

Knowledge, Attitude and Practices Related to Food Wastage among Indian Men and Women

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ABSTRACT **Context:** Large quantities of food being produced for human consumption are being wasted all over the globe. **Aim:** This study was conducted to assess the knowledge, attitude and practices (KAP) regarding food wastage among men and women in the cities in National Capital Region and the State of Punjab in India. An attempt was also made to identify the relationships between KAP and select sociodemographic factors of men and women. **Methods and Material:** The study sample comprised 60 married adults, 30 men and 30 women, between 20-50 years of age. An online survey was designed to gather data for the study. **Results:** Majority of subjects had 'excellent' (50%) to 'good' (40%) knowledge about food wastage. Attitude of 40% subjects on food wastage related aspects was categorized as 'excellent', while that of 38% subjects was 'average'. About 72% subjects had 'average' food wastage practices. A weak positive association was found between knowledge and attitudes about food wastage among the male subjects as well as the total sample. A significant association was found for monthly family income with knowledge and attitude of female subjects. For practices, a significant association was found among the male subjects with their educational qualification and occupation. **Conclusion:** Most men and women had excellent to good knowledge related to food wastage, and excellent or average attitudes but their practices were not as good, and did not measure up to their knowledge and attitudes.

Keywords: Attitude, Food wastage, Knowledge, Practices, India

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INTRODUCTION

Food waste refers to the removal of processed, semi-processed or raw food which is fit for consumption from the food supply chain. This removal may be by choice or as the food is left to spoil or expire, mainly due to negligence by the consumer at the household level.^[1] In recent years, food wastage has emerged as a global problem and is receiving growing interest from policymakers, international and voluntary organizations, as well as academics from various disciplines. The Food Waste Index Report 2021 has estimated that food waste from households, retail establishments and the food industry is 931 million tons annually, and 570 million tons of this waste occurs at the household level. India has an estimated household food waste of 50 kg/capita/year.^[2]

Global food demand is driven by population size, economic growth, and urbanization and this trend is expected to continue over the coming decades. Minimization of food losses and waste can help to meet this increasing demand, decrease pressure on food production and improve food security.^[3-4]

Food is wasted throughout the food supply chain, from initial agricultural production to final household consumption.^[5] There are various reasons for production of food waste at consumer level; some of which are evitable while others are inevitable. They have been identified as food

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spoilage due to microbial growth, bought and cooked more than needed, exceeded the expiry date, package too big and difficult to empty, oversized portions, bought something not required unintentionally, plate leftovers, dislike for appearance or taste of food, lack of awareness and consumer attitude towards food waste etc.^[4,6-9]

It is important to put in considerable amount of effort and take steps towards reducing the amount of food that is wasted and curb the impact imposed by food wastage on the economic health of the country. As there is limited information on food wastage behavior of Indians, the present study was undertaken to get an insight into the knowledge and attitudes that lead to wasting of food by men and women, and the practices that are being followed by them at various stages of food management and consumption, which result in food wastage. An attempt was further made to identify the relationships between knowledge, attitude and practices (KAP) related to food wastage and select sociodemographic factors of men and women.

METHODS AND MATERIALS

The present cross-sectional study was carried out in the National Capital Region and cities from the State of Punjab in India, such as Jalandhar, Phagwara, Ludhiana, Panchkula, and Amritsar. Convenience sampling technique was used to identify a total of 60 subjects, 30 men and 30 women, who were between 20 – 50 years of age, married, and belonged to middle- and high-income group as the sample for the study. Single men and women, students, those living in hostel or paying guest accommodation, and not involved in household food purchases and other related activities were not included as subjects in the present study. From one household, either a male or a female subject was included.

A questionnaire schedule was designed comprising four sections, and administered to the subjects through email. The first section included questions on personal profile and family characteristics of the subjects. Section II included 11 questions on knowledge about food wastage and some related aspects, like causes, consequences and actions to prevent food wastage. The responses obtained were scored as correct (1) and incorrect (zero) and a total knowledge score for each subject was calculated. In Section III, 22 statements regarding food wastage attitudes and attitudes related to planning for food purchase, cooking and storage, use of leftovers, food budgeting and management etc. were included. Scoring for each statement was done on a 5-point Likert scale, i.e., Strongly agree=5, Agree=4, Neutral=3, Disagree=2, Strongly disagree=1. Total attitude score for each subject was calculated by summing up their score on each statement. Section IV included 21 questions on practices related to food wastage

and purchasing, storing, managing food etc. Scoring was done on the basis of frequency of their involvement in various practices, i.e., Always=5, Often=4, Sometimes=3, Rarely=2, Never=1. Some questions asked in this section portrayed negative practices for which scoring was done in the reverse manner. Total practice score was calculated by summing up the score obtained by the subjects on each question.

Frequency and percentages were calculated for all parameters included in the different sections of the questionnaire. Total scores were computed for food wastage KAP for men and women and the total sample. Pearson's correlation coefficient was used to identify the relationship between knowledge, attitude and practices related to food wastage. Chi square test was used for analyzing all categorical data, for comparing male and female subjects with regard to their personal profile and family characteristics and various aspects of KAP about food wastage, and to determine the influence of sociodemographic factors of subjects on their KAP regarding food wastage. MS-Excel and IBM Statistical Package for Social Sciences Statistics version 27.0 were used for the analysis of data. Level of significance used was $p < 0.05$. The study protocol received approval from the Institutional Ethics Committee.

RESULTS AND DISCUSSION

Data on personal profile and family characteristics indicated that 60% subjects were in the age range of 20-30 years, and 95% were post-graduates/had a professional degree and were graduates. Higher percentages of female subjects (57%) were post-graduates or had a professional degree while more male subjects (64%) were graduates. More than one-third of the total subjects (39%) were employed in private sector jobs, and there was a significant difference among male and female subjects with respect to their work profile. About 65% subjects had been married for 5 years or less, and 53% belonged to nuclear families. Nearly 43% subjects each had a monthly family income of Rupees (Rs.) 1,00,000 lakh or more, and spent between Rs. 10,000/- to 19,999/- on food in a month.

Analysis of data on knowledge about food wastage and related aspects showed that nearly two-thirds of the subjects could correctly define food waste, and 70% knew that 'best-before' and 'expiry dates' did not mean the same. All subjects considered it extremely important to check the 'best before' and 'expiry dates' of food products before purchasing them. About 88% subjects knew the correct meaning of shelf life of products. Regarding methods of reducing food wastage and consequences of food wastage, majority of the subjects felt that food wastage could be reduced by properly planning the food purchases (98%), reducing food wastage resulted in less expenditure on food purchases (92%), improper disposal of food waste adversely affected the environment (88%), and

reusing food leftovers helped in reducing food wastage (95%). It has been reported that people are unable to prioritize and correctly estimate the scope and consequences of food waste levels on the environment and food distribution, and generally underestimate it.^[10-12] They also underestimate the food that they waste themselves.^[11,13] Greater awareness among people about the problem of food waste is linked to more waste prevention behaviors,^[14] and lower waste levels to some extent.^[4,15-16] Furthermore, in promoting waste prevention behaviors, awareness of economic consequences of food waste holds more importance than awareness of its social or environmental consequences.^[11,17-18] In a study done on Tunisian men and women from diverse socio-economic backgrounds, 89% reported that they were aware of food waste.^[19] Another study conducted in Egypt reported that 86.7% respondents understood and had knowledge about 'use by' label as food that must be eaten or thrown away by this date.^[20] Majority of the subjects in a study from New Zealand were at least 'somewhat concerned' about their household wastes' environmental impact, and about 75% of participant households threw food waste into their garbage bin.^[21] Social media was reported as the source of information about food wastage by 72% subjects in the present study.

As depicted in total knowledge score data given in Table 1, more than 50% of the subjects scored 90% or above, and 40% scored between 75% - 89% indicating that majority of the subjects in the sample had excellent to good knowledge regarding food wastage. No significant differences were found between male and female subjects regarding any aspect of knowledge about food wastage.

Though the attitude towards food waste is predominantly negative,^[16,22] it is the difference in attitude among individuals which determines the amount of food they waste. Thus, the more negative a persons' attitude towards wasting food, the less food they are likely to waste.^[15-16] However, studies have

also reported that with negative attitude, there may be reduced intention to waste food but the actual food waste may not decrease.^[15, 23-24] Regarding statements on their general attitude on food wastage, data revealed that all subjects either 'strongly agreed' (84%) or 'agreed' (16%) with the statement that food waste should not be appreciated. About 98% subjects were in agreement with the fact that food should be bought only in quantities that were essential, and there were marginally more women than men who agreed with this. As females generally contribute more in food-related matters for their household, they are also likely to better understand the importance of buying only the amounts required. Almost 98% subjects agreed with the statement that unorganized way of managing food and careless attitude resulted in food wastage. People may not actually want to waste food intentionally, as they usually consider it a waste of money.^[10-11] They may also feel that it is morally incorrect to waste food,^[17] and this may make them guilty if they waste food.^[11,17-18] However, they may still continue wasting food without consciously setting a goal to reduce food waste, as this goal may not hold as much importance for them as compared to their goals which they value more.^[9]

On attitudes related to storage, preparation and handling of food products too, majority of the subjects reported their agreement. About 58% subjects 'strongly agreed' and 33% 'agreed' with the statement that awareness about 'best-before' and 'expiry' dates could help in reduction of food waste; 94% subjects agreed that food items if not stored properly could get spoilt easily and become unfit for consumption.

In Indian households, there is a common practice of preparing extra food, especially if there are small children, or for uninformed arrival of guests. This may lead to an increase in the amount of leftovers which, if not consumed, are eventually thrown away. About 97% subjects 'agreed' with the statement that preparing meals by keeping the portion

Table 1: Distribution of Subjects as per their Total Knowledge Score Category

Knowledge Score Category	Score	Female (n=30)	Male (n=30)	p-Value	Total(N=60)
Excellent (90% and above)	10 – 11	17 (57)	15 (50)	¶0.864	32 (53)
Good (75% - 89%)	8 – 9	11 (36)	13 (43)		24 (40)
Average (50% - 74%)	6 – 7	2 (7)	2 (7)		4 (7)
Poor (<50%)	≤5	0 (0)	0 (0)		0 (0)
Note: *Figures in parentheses denote percentages, ¶ χ^2 not significant at $p < 0.05$.					

size consumed by each family member in mind could help in reduction of food wastage. Regarding attitude towards the leftovers present in their household, 92% subjects agreed that it was important to check the food if it was fit for consumption before throwing it away as it could save large amounts of foods from getting wasted. Nearly 95% subjects agreed that it was better to give away leftover food to the needy rather than throwing it away.

Many Indian households try to convert leftovers into a new dish that is consumed and relished by the whole family. The amount of food waste being produced can be reduced in this manner, but some households do not prefer to do this due to various beliefs and preference to eat freshly cooked foods only. In the present study, 85% subjects reported their agreement towards this.

Majority of the subjects reported their agreement on the importance of segregating food waste from household waste (97%), reduction in several environmental hazards due to proper food waste disposal (93%), food wastage at household level causing problems such as hunger, poverty, malnutrition etc. (98%), excessive food waste occurring during Indian weddings and other celebrations (96%), and that awareness about organizations working in the field of food waste management could help in reducing food wastage (95%).

Planning before purchasing can prevent overbuying and overcooking, but only when people accurately predict how much is needed.^[9] About 93% subjects agreed that planning and making a list of food items required before going to the supermarket/grocery store could help in reducing food waste, and 52% subjects were in strong agreement that making a proper budget and allocating fixed amount of money to food-related purchases could prevent food wastage.

COVID-19 pandemic has increased panic buying among some consumers which results in making purchases in excessive

quantities which may not actually be required, leading to more food wastage. In the present study, about 86% of the subjects expressed their agreement with this notion. No significant differences were observed between male and female subjects regarding their attitudes on various aspects of food wastage.

Based on their total attitude score, about 40% subjects were categorized as having an 'excellent' attitude as they obtained a score of 90% or above, and 38% subjects were categorized as having an 'average' attitude as their score was between 50% to 74% (Table 2).

Individuals are likely to have different practices related to food purchase, preparation, storage etc., based on several factors that influence them all the time to learn/unlearn such practices. Data revealed that high percentage of subjects either 'always' or 'often' planned their visits to the grocery stores/supermarkets/fruit-vegetable market (85%), checked the quality and shelf life of food products before buying (82%), and checked the 'expiry' and 'use by' dates on food packages (92%). It was heartening to note that higher percentages of subjects either 'sometimes', 'rarely' or 'never' bought more food than required (71%), indulged in panic buying (82%), or got attracted by discounts/offers on food items that were not required (68%). It was further found that 74% subjects 'always' and 'often' read and followed storage instructions mentioned on packaged foods, and 58% subjects got the leftovers packed in the same frequency while eating out. Some individuals might not be getting leftovers packed due to embarrassment, or because of the notion that they would anyway not eat that food even if they got it packed.

Packed food products may be thrown away as they get expired and become unfit for consumption. The main reason behind such behavior is that people either forget about the food product or they do not pay much attention towards the 'best before' or 'expiry dates' after purchasing it. About 58% and 55% subjects reported that they 'always' or 'often' threw away

Table 2: Distribution of Subjects as per their Total Attitude Score Categories

Attitude Score Category	Score	Female (n=30)	Male (n=30)	p-Value	Total(N=60)
Excellent (90% and above)	99 – 110	11 (37)	13 (43)	¶0.857	24 (40)
Good (75% - 89%)	83 – 98	5 (16)	4 (14)		9 (15)
Average (50% - 74%)	55 – 82	11 (37)	12 (40)		23 (38)
Poor (<50%)	≤54	3 (10)	1 (3)		4 (7)
Note: *Figures in parentheses denote percentages, ¶ χ^2 not significant at $p < 0.05$.					

food items that had crossed their 'expiry' or 'best before' dates and those that had spoiled respectively. Other studies have also reported that household food got wasted as it exceeded the expiration date.^[20,25-26]

In Indian culture, from the very beginning, individuals are taught not to take extra food on the plate, but sometimes, people tend to take extra which they are unable to consume and it is consequently thrown away. About one-third of the subjects reported that they 'never' took extra food which they could not finish eating, and 46% 'never' threw away leftovers that were fit for consumption. Significantly higher percentages of female subjects threw away extra food on the plate or threw away edible food leftovers fewer times as compared to the male subjects. It has been highlighted that households have problems in assessing the durability of leftovers, and therefore, tend to be concerned by safety issues when considering them for reuse.^[27] This is one of the many reasons why leftovers get thrown away.

It is common to organize some party or get-together in households to celebrate special occasions, wherein a variety of food items are prepared for the guests. After such gatherings, a lot of food might be left over and everyone has a different way of handling it. High percentages of subjects in this study reported that they stored the food left over from a party properly (80%) and gave it away to the needy (77%). About 35% subjects gave away the leftover food to a food bank or a voluntary organization dealing with such leftovers. Less than 10% subjects reported that they threw away the leftovers, and 2% each kept it to feed their pets or street animals.

Data on frequency of planning and cooking meals revealed that about 80% and 60% subjects respectively either 'always' or 'often' planned menus after checking the uncooked food as well as leftovers from previous meals available with them already. The reasons given for using leftovers infrequently by about one-third of the subjects were to avoid repetition of

the same food/dishes, procrastination, forgetfulness and carelessness. Significantly higher females than males planned the meals taking into account the leftovers more frequently as compared to the male subjects. Moreover, only 20% subjects each prepared extra food without considering the portion sizes required by family members or wasted edible food while cooking by spilling, excessive peeling or trimming etc. more frequently. Regarding food waste management practices, it was found that higher percentages of subjects either 'always' or 'often' segregated food waste from household waste (57%), and used food waste as animal feed or compost (60%).

About 35% subjects perceived that they wasted only average amounts of food, while about one-fourth of the subjects each reported that they wasted 'small' to 'very small' amounts of food. Dinner was identified as the meal in which maximum food was wasted by 72% subjects. Nearly 90% subjects reported that they purchased only what was necessary in order to reduce household food wastage, and about 80% subjects believed that the possibility of saving money was an incentive for them to reduce food wastage. It has been reported that saving money provides a strong motivation to reduce food waste.^[11,17,28] Food is considered to be sacred in Indian culture; and the amount of food wasted in India is less in comparison with other developed countries. But as the disposable income among Indians is increasing and there is easy accessibility to a variety of foods, food waste is also gradually increasing.^[7] It has been suggested that an illusion of abundance results in negligent behavior towards food.^[28]

Total practice score revealed that 72% subjects had 'average' practices regarding food wastage and related aspects as their scores were between 50% to 74%. No significant differences were observed between the male and female subjects based on their total practice score (Table 3).

As presented in Table 4, a weak but significant positive association was found between knowledge and attitudes of

Table 3: Distribution of Subjects as per their Total Practice Score Categories

Practice Score Category	Score	Female (n=30)	Male (n=30)	p-Value	Total(N=60)
Excellent (90% and above)	95 – 105	1 (3)	0 (0)	¶0.111	1 (2)
Good (75% - 89%)	79 – 94	11 (37)	5 (17)		16 (26)
Average (50% - 74%)	53 – 78	18 (60)	25 (83)		43 (72)
Poor (<50%)	≤52	0 (0)	0 (0)		0 (0)

Note: *Figures in parentheses denote percentages, ¶ χ^2 not significant at $p < 0.05$.

Table 4: Relationship between KAP of the Subjects Regarding Food Wasteage

Parameters	Female		Male		Total	
	r-Value	p-Value	r-Value	p-Value	r-Value	p-Value
Knowledge and Attitude	0.259	0.167	0.395	0.031*	0.325	0.011*
Attitude and Practices	0.020	0.918	0.244	0.193	0.082	0.531
Practices and Knowledge	-0.228	0.225	0.181	0.338	0.010	0.937

Note: *Significant at $p < 0.05$

male subjects ($r=0.395$, $p < 0.05$) as well as the total sample ($r=0.325$, $p < 0.05$). Knowledge and attitudes of the subjects about food wastage did not get translated into their practices. It has also been suggested by some other studies that greater awareness and positive attitude do not always direct people to reduce food wastage.^[23-24]

On analysis of relationship between select socio-demographic factors and categories based on KAP scores obtained by the subjects, a significant association was found for the monthly family income with knowledge and attitude of female subjects. For food wastage practices, a significant association was found among the male subjects with their educational qualification and occupation. Varied findings have been reported by a few studies that have determined this relationship. A study in Philippines reported that monthly income influenced the way participants managed their household food waste, while age, educational attainment and gender did not have any influence on household waste management practices.^[29] In Malaysia, a study reported that 50% of the respondents had a good level of KAP regarding food waste generation and intervention, but there were no significant differences in these levels in relation with the socio-demographic factors.^[30]

CONCLUSION

Findings of the present study revealed that while majority of men and women had excellent to good knowledge related to food wastage, their attitudes were excellent and average, and their practices were not as good and in consonance with their knowledge and attitudes. As food wastage is an important issue that can influence several of the Sustainable Development Goals, it is imperative that the knowledge and attitudes of males and females get translated into their behavior too. Therefore, suitable interventions need to be initiated to target individuals to not only create more awareness about reducing food wastage, but also equip them to take appropriate actions in this direction.

This study was one of the first known attempts made to explore the knowledge, attitudes and practices regarding food

wastage among Indian men and women. More detailed studies need to be conducted to get clarity on various barriers that prevent Indians from reducing food wastage and adopting good food management behavior.

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ETHICAL APPROVAL

The study protocol received approval from the Institutional Ethics Committee of the Institute of Home Economics, University of Delhi, New Delhi, India (IHE/2020-21/Admin/460 dated 26th October 2020).

CONFLICT OF INTEREST

None

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