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SOLID WASTE MANAGEMENT IN AMRAVATI CITY AND IT'S IMPACT ON COMMUNITY HEALTH

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Abstract: Due to rapid growth of population in Amravati municipal corporation area and changing life styles has resulted in increased waste generation. Consequently, waste management has become a key issue needing to be addressed. Amravati city generates about 184.90 tons municipal solid waste per day. Handling of MSW is the responsibility of the Amravati Municipal Corporation (AMC) and Solid waste management strategies adopted by AMC includes management of MSW at compost depot, management of biomedical waste, and implementation of MSW rules 2000. With increase in population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household. This waste is ultimately thrown into municipal waste collection centers from where it is collected by the area municipalities to be further thrown into the landfills and dumps. However, either due to resource crunch or inefficient infrastructure, not all of this waste gets collected and transported to the final dumpsites. If at this stage the management and disposal is improperly done, it can cause serious impacts on health and problems to the surrounding environment. The present paper is based on the study carried out on Solid Waste Management Practice by Amravati Municipal Corporation for Amravati City. The outline of existing situation of solid waste management system, problems associated with the system and the effect of unhandled solid waste on human health are discussed.

Keywords: Solid waste, Disposal, Impact, Human Health, Landfill

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INTRODUCTION

Amravati is second largest growing industrial city in Vidarbha region, situated at 156 Km towards west from Nagpur. As so many other small cities in India, Amravati is growing in terms of living quality. New flyovers and roads are being built to renovate the city, and other improvements are going on. Amravati known as Indrapuri the capital of Lord Indra and named after ancient "Ambadevi" temple, which is famous for its ancient culture. Solid waste anagement (SWM) is a universal problem with Amravati being no exception. Over the years the city has grown significantly both in population and in density, which has resulted in great pressure being forced on the resources of the city, which is turn has contributed to an exponential increase in the generation of solid waste to a level which is beyond the city ability to cope. The quantity of solid waste produced in the Amravati city is mainly consists of residential area municipal solid waste and commercial area waste products. Disposal of increasing quantities of urban solid waste is a major challenge for Amravati Municipal Corporation. Resources are short; although municipal authorities have made some investments the present method of solid waste disposal in the city has not been satisfactory. The wastes are disposed in most unscientific way on to the land thereby posing threat to environment and public health. This paper presents the current solid waste management scenario in Amravati city and its impact on community health.

GENERATION OF WASTE

In Amravati, there are 4 zones within which 81 wards are located. For sake of convenience of management of municipal solid waste, the waste generated, resources available etc. are referred to each ward and respective zonal office. The corporation performs its function as per the provisions of the Act governing the municipal corporation in the state. The table below shows the daily waste generation for each zone and ward based on population data. It is based on the assumption that 240 gram per person per day of MSW generation. The Table 1 below depicts the zone wise population and respective waste generation in tones per day.

Table 1: Zone Wise Population and Total Solid Waste Generated

Number / Name	2001	2005	generation (TPD)
Zone - 1 : Rampuri Camp	126251	141558	42.47
Zone-2 : AMC Main office	159698	179060	53.72
Zone-3 : Hamalpura	167161	187427	56.23
Zone 4 : Badnera	96568	108276	32.48
	549678	616321	184.9

Therefore the total waste generated in Tons/day is 184.90.

COMPOSITION OF WASTE

A typical Solid waste comprises of biodegradable, non biodegradable and debris matter as given in **Table 2** for Amravati city. The laboratory analysis of waste encompasses both physical and chemical characteristics and is given below in the form of tables. The chemical characteristics of MSW are depicted in **Table 3**.and physical characteristics of the MSW are depicted in **Table 4**

Table 2: Classification of Waste

Sr.	Type of waste	%Ton
1	Biodegradable	35.53
2	Recyclable	15.95
3	Debris and Silt	48.52

Sr.	MSW Parameter	Value
1	pH	8.17 %
2	ECE	2.842 Ms/cm
3	Organic carbon	11.27 %
4	Nitrogen as N	0.87 %
5	Phosphorus as P2O5	0.66 %
6	Calcium as Ca	0.72 %
7	Magnesium as Mg	0.48 %
8	C:N Ratio	12.95 %
9	Zinc as Zn	317 Mg/kg
10	Iron as Fe	15820 Mg/kg
11	Manganese as Mn.	186 Mg/kg
12	Copper as Cu.	360 Mg/kg
13	Lignin	11.5 %

Sr.	Parameter	Value
14	Cellulose	9.55 %
Table 4: Physical Characteristics of MSW		
1	Fruit /Vegetable waste	19.42 %
2	Paper	1.86 %
3	Plastic	8.92 %
4	Cloth	2.46 %
5	Wood	1.53 %
6	Metals	0.32 %
7	Glass	0.82 %
8	Leather	0.42 %
9	Rags	0.95 %
10	Rubber	0.06 %
11	Pebbles	13.82 %
12	Fine Sand	26.24 %
13	Ash and fine earth	21.18 %
14	Moisture	7.66 %
15	Density	440 Kg/cum

INFRASTRUCTURE DEPLOYED

The above activity i.e. collection and transportation of MSW is carried out both by contract basis and AMC itself. The total manpower bifurcated into the contractual labor and A.M.C manpower is: a) A.M.C employees – 799 and b) Contractual Labors – 685 The infrastructure deployed for the collection and transportation of MSW is as given in Table-5 The total no of containers zone-wise is presented in Table 6. According to the data presented below in the Table below the most number of Dumper Containers (about 35%) are present in Rampuri Camp while the most number of Ring type containers (about 37%) are present in Rampuri Camp –I. The most number of Open places where dumping is practiced is in Hamlapura (About 42%). The present disposal site is located at Sukli road, which has area of 27 acres and is located at 7 kms from the city.

Table 5: Infrastructure deployed

Sr	Particulars of Infrastructure	No.
1	Handcarts	90 nos
2	Ghanti Katla(mechanized)	200 nos
3	Ghanti Katla (ordinary)	90 nos
4	M.O.H	1
5	Medical officer	1
6	Doctor Incharge	1
7	Sanitary Superintendent	1
8	Senior Sanitary Inspector	3
9	Sanitary inspector	23
10	Mukadam deployed	35

Sr	Zone	Dumper Containe	Ring Type	Open Place
1	Rampuri Camp	166	52	28
2	AMC Main Office Premises	94	21	24
3	Hamalpura	137	32	53
4	Badnera	73	34	21
	Total	470	139	126

HEALTH IMPACT ASSESSMENT

The problem related to solid waste management and its health impact is investigated in two phases. In first phase, the prevailing solid waste management practice in AMC have been evaluated visà- vis the standard solid waste management methods. And suggestions have been put forward keeping in mind the ground realities and system limitations. In the second phase, the health impact assessment has been performed in the affected areas using the survey techniques. A number of risk factors in the form of fatal diseases are associated with the malpractices of solid waste management. The potential diseases that were identified in the area of Amravati Municipal Corporation may occur due to the prevailing solid waste management method. The solid waste related vector borne diseases identified are malaria, dengue, kala bukhar, fever and loose motion. The worst affected areas which are closer to the dumping sites i.e. Sukli village. As Amba nala is flowing in between the city, people beside the nala throw their solid waste in to the nala water causing unhygienic condition and making the

nala water more infectious. There is more problem of mosquitoes in the residential area near the bank of Amba nala and this lead to the spread of disease through mosquitoes. From the survey data collected it is clear that occurrence of dengue is not observed in any location, however other diseases like malaria and loose motions have been reported. A large number of residents, up to 50 – 55 % were found suffering from fever and loose motions more than once every year. This is indicative of strong to moderate health impact on the resident population due to the solid waste being dumped in their vicinity. There is no establishment correlation of occurrence of these infections due to smoking and drinking habits of the residents of these areas. Thus the sole cause of these illnesses lies in the faulty disposal of the waste closer these locations. Problem of diseases by mosquitoes prevails in around 80 % of the city in all 81 wards of AMC area. This is mainly because of open spot located in many part of the city. As the large bin locations are not fully utilized by the people and waste handling staff to collect the solid waste. People throw the waste in the open plot in their vicinity and AMC officers are not taking any objection on this practice. Also the staff employed on hand cart do not disposed of the waste into the large bin totally. Many hand cart people put the waste on the ground near the large bin and sort it for recovering recyclable material like plastic, glass and steel. After this sorting they take this waste into large bin by hand. Because of which about 20 to 30 % of waste is just displayed on to the ground near the large bin. Many such locations create problem of health for people near by that area and staff is also exposed to risk of skin infection, problem of inhalation and many infectious viral diseases. The Survey was conducted in the month of Sep 2011 for knowing the situation about effect of solid waste on human health. Questionnaire was distributed in the various parts of city and answers are collected. The collected survey data is analyzed and it is presented in Table 7. Based on the above data collected from field survey conducted in Amravati city, the analysis is represented in figure-1 to 4. From figure 1 it is clear 91 % of people confirm that there is impact of improper management of MSW on human health. About 2/3 people says that there is problem due to uncollected / unhandled solid waste. To avoid the ill effects of solid waste on human health, AMC is undertaking various efforts to protect the public health; such as providing mesh at outlet of gas vent pipe to avoid mosquito breeding, spraying of chemicals in toilet and bathroom to kill virus causing various diseases, spraying of special smoke to prevent spread of viral diseases. From the survey data it is seen that the above practice is not undertaken equally in all parts of the city, 6 % people says that such actions by AMC are undertaken once in year and only 1 % of people says that such actions are taken by AMC twice in year. Survey results also shows that about 55 % of the people are conscious about problem of solid waste in the city and its effect on human health and they report their problem to their ward member. 17 % people don't report the problem, 12 %

people just wait for the action by AMC and 16 % people register their complaint by phone to AMC office.

Sr	Question Asked to people	Options given	Count	% value
1	Do you feel there is impact of improper management of solid waste on human health?	i] Yes	454	90.62
		ii] No	47	9.38
2	Is there problem due to improper / Uncollected / Unhandled Solid waste in your area?	i] Yes	332	66.27
		ii] No	169	33.73
3	What efforts that you know which are done by Municipal Corporation to protect city from diseases causing from improper management of solid waste?	i] Providing mesh at gas pipe head	197	39.32
		ii] Spraying of chemicals	154	30.74
		iii] Spraying of chemicals in toilet and bathrooms	116	23.15
		iv] One times above such actions are taken in year	29	5.79
		iv] Two times above such actions are taken in year	5	1.00
4	What step do you take to report such problem in your area?	i] by Phone complaint to corporation	81	16.17
		ii] Don't report	84	16.77
		iii] Report to ward member	274	54.69
		iv] Just wait for action by Municipal corporation	62	12.38

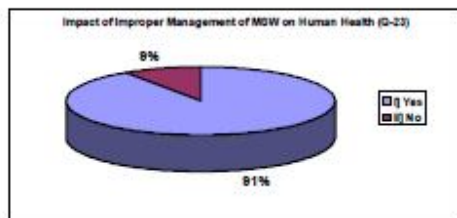


Figure 1 Chart showing impact of improper management of MSW on human health

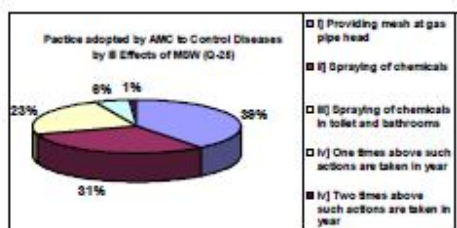


Figure 3 Chart showing practice adopted by AMC to control diseases by ill effects of MSW

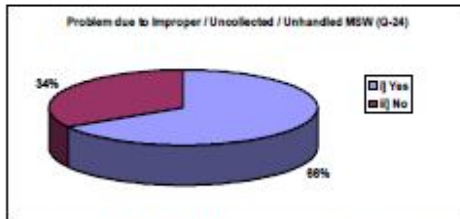


Figure 2 Chart showing problem of improper / uncollected / unhandled MSW

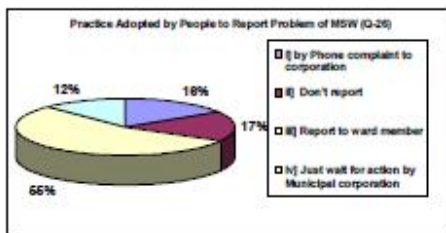


Figure 4 Chart showing practice adopted by people to report problem of MSW

CONCLUSIONS:

It is observed that present facilities for management of solid waste for Amravati city are falling short to cope with increasing population and increased waste generation. The Municipal Solid Waste

Management at Amravati city as managed by AMC needed to be improved by adopting one or more of the following means. In this context following conclusions are drawn.

- i) On site segregation activity of Solid waste to separate dry solid waste and web solid waste should be improved to minimize the load on compost depot.
- ii) Collection and Transportation facilities required to be strengthened by providing different category of extra collection vehicles as well as workers.
- iii) One or two transfer stations are required to be located and established to facilitate quick collection facility.
- iv) Existing compost depot and proposed Landfill site should be well planned and equipped with new technologies for disposal of municipal solid waste.
- v) Thrust should be given on utilization of compost manure, recovery of possible materials for recycling, and landfill gas utilization for energy recovery.

vi) Public involvement should be increased by Campaigning public awareness program to avoid health impact.

REFERENCE:

1. Environmental Status Report of Amravati City Amravati Municipal Corporation Office of Public Health Officer, AMC
2. Coad, A and Coffey, M. Collection of Municipal Solid Waste in Developing Countries. (Volume 1 of Waste Management Series). UN Habitat, Kenya, 2008.
3. Coad, A. Private Sector Involvement in Solid Waste Management. Avoiding problems and building on successes. CWG Publication Series Number 2. Switzerland. ISBN: 3-908156-09-2, 2005.
4. Schubeler, P. Conceptual Framework for Municipal Solid Waste Management in Low-Income Countries. UNDP/UNCHS Working Paper No 9, 1996.
5. Techobanoglous. G, Theisen H, Vigil S. Integrated Solid Waste Management. Engineering principles and management issues. Mc Graw– Hill, 2001.
6. Wilson, D., Whiteman, A. and Tormin, A. Strategic Planning Guide for Municipal Solid Waste Management. Environmental Resources Management (ERM). www.worldbank.org/urban/solid_wm/erm/start_up.pdf, 2004.
7. Bhide, A.D. and Sundaresan, B. B.: Solid Waste Management, Collection, Process and Disposal, Mudrashipa Offset, Nagpur, 2001.
8. Upadhyay V.P., Prasad Rajeswar M., Srivastav Ajay and Singh Khazan : Eco Tools for Urban Waste Management in India, Journal of Human Ecology, 18(4) : 253-269 (2005).
9. Puri A., Kumar M., Solid waste management in Jalandhar city, Indian journal of occupational and Environmental medicine, Vol. 12, issue-2, Aug 2008.