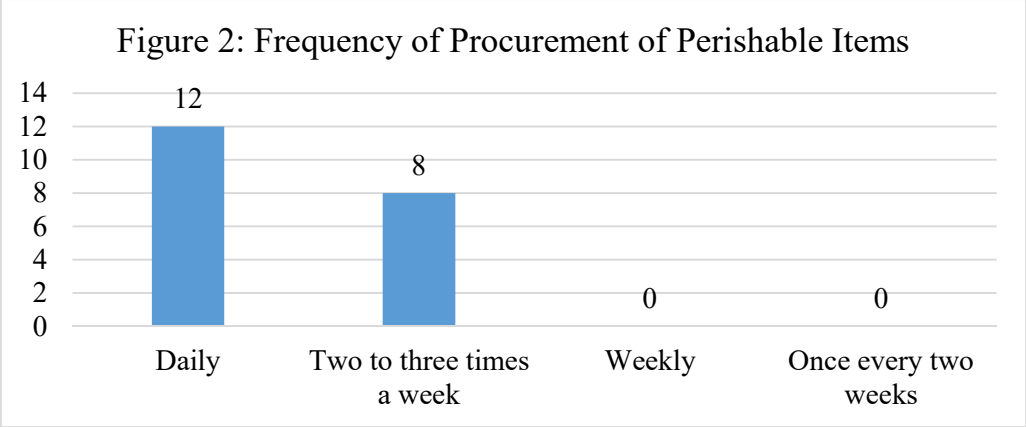
of foods compared to Defence Colony. Data was collected from face to face interview using an interview schedule. The schedule comprised of closed ended questions. The collected data was analysed through MS-Excel software.

Results and Analysis

The selected restaurants were of different nature (figure 1). Out of the 20 restaurants, 12 were of casual dining type, 4 were fast food service outlets, 2 each belonging to fine dining and café category.

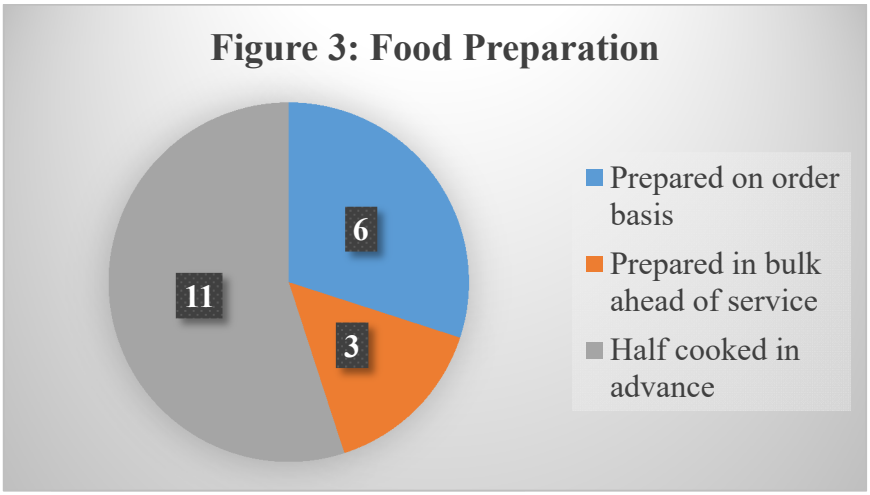


Procurement of items, especially perishable items, is an important determinant of food waste generated by restaurants if proper storage facilities are lacking (figure 2). These can at times are the major contributors of restaurants food waste. In the selected restaurants, 12 used to procure their perishable items every day. The reason is that it automatically reduces the chances of spoilage as they buy fresh products every day. However, 8 restaurants procure their perishable items two-three times a week instead of buying it daily. In such cases, they do possess better storage facilities and also it reduces the cost of purchase as they buy it in bulk. No cases were reported where the perishable items are bought on either weekly or longer time intervals.



Food Preparation and Service

An important determinant of food wastage is related with the preparation process itself. Some restaurants prefer to cook fresh and serve whereas other cook the food in advance and serve it later during the restaurant timing. The most common method (11 restaurants) adopted by the restaurants in the present study is that they half cook most of the items in advance and give it a final cooking touch at the time of actual service. So, most of the items are pre-cooked in advance and at the time of service they either heat it or add some more necessary ingredients before it is ready to be served. 6 restaurants reported that most of the items are served only at the time of receiving the order. These restaurants either belong to the category of café or fast food eateries. The 3 restaurants prepare a major part of their food in advance and serve it at the time of order (figure 3).



As far as keeping a track of the food waste produced in these restaurants (figure 4), 14 reported that they do not maintain regular tracking of food waste. Only 6 restaurants reported that they

track the amount of food waste produced. Studies indicate that tracking of food waste, both in kitchens and customer plate, enables and drives reductions in both pre-consumer (preparatory/kitchen) and post-consumer (plate/buffet) waste. But these reductions are strongest when tracking is paired with customer feedback, managerial action and proper and staff training. Study by Sigala et. Al. (2025) shows that installation of the waste-tracking devices led to significant reduction in food waste. This can go up to 23-51% reduction in per-meal. Many other studies (Orr and Goossens, 2024; Leverenz et. al. 2021) have also established that food waste monitoring and tracking leads to food waste reduction to varying degrees.

These reduction further increases if there are dedicated persons with the responsibility of tracking and monitoring the wasted food. In those restaurants where the owners themselves track and monitor the food waste amount (figure 5), the reduction is more drastic compared to where the staff (chef and other kitchen staff) are responsible. In the present study, out of the 14 restaurants where food wastes are tracked, in 9 cases the owner is responsible for keeping the record while chefs are responsible in 2 restaurants and other kitchen staff in 3 remaining restaurants.

Figure 4: Regular Tracking and Record of Food Waste Amount

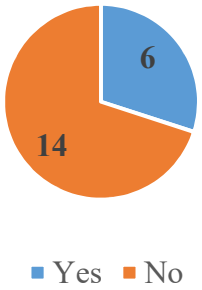
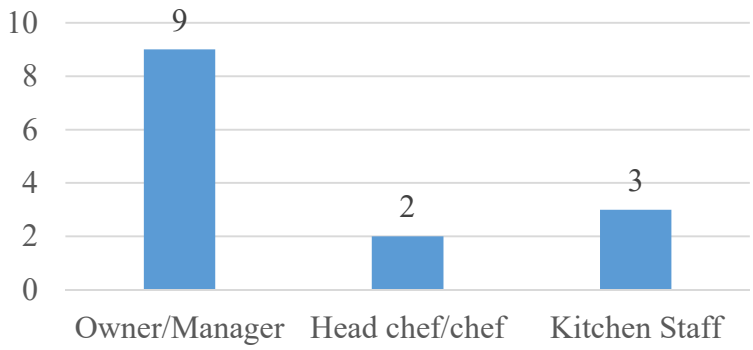
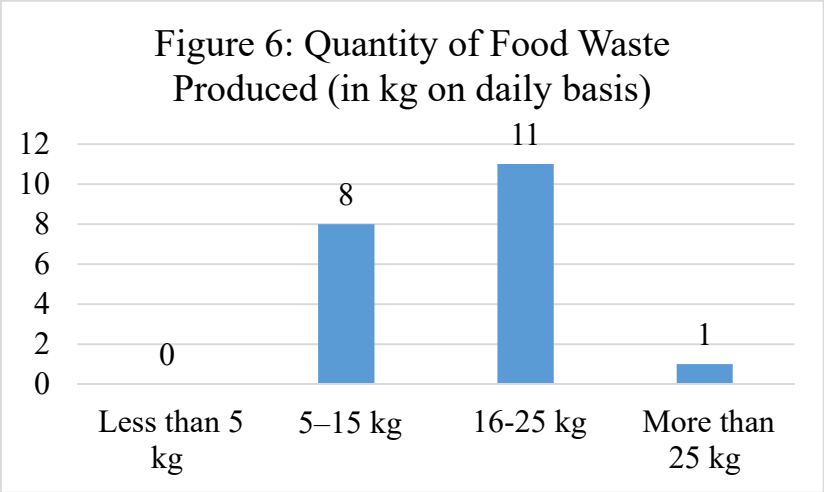


Figure 5: Responsibility of Monitoring Food Waste

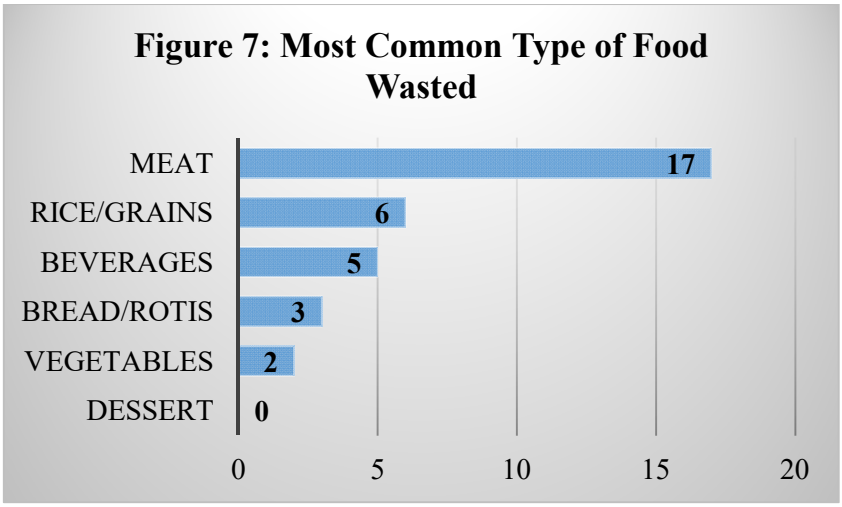


Food Waste Generation and Management

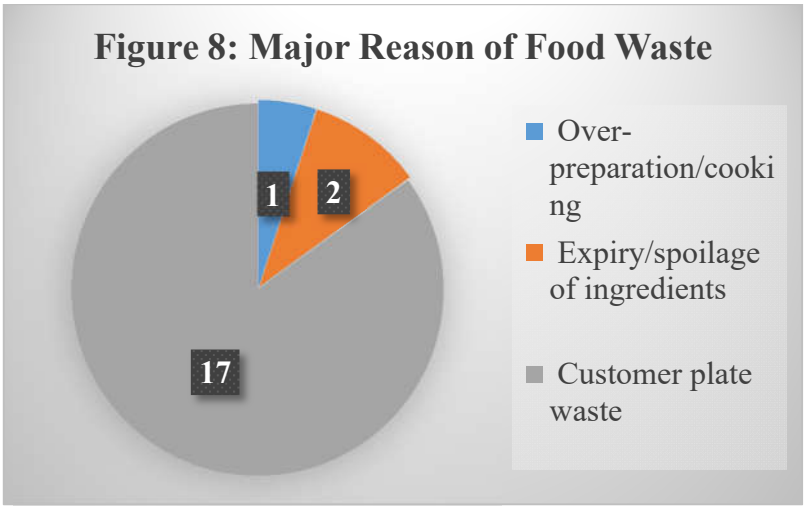
The restaurants greatly differ in terms of amount of actual food waste produced. However, this is connected with the size of the restaurants (seating capacity and number of customers served) as well as its nature (fine dining or fast food) also. Quantification of food waste plays a crucial role because it makes a more accurate and systematic, evidence-based waste reduction possible. Studies conducted shows that when food waste is measured, owners (or whoever is responsible for its measurement) gain a clear understanding of where, when, and why waste actually occurs. It is during the storage, preparation, cooking, serving, or from customer plate returns, becomes more clearly identifiable. Without quantification, waste remains invisible, making it difficult to identify patterns, diagnose inefficiencies, or justify operational changes. Measurement also equips restaurants to monetise losses, revealing the financial impact of overproduction, oversized portions, or poor inventory control, thereby strengthening managerial motivation to intervene.



It was found that in 11 restaurants (figure 6), food waste amount is in the range of 16-25 kg every day. In 8 restaurants, 5-15 kg wastes are produced and in only sample restaurants more than 25 kg food waste is produced daily. In behavioural terms, measurement of waste increases staff awareness and accountability. It has been found that when employees see actual waste volumes or costs, their daily practices become more careful and efficient.

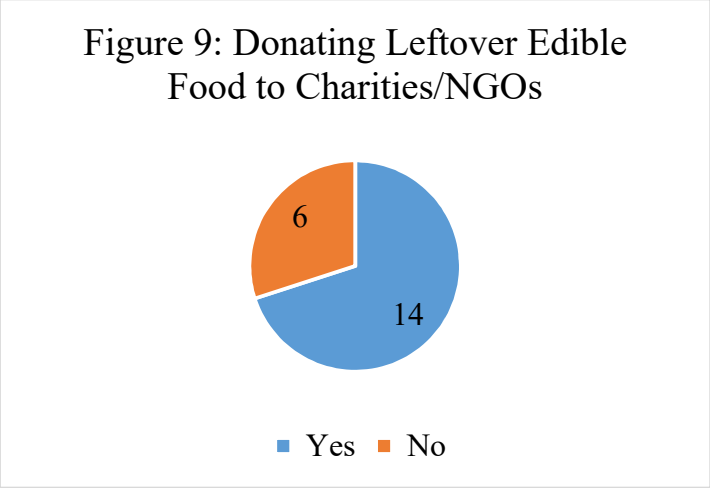


As far as the types of food wasted is concerned (figure 7), 17 restaurants answered that cooked meat is the most common items wasted. 6 restaurants said that rice/grain is the most common food waste. Beverages, bread/roti, vegetables constitute the most common food waste in 5, 3, and 2 restaurants respectively. None of the restaurants reported dessert as an item of food waste. For the query related to items of food waste, respondents were encouraged to cite multiple responses.



As far as the reason of food waste is concerned (figure 8), the three possible reasons recorded are over-preparation, expiry/spoilage of ingredients, and customer plate waste. Out of all the reasons identified, customer plate waste is the most common reason (reported by 17 restaurants) of food waste generation. It was followed by expiry/spoilage (2 restaurants) and over-preparation (only 1 restaurant) as the reasons of food waste. Plate waste being the most common reason of waste in restaurants may be due to multiplicity of reasons. Studies highlight that portion size is the strongest predictor of plate waste. When people are served more food than they actually need, it leads to more waste. When the food that does not meet the

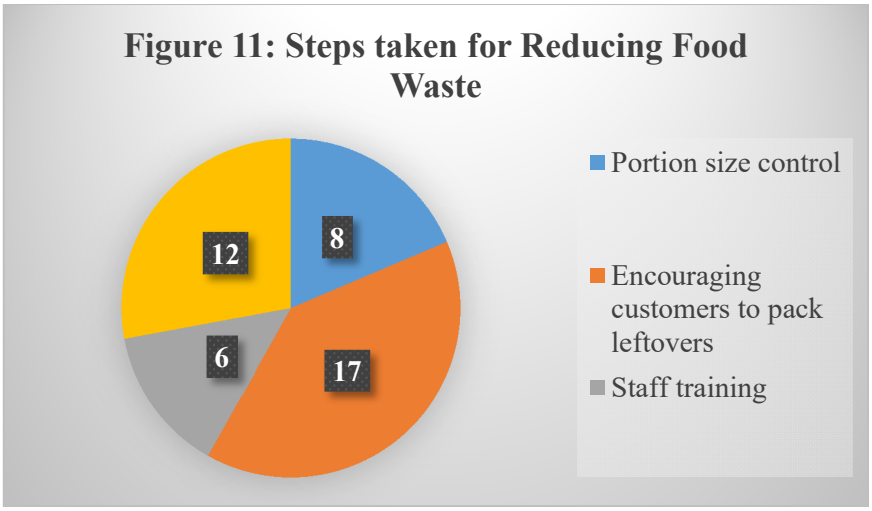
expectations of the customer in terms of taste, appearance, or some other reasons, food is often left uneaten. On the socio-psychological side, some times more food is ordered than actually required simply out of social pressure of the group or to meet certain standards in the social circle.



Even after the waste is generated, there are multiple ways by which it can be utilised before being thrown into landfills and becoming not only a social hazard but also negatively impacting the environment. The study enquired about whether the restaurants donate the leftover food in order to reduce its complete wastage (figure 9), 14 responded in affirmative while 6 did not donate to local charities or non-governmental organisations. Research studies shows that staff training is one of the most effective interventions for reducing restaurant food waste. Training on portion control and standardized serving significantly lowers both preparation waste and plate waste (Principato et al., 2018). In the present study, in 11 restaurants staff were trained in different skills at reducing food waste while in 9 restaurants such training is lacking (figure 10).

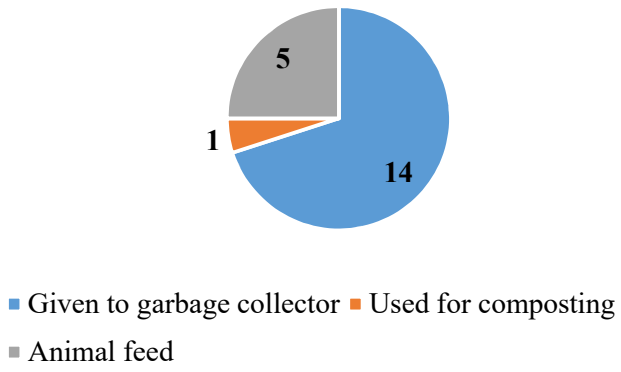
Waste Disposal Practices

As far as the actual steps taken to reduce the generation of food waste is concerned, respondents were asked to answer all the possible steps which they actually consider and also implement in order to reduce their food waste (figure 11). Out of all the possible reasons identified, the common form of waste reduction is that they encourage the customers to pack the leftovers which can either be consumed by them later or they can donate it on their own to needy people. This was reported in 17 restaurants. Another most common method (reported in 12 restaurants) was that they encourage their staff to carry the edible/fresh leftover part of the food for their own consumption. Portion size control and training of the staff was reported in 8 and 6 in restaurants respectively.



Finally, what happens with the inedible waste produced in the restaurant (figure 12), again the responses were varies. In 14 cases, these waste are collected by the garbage collector (municipal or private waste contractors) for disposing in the designated places identified by the Municipal Corporation of Delhi (MCD). In 5 cases, it was used for animal feed while one reported that it is used for composting purposes.

Figure 12: Process of Food Waste Disposal



Conclusion

The food waste has emerged as a major challenge of unsustainable food production and consumption patterns in the recent years. From an environmental perspective, food waste directly imposes additional strains on our environment by exacerbating the overexploitation of natural resources, excessive use of fertilizers, loss of biodiversity, and greenhouse gas emissions. It also entails hidden costs stemming from these environmental impacts and their adverse effects on human health and well-being. Moreover, wasting food represents intrinsic financial, investment, and income losses leading to a rise in food prices. Although food waste is generated across the entire food supply chain, the food waste produced downstream reflects a higher loss of resources, labour, and investments, as it aggregates inputs from all the previous stages.

Food waste in out-of-home settings originates primarily from three sources: pre-kitchen or inventory-related stages, preparation and serving procedures, and plate waste left by consumers. The present study was conducted to find out the how restaurants as a site of food waste production deal with this emerging problem. Based on the fieldwork conducted in Delhi-NCR region, it was found that food waste produced is a function of multiple factors such as type of outlet (fine dining, cafeteria, fast food eateries, etc.), process of procuring perishable food items, whether the staff is trained in the skills of reducing food waste or not and also whether any tracking system is applied or not to monitor the food waste produced. In the present case, the major source of food waste is generated from the customer plate. This is due to various reasons. Sometimes more quantity is served than the customer is actually needed or sometimes because of the mismatch between the expected and the actual quality of the food

ordered. Based on the study, it can be gauged that restaurants can significantly reduce their food by adopting better storage procedures, training of their staff in handling food waste related skills, tracking and monitoring of waste produced and take appropriate action for its reduction. Since a major source of food waste produced in restaurants comes from the plate, if the customers are encouraged to take away the leftover, it can significantly reduce the waste produced. Also donating the leftover before it becomes stale and unfit for use can be another effective way of reducing waste. Therefore, solution to this emerging social problem is not only planning and management but also socio-psychological. People need to me made more aware of the menacing impact of food waste not only in terms of its monetary and social cost, but also its impact on our environment.

References

FAO (2011) Global Food Losses and Food Waste-Extent, Causes and Prevention. FAO, Rome

Gustavsson, J., Cederberg, C., & Sonesson, U. (2011) Global Food Losses and Food Waste: Extent, Causes and Prevention. FAO.

Lipinski, B., Hanson, C., Lomax, J., Kitinoja, L., Waite, R. and Searchinger, T. (2013) Reducing Food Loss and Waste. World Resources Institute Working Paper.

Leverenz, D., Hafner, G., Moussawel, S., Kranert, M., Goossens, Y., Schmidt, T. (2021) Reducing Food Waste in Hotel Kitchens based on Self-Reported Data, *Industrial Marketing Management*. Vol. 93, pp. 617-627.

Orr, L., Goossens, Y. (2024) Trimming the Plate: A Comprehensive Case Study on Effective Food Waste Reduction Strategies in Corporate Canteens, *Sustainability*, Vol. 16, No. 2, 785.

Principato, L., Pratesi, C. A., & Secondi, L. (2018) Towards Zero Waste in Restaurants: A Pilot Study on Staff Training and Consumer Behaviour, *Waste Management*, Volume 79, pp. 96-104.

Sigala E. G. et al. (2025) Reducing Food Waste in the HORECA Sector using AI, *Waste Management*, Vol. 198, pp. 77-86.

Acknowledgement

This work is based on the research fellowship (post-doctoral fellowship) offered by the Indian Council of Social Science research (ICSSR), New Delhi.