

Improper usage of Cooking Fuel, Electricity, Kitchen and Plastic Waste Role in increasing Carbon Footprint

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ABSTRACT: Climate change, linked to the Industrial Revolution's onset, is primarily driven by widespread fossil fuel usage, high energy consumption, and deforestation. Household activities, relying heavily on electricity and generating kitchen, plastic, and cooking fuel waste, contribute significantly to carbon emissions. This study conducted in Bhilwara district, Rajasthan, surveyed 480 women in rural and urban areas. The findings indicate that both rural and urban respondents display inadequate carbon footprint practices, with few showing average practices and none demonstrating good practices. Despite challenges, the research provided valuable insights, allowing for customized interventions and gender-sensitive policies to effectively combat climate change in Bhilwara (Rajasthan).

Keywords: Cooking fuel, electricity, kitchen waste, plastic waste, carbon footprint, carbon emission.

INTRODUCTION

Climate change has been occurring since the initiation of the Industrial Revolution in the 1820s, owing to substantial fossil fuel consumption, energy usage, and deforestation. The primary consequence of these activities includes a rise in Earth's temperature, heightened precipitation events, acidification, and warming of the oceans, as well as an increase in the concentration of greenhouse gases. Greenhouse gases, by virtue of their ability to absorb infrared radiation, contribute to the elevation of Earth's temperature (Gupta *et al.*, 2019). These gases are released through the utilization of fossil fuels in electricity generation, heating, transportation, and manufacturing processes. Notably, the emission of greenhouse gases from the road transport sector in India has increased from 27 million tons (Mt) of CO₂ in 1980 to approximately 105 Mt in 2000 (Singh *et al.*, 2008). The most prevalent greenhouse gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and various fluorinated gases. Between 1996 and 2015, India ranked fourth among countries impacted by climate change. The annual emission of CO₂ alone amounts to approximately 3 gigatons of greenhouse gases (McNeill and Engelke 2016). Release of green house gas has increased over the past decades and average global temperature also increased. NCA warned that if global carbon emission does not start to decrease rapidly it may cause economic as well as environmental crisis (Reidmiller *et al.*, 2018). Year 2000 recorded warmest decade of the earth, due to this glaciers ice sheets had

melted. The melting ice is causing rising of sea level at a rate of 2 millimeters (0.09 inches) per year. This is making causing of flood and drought in coastal regions. Entire nations, such as islands of Maldives are threatened by the climate change and global warming (Lemcke-Stampone *et al.*, 2022).

The concept of footprint has emerged as a tool to evaluate the environmental impact of individual and household activities, both direct and indirect, by estimating the pressure exerted on the environment. Carbon footprint specifically measures the amount of carbon dioxide generated through human activities (Dev, 2017). Many human activities, whether directly or indirectly, contribute to the release of greenhouse gases into the atmosphere (Dioxide, 2017). In rural India, it has been observed that a significant portion of the cooking energy needs are fulfilled by cutting down trees or burning fossil fuels, which are the primary sources of greenhouse gas emissions.

According to the India Residential Energy survey of 2020, which collected data on the usage of different cooking fuels in India, the report reveals that approximately 80 percent of rural households have access to LPG connections. However, despite this, two-thirds of rural households in India still rely on firewood for cooking purposes (Agrawal *et al.*, 2021).

Household activities heavily depend on electricity, diesel, and petrol, leading to substantial carbon emissions (Panwar *et al.*, 2017). Furthermore, improper waste management, including kitchen and plastic waste, exacerbates greenhouse gas emissions, impacting climate change, air quality, and ecosystems. The study

revealed that irresponsible consumer behavior in electricity usage poses challenges for sustainable supply, attributed to low awareness due to limited information availability (Hanif, 2021).

Based on the UN's Emissions Gap Report (EGR), India ranked as the third largest emitter of carbon dioxide in 2020, despite having lower per capita emissions compared to the global average. The primary driver of India's carbon emissions is electricity generation, predominantly from coal-based power plants. Coal constitutes 74% of India's electricity generation and contributes to one-third of the country's total greenhouse gas emissions (Olhoff and Christensen 2020).

The current study focuses on examining the practices of selected urban and rural women concerning carbon footprints associated with cooking fuel consumption, usage of electrical appliances, management of kitchen waste, and disposal of plastic waste. The study aims to gain insights into human interaction with the environment by employing the concept of footprint, which has become a widely used tool to estimate the environmental impacts resulting directly and indirectly from individual and household activities.

MATERIAL AND METHOD

A self-administered questionnaire was used to assess carbon footprint practices among rural and urban women, focusing on aspects like cooking fuel consumption, electrical appliance usage, waste management, and plastic waste disposal.

The study was conducted in Bhilwara district, Rajasthan, encompassing a total of 480 respondents, with 240 rural women and 240 urban women. Specific criteria and a lottery method were used to select representative samples from eight villages for rural areas and eight colonies for urban areas.

For this study, data on household-level carbon footprint practices were collected through 48 closed-ended questions in door-to-door interviews with both rural and urban women. The questionnaire was designed with input from existing literature and evaluated by subject matter experts to ensure clarity and comprehensiveness of the questions.

RESULTS AND DISCUSSION

The study assessed household practices related to carbon footprint based on four identified components, using a three-point continuum (always, sometimes, never). The results are summarized as follows:

Table 1: Component-wise household practices of the rural and urban respondents about carbon footprint. n=480

Sr. No.	Aspects	MPS of rural respondents (240)	MPS of urban respondents (240)
1.	Cooking habits for fuel consumption	20.94	30.22
2.	Habits of using electrical appliances	36.86	35.47
3.	Disposing habits of kitchen waste	7.13	5.00
4.	Disposing habits of plastic waste	30.79	26.58
Overall MPS		25.71	24.32

Table 1 depicts the mean percentage scores of household practices for each component of carbon footprint among the urban respondents (24.32 MPS). A careful analysis of the practice scores reveals that urban respondents demonstrated average habits in terms of using electrical appliances (35.47 MPS) and cooking fuel consumption (30.22 MPS). However, their practices in disposing of plastic waste (26.58 MPS) and kitchen waste (5.00 MPS) were found to be poor. As for the rural respondents, the overall household practices score was 25.71 MPS. It was observed that rural respondents exhibited poor practices in terms of cooking fuel consumption (20.94 MPS), disposing habits of plastic waste (30.79MPS), and disposing habits of kitchen waste (7.13 MPS). On the other hand, their average practice for using electrical appliances was 36.86 MPS.

It is worth noting that none of the urban or rural respondents fell into the category of good household practices regarding carbon footprint. In conclusion, the study's findings highlight the urgent need for interventions and awareness campaigns that target household practices related to carbon footprint in both

rural and urban settings. By fostering sustainable behaviors and reducing carbon emissions at the grassroots level, we can collectively work towards a more environmentally conscious and resilient future (Fadhullah *et al.*, 2022).

Table 2 and Fig. 1 depict the findings regarding specific practices of urban and rural respondents. It is observed that a significant majority of urban respondents (94.79%) reheat their food before eating, whereas in rural areas, slightly over half of the respondents (53.33%) engage in the practice of reheating food. Furthermore, more than one-third of both urban (39.79%) and rural (33.33%) respondents switch off the burner when it is not in use, indicating a conscious effort to conserve energy. In terms of cooking methods, a notable proportion of urban respondents (38.75%) use pressure cookers, while in rural areas, only 16.46% of respondents utilize this energy-saving cooking device. This aligns with similar studies that highlight approximately 43% of respondents demonstrating knowledge and awareness about the benefits of using a pressure cooker (Hasalkar *et al.*, 2012).

Table 2: Distribution of rural and urban respondents on the basis of their cooking habits for cooking fuel consumption n=480.

Sr. No.	Aspects	Rural (240)				Urban (240)			
		Always f/%	Sometimes f/%	Never f/%	Mean score	Always f/%	Sometimes f/%	Never f/%	Mean Score
1.	Prepare and collect all the raw material before actual cooking	40 (16.67%)	95 (39.58%)	105 (43.75%)	36.46	60 (25%)	65 (27.08%)	115 (47.92%)	38.54
2.	Use optimum quantity water for cooking	30 (12.50%)	60 (25%)	150 (62.50%)	25	40 (16.67%)	65 (27.08%)	135 (56.2%)	30.21
3.	Cover the pot while cooking food or heating the water	30 (12.50%)	25 (10.42%)	185 (77.0%)	17.71	23 (9.58%)	56 (23.33%)	161 (67.08%)	21.25
4.	Soak cereals, pulses, rice and whole grains before cooking	56 (23.33%)	65 (27.08%)	119 (49.58%)	36.88	45 (18.75%)	59 (24.58%)	136 (56.6%)	31.04
5.	Use pressure cooker for cooking food	20 (8.33%)	39 (16.25%)	181 (75.42%)	16.46	65 (27.08%)	56 (23.33%)	119 (49.58%)	38.75
6.	Use correct size of pot for your burner	05 (2.08%)	16 (6.67%)	21 (8.75%)	5.42	10 (4.17%)	56 (23.33%)	174 (72.5%)	15.83
7.	Cook at slow speed	10 (4.17%)	20 (8.33%)	210 (87.50%)	8.33	15 (6.25%)	36 (15%)	189 (78.7%)	13.75
8.	During break in cooking, turn the LPG off and then relight again	36 (15%)	56 (23.33%)	148 (61.67%)	26.67	26 (10.83%)	78 (32.50%)	136 (56.6%)	27.08
9.	Reheat food before eating	115 (47.92%)	26 (10.83%)	99 (41.25%)	53.33	215 (89.58%)	25 (10.42%)	0	94.79
10.	Defrost frozen food before cooking	05 (2.08%)	16 (6.67%)	219 (91.25%)	5.42	36 (15%)	39 (16.25%)	165 (68.7%)	23.12
11.	Switch off the burner when it is not in use	65 (27.08%)	30 (12.50%)	145 (60.42%)	33.33	51 (21.25%)	89 (37.08%)	100 (41.67%)	39.79
12.	Check regularly the regulator, pipe and burner for leakage	10 (4.17%)	15 (6.25%)	215 (89.58%)	7.29	25 (10.42%)	40 (16.67%)	175 (72.9%)	18.75
13.	Use solar cooker for cooking food	0	0	240 (100%)	0	0	0	240 (100%)	0

Regarding cooking preparations data presented in table 2 reveals that more than one-third of urban respondents (38.54%) and rural respondents (31.04%) engage in the practice of preparing and collecting all the raw materials before actual cooking. Additionally, both urban (36.46%) and rural (36.88%) respondents

commonly soak cereals, pulses, rice, and whole grains before cooking. The results are in line with study done by Avila *et al.* (2015) who found in their study that soaking cowpeas in water led to a shorter cooking time which indirectly saves energy.

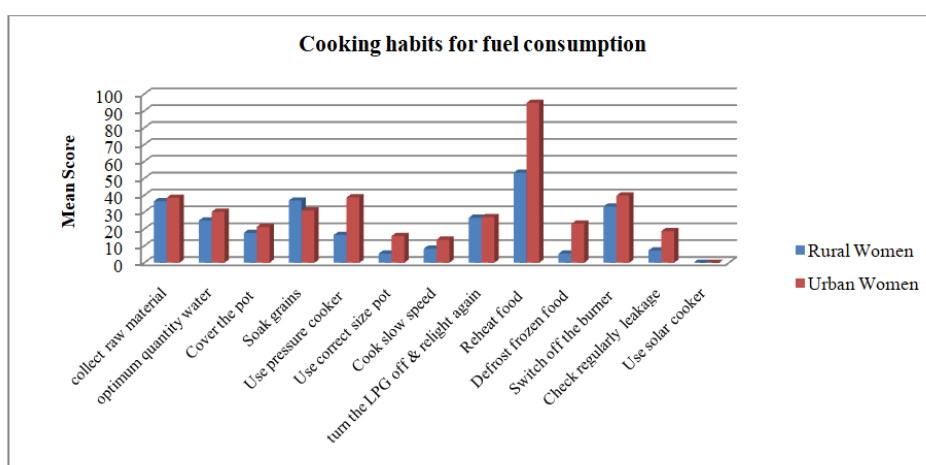


Fig. 1. Distribution of rural and urban respondents on the basis of their cooking habits for fuel consumption.

Table 2 and Fig. 1 illustrate that in urban areas, less than one-third of respondents (30.21%) and in rural areas, one-quarter of respondents (25%) utilize the

appropriate amount of water for cooking. A similar study conducted by Oageng and Mmopelwa (2014)

discovered that the average water usage per individual was estimated to be 20.6 liters per day.

Data also highlighted in Table 2 that in both urban and rural regions, approximately one fourth of respondents (27.08% and 26.67%, respectively) reported switching off their LPG supply during breaks and relighting it afterward, highlighting the practical advantage of LPG technology for enabling quick cooking. This finding is consistent with Kimemia and Annegam (2016) study, emphasizing the rapid cooking capabilities of LPG in households.

Data presented in Table 2 highlighted that in urban areas, a relatively small proportion of respondents, specifically 23.12% and 21.25% respectively, make the effort to defrost frozen food before cooking it. Additionally, a similar percentage of respondents in urban areas, around 21.25%, cover the pot while cooking food or heating water. On the other hand, in rural areas, only 5.42% of respondents defrost frozen

food before cooking, and 17.71% take the precaution of covering the pot while cooking or heating water. Regarding safety practices, the numbers are quite low in both urban and rural areas. In urban areas, only 18.75% of respondents check the regulator for leakage, 15.83% inspect the pipe for any potential issues, and merely 13.75% ensure the burner is in good working condition. Furthermore, in terms of using the correct pot size for the burner, only 7.29% of respondents in rural areas take this precaution, along with 5.42% who regularly check for leakage in the regulator and pipe, and a mere 8.33% who cook at a slower speed. Surprisingly, no respondents from either urban or rural areas mentioned using a solar cooker for their cooking requirements. This result aligns with Yadav *et al.* (2016) study, where a significant majority (56.0 percent) of respondents expressed a neutral viewpoint regarding solar cookers.

Table 3: Distribution of rural and urban respondents on the basis of their habits of using electrical appliances n=480.

Sr. No.	Aspects	Rural (240)				Urban (240)			
		Always f/%	Sometimes f/%	Never f/%	Mean score	Always f/%	Sometimes f/%	Never f/%	Mean score
1.	Frequently open the door of electrical equipments example Fridge	196 (81.67%)	44 (18.33%)	0	90.83	212 (88.33%)	28 (11.67%)	0	94.17
2.	Leave the door open for longer than necessary	164 (68.33%)	76 (31.67%)	0	84.17	174 (72.50%)	20 (8.33%)	46 (19.17%)	76.67
3.	Put hot and warm food straight into the refrigerator	183 (76.25%)	57 (23.75%)	0	88.12	114 (47.50%)	100 (41.67%)	26 (10.83%)	68.33
4.	Overload the refrigerator	113 (47.08%)	100 (41.67%)	27 (11.25%)	67.92	220 (91.67%)	20 (8.33%)	0	95.83
5.	Fill the pot full while churning butter milk	115 (47.92%)	100 (41.67%)	25 (10.42%)	68.75	150 (62.50%)	50 (20.83%)	40 (16.67%)	27.08
6.	Switch off the fans, lights and television when leaving the room	40 (16.67%)	69 (28.75%)	131 (54.58%)	31.04	36 (15%)	79 (32.92%)	125 (52.08%)	31.46
7.	Use temperature control (Thermostat) equipment	0	0	240 (100%)	0	0	0	240 (100%)	0
8.	Use energy efficient bulbs or lights	10 (4.17%)	24 (10%)	206 (85.83%)	9.17	15 (6.25%)	28 (11.67%)	197 (82.08%)	12.08
9.	Unplug items when not in use or going for holidays	0	0	240 (100%)	0	0	0	240 (100%)	0
10.	Switch on outdoor light only when needed	0	0	240 (100%)	0	0	0	240 (100%)	0
11.	Keep computer, T.V on standby mode	0	0	240 (100%)	0	0	0	240 (100%)	0
12.	Charge the batteries of mobile phones on switch on mode	240 (100%)	0	0	100	240 (100%)	0	0	100
13.	Take advantage of daylight	210 (87.50%)	20 (8.33%)	10 (4.17%)	91.67	45 (18.75%)	32 (13.33%)	163 (67.92%)	25.42
14.	Timely service the appliances	0	0	240 (100%)	0	0	0	240 (100%)	0
15.	Use solar energy	0	0	240 (100%)	0	0	0	240 (100%)	0
16.	Use agro net (green net cloth) for controlling the temperature in the house	25 (10.42%)	39 (16.25%)	176 (73.33%)	18.54	40 (16.67%)	95 (39.58%)	105 (43.75%)	36.46

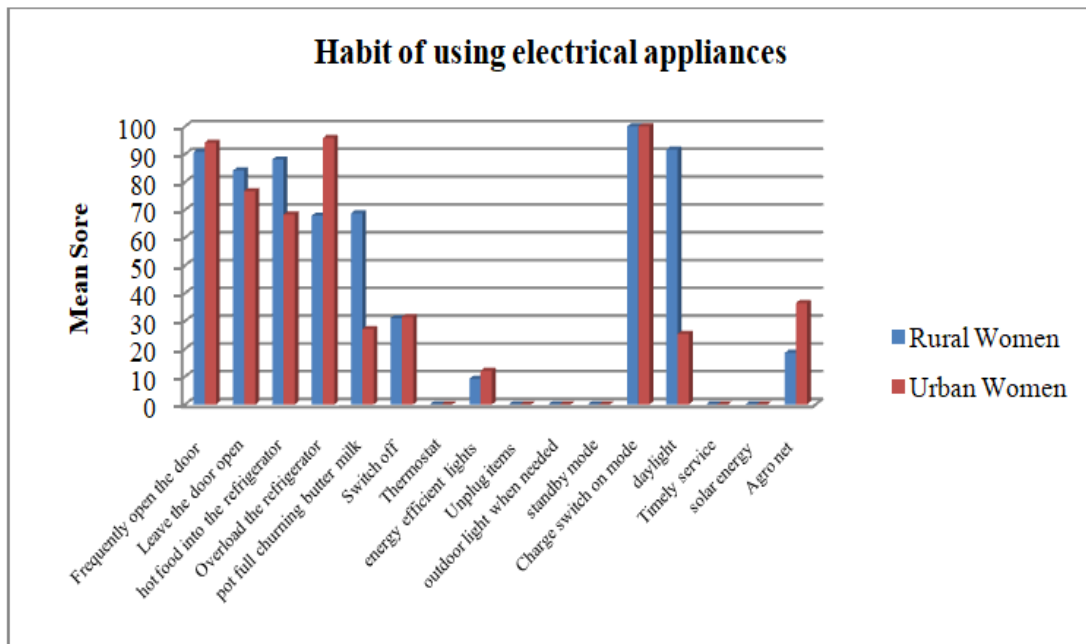


Fig. 2. Distribution of rural and urban respondents on the basis of their habits of using electrical appliances.

Table 3 and Fig. 2 provide insights into the behavior of respondents in both urban and rural areas. It is notable that all respondents in both urban and rural settings (100%) charge their mobile phone batteries while keeping the switch turned on. In urban areas, a majority of respondents (95.83% and 94.17% respectively) tend to overload their refrigerators and frequently open the doors of electrical equipment simultaneously. Similarly, in rural areas, a significant percentage of respondents (90.83% and 67.92% respectively) frequently open the doors of electrical equipment and overload their refrigerators. Similarly in a study by Arawomo (2017), it was observed that respondents exhibited energy-wasting behavior when using refrigerators. Both in urban and rural areas, a considerable proportion of respondents (76.67% and 72.92% respectively in urban areas, and 84.17% and 68.75% respectively in rural areas) have a tendency to leave the refrigerator door open for longer than necessary and fill the pot to its full capacity when churning butter milk.

Interestingly data presented in Table 3 shows that more than half of the respondents in both urban and rural areas (68.33% and 88.12% respectively) have the habit of placing hot and warm food directly into the refrigerator. When it comes to energy-saving practices, less than one-third of respondents in both urban and rural areas (31.46% and 31.04% respectively) make the effort to switch off fans, lights, and televisions while leaving the room. In a similar study conducted by Fan *et al.* (2017), the research reveals comparable findings. It is observed that the usage of household appliances, particularly ICT devices, is personalized among household members. The presence of a greater number of appliances in a home enables individuals to use the same type of equipment simultaneously without causing disruptions to one another. Additionally, the study highlights that many ICT appliances are frequently left turned on due to the perceived extended start-up time.

Further data shows in table 3 that in urban areas, more than one-third of respondents (36.46%) utilize agro net to regulate the temperature in their homes, whereas in rural areas, only 18.54% make use of this method. In urban areas, only one-fourth of respondents (25.42%) take advantage of daylight, while in rural areas, the majority of respondents (91.67%) utilize this natural light source. It is worth mentioning that in urban areas; only 12.08% of respondents and in rural areas, only 9.17% of respondents use energy-efficient bulbs or lights. The findings from Lucas *et al.* (2021) study demonstrate that, despite the identification of an upward trajectory in citizen engagement and participation, there are still prevailing misconceptions, as well as inadequate and ineffective awareness and communication strategies concerning renewable energies. These persisting factors hinder the effective promotion and understanding of renewable energy initiatives.

Interestingly data presented in Table 3 that none of the respondents in urban or rural areas reported using temperature control equipment (such as thermostats), unplugging items when not in use or during holidays, activating outdoor lights only when necessary, keeping computers and televisions on standby mode, servicing appliances in a timely manner, or utilizing solar energy at home. In a similar study conducted by Wang *et al.* (2021), the research examines the potential for electricity savings by analyzing the impact of habits on electricity consumption. The findings indicate that residents who lack electricity-saving habits consume an average of 15.54 kWh more electricity per month compared to those who have adopted such habits. Additionally, it is estimated that residents without electricity-saving habits have the potential to achieve electricity savings of up to 6.9%.

Table 4: Distribution of respondents on the basis of their habits of disposing kitchen waste n=480.

Sr. No.	Aspects	Rural (240)				Urban (240)			
		Always f/%	Sometimes f/%	Never f/%	Mean score	Always f/%	Sometimes f/%	Never f/%	Mean score
1.	Segregate the dry and wet waste of kitchen	0	0	240 (100%)	0	0	0	240 (100%)	0
2.	Maintain bags for dry waste like paper, plastic and other item that are recyclable	0	0	240 (100%)	0	0	0	240 (100%)	0
3.	Separately collect the peels of onion and garlic	0	0	240 (100%)	0	0	0	240 (100%)	0
4.	Separately collect the oils and fats waste	0	0	240 (100%)	0	0	0	240 (100%)	0
5.	Reuse the leftover food	10 (4.17%)	34 (14.17%)	196 (81.67%)	11.25	0	34 (14.17%)	206 (85.83%)	7.08
6.	Donate items when possible	78 (32.50%)	98 (40.83%)	64 (26.67%)	52.92	42 (17.50%)	98 (40.83%)	100 (41.67%)	37.92
7.	Use separate and covered dustbin to throw dry and wet waste	0	0	240 (100%)	0	0	0	240 (100%)	0
8.	Give the kitchen waste to sweeper or municipal auto truck	0	0	240 (100%)	0	0	0	240 (100%)	0
9.	Composting the leftover food items	0	0	240 (100%)	0	0	0	240 (100%)	0

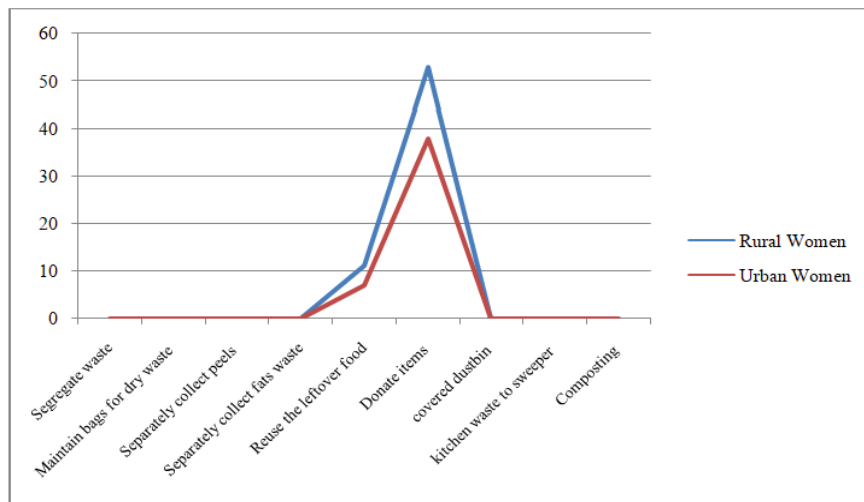


Fig. 3. Distribution of respondents on the basis of their habits of disposing kitchen waste.

According to Table 4 and Fig. 3, the data shows that in urban areas, more than one third of respondents (37.92%) and in rural areas, over half of respondents (52.92%) choose to donate leftover food items whenever possible. Findings of Stancu *et al.* (2016); Van Geffen *et al.* (2017) also revealed that practicing behaviors such as saving and consuming leftovers can significantly reduce food waste. Leftover food can be stored and repurposed into new meals, eaten as is, or discarded depending on individual preferences. Data presented in table 4 that in urban areas, only 7.08 percent of respondents engage in reusing leftover food items, while in rural areas, this number increases to 11.25 percent. However, it is noteworthy that none of the respondents, both in urban and rural areas, practice segregating the dry and wet waste from their kitchen, maintaining separate bags for recyclable items such as paper and plastic, collecting onion and garlic peels separately, separating oils and fats waste, utilizing separate covered dustbins for dry and wet waste, refraining from giving waste to sweepers or municipal auto trucks, or engaging in composting of leftover food

items. These findings highlight the lack of awareness and implementation of waste management practices in both urban and rural settings, indicating the need for greater emphasis on sustainable waste management and recycling initiatives. Similar study found by Warunasinghe *et al.* (2016) on solid waste management in an urban area, focusing on household-level practices and residents' willingness to participate in improved waste management. Over 70% of households generated more than 2 kg of waste daily, mostly from the kitchen. Common disposal methods included home garden pits, garbage truck collection, burning, composting, and incineration. Waste separation was practiced by 52% of households, while 30% used compost bins. All respondents were aware of environmental hazards, with 2% showing less concern. Dissatisfaction with current practices was expressed by a significant number of households, and 96% were willing to participate in an improved waste management program. Suggestions included composting, waste separation improvements, government-owned waste collection centers, subsidized waste bins, and enhanced garbage trucks.

Table 5: Distribution of respondents on the basis of their habits of disposing plastic waste n=480.

Sr. No.	Aspects	Rural (240)				Urban (240)			
		Always f/%	Sometimes f/%	Never f/%	Mean score	Always f/%	Sometimes f/%	Never f/%	Mean score
1.	Use cloth, paper bags or recycled plastic while going for shopping	0	20 (8.33%)	220 (91.67%)	4.17	0	19 (7.92%)	221 (92.08%)	3.96
2.	Use plastic jars and containers for keeping food items	240 (100%)	0	0	100	240 (100%)	0	0	100
3.	Avoid using plastic bags or single used plastic	0	0	240 (100%)	0	0	0	240 (100%)	0
4.	Separate the plastic things before throwing	0	0	240 (100%)	0	0	0	240 (100%)	0
5.	Separately throw the sanitary pads	0	0	240 (100%)	0	0	0	240 (100%)	0
6.	For throwing the pads use plastic polythene	240 (100%)	0	0	0	240 (100%)	0	0	0
7.	Use cover dustbin at home for household waste	09 (3.75%)	0	231 (96.25%)	3.75	98 (40.83%)	0	142 (59.17%)	40.83
8.	Throw waste outside the house	240 (100%)	0	0	100	240 (100%)	0	0	100
9.	Give the plastic waste to sweeper or municipal auto truck	0	0	240 (100%)	0	26 (10.83%)	49 (20.42%)	165 (68.75%)	21.04
10.	Reuse or recycle the plastic bags, bottles or glass jars with plastic lids	0	0	240 (100%)	0	0	0	240 (100%)	0

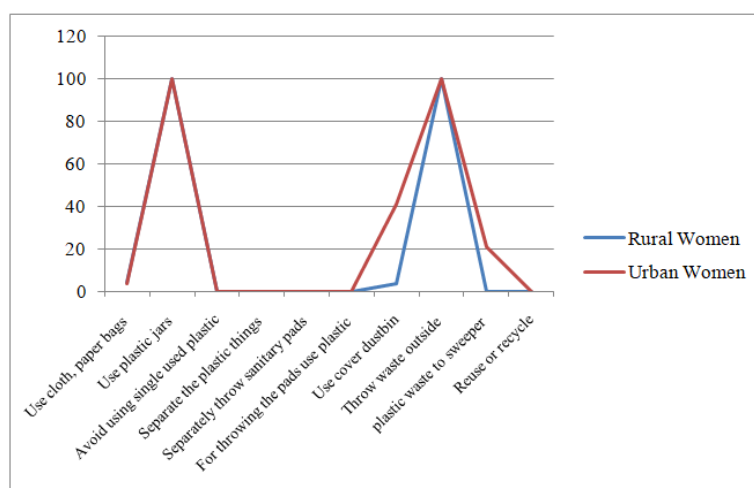


Fig. 4. Distribution of respondents on the basis of their habits of disposing plastic waste.

Table 5 and Fig. 4 provide comprehensive data on the waste management practices of urban and rural respondents. It is noteworthy that all respondents, regardless of their urban or rural background, utilize plastic jars and containers for storage and dispose of their waste outside their homes. Findings align with Rani *et al.* (2022) also revealed that the respondents commonly disposed of their household waste by simply throwing it outside their houses and burning waste

emerged as the most prevalent practice among the respondents for the purpose of cleaning their immediate surroundings.

Further data presented in Table 5 that in urban area, approximately 21.04% of respondents reported handing over their plastic waste to sweepers or municipal auto trucks for proper disposal. However, none of the rural respondents engaged in this practice. Adane and Muleta (2011) found that in Jimma City, Ethiopia, plastic bag

usage was favored by most respondents (76.52%) due to low cost and easy availability. Open dumping of plastic bags (59.56%) caused environmental issues like animal deaths and sewage line blockages. Public education, eco-friendly alternatives, and legislation were recommended to address the rising plastic bag usage.

Data reveals in Table 5 that small percentage of urban (3.96%) and rural (4.17%) respondents use cloth or recycled plastic bags when shopping, indicating a limited adoption of eco-friendly alternatives. Interestingly, neither urban nor rural respondents demonstrated an inclination to avoid using plastic bags or single-use plastics. Additionally, the separation of plastic items before disposal and proper disposal of sanitary napkins were not commonly practiced among

the respondents. Plastic polythene, specifically, was frequently used for the disposal of sanitary pads. Moreover, the majority of respondents did not engage in the reuse or recycling of plastic bags, bottles, or glass jars with plastic lids. In a similar study conducted by Nxumalo *et al.* (2020), it was found that rural households, on average, generate approximately 15.9 grams of plastic waste per day. The study identified several prevalent waste management practices in rural areas, including open burning, burying, reusing, disposal in backyard pits, and indiscriminate disposal in the backyard, selling, and recycling. These findings highlight that the majority of rural households continue to rely on traditional methods for managing their plastic waste.

Table 6: Distribution of respondents by their overall household practices regarding carbon footprint n=480.

Particulars	Rural (240)		Urban (240)	
	f	%	f	%
Poor (Below 33%)	210	87.50	190	79.17
Average (33 – 66%)	30	12.50	50	20.83
Good (above 66%)	0	0	0	0

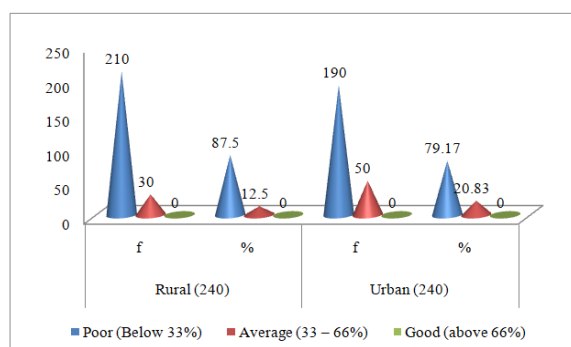


Fig. 5. Distribution of respondents by their overall household practices regarding carbon footprint.

According to the findings presented in Table 6, Fig. 5 a significant majority of both rural and urban respondents, comprising 87.50% and 79.17% respectively, were classified as having poor practices in relation to their carbon footprint. This suggests that the behaviors and actions of these respondents contribute to a higher carbon footprint, indicating a greater negative impact on the environment. Furthermore, the data reveals that only a small proportion of urban respondents, accounting for 20.83%, and rural respondents, making up 12.50%, demonstrated an average practice score concerning their carbon footprint. Although these respondents displayed relatively better practices compared to those in the poor category, their efforts were still deemed insufficient to achieve a more sustainable carbon footprint. Surprisingly, none of the urban or rural respondents were categorized as having good practices related to their carbon footprint. This indicates a lack of individuals who have adopted environmentally friendly behaviors and actions to reduce their carbon emissions and minimize their impact on the environment. Overall, the findings highlight the need for greater awareness, education, and efforts in both rural and urban areas to promote and encourage more sustainable practices that contribute to a reduced carbon footprint.

CONCLUSIONS

In conclusion, the study's findings suggest that both rural and urban communities have poor practices related to carbon footprint, which has made human a significant contributor to carbon emissions and responsible for carbon footprint. To combat climate change, it is essential to create awareness and education about the impact of daily practices on the environment, as well as to implement policies and regulations that promote sustainable practices and reduce carbon emissions. Only through collaborative efforts can we mitigate the negative effects of carbon emissions on the environment and ensure a sustainable future for generations to come.

FUTURE SCOPE

Future actions are necessary to address poor carbon footprint practices among rural and urban respondents. This requires focused awareness campaigns, education initiatives, and community engagement to promote sustainability. Policymakers should enforce regulations promoting eco-friendly behaviors, while investments in renewable energy and improved waste management are crucial. These measures aim to create an

environmentally conscious society and reduce carbon footprints in both rural and urban areas.

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Conflict of Interest. None.

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