Original Article

Assessment of waste disposal practices among residents in Mappedu, Thiruvallur district, Tamilnadu

Kavin Amuthan A.M [1] Sarika Balaganesh [2]

1 Assistant Professor, Department of Orthopedics, Saveetha Medical College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai- 602105

2 * Post graduate student, Dept of public health dentistry, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai- 600077

Abstract

Introduction : Solid waste is the unneeded or useless which are not liquid or gas generated from human activities in residential, industrial or commercial areas. Various types of solid waste are Municipal waste, Industrial waste, Construction and demolition waste, Electronic waste, Hazardous waste. Outbreak of Dengue fever was most common among the residents of Thiruvallur in 2019. The investigation was started to identify the potential exposure and possible recommendation and education to the villagers on waste management. Hence the aim of the research was to investigate the rural resident's practices in solid waste disposal and their health hazard implications to the community in Mappedu village.

Materials and methods : Two methods such as the observation and questionnaire survey was employed in the current research. No waste collection system was present in the village based on observation method. Dumping of waste was most common among the villagers and burning of waste were also common as there was inadequate awareness among the people as burning waste produces harmful gases. Diseases which are very prone to lack of hygiene such as dengue, malaria, diarrhea, dysentery, cholera, typhoid and worm diseases were projected from the questionnaire. To minimize the risk of environment and human health appropriate hygiene practices and proper disposal of waste needs to be practiced.

Results : Most of the rural residents disposed the waste at a common point and minimal waste were burnt. There was a significant difference between the frequency of hospital visits and the waste disposal method.

Conclusion : The villagers must be educated on the proper solid waste management as it leads to deteriorating health and be fatal.

Keywords : Solid wastes, Waste disposal facilities, Risk factors, Waste management, Health knowledge

Address for Correspondence:

Sarika Balaganesh, Post graduate student, Dept of public health dentistry, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Poonamallee, Chennai-600077, India.
Email-Id: **drsarika1995@gmail.com**

INTRODUCTION

A vector is an organism, typically an insect or other arthropod, that can transmit disease from one host to another (1). Vectors can carry and transmit a variety of disease-causing pathogens, such as bacteria, viruses, and parasites, to humans and other animals. Seven lakhs' deaths were reported every year from diseases such as Dengue, Schistosomiasis, Malaria, Leishmaniasis, Human african Trypanosomiasis, Yellow fever, Onchocerciasis, Japanese encephalitis and Chagas disease. Distribution of vector-borne diseases is determined by a complex set of demographic, environmental and social factors (3). Dengue virus is transmitted by female mosquitoes mainly of the species Aedes aegypti and, to a lesser extent, Ae. Albopictus (4).

In 2020, dengue affected several countries, with reports of increases in the numbers of cases in Bangladesh, Brazil, Cook Islands, Ecuador, India, Indonesia, Maldives, Mauritania, Mayotte (Fr), Nepal, Singapore, Sri Lanka, Sudan, Thailand, Timor-Leste and Yemen. Dengue continues to affect Brazil, India, Vietnam, the Philippines, Cook Islands, Colombia, Fiji, Kenya, Paraguay, Peru and, Reunion islands, in 2021. All over Tamil Nadu, 493 persons have been affected by Dengue in November 2021. In October 2020, 30,000 (dengue-related) tests were conducted while it was 1.21 lakh this October 2021(5). Thiruvallur district ranks 3rd in Tamilnadu and more children were affected from dengue fever. Villages in Thiruvallur contribute to the maximum dengue cases and mortality due to this vector borne diseases (6). The increased risk of diarrhoeal diseases following natural calamities like cyclones and floods has been documented worldwide (7). Specifically, these calamities like flood, Tsunami alter the existing water supply system, sanitation and sewage system, and thus increase risk of infectious diseases (8).

Emerging waste streams, such as electronic waste, pharmaceutical waste, and plastic waste, pose new challenges for waste management. Major gaps in research are the lack of accurate and comprehensive data on the amount and composition of waste generated in different regions and countries. Without this information, it is difficult to design effective waste management strategies and policies. (9). Another lacuna of the solid waste disposal is the the environmental and health impacts of these practices, as well as on strategies for improving their safety and sustainability. Waste management is not just a technical or environmental issue, but also a social and cultural one. However, there is limited research on the social and cultural factors that influence waste generation, disposal practices, and attitudes towards waste management. Hence the aim of the project was to investigate the solid waste disposal practices and their health hazard implications to the community in Mappedu village, Thiruvallur district.

MATERIALS AND METHODS

Study setting: Mappedu village in Thiruvallur district

Duration of the study: 3 months (December 2021-March 2022)

Total population of the Mappedu village was 1163 (2011 census), Door to door survey was done in the village. The study was conducted by considering several solid waste disposal sites based on two methods, observation and questionnaire survey.

A self- administered questionnaire was given to the residents of Mappedu village in Thiruvallur district and were asked them to fill. The questionnaire covered the demographic details, number of members in the house, education status, occupation. The participants were asked regarding their hospital visit in a month. Type of house, toilet facilities, drainage linked to home, waste collection system, annual income, source of water, Power and electricity information were obtained. The participants were recruited after getting their consent and the information disclosed by them was maintained privy from other participants of the study.

Inclusion criteria: Residents of Mappedu village, Migrants to the village were included in the study.

Exclusion criteria: Differently abled people, villagers who were not interested were excluded from the study.

Statistical analysis: SPSS version 25 was used to perform the analysis. Data were entered in the Excel spreadsheet and was transferred to the SPSS Software. Descriptive statistics was done and Chi-square association was done to determine the level of significance between the variables.

RESULTS

Totally 370 households and 1090 participants were involved in this study. Males were 467 and females 623 were present in this study (Fig 1). Based on the question "Type of house"- 65% were residing in Pucca and 30% Kutcha houses 5% were homeless. 71% of the household had covered drainage linked to the house and 29% had open drainage linked to the house (Table 1). 71% of the houses in village had covered drainage system and 29% of the houses had open drainage system. 81% of the villagers stated that they dispose waste at the common point and 19% stated that they burn the waste (Table 1). Based on observation method, solid waste was not disposed appropriately and dumping of waste was most common among the villagers and burning of waste were also common as there was inadequate awareness among the people as burning waste produces harmful gases. Hospital visit was determined using the second method which is the questionnaire survey as one time a month and three times a month. Chi-square association test was performed to determine the level of significance between waste collection system and hospital visit. There was a significant difference between waste being disposed at a common point and number of hospital visit per month among the participants (Table 2). 81% of the participants disposed waste at a common point and there was a frequent visit to hospital (3 times per month) and 19% of the villagers burnt the waste and there was once a month hospital visit.
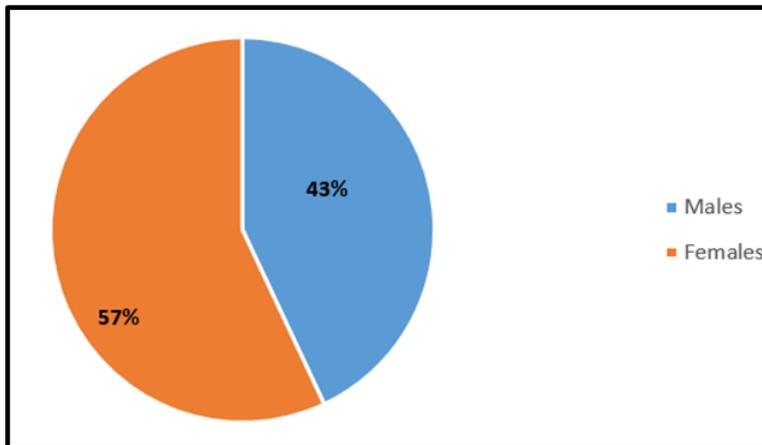

Figure 1: Pie chart representing the Gender distribution among participants
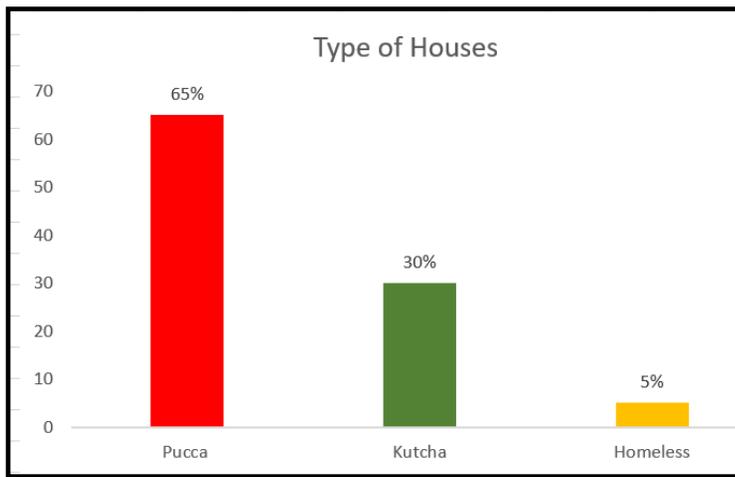
Figure 2: Bar chart representing the types of houses in the household

	Frequency(n)	**Percentage (%)**
Drainage linked to house		
Covered	773	71%
Open	317	29%
Waste collection system		
Common point	882	81%
Waste burnt	207	19%

Table 1: Drainage Facility and waste collection system in target village

Type of waste collection	Hospital visit		Total	p-Value
	Once a month visit	Thrice a month visit		
Common point	52	253	305	
Burnt waste	22	43	65	0.003
Total	74	296	370	

Table 2: Association between Hospital visit and Waste collection system

DISCUSSION

Previous study showing that urban biological vector-borne diseases, especially Aedes-borne diseases, are associated with solid waste accumulation, but vector preferences vary over season and region, which coincides with the results of the current study (10). To prevent vector-borne diseases permanently, it is necessary to consider and manage solid waste management effectively (11). A community awareness needs to protect mankind from vector-borne diseases is suggested by another study conducted in Kerala (Retheesh Babu Gopalan et al, 2021) (12). The hepatitis E virus outbreak was mainly due to water-borne transmission resulting from leakage from the pipeline (13). Leakage of water pipeline due to broken or poor construction was the most reported cause underlying the outbreak (14). The broken water pipelines caused fecal or sewage contamination of the drinking water supply, while another underlying cause of the outbreak was the failure of water treatment (such as filtration or chlorination). This failure resulted in the supply of grossly contaminated drinking water to households. (15). The underlying cause of the outbreak was also reported to be the use of untreated water from rivers and springs. Contamination of water supplies with feces was facilitated by several HEV outbreaks that occurred following flooding or heavy rainfall (16). One study reported food contamination as the likely cause of the outbreak of HEV aboard a cruise ship (17). The most reported control measures during HEV outbreaks were chlorination of the water supply, followed by repairing the broken water pipeline (18). Improving general hygienic precautions such as hand washing and boiling of drinking water is a simple and low-cost intervention to prevent HEV transmission during an outbreak (19). Providing an alternatively safe water supply, such as containers of safe drinking water, was also reported (20). Lack of proper facilities for disposal of human feces is one of the underlying factors responsible for outbreaks, particularly in refugee camps. Therefore, hastening of latrine construction was reported as a control measure during HEV outbreaks in the refugee camps (21).

A higher percentage of HEV outbreaks that have occurred in many other countries may not be reported or well-documented, mainly due to the absence of a surveillance system of HEV infection or lack of serology and PCR confirmation. Mohan et al's 2016 study on the outbreak of Acute diarrheal disease in Thiruperur village in Tamilnadu found that the consumption of water contaminated with E. coli supplied through damaged subterranean pipelines post-cyclone was the cause (22). We recommended the replacement of subterranean pipelines and the distribution of chlorinated water. Point-of-use chlorination methods and drinking boiled water have proved to be effective in preventing waterborne diseases. These alternative methods for providing safe water should be implemented in disaster preparedness and response plans in India. The practice of open-air defecation along the main water sources poses a threat for fecal contamination, and the chances would increase during floods (23). Not all organisms found in contaminated drinking water may be pathogens; however, any pathogen that enters a water delivery system with the potential for causing an outbreak would increase the likelihood of an outbreak. In most parts of India, the frequency of drinking water supply is intermittent, thereby increasing the risk of contamination owing to the negative suction pressure between the successive supplies (24). In the current episode, we could not identify any pathogens in the stools; however, we identified E. coli in the water specimens, indicating the possibility of fecal contamination of drinking water. In general, flooding increases the likelihood of contaminated water entering the submerged or damaged pipelines, increasing the risk of outbreaks of diarrheal diseases such as cholera (25). This could have been the case in the current episode, wherein fecal contamination could have occurred due to floods post-cyclone (26). Diarrheagenic E. coli (DEC) is the most frequently implicated organism in epidemic and endemic diarrhoea worldwide (27). However, conventional phenotypic methods make it difficult to distinguish DEC strains from normal fecal flora, especially in resource-poor settings across LMICs (28). The presence of E. coli in the water is often linked to diarrheal outbreaks, despite the limitations of such an association, and is widely used as an indicator of recent fecal contamination (29). Tamil Nadu is highly susceptible to cyclones and floods, resulting in the breeding of water-borne diseases such as cholera.

Although cholera outbreaks have become less frequent due to measures taken by the government of Tamil Nadu, outbreaks in 2010, 2011, and 2019 require more thorough analysis and surveys to prevent further spread of infection (30). In 2011, an outbreak in the shadow area was caused by untreated municipal water supply, and samples were taken from suspected cholera. The entire Tamil Nadu region was further affected by Cyclone "Thane" in 2011. The study may have a few limitations, as the causative organism responsible for the outbreak could not be confirmed.

CONCLUSION

Providing proper awareness to the rural residents about the waste disposal methods and the ill effects caused is of utmost important. This study concluded that multiple hospital visits were seen in households with inappropriate waste disposals. Inspite of the limitation in the present study this study proves that proper awareness is the crucial part in villagers as this may cause various diseases.

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Conflicts of interest

There are no conflicts of interest

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