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Household Solid Waste in Semi – Urban Area: A case Study in Lamlongei (Mantripukhri), Imphal, Manipur

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ABSTRACT

According to the World Bank report, household solid waste is expected to grow at a rate twice as fast as the population growth rate. Developing nations are anticipated to experience a substantial impact from the unregulated generation of waste compared to their counterparts in developed countries. In this study, direct sampling method is utilized, encompassing household surveys to assess both the quantity and composition of solid waste. The characterization process involves manual hand sorting. This study focuses on Semi - Urban Household Solid Waste in Lamlongei, Imphal, Manipur. Thirty households in and around Lamlongei, Imphal were selected for the study. The investigation is conducted consistently over a period of seven days. The study revealed that the highest proportion in the waste composition is biodegradable, with food waste (45.1%) being the predominant component, while hazardous waste (0.056%) constitutes the smallest percentage. The results obtained from this study, which analyses the composition of solid waste, can serve as a valuable resource for academic and policy-related purposes. These findings can guide future studies and contribute to enhancing the efficiency of household solid waste management in Imphal, Manipur.

Key words: *Solid Waste, Semi-Urban, Mantripukhri, Imphal, Household.*

Introduction

Waste can be classified based on its characteristics and source. In terms of characteristics, waste can be categorized as liquid waste, solid waste, or gaseous waste. Depending on the source, waste is identified as either domestic waste, industrial waste, or agricultural waste. The characterization of waste is summarised in Fig. 1. As per the World Bank report, household solid waste is expected to grow at a rate twice as fast as the population growth rate (*what a waste A Global Review of Solid Waste Management*, 2018). Many have studied municipal solid waste in the cities and urban areas, but there is a meagre information and work in rural and semi – urban areas. There is insufficient research work that has focussed on quantitative studies (Cao *et al.*, 2018; Vahidi *et al.*, 2017). Quantifying and characterizing of Household (HH) solid waste is essential objective to develop an efficient waste collection and management strategy for the residential area of the city (Dharia *et al.*, 2023; Malangmei and Bhushan Singh, 2023; Suthar and Singh, 2015; Worrel and and Vesilind, 2012). There is inconsistency and less information on the household solid waste (HHSW) of Imphal, Manipur, India. Having uniform data and understanding the composition of waste is crucial for establishing an effective strategy for solid waste management. The

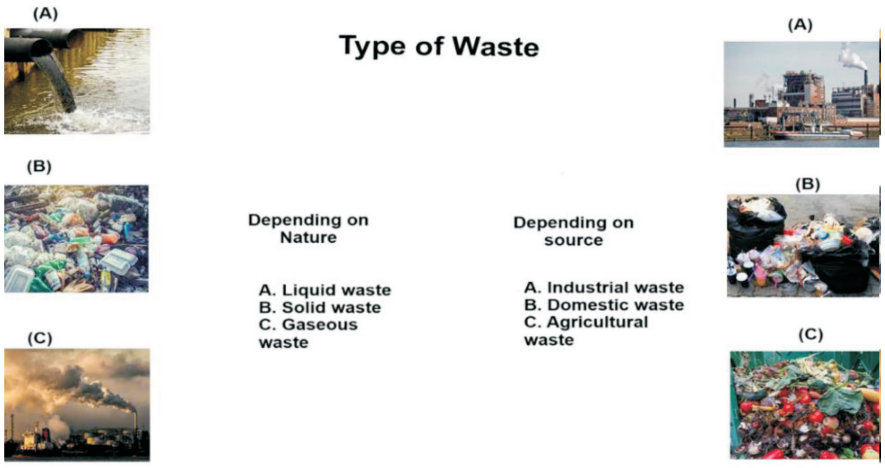

Fig. 1. Characterization of waste

attitude of the people is important to have more effective waste segregation process at the source (Song *et al.*, 2016; Wu *et al.*, 2021). The outcome of the study will raise an awareness among the people of Lamlongei about the importance of source segregation. The study also aims to quantify the waste composition and analyse the waste generation rate of the household per person in Lamlongei. This case study at the local level may be an effective tool for understanding and a good source of information for solid waste management.

Study Site

Lamlongei (Mantripukhri) Imphal, Manipur is approximately 5.9 Km away from Imphal city. It is located at 24.85252790 N,93.92468830 E, 895m above mean sea level (MSL), and considered this place as a semi-urban area.

Materials and Methods

The study is carried out for seven days in the month of November, 2023. All together 30 (thirty) household is randomly picked for the sampling of the HHSW. Before the quantification of the waste, a prior one day is spent giving awareness to the resident on how to segregate the waste into different waste composition; plastic, paper/ cardboard/ ash, food waste, etc. Black plastic carry bag is provided for the waste to be kept. The weighing of the HHSW is done through a portable digital machine. There are many methods for quantification of solid waste namely direct sampling method (door - to - collection), material flow method, survey method, etc. A direct sampling method is used in the study as it has more accuracy (handbook of solid waste management, 1993; Pfeffer, 1992).

Results and Discussion

In the present study, the HHSW composition of Lamlongei resident is quantified. Fig. 2 is the representation of the HHSW composition generated in the Lamlongei (Mantripukhri) area of Imphal, Manipur in the month of November, 2023 for a period of one week. The study also revealed that the food waste is the major component of the HHSW with 45.1 % of the total Solid waste. This finding is in tuned with many other research work (Abdel-Shafy and Mansour, 2018; Abdulredha *et al.*, 2017; Burnley, 2007; Noufal *et al.*, 2020; Senzige, 2014). The textile/ diapers waste is found to contribute the second highest HHSW composition with 44.2%. The possible reason for high textile particularly diaper

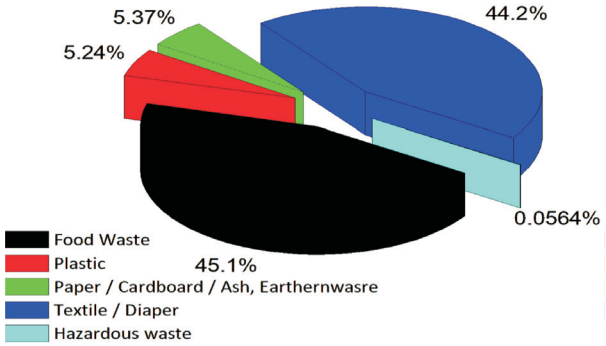

Fig. 2. Variation of total HH SW from the present study, November, 2023.

waste in the area may be that most of the residents of households are young families with at least a baby in the family. The composition of the other wastes, such as paper/ cardboard/ Ash, Earthenware, plastic and hazardous waste are 5.37 %, 5.24% and 0.0564% respectively.

Similarly, Fig. 3 represents the waste composition generated by HH with respective family size of 1 -2 members, 3 – 4 members and 5 & above members. It is understood from the figure that the HH with 1 – 2 family members do not generate any textile/ diapers and hazardous waste, food waste (90.60%), plastic (5.44%) and paper (3.96%). In the case of HH with 3 – 4 family members, the highest HHSW composition is food waste (44.94%), followed by textile/ diapers (36.75%), paper (10.06%), plastic (8.14%) and hazardous waste (0.10%) respectively. While in the HH with 5 & above family members, the highest HHSW composition is Textile/ Diapers (49.30%) which is followed by food waste (46.66%), plastic (2.79%) and paper (1.28%). The highest percent of food waste is being generated in HH with 1 -2 family members. This may be attributed to the life style of the people.

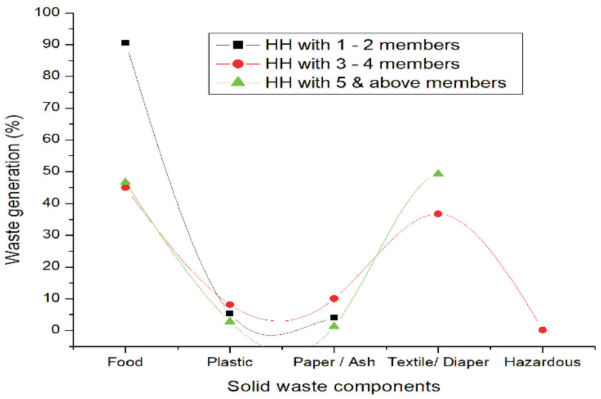

Fig. 3. Percentage of waste variation based on HH size November, 2023

Fig. 4 represents the per -person waste generation per day in Lamlongei (Mantripukhri), Imphal, Manipur in the November, 2023 for a period of one week. The highest waste generation is found in HH with 3 – 4 members with 0.144 kg/ day, followed by HH with 5 and above members with 0.099 kg/ day, and the least in HH of 1 – 2 members with 0.054 kg/ day. It is clear from the present study that the waste generation does not directly correlate with the number of people in the family. It all may depend on attitude, socio – economics, location, ethics etc. Perhaps all these variables have certainly contributed to the HHSW generation.

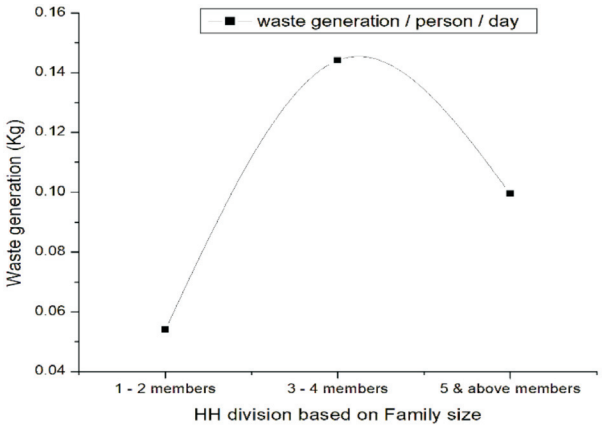

Fig. 4. Variation of waste / person / day from different HH for a period of 7 days, November, 2023.

Conclusion

The study of household solid waste in the semi-urban vicinity of Lamlongei (Mantripukri) near Imphal, Manipur, indicates that the predominant component of waste is attributed to food waste. The portion of waste stemming from reusable and recyclable HHSW in the area is relatively low, as suggested by the study. Further, the study highlights that there is no direct correlation between waste generation and the number of family members. Above all, the generation of waste is minimal in the study area as shown in Table 1.

Table 1. Solid waste generation across diverse location

Sl. No.	Study Sites	Year	Waste generation / person / Day (Kg)
1.	Lamlongei (Mantripukhri), Manipur	2023	0.119
2.	Jant Village (Mahendergarh), Haryana	2019	0.117
3.	Imphal Municipality, Manipur (C. Yadav & L N Devi, 2016)	2004	0.120
4.	India (CPCB, 2019)	2020	0.119
5.	World (worldbank.org)		0.74

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