Homemakers' Attitude towards Solid Waste Management in Urban Area of Hubli-Dharwad

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Proper waste management is a major concern of public health. It is necessary to create positive behavioral changes toward waste management among the public to control diseases. Objectives were to determine the attitude toward solid waste management among the households of Hubli - Dharwad city in Karnataka, India. A community based cross sectional study was conducted in 67 wards of Hubli- Dharwad city located in the Dharwad district of Karnataka state from January 2021 to December 2021. A total of 400 households were studied and multistage sampling was done. Data was collected by direct interview using a pre-questionnaire and analyzed using SPSS software. The participants responsible for waste management in the household were women. Out of the 400 participants, 83%, 11% and 6% were Hindus, Muslims and Christians respectively. The majority of them (82%) had an educational qualification of high school and were housewives. About 47% of the study population belongs to the upper middle class. Their major sources of information about solid waste management were Self Help Groups (SHGs). In the study, 93.8% of the studied

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population had above average attitudes and 6.2% had below average attitudes toward household waste management. Almost 70% had the belief that the government is not doing anything to fix the garbage problem. About 97%, 88.6% and 92% were willing to do composting, segregation and recycling of waste respectively. . Continuous awareness programs have to be conducted on safe waste disposal and efforts should be made to sustain the supervision of household waste management.

1. INTRODUCTION

"Solid waste may be defined internationally as non-liquid waste materials from domestic, trade, commercial, industrial, agricultural and mining activities and public services" (Reference). "Wastes arising from human and animal activities are normally solid and are discarded as useless or unwanted. The Resource Conservation and Recovery Act of 1976 (RCRA) defines solid waste to include garbage, refuse, sludge from municipal sewage treatment plants, ash from solid waste incinerators, mining waste, waste from construction and demolition and some hazardous wastes" [1].

"Solid waste can be classified in terms of its original use (such as packaging waste), the material (glass, paper, or plastics), its physical properties (combustible or biodegradable), its origin (domestic, commercial, industrial, or agricultural) and the safety parameters (hazardous/ radioactive). Household wastes can be classified as biodegradable and non-biodegradable waste. Biodegradable wastes are wastes like food waste that can be decomposed by biological processes. This should be composted at the community level. Non-biodegradable wastes are wastes like plastics, broken glass, etc. that cannot be decomposed, that can be segregated and sold, or recycled. Waste segregation is the sorting out or separating biodegradable and non-biodegradable waste into separate bins" [2].

"Solid waste management is a service of public health that is often understated in its significance. If a public health emergency like the COVID-19 outbreak exacerbates the solid waste management problem, its true importance as an imperative service becomes more apparent. The crisis triggered by the COVID-19 pandemic has changed the dynamics of waste generation globally in nearly every sector and has therefore raised the need for special attention. The unpredictable variations in the quantity and composition of waste also pressurize policymakers to react dynamically. The most important cause of concern throughout the crisis in the process of waste management, in addition, the mixing of virus infected biomedical waste with the stream of normal solid waste and the lack of active involvement of the citizen and cooperation presents major negative safety and health concerns for the workers involved in the sanitation process" [3].

"Waste should be properly stored before disposal. Storage is the action of accumulating rubbish before disposal" [4]. "There are different kinds of waste like kitchen waste, garden waste, leather, rubber, glass, plastics, electronic waste, etc. E-waste is a common terminology used for electronic equipment such as TV, refrigerators, telephones, air conditioners, computers, mobile phones, etc that is not in use now by the current user" [5]. "Hazardous wastes are those wastes that can cause a hazard to the ecological or environmental balance. These include batteries, cooking oil, pesticides, fertilizers, etc" [6].

"Waste management is the process of collecting, transporting, processing, or disposing of, managing and monitoring waste materials. The term usually relates to materials produced by human activity and the process is generally undertaken to reduce their effect on health, and the environment. The 2011 Census of India estimates a population of 1.21 billion which is 17.66% of the world population. About 0.1 million tonnes of MSW is generated in India every day. The data report indicates that 366 cities in India, which represent 70% of India's urban population were generating 31.6 million tons of waste in 2001 and are currently generating 47.3 million tonnes (2011), a 50% increase in one decade. In the case of Karnataka, 11085 tons of solid waste is being produced every day" (Adogu *et al.* 2015).

"Increasing population, urbanization, industrialization and changing consumption patterns are resulting in the generation of increasing amounts and different types of waste.

There is a need of integrated solid waste management approach such as the incorporation of more environmentally and economically friendly concepts of source separation; recovery of waste; legitimization of the informal systems; partial privatization and public participation" [7].

"Wastes can be reduced by manufacturing products with less packaging, encouraging customers to bring their reusable bags for packaging, encouraging the public to choose reusable products such as cloth napkins and reusable plastic and glass containers, backyard composting and sharing and donating any unwanted items rather than discarding them" [8].

"India has undertaken several waste management programs. In 1999, the Government of India restructured the Comprehensive Rural Sanitation Programme and launched the Total Sanitation Campaign (TSC) which was later (on 1st April 2012) renamed Nirmal Bharat Abhiyan (NBA). The Swachh Bharat Mission was launched on 2nd October 2014 by the Government of India" [9].

The main objective of this study was to determine the attitude toward solid waste management among the homemakers of Hubli-Dharwad in North Karnataka. The findings can be utilized to alter the quality of the environment and thus improve public health.

2. MATERIALS AND METHODS

A community based cross sectional study was conducted in 67 wards of Hubli- Dharwad city in Karnataka state for one year from January 2021-December 2021. A total of 400 homemakers were selected from the urban area by using a random sampling method for the study. The consecutive houses were obtained from each of the 67 wards making the sample size 400. Data was collected by direct interview using a pre-tested semi-structured questionnaire with two parts: Part 1 includes questions on socio-demographic variables such as age, address, religion, caste, head of the family, education and employment of the respondent, family income, type of family, number of family members. Part 2 includes questions on the attitude toward waste disposal. The questionnaire in English has been translated by a language expert into Kannada and re-translated Kannada version back to English and corrections were done accordingly. The person involved in that particular solid waste management was chosen for the interview.

Attitude questions were scored. The maximum score obtainable in attitude was 156 and the minimum was zero. The attitude was graded as below average (0-124) and above average positive attitude (125-156). Data were analyzed with the SPSS 20 software. All results are expressed in frequencies and percentages

In this study, socioeconomic status (SES) was assessed using a modified B.G Prasad (2016) scale. B.G. Prasad scale is based on the per capita income of an individual [10]. It classified the status into five classes.

3. RESULTS AND DISCUSSION

Table 1 shows that out of 400 homemakers, the majority were in the age group 40-49 years (31%). The mean age of the study population was 45.16±11.61 years. This was almost similar to the study done by [11] belonging to the age group of 30-50 years (46.8%).

Table 2 shows that 83% of the study participants belong to the Hindu religion. According to [11], 83% belonged to the Hindu religion followed by Muslim (11%) and Christian religion (6%).

Table 1. Age-wise distribution of the study population (N=400)

Age group (in years)	Frequency	Percentage (%)
20-29	27	6.8
30-39	113	28.2
40-49	124	31.0
50-59	78	19.5
60-69	49	12.2
70-79	9	2.2
Total	400	100.0

Table 2. Religion-wise distribution of the study population (N=400)

Religion	Frequency	Percentage (%)
Hindu	332	83.0
Muslim	44	11.0
Christian	24	6.0
Total	400	100.0

Fig. 1 shows that 70% of the studied population belongs to the nuclear family. Fig. 2 shows that 57% of the study population belongs to a family size of less than or equal to 4 members and 41% belongs to a family size of 5-8 members. These findings are consistent with the NFHS 4 report, 54.8% of the households are with 1-4 numbers of

family members, 45.2% with 5-8 members and 4.9% with more than 9 members [12].

Table 3 shows that the majority (47.8%) of the study population had High school education. There were no illiterate in the study population. Majority (82.5%) of the participants were housewives. According to NFHS-4 report of Kerala, 28.7% of the women have completed 12 or more years of schooling, 19% completed 10-11 years, 34% completed 5-9 years of schooling whereas, 4.2% of women have not done schooling. In the present study, 18% of the women were employed which is similar to the NFHS report Kerala, where 21% among the women in the age group of 15 to 49 years were employed.

Fig. 3 shows that the majority (47%) of the study population belongs to the upper middle class and 3.5% belongs to the lower class. In the study, the majority of the houses have a concrete ceilings (87.8%) followed by tiled (10%), kutcha ceilings (2%) and asbestos (0.2%). Around 97% of them have their own house and 3% live in a rented house. Based on the updated B G Prasad classification (2016) of socioeconomic status, 10% of the study population belonged to the upper class, 47% belonged to the upper middle class and very few belonged to the lower class (3.5%). In NFHS 4 report Kerala, based on wealth quintile, 48% of the households were in the highest quintile and 0.5% in the lowest wealth quintile [13]
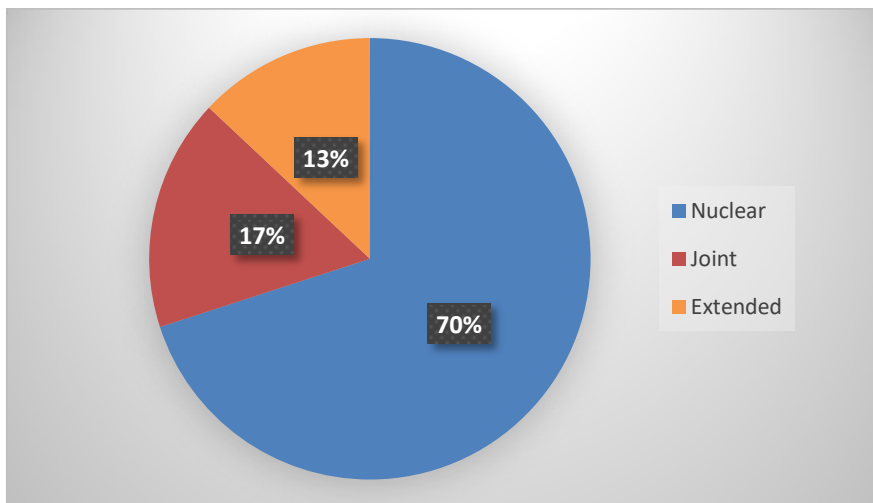

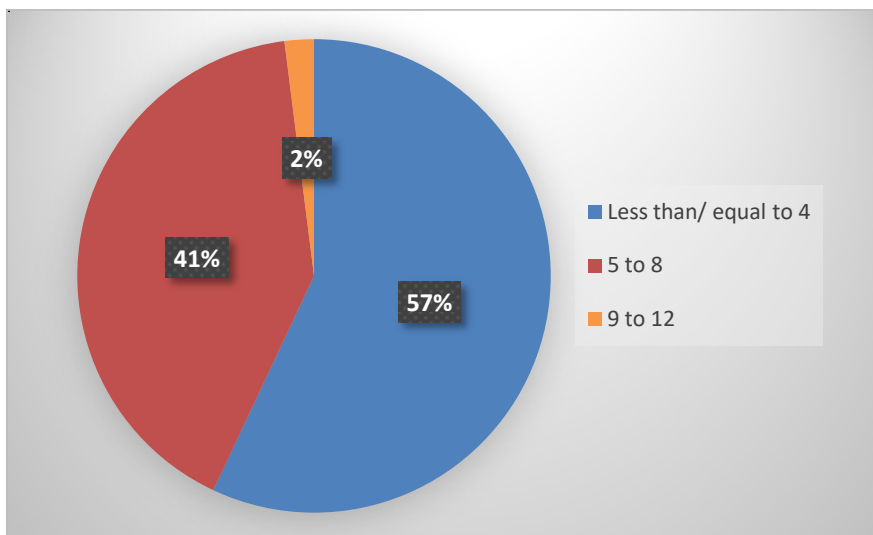**Fig. 1. Distribution by the type of family (N=400)**

Fig. 2. Distribution by the size of the family (N=400)

Table 3. Socio-demographic factors of the study population (N=400)

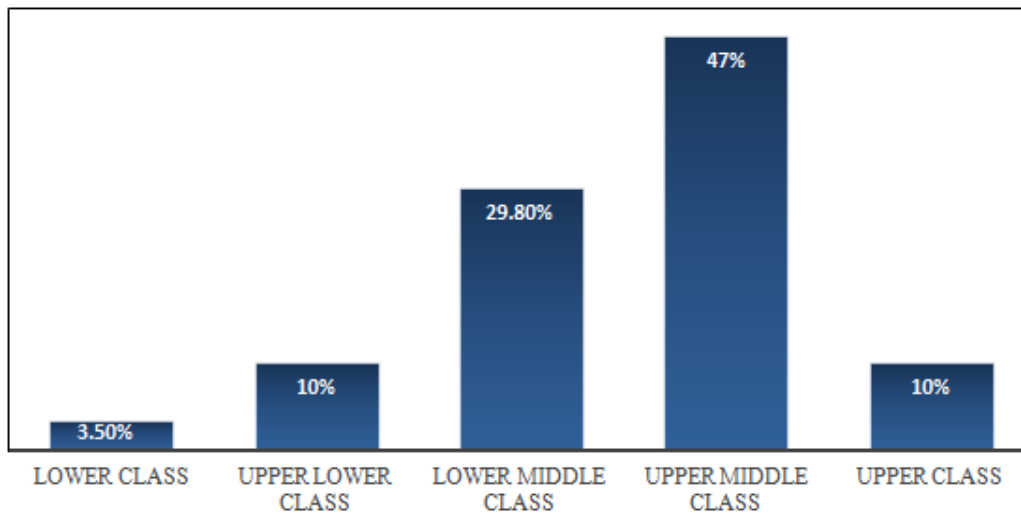|	Frequency	%
Education		
Primary school Middle school	30	7.5
	42	10.5
High school intermediate school/ Post diploma	191	47.8
	119	29.8
Graduate	18	4.5
Total	400	100.0
Occupation		
Unemployed/Housewife	330	82.5
Unskilled	45	11.2
Semi-skilled	11	2.8
skilled	6	1.5
Clerical/shop owner/ Farmer	5	1.2
Semi-professional	3	0.8
Total	400	100.0

Fig. 3. Socio-demographic status* of the study population (N=400)

Table 4 shows that percent of homemakers strongly agreed with the statement that waste management awareness classes should be held in the community, and only 75% strongly agreed to have environmental education in school. About 95% strongly agreed and 18% agreed that they should play an important role in reducing household waste generation. Out of the total, 59.5%, 33.5% and 4.2% strongly agreed, agreed, and disagreed with the statement that the purchase decision they make can increase or decrease the amount of garbage the household must get rid of. Similarly, by [14], 78% agreed that public education was appropriate to tackle solid waste problems, and 88% agreed that there should be waste management education in the school curriculum. According to Banga (2013), 63.5% strongly agreed, 27.5% agreed and 2.8%

strongly disagreed with the statement that generated waste could be managed at the source itself. Around 27% strongly agreed, 43% agreed and 14% strongly disagreed that local self-government was not doing enough to fix the garbage problem. Although half (49.5%) of the participants strongly disagreed that people throw garbage in the streets as they have no other means, there were 26.5% people agreed that no other means for garbage disposal.

Table 5 shows that 93.8% of the studied population had above average attitude towards household waste management and 6.2% had below average attitude. Similarly, in a study done by [15] 55.4%, 38.6% and 6% of the participants had moderate, good and poor levels of attitude toward environmental sanitation respectively.

Table 4. Attitude toward solid waste management

	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
A. Solid waste management	N (%)	N (%)	N (%)	N (%)	N (%)
A1. waste management awareness class should be held in community	400 (100)				
A2. Environmental education should be taught in school	300 (75)	81 (20.2)	18(4.5)	1 (0.2)	
A3. Household should be clean and free of waste	393 (98.2)	5 (1.2)	1 (0.2)		1 (0.2)
A4. I should play an important role in reducing household waste generation	380 (95)	18 (4.5)	1 (0.2)	1 (0.2)	
A5. The purchase decision I make can increase or decrease the amount of garbage my household must get rid off	238 (59.5)	134 (33.5)	7 (1.8)	4 (1)	17 (4.2)
A6. I don't think that burning garbage can be bad for my health and others health	52 (13)	15 (3.8)	8 (2)	12 (3)	313 (78.2)
A7. people throw garbage in streets as they have no other means of getting rid of garbage	47 (11.8)	106 (26.5)	22 (5.5)	27 (6.8)	198 (49.5)
A8. local self-government is not doing enough to fix the garbage problem	109 (27.2)	172 (43)	25 (6.2)	36 (9)	58 (14.5)
A9. Regular collection of garbage is only solution to garbage problem	280 (70)	93 (23.2)	12 (3)	8 (2)	7 (1.8)
A10. Generated waste can be managed at source/household itself	254 (63.5)	110 (27.5)	14 (3.5)	11 (2.8)	11 (2.8)
B. Willingness to participate					
B1. composting	291 (72.8)	97 (24.2)	10 (2.5)		2(0.5)
B2. recycling	206 (51.5)	163 (40.8)	19 (4.8)	4 (1)	8(2)
B3. Willingness to segregate materials for collection	199 (49.8)	155 (38.8)	31 (7.8)	9 (2.2)	6(1.5)
B4.Willingness to pay for pick up for recyclable materials	222 (55.5)	148 (37)	20 (5)	3 (0.8)	7(1.8)
B5. willingness to give away plastic bottles for recycling	232 (58)	116 (29)	26 (6.5)	7 (1.8)	19(4.8)
B6. willingness to buy lesser amount of throwaway products	263 (65.8)	126 (31.5)	5 (1.2)		6(1.5)
B7. willingness to gather more information on reduction of garbage	320 (80)	67 (16.8)	8 (2)	1 (0.2)	4(1)
C. Composting					
C1. takes up a lot of time	175 (43.8)	192 (48)	6 (1.5)	10 (2.5)	17 (4.2)
C2.takes a lot of effort	157 (39.2)	203 (50.8)	6 (1.5)	13 (3.2)	21 (5.2)
C3. demand high degree of technical knowledge	173 (43.2)	190 (47.5)	8 (2)	14 (3.5)	15 (3.8)
C4. requires lot of space	72 (18)	195 (48.8)	12 (3)	35 (8.8)	86 (21.5)
C5. not worthwhile unless there is lot of waste	95 (23.8)	158 (39.5)	9 (2.2)	25(6.2)	113 (28.2)
C6. compost pits attracts insects and rodents	137 (34.2)	168 (42)	5 (1.2)	22 (5.5)	68 (17)
C7. compost pits are unsightly	98 (24.5)	160 (40)	11 (2.8)	36 (9)	95 (23.8)
D. Issues for concern	**Concerned**	**Not concerned**	**No opinion**		
	N (%)	N (%)	N (%)		
E1. health risk is related to burning/dumping garbage	400 (100)				
E2. Illegal dumping polluting water body	400 (100)				
E3. Diseases related to improper storage and disposal	400 (100)				
E4. Flooding due to garbage blocking drains and gullies	398 (99.5)	1(0.2)	1 (0.2)		
E5. Litters/illegal dumping	398 (99.5)	2 (0.5)			

Table 5. Assessment of attitude towards solid waste management (N=400)

Grading	Frequency	Percentage (%)
Above average	375	93.8
Below average	25	6.2
Total	400	100.0

Table 6. Two-way ANOVA test for homemakers' attitude toward solid waste management based on their age, education and occupation

Source of variation	Sum of squares	Degree of freedom	Mean squares	F-value	P-value
Age	945.25	2	472.63	3.828**	
Attitude towards SWM	3028.5	1	3028.5	24.53**	0.008
Error	246.9	2	123.45		
Total	4220.66	5			
Education	120.49	2	60.245	54.031**	
Attitude towards SWM	1432.22	1	1432.22	1284.5**	0.006
Error	2.23	2	1.115		
Total	1554.94	5			
Occupation	26261.08	2	13130.54	61.587**	
Attitude towards SWM	118244.9	1	118244.9	554.62**	0.002
Error	426.4033	2	213.2017		
Total	144932.4	5			

*** Significant at P<0.01*

Table 6 shows the results obtained due to the application of the two-way Analysis of Variance (ANOVA) test for homemakers' attitudes toward solid waste management based on their age, education and occupation. The F values computed as 3.828, 54.031 and 61.587 for homemakers' age, education and occupation respectively due to variation in their attitude towards solid waste management are found to be highly significant (at P<0.01). This indicates that there exists a significant variation among the different parameters due to variations in their attitude toward solid waste management. Further, the F values computed as 24.53, 1284.5 and 554.62 for homemakers' attitudes towards solid waste management due to variation in their age, education and occupation respectively are also found to be highly significant (at P<0.01). This also shows a significant variation in homemakers' attitudes toward solid waste management due to variations in their age, education and occupation.

4. CONCLUSION

A community based cross sectional study was conducted in Hubli – Dharwad city of Dharwad district in Karnataka to assess the Knowledge, Attitude and Practice of solid waste management among the homemakers. Solid waste is a difficult problem that requires public cooperation for successful implementation. Community participation is an essential tool for reducing solid waste. The segregation of waste at source and promotion of recycling or reuse of segregated materials reduces the quantity of waste. The community should be trained to store wet & dry waste separately. The collection should be done door to door to improve efficiency in all the cities. Biodegradable waste can be decomposed by natural methods. Energy recovery such as biogas and power generation could also be thought of as a measure using biodegradable wastes. Strict implementation of solid waste management regulation by municipal corporation and local bodies can contribute to better management of waste. The study also proved that intervention programs would significantly enhance the knowledge, attitude and practices of solid waste management among homemakers.

5. RECOMMENDATIONS

- Knowledge of waste management should be promoted. Education should be focused in groups rather than one-to-one contact. This can be achieved through organizing workshops, seminars and conferences on solid waste management at schools, colleges and residence associations.
- Source segregation of waste should be strictly implemented. The biodegradable fraction of the waste can be composted at the household level.

753

- Legislation on banning the indiscriminate use of plastic should be strictly enforced as the public is used to stick rather than carrot methods of implementation.
- There is a dire need for community participation in proper solid waste management.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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