

Original Research Article

Study on attitude of household waste management in a rural area of Northern Kerala

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ABSTRACT

Background: Proper waste management is a major concern of public health. It is necessary to create positive behavioural changes towards waste management among public in order to control diseases. Objectives were to determine the attitude towards solid and liquid waste management among the households of Cheruthazham Panchayat in Northern Kerala.

Methods: A community based cross sectional study was conducted in Cheruthazham Panchayat, under Kalliasseri block, located in Kannur district of Kerala state from June 2017 to July 2018. A total of 400 households were studied. Multistage sampling was done. Data was collected by direct interview using a pre-tested semi-structured questionnaire. Data was analyzed using SPSS software.

Results: The participants responsible for the waste management in household were women. Out of the 400 participants, 83%, 11% and 6% were Hindus, Muslims and Christians respectively. Majority of them (82%) had an educational qualification of high school and above. Most of them (82.5%) were housewives. About 47% of the study population belongs to upper middle class. Their major sources of information about solid waste management were kudumbasree class. In the study, 93.8% of the study population had above average attitude and 6.2% had below average attitude. Almost 70% had the belief that 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.

Conclusions: Majority of the participants had above average attitude towards household waste management. Continuous awareness programmes have to be conducted on safe waste disposal and efforts should be made to sustain the supervision of household waste management.

Keywords: Household, Waste management, Attitude

INTRODUCTION

Solid waste may be defined internationally as the non-liquid waste materials from domestic, trade, commercial, industrial, agricultural and mining activities and from public services. 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 their original use (such as packaging waste), the material (glass, paper, or plastics), their physical properties (combustible or biodegradable), their origin (domestic, commercial, industrial or agricultural), and the safety parameters (hazardous/ radioactive).² The household wastes can be classified as biodegradable and

nonbiodegradable 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 out the biodegradable and nonbiodegradable waste in to separate bins.²

Waste should be properly stored before disposal. Storage is the action of accumulating rubbish before disposal.⁴ There are different kinds of wastes 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 which can cause a hazard to the ecological or environmental balance. These includes batteries, cooking oil, pesticides, fertilizers etc.⁶

Liquid waste is the used and unwanted water. Waste water generated in the toilet is called "Black water". It is also called as sewage, which contains the excreta and other harmful pathogens. Waste water generated in the kitchen, bathroom and laundry is called "Greywater".³ It is also termed as sullage. Lack of a proper environmental sanitation system and poor hygiene can lead to deterioration of public health.⁷ Sanitation is a crucial barrier to the faecal-oral disease transmission and the environmental contamination.⁸

Waste management is the process of collecting, transporting, processing or disposing, managing and monitoring of 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.⁹

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.¹⁵ 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.¹⁰ In case of Kerala, 8000 tons of garbage is been produced everyday, of which 7% is plastic waste.¹¹

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 to practice integrated solid waste management approach such as incorporation of more environmental and economic friendly concepts of source separation; recovery of waste; legitimization of the informal systems; partial privatization and public participation.¹²

Wastes can be reduced by manufacturing products with less packaging, encouraging customers to bring their own 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.¹³

India has undertaken several waste management programmes. In 1999, the Government of India restructured the Comprehensive Rural Sanitation Programme and launched the Total Sanitation Campaign (TSC) which was later (on 1 April 2012) renamed Nirmal Bharat Abhiyan (NBA).¹⁴ Kerala has launched a Clean Kerala mission in 2002, with the objective of creating a garbage free Kerala.¹⁵ One of the recent initiatives of Kerala government in 2016 was "Nava Kerala Mission".¹¹

The purpose of this study is to determine the attitude of domestic waste management among rural people. The findings can be utilized to alter the quality of environment and thus improve public health.

Aim and objective of the study were to determine the attitude towards solid and liquid waste management among the households of Cheruthazham Panchayat in Northern Kerala.

METHODS

Study design: A community based cross sectional study.

Study setting

Cheruthazham Panchayat, under Kalliasseri block is located in Kannur district of Kerala state. It has got a total of 9454 households and a population of around 45000.

Study population

Includes households in Cheruthazham Panchayat of Kannur district.

Inclusion criteria

All households with permanent residents of Cheruthazham Panchayat for atleast a period of 6 months.

Study period

18 months, from June 2017 to July 2018.

Sample size

A study done on household waste disposal in a Panchayath of K.S. Hegde Medical Academy, Mangalore in 2015, showed that about 55% of households reduce, reuse and recycle waste materials.(13) so by taking 55% as prevalence rate and 10% as relative precision, sample

size was 327 as per $4pq/d^2$, where P=prevalence, Q=1-P and d = precision. By considering 10% of non response rate, sample size obtained was 360, rounded off to 400.

Sampling method: Multistage sampling.

First the area of Cheruthazham Panchayat with 17 wards was divided into four zones (North, south, west and east) based on stratified sampling so that each zone has 4 or 5 wards. Secondly, from each of these 4 zones, two wards were selected randomly. Thus 8 wards were selected.

Selection of houses

First household was randomly selected by spinning the bottle at one of the junctions and the house in which ever direction the mouth of the bottle pointed taken as the first house. Then the consecutive houses were visited till 50 houses were obtained from each of the eight wards making the sample size of 400.

Study materials and tools

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 attitude of waste disposal. The questionnaire in English has been translated by a language expert in to Malayalam and re-translated the Malayalam version back to English and corrections were done accordingly. The person involved in that particular household waste management was chosen for interview.

Scoring system

Attitude questions were scored. Maximum score obtainable in attitude was 156 and minimum was zero. Attitude was graded as below average (0-124) and above average positive attitude (125-156).

Data was analyzed with software SPSS 16. All results are expressed in frequencies and percentages.

Pilot testing

Pilot testing was done in twenty households of study area and the required changes were made in the questionnaire.

Socio economic scale

In this study, socio economic status (SES) was assessed using modified B.G Prasad (2016) scale. B.G. Prasad scale is based on the per capita income of an individual. It classified the status into five classes.¹⁶

RESULTS

The total households taken in the study was 400. The participants responsible for the waste management in household were women.

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 1 shows that out of 400 study population, majority were in the age group 40-49 years (31%). The mean age of the study population was 45.16 ± 11.61 years. All the respondents were females (100%)

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

Table 2 shows that, 83% of the study participants belong to Hindu religion.

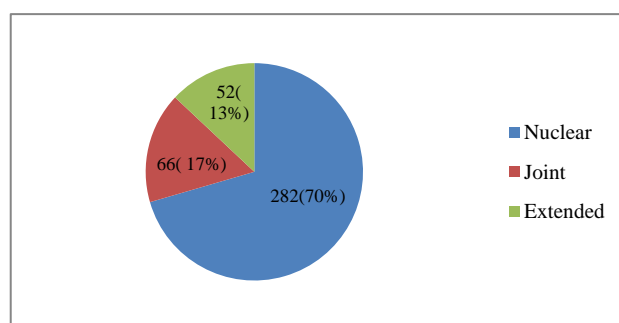


Figure 1: Distribution by the type of family (n=400).

Figure 1 shows that 70% of the study population belong to the nuclear family.

Figure 2 shows that 57% of the study population belongs to a family size of less than or equal to 4 members and 41% belong to family size of 5-8 members.

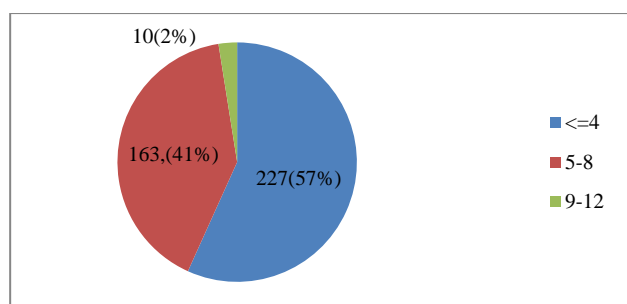


Figure 2: Distribution by size of the family (n=400).

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

Education	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

Table 4: Attitude towards household 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)

Table 3 shows that 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.

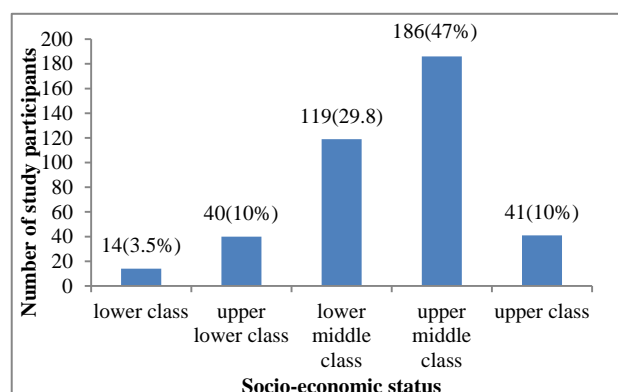


Figure 3: Socio-demographic status* of the study population (n=400).

*Updated B G Prasad scale 2016.

Figure 3 shows that majority (47%) of the study population belong to upper middle class and 3.5% belong to lower class. In the study, majority of the houses have concrete ceiling (87.8%) followed by tiled (10%), kutchha ceiling (2%) and asbestos (0.2%). Around 97% of them have their own house and 3% live in rented house.

Table 5 shows that 93.8% of the study population had above average attitude towards household waste management.

	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
	N (%)	N (%)	N (%)	N (%)	N (%)
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. Liquid waste					
D1. it's important to dispose liquid waste from kitchen to separate drainage system	338 (84.5)	45 (11.2)	10 (2.5)		7 (1.8)
D2. Human excreta should be disposed in septic tank	395 (98.8)	5 (1.2)			
D3. Stagnation of liquid waste can cause diseases.	396 (99)	3 (0.8)	1 (0.2)		
E. 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)		
E6. presence of rats	398 (99.5)		2 (0.5)		

Table 5: Assessment of attitude towards household waste management (n=400).

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

DISCUSSION

Socio-demographic profile

The majority of the study participants were in the age group 40-49 years (31%) and 30-39 years (28.2%). The mean age of the study population was 45.16±11.61 years. All of them are female respondents (100%). This was almost similar to the study done by S. Mahima and V.L.

Lavanya in Kerala, where the majority of the age group belong to the age group of 30-50 years (46.8%).¹⁷

In this study population, 83% belonged to Hindu religion followed by Muslim (11%) and christian religion (6%). Although reports from NFHS 4 rural India showed that 83.7% Hindus, 10.6% Muslims and 2.5% Christians, NFHS-4 Kerala showed that majority of the household head belonged to hindu (58.8%) followed by muslim (22.9%) and christian (18.2%).⁽¹⁸⁾ But our study is in

accordance with the data available from Cheruthazham Panchayat, Kannur, which is the study setting, where Hindu religion comprised 80%, Muslim (13%) and Christian (7%). In this study nuclear families constituted the majority (70%). According to NFHS 4 report Kerala, nuclear family constituted 57.9%.¹⁸

In the present study, 57% belonged to a family size with less than or equal to four members. About 41% and 2% belonged to the family size with 5 to 8 members and 9 to 12 members respectively. These findings are consistent with the NFHS 4 report. In 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.¹⁹

In the study, 65.8% of the women had an education level up to high school, 34.3% had an education qualification of more than high school and 4.5% were graduates. None of them were illiterates. 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.¹⁸

Based on updated B G Prasad classification (2016) of socio-economic status, 10% of the study population belonged to upper class, 47% belonged to upper middle class and very few belonged to 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.¹⁸

In the study, majority of the houses have concrete ceiling (87.8%) followed by tiled (10%), kutchha ceiling (2%) and asbestos (0.2%). Around 97% of them have their own house and 3% have rented house. The NFHS 4 report India found that 89% of households have pucca houses, 0.4% kachha house and 10.5 percent have semi-pucca houses.⁽¹⁹⁾ In another household survey, 82% of the families in Kerala (Malappuram) were living in own houses.²⁰

Attitude towards household waste management

In the study, 93.8% of the study population had above average attitude and 6.2% had below average attitude. Similarly, in a study done by Duru et al, 55.4%, 38.6% and 6% of the participants had moderate, good and poor level of attitude towards environment sanitation respectively.²¹

Solid waste management

In the study, even though 100% of them strongly agreed to the statement that waste management awareness class

should be held in community, only 75% strongly agreed to have environment 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 off. In a study done by

Davies et al, 78% agreed that public education was appropriate to tackle solid waste problems, 88% agreed that there should be waste management education in school curriculum.²²

In the study, 63.5% strongly agreed, 27.5% agreed and 2.8% strongly disagreed to 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 streets as they have no other means, there were 26.5% who agreed that people have no other means for garbage disposal. In contrary to these findings, study done by N Davies showed that 100% of them agreed that government was not doing enough in case of waste management and 95% of the participants was not in agreement with the statement that people throw garbage in streets as they have no other means of disposal.²²

Willingness to participate

In the study, 72.8% strongly agreed and 24% agreed to participate in composting whereas, 2.5% had no opinion about it. Only 3% and 3.7% were not willing to participate in recycling and segregation of waste respectively. Almost 55.5% strongly agreed, 37% agreed and 2% disagreed to pay for the pick up of recyclable materials. About 87% agreed to reduce the waste. According to a study done by S Devi et al, almost 36% and 33% have not even heard of composting and recycling respectively, which are contrary to our findings. About 87% were ready to segregate waste and 71% were ready to pay for the pick up of recyclable materials, which almost matches with the findings of the present study.²³

Composting

In the study, 44% and 39% of the respondents strongly agreed that composting takes up a lot of time and effort while 4% and 5% strongly disagreed to this statement respectively. Almost 90% believed that composting needed high technical knowledge. About 49% agreed that it requires lot of space but, 22% strongly disagreed to it. Majority (42%) agreed that compost pits attracts insects and rodents. The study carried out by T Dhanalakshmi reported that 19.2% of the respondents were ready to

separate the recyclable materials and do composting in their garden/yard.²⁴

Liquid waste

According to the present study, 84.5% strongly agreed to the fact that it is important to dispose liquid waste to separate drainage system whereas, 1.8% strongly disagreed to this. About 98.8% strongly agreed that human excreta should be disposed in septic tank and 99% strongly agreed that waste water stagnation can cause diseases. Another study conducted by C Duru et al, 82% disagreed that urination and defecation could be done near the wells. Almost 70% disagreed to dispose sewage in to stream.²¹

Issues for concern

In the study, 100% of the respondents were concerned about the health risk related to burning, illegal dumping polluting water body and diseases related to improper storage and disposal. This was in contrast to the study done by N Davies et al where, 13% of the residents were not concerned and 47% had no opinion about illegal dumping polluting water body.²² In the present study, only a very few were not concerned about flooding due to garbage blocking drains (0.2%), litters (0.5%) and presence of rats (0.5%). This findings does not match with the study done by N Davies et al, where only 83% were concerned about presence of rats.²²

CONCLUSION

A community based cross sectional study was conducted in Cheruthazham Panchayat of Kannur district to assess the Knowledge, Attitude and Practice of household waste management among the residents. Among 400 study participants, all were females and their mean age was 45.16±11.61 years.

Out of the 400 participants, 83%, 11% and 6% were Hindus, Muslims and Christians respectively. Majority of them (82%) had an educational qualification of high school and above. Most of them (82.5%) were housewives. About 47% of the study population belongs to upper middle class.

In the study, 93.8% of the study population had above average attitude and 6.2% had below average attitude. All of them strongly agreed to have an awareness class on waste management in the community. Almost 70% had the belief that 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. They were all very much concerned about the illegal waste dumping and diseases related to improper waste storage and disposal.

The good attitude in them may be due to the improved neighbourhood network and the good monitoring activities of local self government.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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