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Research Article

A Study on Food Waste, Religious Guidance and its Impact on Environment in Central Kashmir: A Sample Survey

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Abstract. In economy of any state food waste plays a significant role and its wastage has direct impact on environment and on economy. The decreasing of food waste clearly would lead to improved land utilization and water resources management of that area. In the present study carried out in Central

Kashmir, a survey of the study area was carried out and discussions were held with the people of the study area i.e., district Srinagar, Budgam and Ganderbal of Kashmir. The study based on surveying methodology was conducted by designing a suitable questionnaire to bring out the current methods practiced for food waste disposal in central Kashmir, J&K. The data collected from survey was statistically analysed using standard statistical tools. The study revealed that food waste is directly or indirectly responsible for in environment pollution. It was suggested that responsible persons of area and government should come forward and play their role in controlling food waste and proper disposal of food wastage. We know plastic pollution is the aggregation of plastic objects and particles in the Earth's environment that adversely affects humans, wildlife and their habitat. The elders of study area revealed that a number of water bodies vanished in last 3-4 decades because of overpopulation, poor drainage system, deviation from Islamic teaching and climate change. Finally, it was suggested that everyone should play his/her role in reducing food waste as it is a social, environmental as well as a religious crime.

Keywords: Kashmir, Food waste, Waste management, Environment, Survey

INTRODUCTION

Before exploring strategies for managing food waste, it's important to have a clear understanding of what constitutes food waste. Different researchers have proposed varying definitions for this concept. Brian et al. (2013) define food waste as "food that is still fit for human consumption but is discarded before or after it spoils." Parftt et al. (2010) characterize it as "spoiled food at the end of the food cycle, including waste from retailers and consumers." The Food and Agriculture Organization (FAO, 2013) defines food waste as any food suitable for human consumption that is discarded, whether due to surpassing its expiration date or deterioration. While some food waste occurs naturally at the retail and consumption stages of the food chain, a significant portion is a result of either carelessness or intentional disposal. Food waste extends beyond simply not using edible items; it also includes the inefficient utilization of energy, water, and land resources (Tsang et al., 2019). Additionally, it's crucial to acknowledge the significant impact on environmental quality that accompanies food waste (Mishra et al., 2020).

Global Perspective of food waste

Food waste has emerged as a pressing issue globally, posing financial, ethical, and environmental challenges in both underdeveloped and developed nations. Primarily occurring at the production stage, it stems from a combination of factors such as inadequate skills, natural disasters, insufficient infrastructure, and ineffective waste management practices (Wani et al., 2023). Remarkably, each year, about one-third of the food produced worldwide for human consumption is lost or wasted. Notably, the total amount of food wasted by affluent nations is nearly equivalent to the entire food production of sub-Saharan Africa. Developed countries, on average, discard between one-third to half of the food materials purchased for consumption by consumers (Boon and Anuga, 2020). Disposing of food isn't merely a matter of humanitarian or social concern; it carries significant environmental implications as well. The food cycle extends beyond our trash cans. Food waste that accumulates in landfills and decomposes generates substantial methane emissions – a greenhouse

gas more potent than CO₂. In fact, food discarded in landfills contributes to approximately 8 percent of global emissions. Moreover, discarding food entails squandering the time, resources, and energy invested in its production from the outset.

The Food and Agriculture Organization of the United Nations (FAO) reported that an estimated 1.3 billion tonnes of food is wasted globally each year, constituting one-third of all food provided for human consumption worldwide (FAO, 2017). Despite the world producing enough food to sustain double the current population, food wastage remains a significant contributor to malnutrition affecting billions of people globally. The primary factors contributing to widespread food wastage are often not deliberate actions by individuals but rather deficiencies such as inadequate storage facilities, ineffective pest control methods, particularly in regions where a considerable portion of food fails to reach consumers, and challenges in transportation of food items.

Challenges and concerns in India

Up to one-third of the food intentionally cultivated for human sustenance goes to waste, with detrimental effects on both the environment and socio-economic aspects. In India, addressing food waste has emerged as a significant environmental concern. The output of food waste is on the rise in Indian urban areas due to the country's urban expansion, modernization, and population growth. Inadequate management of food waste can result in adverse environmental impacts and pose health risks to the public (Sahoo et al., 2023). In India, a country with a population exceeding 1.3 billion, each individual generates approximately 0.5 kg of organic waste daily (Paulraj et al., 2019). Various sectors such as hostels, supermarkets, apartments, restaurants, cafeterias on airplanes, and the food processing industry contribute significantly to the overall production of food waste in the country. India has been one of the leading food producers globally for the past five decades, excelling in the production of milk, fruits, vegetables, and grains. However, despite its agricultural prowess, India faces a significant challenge in managing food waste due to poor postharvest management, inadequate infrastructure, and technological limitations. The per capita waste generated in India is estimated to escalate annually at a rate of 1 to 1.33%.

Food wastage in Kashmir valley

Food wastage poses a significant challenge in the Kashmir valley, compounded by its geographical isolation and frequent shortages of food and other essentials during harsh winters. Despite the valley's fertile lands, capable of sustaining a substantial portion of the local population, issues persist with outdated agricultural practices and inadequate storage and preservation methods. While there have been discussions in the horticulture sector regarding the implementation of cold storage facilities, past experiences highlight the detrimental effects of storage problems, leading to the spoilage of tonnes of food due to adverse weather conditions and the absence of proper temperature and humidity control equipment. Transportation also contributes to food waste in the valley, as exported foodstuffs decay during halts in

transit. Moreover, the lack of protection for fruit-laden trucks further exacerbates the issue. Irresponsible behaviour among individuals, coupled with the extravagance of wedding feasts, further contributes to food wastage. However, it is during crises that the true value of food and other resources is realized. While residents of the valley have a natural inclination to store food, there is a need to educate them on proper preservation and mindful consumption practices. While complete prevention of food wastage may be challenging, individuals can take steps to reduce it at a personal level. Responsible citizenship entails cultivating habits of not wasting food, even a morsel, thereby contributing to the mitigation of this pressing issue.

Islamic perspective on food waste

Throughout history, waste has posed an environmental challenge. Waste extends beyond mere trash and has been a concern since ancient times. Recognizing the different types of waste helps us find ways to prevent and minimize it. Islam offers valuable teachings on waste reduction, dating back over 1,400 years, emphasizing the importance of avoiding waste through Quranic verses and the Prophet's teachings. As the Quran states, "Eat of their fruit in season, but give the due thereof on the day of its harvest, and waste not by prodigality, for Allah loves not the wasteful" [Quran 6:141]. Excessiveness leads to waste, even of the most delicious produce. Allah warns against excess in the Quran, advising believers not to make unlawful what is lawful and to avoid extravagance, as stated: "O you who have believed, Do not prohibit the good things that Allah has made lawful to you, and do not transgress. Indeed, Allah does not like transgressors." [Quran 5:87]

According to the Waste Hierarchy (WH), prevention stands out as the most effective strategy for reducing food waste (FW). Despite the need for revising current prevention practices, it offers significant environmental, social, and economic benefits. Embracing prevention as a priority is crucial for all stakeholders. In the context of FW reduction, prevention aims to mitigate harm to humans and the environment, minimizing economic and social impacts. In Islam, preventing food waste aligns with the principle of eliminating harm (ḍarar). The legal maxim "Lā Ḍarar wa-lā Ḍirār" emphasizes the avoidance of harm, obligating Muslims to prevent harm to themselves and others by anticipating, addressing, or providing alternatives to potential harm (Mamat, 2020)

Encouraging reuse and recycling alongside prevention is essential, teaching Muslims to curb constant new purchases and combat over-consumption, a hallmark of modern society contributing to FW and solid waste increase. This crisis stems from prioritizing wants over needs, contradicting Islamic values. The Qur'an condemns gluttony, highlighting specific terms for the greedy. A hadith illustrates reusing: Ā'ishah R.A mentioned the Prophet (PBUH) sewing clothes and repairing sandals, advocating for prolonging the use of items. Thus, FW like food scraps can be composted for fertilizer, and leftovers transformed into new dishes to share, aligning with sustainable practices and Islamic teachings (Ujang and Yusoff, 2020).

In Islam, excessive acts are prohibited, with squandering likened to aligning with the devil. Wasteful spending is deemed inappropriate by Allah, earning the spender the title "brother of the devil" (Quran 17:27). Food, a blessing from Allah,

must be consumed according to need, with wasting it seen as squandering Allah's blessings. Even in charitable acts, wasting food is forbidden, as exemplified by early Muslims who were reproached for excessive giving. Moderation is advocated in Islam, including food intake, to prevent harm to health and the environment, as excessive consumption leads to increased FW. Muslims are urged to eat in moderation, as excess disrupts balance and contributes to FW (Qutb, 2000).

Islam underscores the significance of cleanliness and hygiene, considering it fundamental to faith. The Prophet Muhammad SAW stated, "Cleanliness is half of faith," emphasizing its importance. From a FW perspective, maintaining cleanliness and hygiene can prevent food spoilage and subsequent waste. This is echoed in a hadith from Salman RA, where ablution before and after eating is deemed essential for food's blessings. Hence, prioritizing cleanliness and hygiene during food preparation and handling, particularly in homes and restaurants, is crucial. This ensures food safety and minimizes the risk of cross-contamination. Thus, keeping oneself, ingredients, and utensils clean while preparing food is imperative to prevent food deterioration and unnecessary waste (Sahih Muslim: 233).

In Islam, sharing food is a commendable gesture, fostering community and goodwill. Individuals may occasionally prepare excess food, whether due to lack of planning or surplus purchases. Rather than allowing it to go to waste, sharing meals prevents food wastage. Rather than discarding excess or letting it spoil, donating or sharing it with others is preferred, aligning with Islamic principles of generosity and compassion (Sahih al-Bukhari: 286)

Islam permits the use of natural resources for human consumption, provided there is no wasteful behavior towards nature. Chapter 7, verse 31, admonishes against wastefulness, stating, "eat and drink: But waste not by excess, for Allah loveth not the wasters." Similarly, in Chapter 17, verses 26-27, wasteful attitudes are condemned, associating them with ungrateful desires that lead to evil ends. Islam prohibits wasteful behavior and promotes moderation in consumption. The Qur'an praises those who spend without extravagance or stinginess, but maintain a just balance. (Qur'an, 25:67). Islam emphasizes the prohibition of wastage in every aspect of life, including time, energy, wealth, and food. If blessed with more than necessary, gratitude to Allah is essential, manifesting in sharing the excess with the less fortunate (Quran 6:142). In view of the scientific as well as religious literature available, we chose this topic with an objective to examine the behaviour of people towards food waste management.

METHODOLOGY

In current study both quantitative as well as qualitative methods are employed to collect the information from 400 respondents (Cochran, 1977) from different backgrounds living or working in central Kashmir from last three decades or more. A well-designed questionnaire based on literature available on topic and expertise of researchers was employed for collection of data from respondents who showed their willingness to participate in our study. Group discussions were also held with the senior citizens of the study area to know the past. The data collected was

analysed and interpreted statistically using standard statistical tools. Statistical software SPSS (Version 20) was used for analysis purpose.

Research Hypothesis

Hypothesis: There is no significant difference in the opinion about main reasons for food wastage between rural and urban people in the study area. In order to test the hypothesis, we use Chi-square test (with usual notations) as given below:

$$X^2 = \sum_{i=1}^2 \frac{(o_i - e_i)^2}{e_i}$$

where $X^2 \sim \chi_1^2$, o_i and e_i are observed and expected frequencies. We reject H_0 if p-value is less than specified level of significance.

Data Analysis:

Graphical representation was used to summarize the demographic characteristics of the participants understudy. To assess the approach of respondents towards food waste in study area, approximate statistical tools were used.

Data Interpretation:

The results obtained were interpreted in the context of the research objective and conclusions were drawn regarding the approach of respondents towards food waste management in Central Kashmir.

RESULTS AND DISCUSSION

The data presented in Table 1 shows the Residence, Education status, Economic status and type of family of understudy. The majority of the respondents 93.25% were from urban area, 90.75% respondents were educated, 88.0% respondents belong to middle class families and majority of respondent's understudy (68.0%) were involved in business and majority of respondents understudy were from nuclear families (90.50%).

Table 1: General information of the participants understudy in District Srinagar

Variable		Count	Percentage
Residence	Rural	27	6.75
	Urban	373	93.25
Education Status	Educated	363	90.75
	Illiterate	37	9.25
Profession of Head of the Family	Business	272	68.00
	Government employee	79	19.75
	Private employee	49	12.25
Economic status	Lower class	39	9.75
	Middle class	352	88.00
	Upper class	9	2.25

Type of family	Joint	38	9.5
	Nuclear	362	90.5

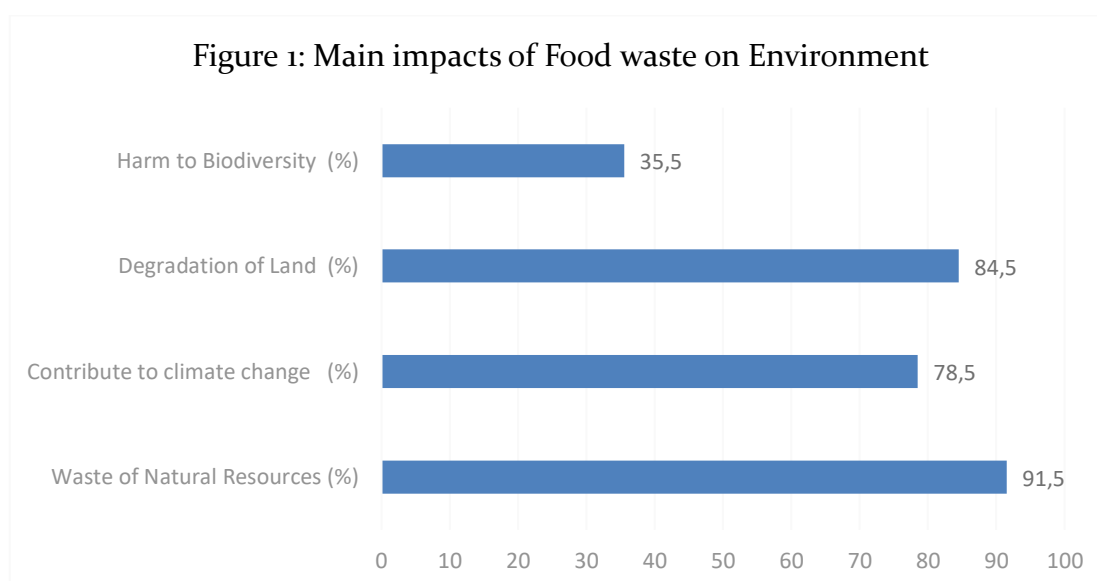
The data presented in Table 2 revealed that in response to statement 1, i.e.,

What is the Approx. total amount of waste generated per day (in kg), majority (90.75 %) of respondents revealed that upto 1 kg of waste is generated daily in their home. In response to statement 2, i.e., Do you categorize waste into biodegradable and non biodegradable, majority (83.0 %) of respondents said no. In response to statement 3, i.e., How do you dispose the food waste generated, majority (64.25%) of respondents revealed that they pPack in Waste box. In response to statement 4, i.e., How do you dispose the plastic waste? majority (89.75%) of respondents revealed that they dispose waste unscientifically. In response to statement 5, i.e., Do you dispose waste on regular interval of time or nonregularly, majority (81.75%) of respondents revealed thatthey dispose wastage regularly. In response to statement 6, i.e., Are you aware of government and NGOs role in waste management, majority (90.25%) of respondents revealed that they are aware. In response to statement 7, i.e., Is there separate team for waste disposal and management, majority (100%) of respondents revealed that they don't have separate teams for waste management. In response to statement 8, i.e., Do you have a special budget dedicated for waste management, majority (79.5 %) of respondents revealed that they have special budget for waste management. Majority of respondents revealed that they are paying regularly for our household waste management. In response to statement 9, i.e., Are you implementing 4R's of waste management, majority (98.75 %) of respondents said no.

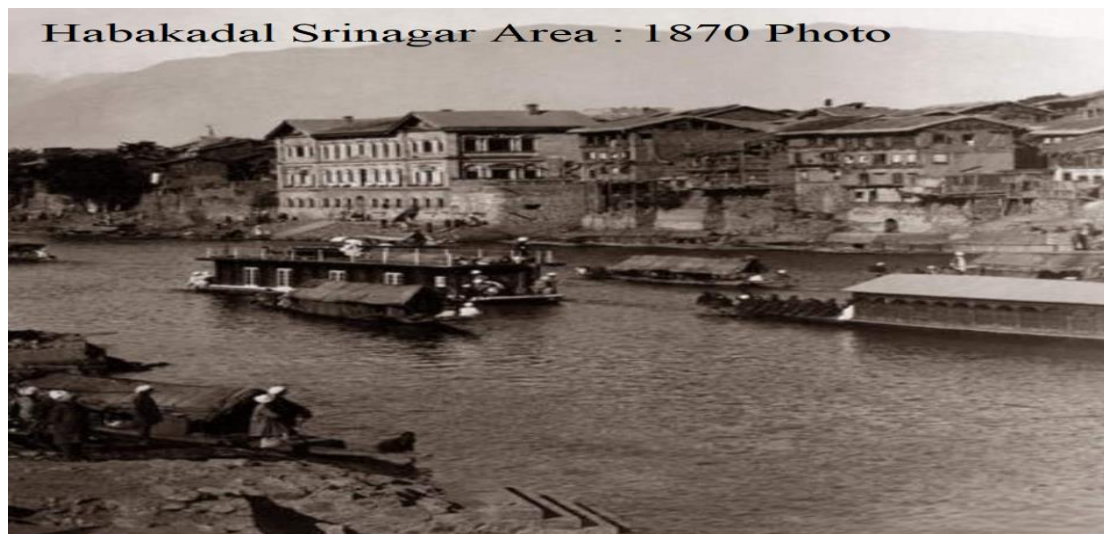
Table 2: Food waste management of People living in Central Kashmir

S.No.	Statement	Response	Count	%
1.	What is the Approx. total amount of waste generated per day (in kg)?	Upto 1 kg	363	90.75
		Upto 2 kg	24	6.00
		> 2 kg	13	3.25
2.	Do you categorize waste into biodegradable and non biodegradable?	Yes	68	17.00
		No	332	83.00
3.	How do you dispose the food waste generated?	Pack separately	143	35.75
		Pack in Waste box	257	64.25
4.	How do you dispose the plastic waste?	Scientific way	41	10.25
		Non-scientific	359	89.75
5.	Do you dispose waste on regular interval of time or nonregularly?	Regularly	327	81.75
		Non-regularly	73	18.25
6.	Are you aware of government and NGOs role in waste management?	Yes	361	90.25
		No	39	9.75
7.	Is there separate team for waste disposal and management?	Yes	0	0.00
		No	400	100
8.	Do you have a special budget dedicated for waste management?	Yes	318	79.5
		No	82	20.5
9.	Are you implementing 4R's of waste management ?	Yes	5	1.25
		No	395	98.75

The data shown in Figure 1, revealed that majority of respondents (91.5%) reported that food waste causes wastage of natural resources, followed by 84.5% respondents who reported that food waste causes degradation of land, followed by 78.5% respondents who reported that food waste contribute to climate change and 35.% respondents believe that food waste harm to biodiversity. Kashmir Valley had over a thousand small and large water bodies but unfortunately over the last century, massive urbanisation around these water bodies has led to pollution, siltation due to deforestation, and over exploitation of the many streams and lakes, huge number of water bodies have shrunk to a fraction of their original size while many have disappeared.



The data presented in Figure 1, shows that in response to question asked to respondents I.e., Do you follow Islamic guidelines for food consumption, majority of respondents (69.5%) told whereas 19.0% told no and 11.5% reported that they have no clear idea about food consumption pattern as per Islam. Islam guides Muslims to take food within limits always as eating is not main purpose of life. We eat to live not live to eat. The Holy Quran forbids Muslims from being extravagant with food. The Prophet Muhammad (Allah bless him and give him peace) said that we should not waste food and should eat even if a morsel of food falls on the floor. This hadith tells us that we should not follow the footsteps of the Devil and waste food, and it applies to dead fish too.



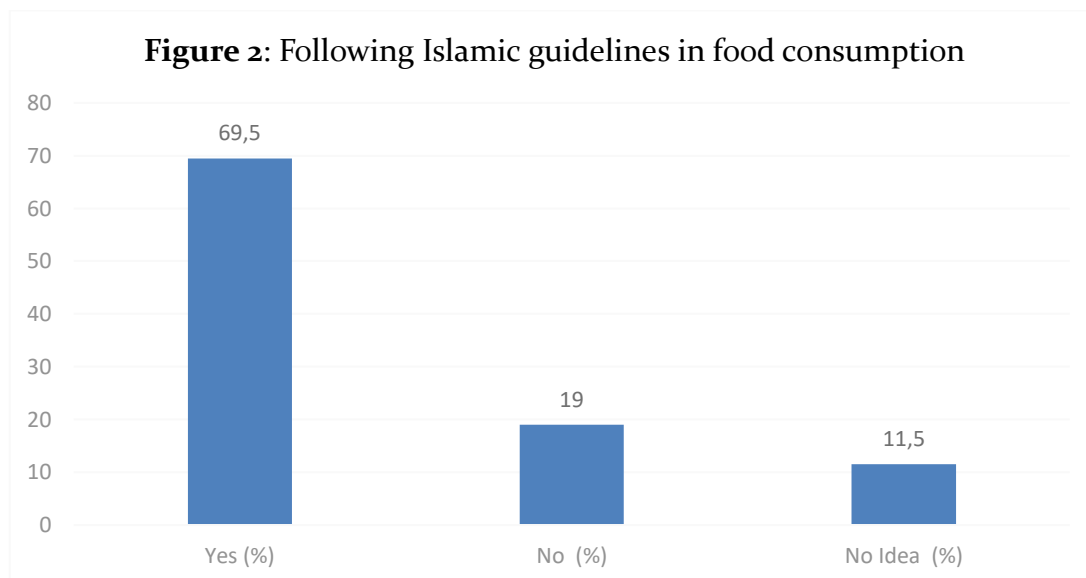
The elders revealed that 30-40 years back people used to drink water from Dal lake and Jehlum as people were considering these sacred. Water bodies of Kashmir as per State Water Mission, are the worst victims of human interference and rapid urbanisation as massive erosion in the catchment area resulting in lakes becoming silted up, thus converting the water areas into landmasses. Further, many water bodies in Kashmir have disappeared due to natural causes such as glacial action and low precipitation. In Srinagar during the past century more than 50% of water bodies and its suburbs have been lost.



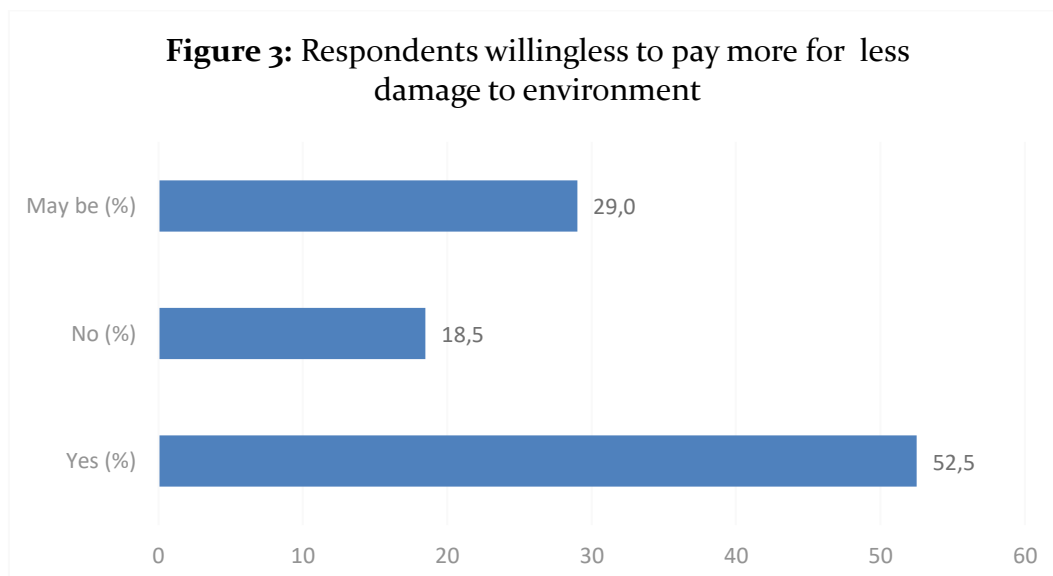
It was observed that stray dogs are fed around the urban dumps, like landfills or garbage dumps everywhere in the study area. We know dog is a loyal animal so develops an affinity towards these areas because of food availability, become territorial and aggressive. It has been found valley of Kashmir recorded 6,800 animal bite cases in 2022-23, highest in the past three years, with over 80% bites by stray dogs. Overpopulation of stray animal is a complex and pressing issue that affects human well-being, animal welfare, and environmental sustainability of the area. Government as well as people have to play a crucial role in handling this serious issue.



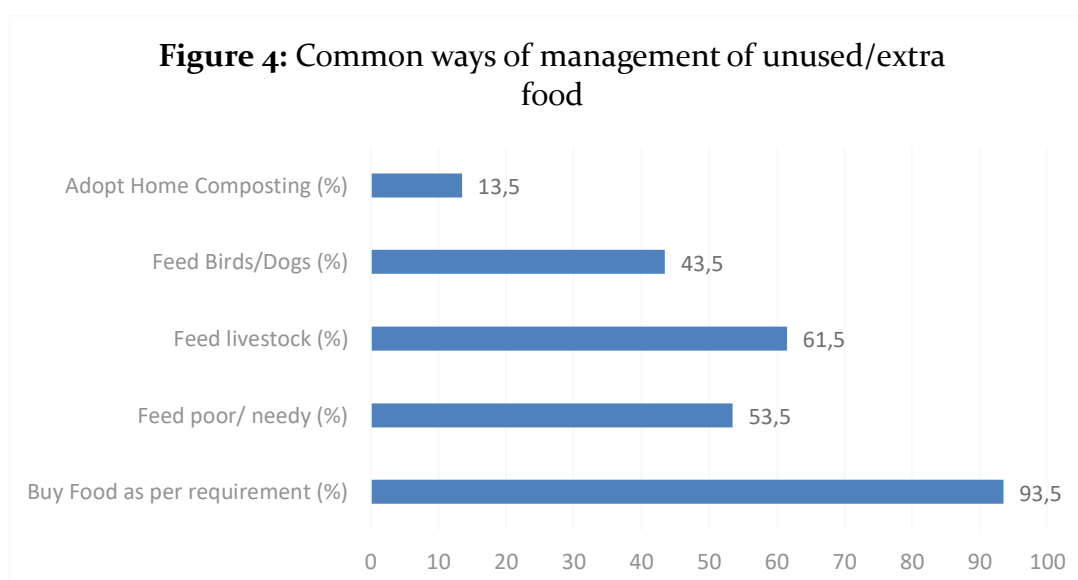
Unfortunately, it has been observed that in practice majority of people worldwide follow Unislamic way. We see in Kashmir valley and other parts of the world during marriage and other functions lot of food gets wasted as is shown in picture below. Food wastage during marriage and use of disposals causes economic as well as environmental problems. It was reported by FAO 40% of food served in marriages of Kashmir gets wasted which is a social as well as a religious sin.



The data presented in Figure 3, revealed that majority of respondents (52.5%) showed willingness to pay for proper waste management. In majority people were aware about the ill effects of improper /unscientific waste management.

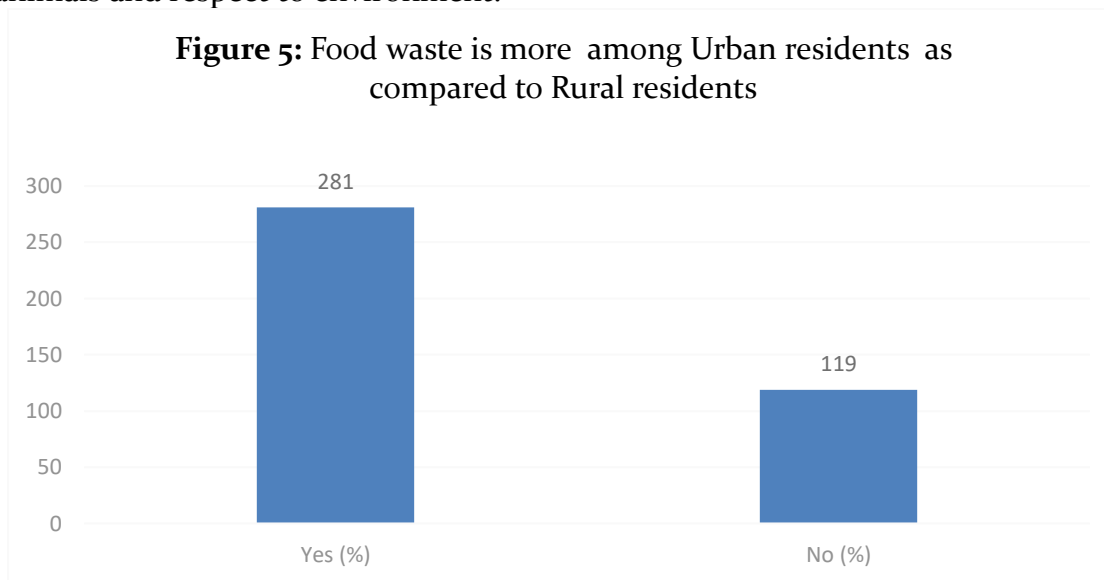


The data shown in Figure 4, revealed that majority of respondents (93.5%) were of the opinion that we should buy food as per requirement to avoid food waste. They believe purchasing of extra food is wastage of resources as well as it is a sin. Further, 53.5% respondents were of the opinion that we should feed surplus food to poor/needly to avoid wasting of food as besides environmental protection it's a good deed, 61.5% respondents were of the opinion that surplus food should be used for livestock, 43.5% were of the opinion to feed birds/dogs and 13.5% respondents were of the opinion to adopt home composting to avoid wastage of food. Discussion with elders revealed that earlier food waste was not seen on roads as people were considering it a greatest sin. Today food waste is observed in drains in most places.



The data presented in Figure 5, revealed that majority of respondents (70.25%) were of the opinion that among urban residents, food wastage is more than rural residents.

In Islam wasteful is an act that is abhorred as Quran says , And render to the kindred their due rights, as (also) to those in want, and to the wayfarer; but squander not in the manner of a spendthrift. Verily spendthrifts are brothers of Satan; and Satan is to his Lord (himself) ungrateful (Surah al-Isra' Quran). In Rammadan, Muslims feed poor members of the society and its encouraged one must show sympathy towards animals and respect to environment.



The data presented in Table 3, revealed that as per discussion with respondents (rural=100, urban=100) it was found that the main reasons for food wastage as per respondents were inadequate storage facility (rural=33%, urban=16%), poor transportation system (rural= 26 %, urban=22%), marketing preference (rural= 13 %, urban=39%), over production (rural=21%, urban=14%) and others (rural= 7%, urban= 9 %). Statistically, it has been observed that there was a significant difference in opinion of rural and urban respondents in response to statements about the main reasons for food wastage (Chisquare= 20.881, P<0.01). During field visit it was observed that rural as well as urban people showed poor responsiveness towards food waste management. A large number of people ignored the religious as well as govt guidelines towards food waste management which resulted in environmental degradation.

Table 3: Main Reasons for wastage as per respondents in Central Kashmir

Residence	Main Reasons for wastage				
	Inadequate storage facility	Poor transportation system	Marketing preferences	Over production	Others
Rural	33	26	13	21	7
Urban	16	22	39	14	9
Chisquare=20.881, P-value<0.01					



CONCLUSION

Globally food wastage is a critical issue as it has social, economical and economic impacts. Food wastage reduction is very important for reducing environmental impact and conservation of natural resources. We can minimize food wastage at larger scale by adopting techniques such as plan meals and shopping, proper storage, following FIFO, donating surplus food, understand expiry date, compost wasted food, raising awareness about impact of food waste in scientific as well as in religious perspective. The study revealed that majority of respondents were aware of the impacts of food waste in scientific and Islamic perspective. Modern life style is the main cause of food waste. We noticed statistically, there was a significant difference between rural and urban respondents in the opinion of main factors responsible for food wastage in Kashmir ($P < 0.01$). Life style as well as environment varies in urban and rural areas so difference in attitude towards food waste varies to some extent. We notice in marriages tonnes of food items get wasted and wasted food is not properly disposed. Generally, wasted food is thrown on road side or around water bodies in many areas as revealed by respondents. Group discussion with elders revealed that a number of water bodies vanished in last 30-40 years. Earlier people used to drink water from Dal lake, Jehlum and other water bodies of the study area but at present due to pollution we can not drink water from these water bodies. There is a basic linkage between all natural elements and if a man abuses one, the whole natural world will get disturbed. Prophet Muhammad (PBUH) acknowledges that God's knowledge and power covers everything. Therefore, abusing one of his creations, whether living being or a natural resource, is a sin. He (PBUH) considered all of God's creations to be equal before God and he believed animals, land, forests and water resources have rights. Quran (4:126), says "To God belongs all that is in the heavens and in the earth, for God encompasses everything". It was concluded that food waste is directly or indirectly responsible for environment pollution. It was suggested that responsible persons of area and government should play their role in controlling food waste and proper disposal of food wastage as food wastage is a social as well as religious crime.

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