

## ASSESSMENT OF SOLID WASTE GENERATION IN RESIDENTIAL AREA OF MENDHAR TOWN, DISTRICT, POONCH J&K, INDIA (A CASE STUDY)

JAVED MANZOOR<sup>1</sup>

Environmental Science, Govt. Degree College, Mendhar, Jammu & Kashmir, India

### ABSTRACT

**Generation of Solid wastes is as old as civilization. Solid Wastes refers to all discarded and thrown away solid and semi-solid wastes arising from human and animal activities. However its generation and composition has increased manifold. Quantity and composition of its generation in an area depends upon, population, urbanisation, Affluence, Technology and life style of People. In the present study an attempt is made to assess the generation of solid wastes in residential Area of Mendhar Town of District Poonch. Mendhar town has grown fast in the last few years due to migration of people from adjoining villages on account of better education for children, security issues and militancy.**

**KEYWORDS:** Generation, Solid Wastes, Study, Mendhar, Migration.

Human and animal activities generation many waste that are discarded as useless or unwanted. The term solid waste is very broad; it encompasses the highly heterogeneous mass of discarded material or throwaways from the urban community as well as the more homogenous accumulation of wastes generated by agricultural and industrial activities. Solid wastes is applied to unwanted or discarded waste material arising from houses, street sweeping, commercial, industrial, extraction wastes, energy production wastes, sewage sludge's etc, arising from man's activities (Park and Park<sup>10</sup>, 1991 and Santra<sup>12</sup>, 2001). It is the mixture of dust, ash, vegetable and putrescible matter, paper and packing of all kind, rags and other fabrics, glass and other combustible and Non-combustible debris.

Increasing urbanization, industrialization, population growth and rising in standard of living have contributed to an increase in both the amount and variety of solid wastes generated throughout of the world especially in the developing countries. All the solid wastes are ecologically classified into biodegradable wastes, and non- biodegradable waste. Biodegradable wastes are those which can be degraded by microorganisms such as kitchen waste, waste from fruits, vegetables, meat and fish markets etc and non- biodegradable waste are those which cannot be degraded by microorganism e.g. Plastics, batteries, chemical synthetic etc.

On the basis of materials solid waste is classified into garbage, rubbish, ashes, street refuse, dead animals, demolition wastes, construction wastes, sewage treatments residues, industrial solid wastes, hospital wastes, and agricultural waste (Park and Park, 1991, Santra 2001)

Indiscriminate disposal of solid wastes, especially of hazardous wastes cause adverse environmental effects. The effect of solid waste in an area depends upon the disposal. There are various methods of solid waste disposal such as open dumping, sanitary landfills, incineration, composting, burial, manure pits etc.

However open dumping is one of the common methods of its disposal followed by maximum number of people in small cities and town. Open dumping pose serious health hazard to mankind, livestock, it also cause air and water pollution beside nuisance from aesthetic point of view.

The present study is made to assess the generation and composition of solid waste in the residential area of Mendhar town of District Poonch. During the last two decades Residential area of Mendhar town has increased manifold due to mass migration of people from the adjoining villages for better facilities, security issues, better education for children, Militancy etc.

### MATERIALS AND METHODS

#### Study Area

Tehsil Mendhar of District Poonch, J&K India, lies in the foothills of Pir Panjal range in the western Himalayas and is geographically located in 33° 37' 0" N Latitude and 74° 8' 0" E Longitude at an altitude of 977m .Climate of Tehsil Mendhar varies from subtropical to temperate. Temperature ranges between 19C° to 43C° in summer and between 8C° to -4.8C° in winter. The present study in carried in Mendhar town of the Tehsil which lies on the bank of Mendhari Nallah. Mendhar town has an area of 12.85 km<sup>2</sup> with 1320 households.

<sup>1</sup>Corresponding author

### Sampling and Statistical Analysis of Solid Waste

Residential area of Mendhar town comprised of 1320 households which were divided into three categories on the basis of economical status i.e. low class household, Middle class household and High Class household. Three samples of solid waste generation from each type of household were taken. During each sampling of solid waste, the total solid waste generated per household during 24 hours was collected in a plastic bag and weighed with digital balance. Solid waste was segregated into biodegradable, non biodegradable and inert material and weighed separately.

### Statistical Analysis

For the analysis of solid wastes generation, mean and standard deviation method is used. Date of solid waste generation of three samples from each type of household was compiled to calculate average solid wastes (kg/day) generation along with standard deviation at each type of household. The average solid waste generation (kg/day) values of each type of household were further compiled to evaluate average solid waste (kg/day) generation in average household at study area. This average value of solid waste (kg/household /day) generation was multiplied by total number of households of study area to calculate average solid wastes (kg/day) generation in residential area.

Average solid waste (kg/day) generation in residential area = average solid waste generated kg/household/day  $\times$  total number of households.

## RESULTS AND DISCUSSION

Population growth, increasing urbanization, affluence and modern culture have contributed to an increase in both amount and variety of solid wastes generation. An analysis of the data of the qualitative composition of solid waste (kg/day) generation in the study area shows that the solid waste generation in all the three types of households (Low Class household, middle class household and high class household) differs. The biodegradable solid waste (kg/day) generation in low class household observed to range from 0.4 to 0.72 kg with an average value of  $0.578 \pm 0.163$  kg/day. The maximum percentage of biodegradable solid waste was comprised of 49.95% food and garbage followed by 3.12% foliage, 2.3 % paper waste and 2.23% wood.

The non-biodegradable solid waste (kg/day) generation was observed to range from 0.30 to 0.40 kg

with an average value of  $0.347 \pm 0.052$  kg/day. plastic waste constitute maximum percentage (14.13%) followed by glass ware (10.3%) metallic waste (5.26%) bone and eggshell (4.83%), inert material was observed to exhibit average value of  $0.08 \pm 0.063$  kg/day with a range of 0.005 - 0.12 kg/day (Table 1). The average solid waste generation in a low class household was observed to range from 0.81 to 1.13kg/day with an average value of  $1.005 \pm 0.278$  kg/day comprising biodegradable ware (57.6%), non biodegradable waste (34.52%) and inert material (7.88%).

In case of middle class household, the biodegradable solid waste (kg/day) generation was observed to exhibit an average value of  $0.99 \pm 0.38$  kg with a range of 0.718-1.44 kg/day. The maximum (57%) of biodegradable solid was comprised of food and garbage followed by foliage (6.21%). Paper waste (3.3%), wood (1.3%) and cardboard (1.0%), whereas the non-biodegradable solid waste observed to range from 0.23-0.76 kg /day with an average value of  $0.41 \pm 0.30$ kg, the maximum (10.23%) percentage was comprised of plastic waste followed by 9.42% glassware, 4.48% bone and egg shell and 4.37% metallic waste.

The inert material was observed to exhibit range of 0.01-0.07 kg/day with an average value of  $0.04 \pm 0.03$  kg /day. The average solid waste generation in a middle class household was observed to range from 1.05-1.75 kg/day with an average value of  $1.44 \pm 0.71$  kg/day. The average solid waste was comprised of 68.81% biodegradable waste, 28.5% non-biodegradable solid waste and inert material 2.69% (kg/day). Generation in high class household was observed to range from 0.65 – 0.84 kg with an average value of  $0.721 \pm 0.105$  kg/day. Food and garbage constituted maximum (61.89%) percentage followed by paper waste (5.68%) foliage (4.30). cloth ware (1.60%) and card board (0.80%).

The non-biodegradable solid waste exhibited a range of 0.13-0.32 kg/day with an average value of  $0.23 \pm 0.09$  kg/day. The maximum (8.20%) percentage was comprised of plastic waste followed by glassware (7.53%) bone and egg shell (4.59%) and metallic waste (3.40%), the inert material was observed to range from 0.005 – 0.02 kg/day with an average value of  $0.02 \pm 0.01$  kg/day.

The average solid waste generation in a high class household was observed to range from 0.80 - 1.16 kg/day, with an average value of  $0.971 \pm 0.205$  kg/day, Comprising 74.22% biodegradable waste,

23.72% non-biodegradable waste and 2.06% inert material.

**Table 1: Quantitative and Qualitative Composition of Solid Waste (Kg /Household/Day) Generation in Residential Area of Mendhar Town**

Types of waste	Low class Household (L)		Middle Class Household (M)		High Class Household (H)		Average household [(L+M+H)/3]	
	$\sum x^2$ $\sigma$	% age	$\sum x^2$ $\sigma$	% age	$\sum x^2$ $\sigma$	% age	$\sum x^2$ $\sigma$	
Biodegradable wastes	0.578 ±0.163 (0.4-0.72)	(57.6)	0.99 ± 0.38 (0.718-1.44)	(68.81)	Biodegradable wastes	0.578 ±0.163 (0.4-0.72)	(57.6)	0.99 ± 0.38 (0.718-1.44)
Paper Waste	0.023	(2.3)	0.05	(3.3)	Paper Waste	0.023	(2.3)	0.05
Card board	...	...	0.01	(1.0)	Card board	...	...	0.01
Cloth ware	...	...	...	...	Cloth ware	...	...	...
Jute	...	...	...	...	Jute	...	...	...
Foliage	0.032	(3.12)	0.09	(6.21)	Foliage	0.032	(3.12)	0.09
Wood	0.022	(2.23)	0.02	(1.3)	Wood	0.022	(2.23)	0.02
Food/Garbage	0.501	(49.95)	0.82	(57)	Food/Garbage	0.501	(49.95)	0.82
Non-Biodegradable Wastes	0.347 ± 0.052 ( 0.30 – 0.40)	(34.52)	0.41 ±0.30 (0.23–0.76)	(28.5)	Non-Biodegradable Wastes	0.347 ± 0.052 ( 0.30 – 0.40)	(34.52)	0.41 ±0.30 (0.23–0.76)
Plastic Waste	0.142	(14.13)	0.15	(10.23)	Plastic Waste	0.142	(14.13)	0.15
Metallic Waste	0.052	(5.26)	0.06	(4.37)	Metallic Waste	0.052	(5.26)	0.06
Glass ware	0.103	(10.3)	0.14	(9.42)	Glass ware	0.103	(10.3)	0.14
Rubber	...	...	...	...	Rubber	...	...	...
Leather	...	...	...	...	Leather	...	...	...
Bone/Egg Shell	0.05	(4.83)	0.06	(4.48)	Bone/Egg Shell	0.05	(4.83)	0.06
Inert Material	0.08 ± 0.063 ( 0.005 – 0.12)	(7.88)	0.04 ± 0.03 ( 0.01 – 0.07)	(2.69)	Inert Material	0.08 ± 0.063 ( 0.005 – 0.12)	(7.88)	0.04 ± 0.03 ( 0.01 – 0.07)
Total waste	1.005 ± 0.278 ( 0.81 – 1.13)		1.44 ± 0.71 (1.05 – 1.75)		Total waste	1.005 ± 0.278 ( 0.81 – 1.13)		1.44 ± 0.71 (1.05 – 1.75)

Source:-Computed

**Table 2: Composition of biodegradable solid waste.**

S. No	Composition of overall Biodegradable Solid Waste	
1	Paper waste	5.52
2	Card board	0.96
3	Cloth ware	0.64
4	Foliage	7.07
5	wood	1.77
5	Food garbage	84.04

Source:-Computed

**Table 3: Composition of Non biodegradable solid waste.**

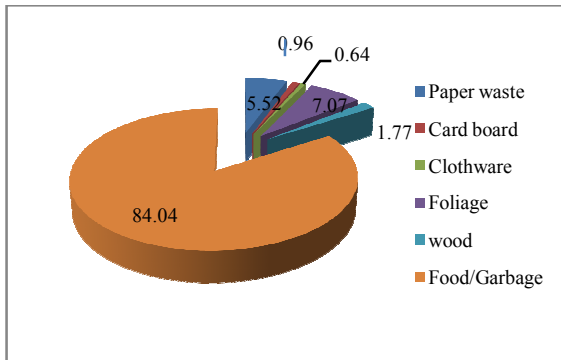
S. No	Composition of non -Biodegradable solid waste	
1	Plastic	37.53
2	Metallic waste	15.01
3	Glass ware	31.44
4	Bone/eggshell	16.02

Source:-Computed

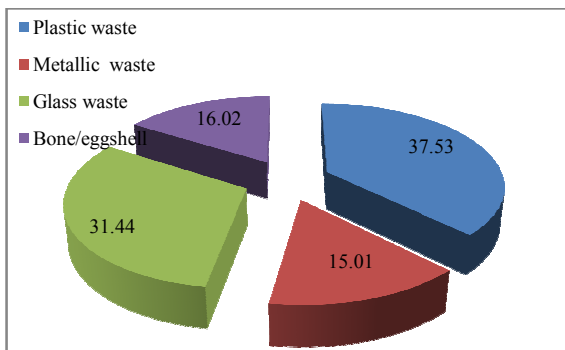
**Table 4: Overall composition of solid waste.**

Sl. No	Composition of Overall Solid waste	
1	Biodegradable waste	66.88
2	Non biodegradable waste	28.91
3	Inert material	4.21

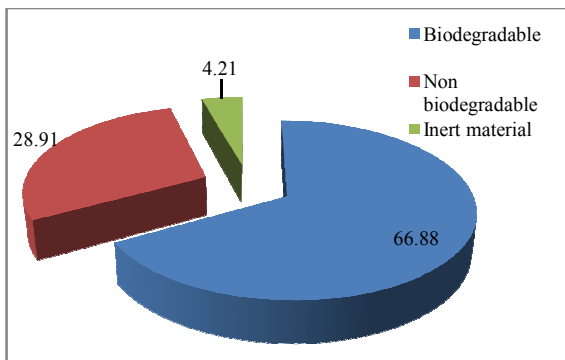
Source:-Computed



**Figure 1: Composition of biodegradable solid waste**



**Figure 2: Composition of Non biodegradable solid waste**



**Figure 3: Overall Composition of Solid waste**

An analysis of data of solid waste generation in residential area of Mendhar town show that the average solid waste (kg/household/day) in average middle class household is more ( $1.44 \pm 0.71$  kg) as compared with that ( $1.005 \pm 0.278$  kg) of average low class household and ( $0.971 \pm 0.205$  Kg) of average high class household. On an average household, in residential area of Mendhar town was observed to exhibit generation of solid waste (kg/household/day) in the range of 0.80 - 1.75 kg with an average value of  $1.138 \pm 0.397$  kg.

The total approximate numbers of households in the study were observed to be 1320, therefore, on an average total solid waste generation kg/day in the residential area of Mendhar town of Tehsil Mendhar was observed to be 1320(households)  $\times$  1.138 kg = 1502.16 kg. Therefore 1502.16 kg of solid waste is generated per day in residential area of Mendhar town comprising of biodegradable waste 66.88 %, non biodegradable waste 28.91% and inert material 4.21%.

### CONCLUSION

Analysis and critical observation of the solid waste generation in the study area (Mendhar town) has shown that the solid waste generation comprised a major portion as biodegradable waste being 66.88% (table 4 & fig.3). There is open dumping of solid waste on vacant lands, near household, on roadside and near small water bodies as open dumping is the only method applied by the people for its disposal. Solid waste is found scattered all over the area on vacant lands, near household, on roadside and near water bodies. moreover there is neither municipal committee nor any other agency for collection and disposal of waste, as open dumping of solid waste in the area serve as a breeding ground for flies and other vectors of various diseases, it also cause odour and air pollution in the area besides aesthetic pollution. Waste dumped in open, during rainy days ultimately finds its way into the Mendhari nallah, thereby deteriorating the quality of the only main source of water in the area used for bathing, washing clothes, irrigation etc.

Based on the observation the following recommendations are made.

1. The local administration should give due attention toward solid waste management in the area.
2. The local administration should install dustbins at particular places

3. Proper open dumping/Collection sites must be established.
4. Local resident must be aware to dispose off the solid waste properly.
5. People must be aware about the ill effects of open dumping / scattered dumping of waste dumping of waste/dumping of waste in the water bodies.

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#### REFERENCES

- Abdoli M.A., Razaeei M. and Hasanian H., 2016. Integrated solid waste management in megacities. *Global J. Environ. Sci. Manage.*, **2**(3):289-298.
- Aggarwal S.K., 1985. Solid waste management. *Acta Ecologica.*, **7**(1):1-8.
- Akther, Zareena and Najar, Ishtiyah Ahmed, 2016. Composition of solid waste in DoodhPatri (Budgam), Jammu and Kashmir India. *Int. Res. J. Earth Sci.*, **4**(11):10-16.
- Boadi K.O. and Kuitunen M., 2003. Municipal Solid waste Management in the Accra Metropolitan Area Ghana. *The Environmentalist*, **23**:211-218.
- Characteristics of Municipal solid waste at Faridabad. 2003. Unpublished project report submitted to MCF.
- Gupta B. and Arora S.K., 2016. Municipal Solid waste Management in Delhi – the capital of India. *Int. J. Innovative Res. Sci. Eng. Technol.*, **5**(4):5130-5138.
- Kappagantula S.R., 2006. Solid waste management- a study of Municipalities in west Godavari Distt. Andra Pradesh, Nagarlok., **38**(1):31-39.
- Kamran A., Chaudhary M.N. and Botool S.A., 2015. Effects of socio economic status and seasonal variation on municipal solid waste composition: a baseline study for future planning and development. *Environ. Sci. Eur.* **27**,16, DOI 10.1186/s12302-0050-9.
- Kishore J., Joshi T.K. and Sagar B., 1999. Hospital waste management in India. *Indian J. Occupl. Med.*, **3**(2):79-84.
- Park J.E. and Park K., 1991. Text book of preventive and social medicine, published by M/S Banarsidas bhawat, Jabalpur India. 509.
- Ramachandra T.V., 2006. Management of Municipal Solid waste. TERI Pres, New Delhi.
- Santra S.C., 2001. Environmental Science. Published by New Central book agency (P) ltd; Calcutta, pp. 251-260
- Sharma P.K., 2000. Generation of the solid waste in Government Sub-District Hospital, Reasi, (Udhampur). M.Sc. Dissertation submitted to the University of Jammu, pp.;1-40(Un Published).
- Singh D.N. and Singh J., 2005. Studies on solid waste management: a review. *annals NAGI*, pp. 74-90.
- Subramanyam P.V.R., 1992. Hazardous waste scenario in India. *J. Indian Assoc. Env. Management*, **18**(1&2):49-58.
- Tripathi D.K. and Shukla J.P., 2016. Projection and Quantification of Municipal solid waste management in Bhopal city M.P. India. *Int. J. Sci. Eng. Appl. Sci.*, **2**(1):189-194.
- Vajifdar K.J., 1985. Handling of municipal solid waste- present practice and future plans. *Civic affairs*, **32**(10):9-14.
- Yadav I.C and Devi N.L., 2009. Studies on Municipal waste management in Mysore city- A case study: report and opinion, **1**(3):15-21.