International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Citizen's Awareness and Perception of Food Waste Management in Some Metropolitan Cities in India

Nikita Dhargave Borkar[1], S. G. Borkar[2]

[1,2]Dr. Borkar's Laboratory and Research Centre, Endeavour Scientific Agriculture, 301, Prestige Point Building, In front of Nashik Road Police Station, Nashik 422101, India

Abstract

Food waste is a global issue with implications for the health of society, economics, and the environment. It is a major issue in urbanized societies/ metropolitan cities as compared to rural areas and village populations in India. Indian villages have their systems of surplus food management like sharing of food items among different families, domesticated animals, and avian, its utilization in the natural gas production units and farm compost units which are lacking in metropolitan cities. More per capita income in metropolitans makes them more liberal in buying more food items than required, creating food waste problems, searching for their disposal of solutions, and sometimes ending up dumping in garbage vans of municipal corporations. Under the present investigation, we surveyed the different facets of food waste and the opinion of its management in metropolitan cities. The analyzed data and suggestions of the citizens are formulated as recommendations to be considered to minimize food waste in the metropolitans.

Keywords: Food-waste, waste-management, packaged food, metropolitans, surplus.

Introduction

Food and food waste is a serious problem in India, occurring during crop harvest, storage, transport, distribution system, and during use in individual households. The annual wastage in food grains, fruits and vegetables, meat, and dairy products (Table 1.) is due to the inadequate storage infrastructure at the local farm level, village level, or district level for these commodities and also occurred during the distribution, sales, and utilization. We have encountered several cases where cereal grains are spoiled due to rains in open railways storage and transportation systems or at agriculture produce mandi due to a shortage of storage infrastructure.

Table 1. Annual wastage: Food grains, Fruits & Vegetables, Milk, and Meat

Sr.no	Commodity/ Crop	Overall loss (%)	The monetary value of the loss (in crore rupees)
1	Cereal food grain	4.65 – 5.99	20, 698
2	Pulses	6.36 – 8.41	3, 877
3	Oilseeds	3.08 – 9.96	8, 278
4	Fruits & Vegetables	4.58 – 15.88	40, 811

5	Milk	0.92	4, 409
6	Meat	2.71	1,235
Total losses			74, 308

Source: Ministry of New & Renewable Energy, CIPHET (Ludhiana) Food waste Index Report 2021 of UNEP.

The global food waste loss accounts for roughly 8% of the total 931 million tonnes. The report indicated that 121 kg of consumer-level food is wasted each year on a global per capita level with 74 kg of this happening in households. India on the other hand reported a waste of 50 kg of food per person per year at the household level (Samant et.al, 2023). Around 74 million tonnes of food was lost in India every year, which is 22 % of foodgrain output or 10 % of total foodgrain and horticulture production, put together, in the country in 2022-23 (Vishwa Mohan, 2023). In other words, this lost amount can feed almost 155 million underprivileged citizens of the country per year. The government shall share its responsibility to minimize the food waste loss at their level under their control, while at the individual Indian family level or commodity level, we have to minimize the losses in the use and disposal of food waste. This approach can be well implemented when we quantify the food loss at the individual family level or community level. Agarwal et.al (2021) reported that food loss and waste in India are in the early stages, and are mainly focused on the quantity of post-harvest losses. Data on food waste at the retail, household, and service levels is limited to a few perception studies. Data on food waste at the household level is almost non-existent. Gender disaggregated research on food loss and waste is neither available nor considered in improving technology or other solutions for its management. Therefore, the present study on “Citizen's Awareness and Perception of Food Waste Management in some Metropolitan Cities in India” was undertaken to assess the awareness of individual families on various aspects of food waste management, which will be necessary for the formulation of a food waste management program.

Material and Methods

The method of online survey was followed to collect data on the different aspects of food use, storage, and food waste management at the individual level as well as the community level. The online questionnaire was sent to respondents in different states and cities of India. The number of respondents selected for the online survey program was 65 in numbers.

The survey questionnaire included the following question for the collection of data and its analysis, and drawing the interference.

1. Email ID of respondent ….
   Name of respondent ……
   Age of respondent……
2. Gender: A) MALE B) FEMALE
3. Location of respondent
4. How many people are there in your household?
   A) 1-5 B) 5-10
5. Do you cook at home regularly
   A) No B) Yes C) Often
6. Do you have a composting system at home?
   A) Yes B) No

7. Are you aware of the environmental implications of food waste?
   A) Yes B) No
8. Do you actively try to reduce food waste at home?
   A) Yes B) No C) Maybe
9. Are you familiar with the best practices for preserving different types of foods like Fruits, vegetables, and dairy products
   Yes B) No
10. How often do you check expiry dates on food waste?
    A) Always B) Often C) Sometimes D) Rarely
11. Have you ever thrown away food because it's passed its expiry dates, even though it was still edible?
    A) Yes B) No C) Maybe
12. What do you think can be done at a community or organizational level to reduce food waste?
13. Suggestions for Improvement?

Result and Discussion

Percent participation in the survey program

The number of respondents selected for the online survey program was 65 in numbers, out of these only 30 respondents (table 2, fig 1) filled in the survey questionnaire and took part in the food waste management survey program.

Table 2. Participation of respondents from different parts of India

Indian state /NCR	Cities/ area	Number of respondents selected for sending questionnaire	Number of respondents participate in the program	Percentage of participation
NCR/ Delhi	NCR	25	12	48
	Uttam nagar	5	2	40
	Saket	5	3	60
Uttarpradesh	Ghaziabad	5	2	40
Maharashtra	Nagpur	10	6	60
	Karjat	5	2	40
	Loni	5	2	40
Jharkhand	Ranchi	5	1	20
Total		65	30	46.1

The maximum number of participants (60 %) were from the metropolitan city of Nagpur in Maharashtra state, followed by Delhi NRC (48.5). Uttar Pradesh has 40 % of respondents while Jharkhand state has 20 percent respondents. This indicates the awareness of citizens at particular places for food waste and its management.

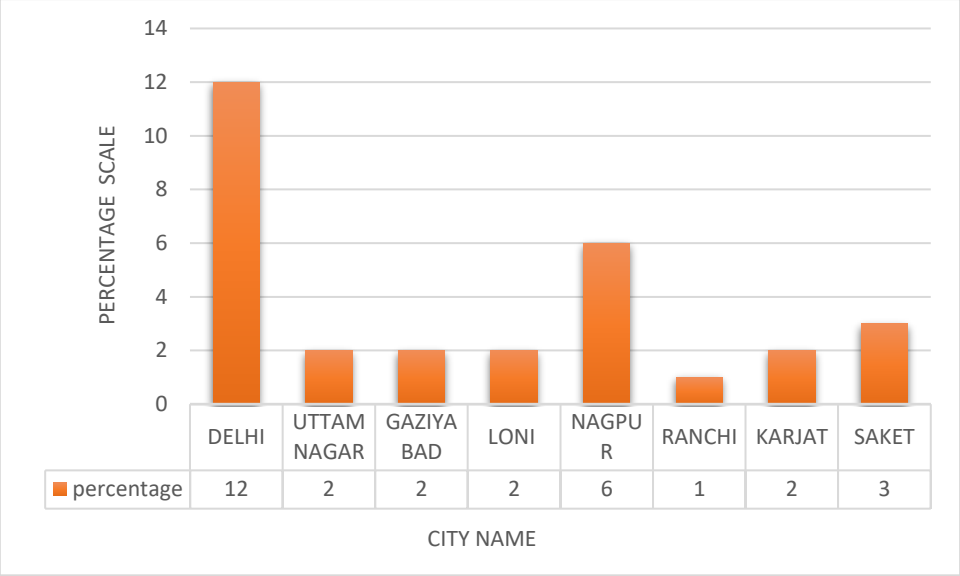


Fig.1. State/City/area-based respondents to the questionnaire

Responsiveness among the age group

The age group of the participants was another important factor in the response to the food waste management questionnaire (table 3, fig 2). The maximum respondents were from the age group of 18 – 20 years old. The minimum respondents were from the age group of 50 and above.

Table 3. Participant age group and their response to the survey questionnaire

The age group of respondents	No. of participants (Percentage)
17	2 (4.5)
18-20	8- 12 (2.3 – 20.5)
21	6 (13.6)
33-36	1 – 2 (2.3 – 4.5)
40	2 (4.5)
50	1 (2.3)
55	1 (2.3)

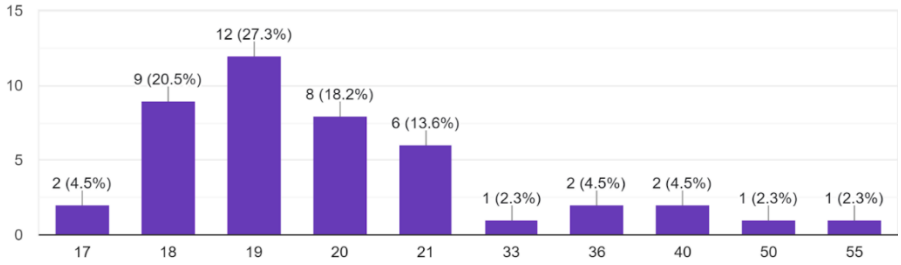


Fig.2. Graphical presentation of age-wise respondents to questionnaire

Awareness among the Gender for the food waste management program

The males were more aware than the females of the food waste (fig 3). Around 70.5 % of males were aware of food wastage in comparison to 29.5 % of females. The probable reason may be that females are used to such food loss routinely in their kitchen and household level which they don't take it seriously. In most households, the males are not working in the kitchen so they generally notice such food waste.

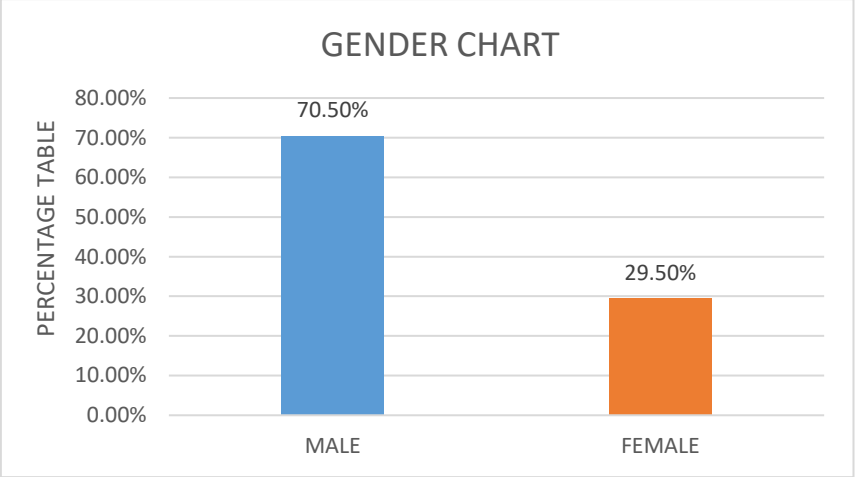


Fig.3. Percentage of respondents based on gender

Data on Food Cooking at home

The data on food cooking (fig 4) indicates that 44.4 % of families cook their food at home regularly, while 20 % of respondents do not cook in their kitchen and are dependent on outside cooked food sources. Around 35.6 % of families often cook their food and sometimes order from outside. The food waste in 44.4 % of families is less as compared to 20 % and 35.6 % of families due to the reason that those families who cook food regularly, keep the leftover food for subsequent use on the same day or the next day. Those who are dependent on outsourcing food dispose of the leftover food.

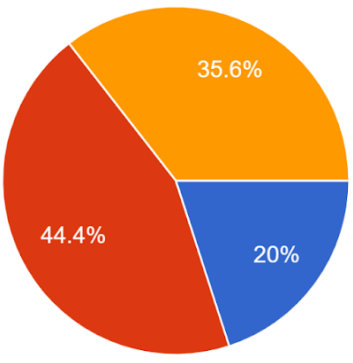
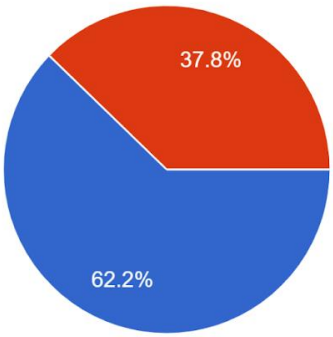


Fig 4. Respondent cooking data at home (Red color indicates YES; Blue color indicates NO, while brown color indicates Often).

Availability of Composting system at home

The data on the availability of composting systems at home (fig 5) indicate that 37.8 % of households have a composting system for food waste management at home while 62.2% of households do not have

such a system.

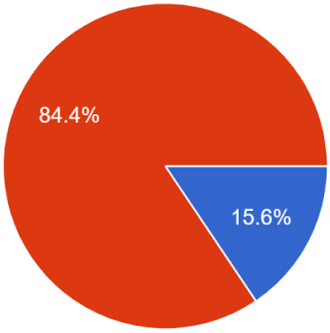


YES	NO
37.8%	62.2%

Fig: 5. Availability of Composting system at individual residences

Awareness of food waste's impact on the environment

The analysis of available data (fig 6) indicates that 84.4 % of households are aware of the food waste's impact on the environment while 15.6 % of households were unaware of any such impact on the environment.



YES	NO
84.4%	15.6%

Fig: 6. Awareness of food waste's impact on the environment

Awareness about minimizing food waste at home

The data (fig 7) indicates that 80 % of households are aware of the minimizing of food waste at home which was a good sign for the proper utilization of the food with minimal wastage. 17.80% of households were unaware of the proper utilization/quantification of the food requirement for their home and therefore were unaware to minimize the waste.

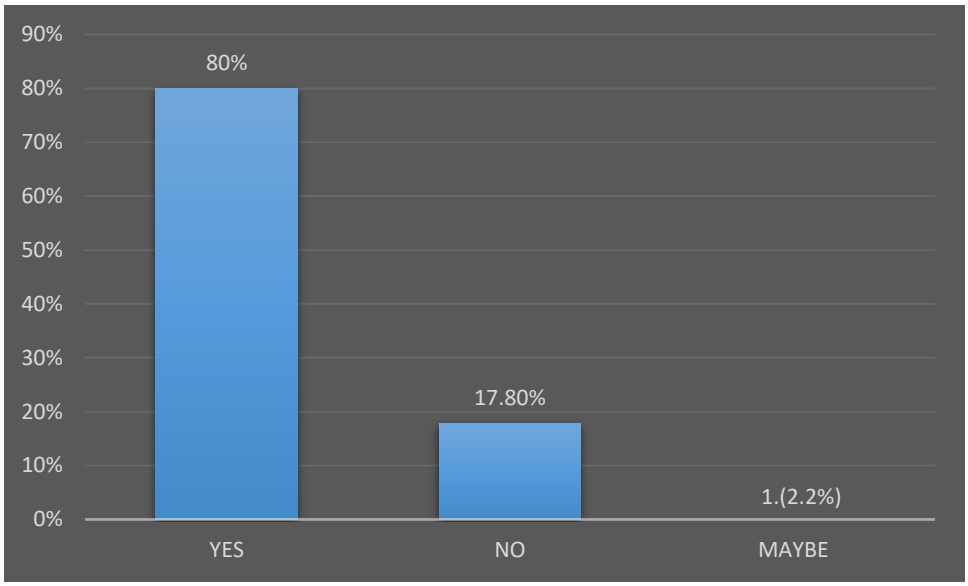


Fig: 7. Awareness about minimizing food waste at home:

Knowledge of proper food preservation

The data (fig 8) indicates that 71.80 % of households are aware of the best methods of food preservation for different types of food, while 28.90 % of households were unaware of the food preservation methods.

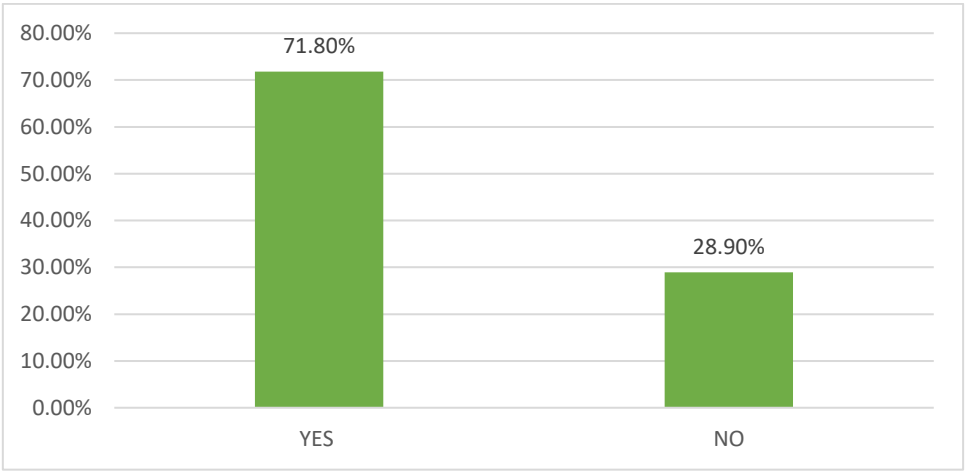


Fig: 8. Knowledge of best practices for preserving different types of food commodities.

Habit to check the expiry dates on the packed/canned food items by the household members

The data (fig 9) indicates that 84.40 % of household members check the expiry date on the packed food/ canned food items at the time of their purchases, while the remaining % of people are not always eager to check the expiry dates on the food items. This habit of checking the expiry date on food items avoids unnecessarily buying expired food items and then the problems encountered in its disposal.

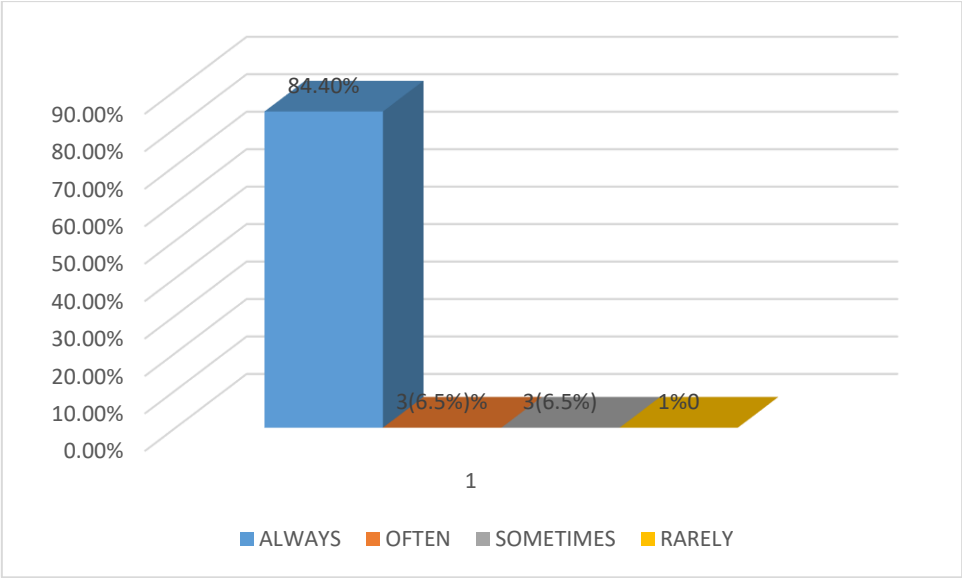


Fig: 9. Habit to check the expiry date on packed/ canned food items.

Oversight disposal of food items before their expiry dates

The data (fig 10) indicates that 63 % of household members dispose of the food items before their expiry dates due to oversight or negligence which contributes towards food waste.

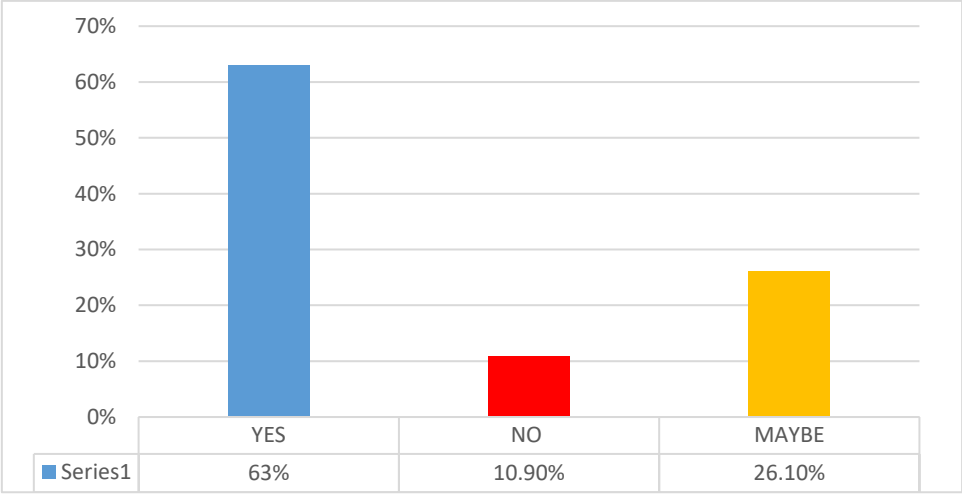


Fig: 10. Oversight disposal of food items before their expiry date.

It is vital that reducing food loss and waste becomes a priority action area for an increasing number of public and private institutions in India. In the absence of any analysis of trade-o□s or quanti□cation of the costs and bene□ts of reducing food loss and waste, it is not easy to justify targeted resource allocations or leverage private investment (Cattaneo et al. 2020). Furthermore, in It is vital that reducing food loss and waste becomes a priority action area for an increasing number of public and private institutions in India. In the absence of any analysis of trade-o□s or quanti□cation of the costs and bene□ts of reducing food loss and waste, it is not easy to justify targeted resource allocations or leverage private investment (Cattaneo et al. 2020). Furthermore, in Up to one-third of the food that is purposely grown for human consumption is wasted and never consumed, which harms the environment and socio-economic aspects. In India, managing food waste is a significant environmental concern. Food waste output is increasing in

Indian cities and towns as a result of the country's urban expansion, modernization, and population growth. Poor management of food waste can have negative consequences for the environment and pose a risk to public health issues (Sahoo et.al., 2023).

Brian et.al (2013) defined food waste as "food that is of acceptable quality and qualified for human consumption but is not consumed because it is squandered either before or after it deteriorates ". Parfitt et.al (2010) described food waste as the "spoilt food arising at the end of the food cycle, which refers to retailer's and consumer's practices". Food waste is defined as food suitable for human consumption that is wasted, whether it is held over the expiration date or left to deteriorate (FAO, 2013). Food waste is not only confined to the non-utilization of edibles but also includes inappropriate waste of energy, water, and non-land resources utilized to grow this food (Tsang et.al., 2019).

According to a recent report by the FAO, 750 billion dollars worth of food weighing around 1.3 billion tonnes is wasted globally each year (FAO, 2017). Hotels, supermarkets, apartments, restaurants, cafeterias in airplanes, and food processing industries all produce a significant amount of food waste in India. In India, 90 kg of food waste per capita per year was reported in a high-income group which was 68 and 63 in the middle and poor sectors, respectively, according to the UNDP Food Wastage Index Report 2021(Chaudhary et.al, 2021). A tremendous amount of food and kitchen waste is piled up annually due to ordinary food waste management practices (Sharma et.al., 2021). The 1.3 billion tonnes of food waste produced annually occupy roughly 28 % of the total agricultural land, which is identical to 1.4 billion hectares of usable cultivable area (Sharma et.al, 2021).

The United Nations Sustainable Development Goal (SDG) 12.3 established in 2015 also concentrates on food waste management while the goal of halving per head of global food waste at the retail and consumer stages and diminishing food losses along production and supply chains, inclusive of post-harvest fall by 2030 (UN, 2015). This goal is based on a broad understanding of the negative consequences of food losses and waste, which includes the waste of land, water, and energy while causing unnecessary greenhouse gas emissions (Narvanen et. al., 2020).

India has not yet begun reporting on sustainable development Goal 12.3 despite having undertaken a nation-level survey on post-harvest loss. The existing data on losses are not comparable due to differences in measurement metrics. Hotspots and critical loss points in the food supply chain need to be identified using a standardized approach. A roadmap is needed for managing food loss and waste in India, based on data-driven strategies and solutions and taking into account the challenges faced by the diverse stakeholders. Concerted efforts are needed to increase awareness of and research into all the dimensions of food loss and waste. A new multi-stakeholder action coalition could foster collaboration and partnership, prioritize the research agenda, mobilize action, and support policy and its implementation for a sustainable food system (Agarwal et.al, 2021)

It is vital that reducing food loss and waste becomes a priority action area for an increasing number of public and private institutions in India. In the absence of any analysis of trade-offs or quantification of the costs and benefits of reducing food loss and waste, it is not easy to justify targeted resource allocations or leverage private investment (Cattaneo et al. 2020). Furthermore, in the absence of clear evidence of the scale of the problem, it is hard to build public and government awareness regarding the need for action. Based on the suggestions of the respondents, and the data analyzed, the following recommendations are formulated which may help in minimizing the food waste and their proper management.

Recommendations

1. Avoid wastage of food on plates at weddings or big events by take-as-required concept.
2. Preserve food items properly particularly the perishable products.
3. Create awareness about food waste's implications on society and environments in the family members and at the community level.
4. Open Food collection centers in every location/ward of the town/cities where people can give away leftovers for homeless people.
5. Buy food items in required quantities as per the requirement of the family.
6. Prepare food as per requirement in the family during that period of the day.
7. Charge fee or fine for waste of food in public places or events.
8. Communities and organizations can implement initiatives like food-sharing programs, promoting composting, educating on mindful consumption, and collaborating with local farmers to redistribute surplus produce.
9. Install the composting system in colonies and societies, rather than dumping waste food in MCD garbage vans,
10. Posters should be displayed at eateries, restaurants, and at food serving events to avoid food waste.
11. Raise awareness: The school curriculum should include chapters on food waste and waste management so the future citizens of the society are sensitive to the issue.
12. Create awareness through an awareness campaign in the metropolitans by the city administration.
13. Open food donation helpline numbers for the individual cities.
14. Awareness camping through digital boards in the cities.
15. Awarding the best food waste management centers in the cities or at the state level.

References:

1. Agarwal, M., S. Agarwal., S. Ahmad and R. Singh.2021. Food Loss and Waste in India: The known and the unknown. WRI India. The Food & Land Use Coalition, India Country Platform, working paper.
2. Brian, L., H. Craig., L. James., K. Lisa., W. Richard., and S.Tim.2013. Reducing food loss and waste-installment 2 of "Creating a sustainable food future". World Resource Institute, Washington DC.
3. Cattaneo, A., M.V. Sánchez, M. Torero, and R. Vos. 2020. "Reducing Food Loss and Waste: Five Challenges for Policy and Research." Food Policy 96 (October): 1–9.
4. Chaudhary, P., S. Garg., T. George., M. Shabin., S. Saha., S. Subodh., and B. Sinha. 2021. Underreporting and open burning- the two largest challenges for sustainable waste management in India. Resource Conserve Recycle. 175: 105865.
5. FAO. 2013. Food Wastage Footprint: Impacts on Natural Resources.
6. FAO. 2017. The future of Food and Agriculture- Trends and Challenges. FAO, Rome
7. Narvanen, E., M. Mesiranta., M, Mattila., A. Heikkinen. 2020. Introduction: a framework for managing food waste. Food Waste Manag 1-24.
8. Parfitt. J., M. Barthel., S. Macnaughton.2010. Food waste within food supply chain: quantification and potential for change to 2050. Philos Transac Royal Soc Bio Sci. 365(1554): 3065-3081.

9. Sahoo, A., A. Dwivedi., P. Madheshiya., U. Kumar., R. K. Sharma and S. Tiwari. 2023. Insights into the management of food waste in developing countries: with special reference to India. Environmental Science and Pollution Research. Doi.10.1007/s11356-023-27901-6.
10. Samant, S.P., S. S. Dixit., Sajal, K., and M. N. Priya. 2023. Food waste in Indian households: Status and Potential solutions. Environmental Solutions and Pollution Research. 30: 124401-124406.
11. Sharma, P., V. K. Gaur., R. Siroh., S. Varjani., S.H. Kim., J.W Wong. 2021.Sustainable processing of food waste for production of bio-based products for circular bioeconomy. Bioresource Techno. 325: 124684.
12. Tsang, Y.F., V. Kumar., P. Samadar., Y. Yang., J. Lee., Y.S. Ok., H. Song., K. H. Kim., E. E. Kwon., Y. J. Jeon. 2019. Production of bioplastic through food waste valorization. Environ Int. 127: 625-644.
13. United Nation. 2015. Resolution adopted by the Generally Assembly on 25th Sept 2015.
14. Vishwa Mohan. 2023. India loses 22% of its grain output annually. Times of India, 07 November. Timesofindia.indiatimes.com