

## A CRITICAL EVALUATION OF THE SOLID WASTE MANAGEMENT SYSTEM IN SELECTED WARDS OF JANGIPUR MUNICIPALITY WITHIN THE MURSHIDABAD DISTRICT, WEST BENGAL, INDIA.

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**Abstract.** Municipal solid waste (MSW), commonly known as garbage, refuses or rubbish, is waste consisting of everyday items that are discarded by the public. Rapid urbanisation in India accelerates the generation of MSW, thereby producing major problems with its disposal. Improper handling of MSW creates environmental and health related hazards. In this paper an attempt is made to evaluate the solid waste management within the Jangipur Municipality, a cantonment town of West Bengal. This paper portrays MSW generation, its collection, as well as the attention of local self-government to spreading diseases. The paper also highlights the issues and challenges related to MSW, while trying to find out some scientific treatment for solid waste management.

**Keywords:** Municipal Solid Waste (MSW), Rapid Urbanization, Health Hazards, Scientific Treatment.

### 1. INTRODUCTION

Solid Waste Management may be defined as the discipline associated with the control of generation, collection, storage, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations [1], [2]. According to Britannica, "Solid-waste management, the collecting, treating and disposing of solid material that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions in turn can lead to pollution of the environment and to outbreaks of vector-borne disease that is, diseases spread by rodents and insects." Municipal solid waste management (MSWM), a critical element towards sustainable metropolitan development, comprises segregation, storage, collection, relocation, transport, processing, and disposal of solid waste to minimize its adverse impact on environment [3]. Unmanaged MSW becomes a factor for propagation of innumerable ailments. MSWM is one of the most overlooked basic services provided by the Government

of India. Characteristic of MS may vary at the level of country, state, city as well as various areas in of the same city. MSW generation rates range between 0.3 and 0.6 kg/capita/day in Indian cities and annual increase in MSW generation (volume) is estimated as 1.33%/capita [4], [5], [6], [7].

As per Municipal solid waste Management and Handling rules -2000, solid waste management is in the mandatory function of urban local bodies, but in actual practice the solid waste management is given the last priority and the duties are either not performed or poorly performed consequently the city has to face numerous problems related to environment and sanitation (Position paper on PPP in Solid Waste Management 2009 Ministry of Finance, govt. of India). As per the reports of the committee constituted by the Hon'ble Supreme Court of India in March of 1999, the lack of financial resources, inefficient institutional arrangement, inappropriate technology, weak legislative measures and unawareness of the public towards solid waste management has made the service most unsatisfactory and inefficient (CPHEEO 2013, Ministry of Urban Development, govt. of India). The solid waste management approach in India is extremely inefficient, using an obsolete system, technology for storage, collection, processing, treatment and disposal. There is no formal organized system of segregation of biodegradable and non-biodegradable solid waste [8], [9], [10]. The recovery and recycling of waste is only done by scavengers and scrap dealers, which is highly hazardous to those involved in this job [9], [10]..

The Jangipur Municipality envisions itself by 2020 to become economically independent, with an equitable social structure and culturally rich community. The Municipality aims to alleviate poverty from the society, by providing all the basic services to citizens, irrespective of their religion, caste and economic status. Safe and adequate drinking water supply, good roads, adequate street lighting, improved drainage network and last but not the least important sanitation and proper solid waste management are among many other objectives, which the municipality vows to provide within the next five years.

This paper critically evaluates the present situation of MSWM system to develop a modern solid waste management system in future. Simple and efficient organization structure and long term innovative financial planning will serve the citizen better, while at the same time achieving adequate solvency for the Municipality, which has a long historical background and many ways to head towards a promising future.

## **1.1 Study Area**

Jangipur is an old town having reference from the historical period of Jahangir when a Moughal army camp was established here [11]. A District Board was set up in 1865 and, before this, the Bengal Municipal Act had been passed in 1842. In 1869 Jangipur Municipal Board made its first appearance. The Municipality is located in Jangipur Subdivision of Murshidabad district in the Gangetic plain of West Bengal. River Bhagirathi, the tributaries of the Ganges River in West Bengal divide the Urban Local Bodies (ULB) in two separate halves, namely Jangipur and Raghunathgunj. The Jangipur part is under Raghunathganj-II block surrounded by ten-gram panchayats and three census towns. The total geographical area of the municipality is 8.20 square kilometres, which is divided into 20 Administrative

wards. Mean Coordinates of the municipality being 24028'N and 8804'E. The Raghunathgunj Police Station and Police Outpost namely, Raghunathgunj and Jangipur, situated within the boundary of the municipality. Jangipur is experiencing a high rate of urbanization. In Jangipur the urban population grew from 55,981 to 86,862 during the last 17 years, but this huge population lives only in 8.2 km<sup>2</sup> area, thereby contributing to a population density of 10,593 per km<sup>2</sup>. The population in Jangipur is projected to increase at a fast rate and expected to reach 116,002 during the DDP period i.e. 2008-2012 and 222,403 in 2020, therefore producing a population density of 14,147 inhabitants per km<sup>2</sup> and 27,122 inhabitants per km<sup>2</sup>, respectively [11], [12].

### 1.2 Rationale Behind the Selection of the Area

Just after the establishment of Jangipur, the municipality undertook a systematic plan for the drainage of this cantonment town. Then, the Executive Engineer designed the whole system of solid-waste disposal system. It was a century old system and definitely a wonderful example of engineering. This system is still working, but it needs proper reconstruction for more improved solid waste management, due to the growing population pressure on the town. For a detailed study on this topic, only three major wards were selected (*cf.* Figure 1).

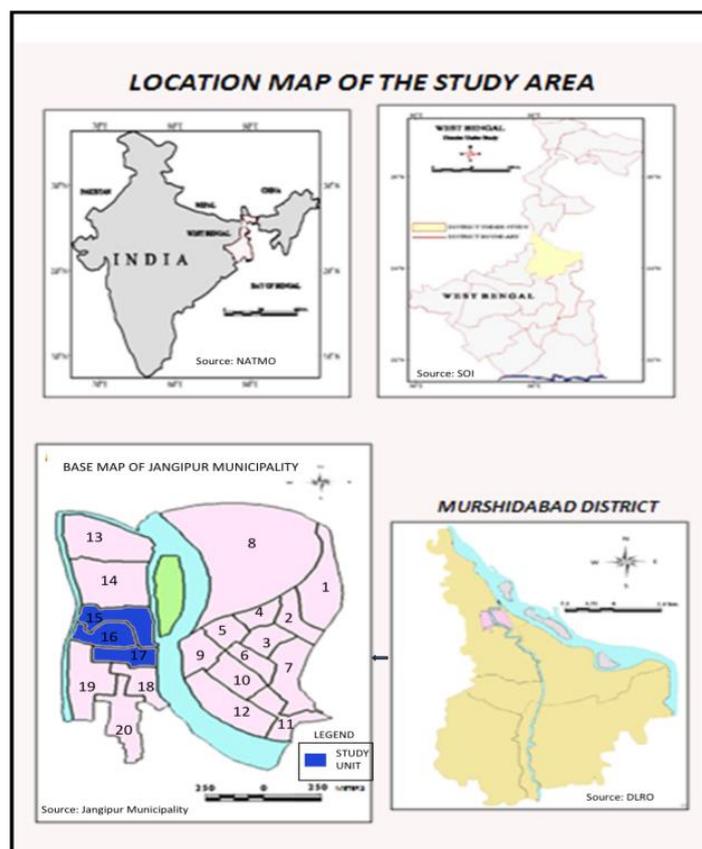


Figure 1: **Location of the Study Area**

*Source:* Various sources.

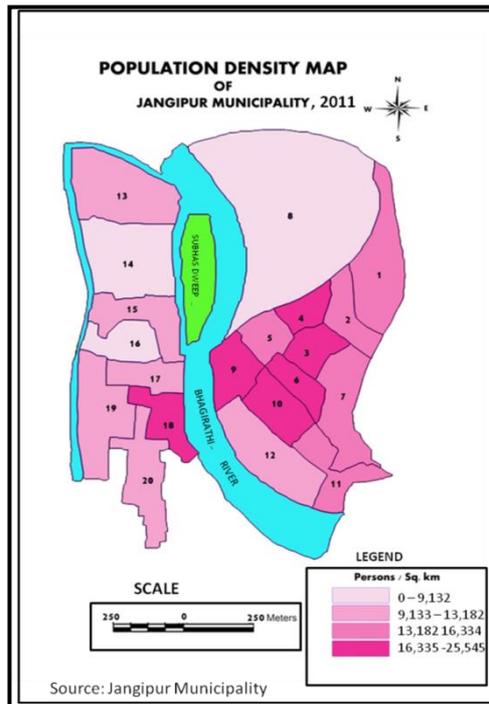


Figure 2: **Population Densities within the Municipality of Jangipur**  
*Source: The Municipality of Jangipur.*

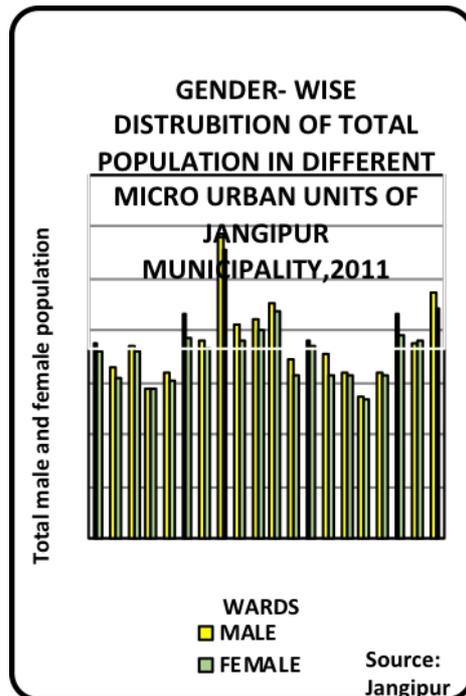


Figure 3: **Gender Distribution within the Municipality of Jangipur**  
*Source: The Municipality of Jangipur.*

### **1.3 Aims of the Study**

This study has the following aims:

- To get a clear picture regarding the beneficiaries and non-beneficiaries of municipal waste-management system in the entire Jangipur Municipality;
- To draw attention of the Local Self Government concerning the spreading of diseases due to non-clearance of accumulated garbage from some areas of the Jangipur;
- To highlight the issues and challenges related to solid waste management in selected wards of the Jangipur Municipality;
- To point out the shortcomings of the Urban Local Body, regarding scientific treatment of the garbage generated regularly within the municipal arena.

## **2. DATABASE AND METHODOLOGY**

Two types of database have been procured for making the project worthy. The first one is a secondary data-source where different reports, records, journals, gazetteers, periodicals on the specific problem have been perused and adequate information have been gathered from those literary sources. This information has been supported by primary data sources procured from the questionnaire survey. Purposive stratified sampling has been adopted to conduct the perception survey, with a hundred households being surveyed in each ward.

In order to conduct the primary survey, a hundred households have been chosen from each ward, in order to get the exact figure of respondents from the master-table in percentage, regarding solid waste management related urban issues associated with this project. Thereafter, thematic maps and diagrams have been constructed based on the dataset obtained from the master table and inferences were drawn accordingly.

## **3. DISCUSSION**

### **3.1 Solid Waste Management**

Waste management is the "generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes" [13]. There are various types of solid waste including municipal (residential, institutional, commercial), agricultural and special (health care, household hazardous wastes, sewage sludge). The term usually relates to materials produced by human activity, and the process is generally undertaken to reduce their effect on health, the environment or aesthetics.

To critically evaluate the scenario of solid waste management system in Jangipur municipality, detailed studies have been conducted that are given below:

Waste types	Waste generation at the municipal level (%)
Large plastic bags	35.19%
Medium plastic bags	51.85%
Small plastic bags	12.96%

Table 1: **Types of Waste Generation**

According to the Jangipur Draft development plan of 2012 [14], the types of waste generated by the municipality have been categorized in 3 types of polymer waste. Within the total waste generation above 50% are medium size plastic bags, 35% large plastic bags and 12% small sized plastic.

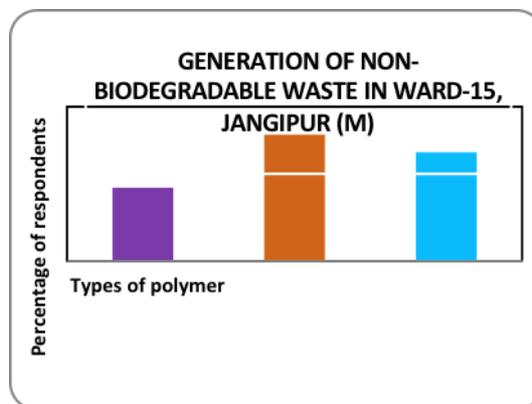


Figure 4 **Generation of Non-Biodegradable Waste in Ward 15, Jangipur**

*Source:* The Municipality of Jangipur.

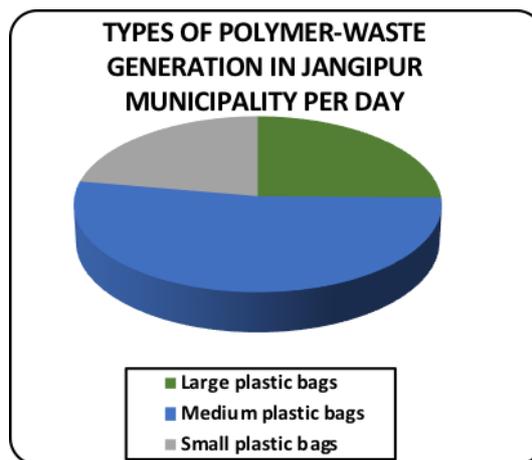


Figure 5: **Types of Polymer-Waste Generation in Jangipur Municipality, per Day**

*Source:* The Municipality of Jangipur.

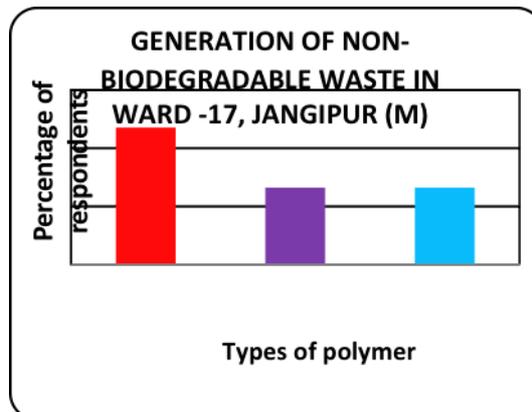


Figure 6: **Generation of Non-Biodegradable Waste in Ward 17, Jangipur**

*Source:* The Municipality of Jangipur.

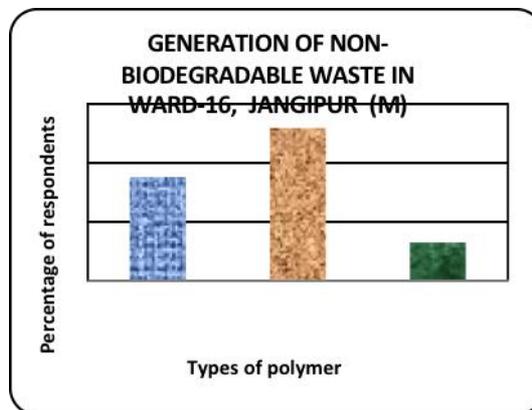


Figure 7: **Generation of Non-Biodegradable Waste in Ward 16, Jangipur**

*Source:* Jangipur Draft Development Plan, 2012.

### 3.2 Waste Disposal Strategies

In the municipality there is 52 MT SW is collected each day. It needs to be collected properly with due attention and recycled [12]. Solid Waste Management has to be taken into serious consideration, in order to maintain cleanliness. The waste needs to be converted into wealth. This is possible through the utilization of rapid advancement of science and technology. In the municipality, garbage is collected from roadside. Door to door collection has not yet been attempted. Garbage disposal is not done properly. There is no system of house-to-house collection. It is thrown here and there, even into the drains. The dumping ground has been in existence for the past ten years. There is a need of one more dumping ground.

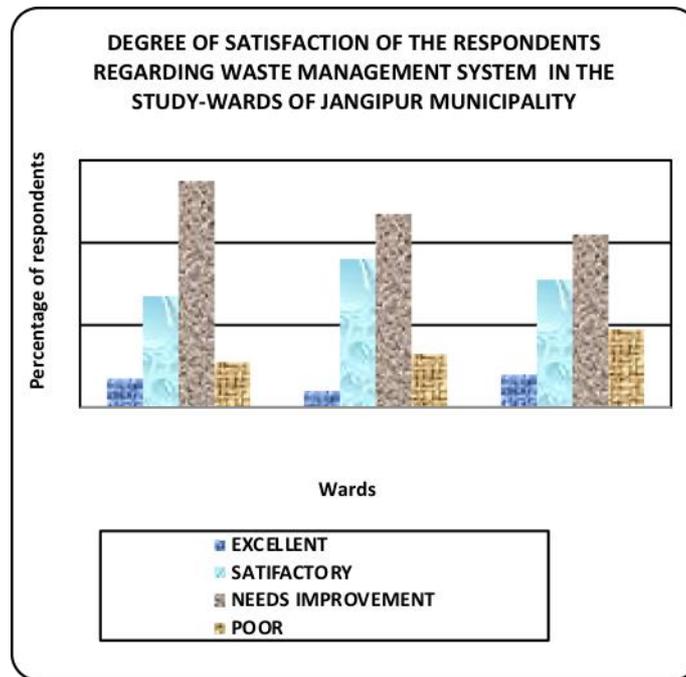


Figure 8: **Degree of Satisfaction with the Waste Management System within the Study Wards**

*Source:* The Author.

Now garbage disposal in the wards is becoming an important and significant issue for maintaining healthy and clean atmosphere. Permanent structures in term of vat at the various points of wards are needed where people can dispose of the garbage from their home. It was clearly mention in problem identification workshop. Operation and Maintenance is to be undertaken by the ULB involving ward committees respectively. The existing dumping ground is situated in ward no. 1 is causing environmental and health concern. The Ward Committee is willing to play the role in supervision, maintenance and operation. Recycling is also required which would create employment opportunities for the unemployed youths.

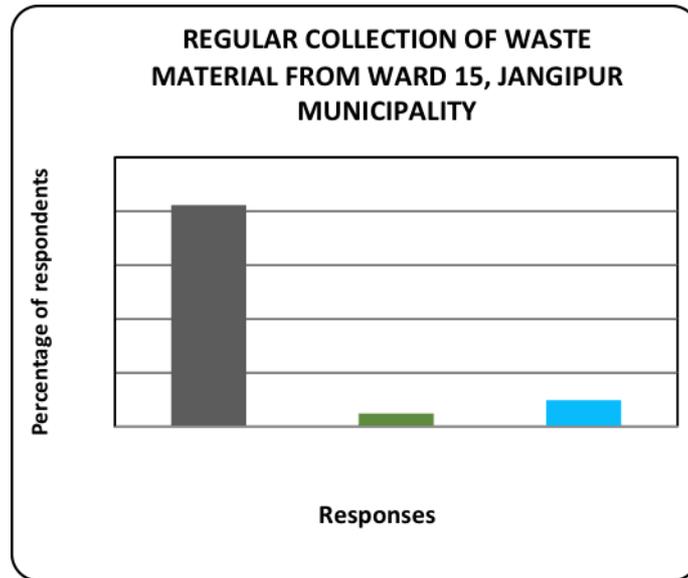


Figure 9: **Regular Collection of Waste Material from Ward 15, Jangipur**

*Source:* The Municipality of Jangipur.

Special team has to be deployed for collection and disposal of waste during festivals in order to keep the festival places clean and hygienic. Vats have to be provided at the spots where the festivals took place. These would draw the attention of pilgrims during their visit to Jangipur Municipality on several occasions (Durga puja, Diwali, Saraswati puja, Eid, Maharam).

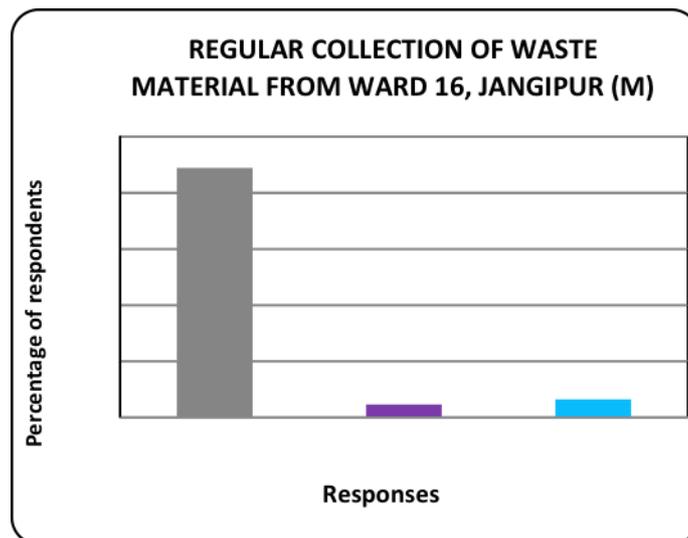


Figure 10: **Regular Collection of Waste Material from Ward 16, Jangipur**

*Source:* The Municipality of Jangipur.

Introducing the waste disposal in a proper manner would draw attention of other persons belong to the upper strata of people and the tourism can be developed in the ULB.

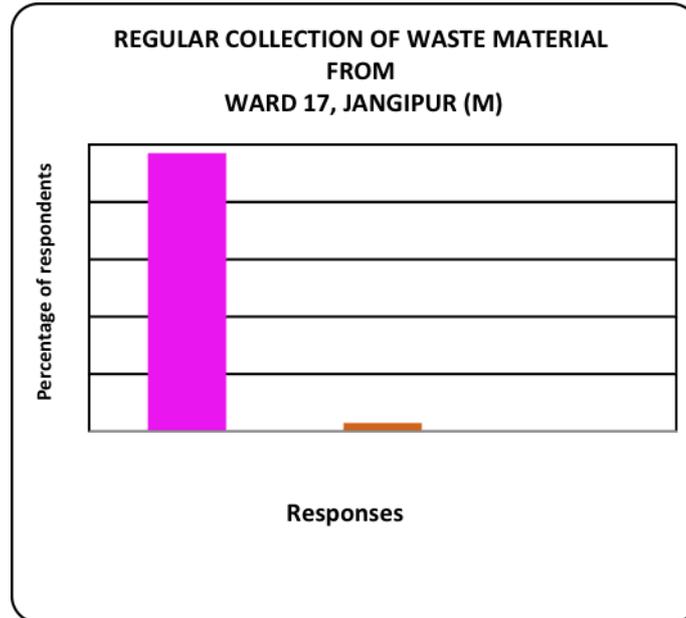


Figure 11: **Regular Collection of Waste Material from Ward 17, Jangipur**

*Source: The Municipality of Jangipur.*

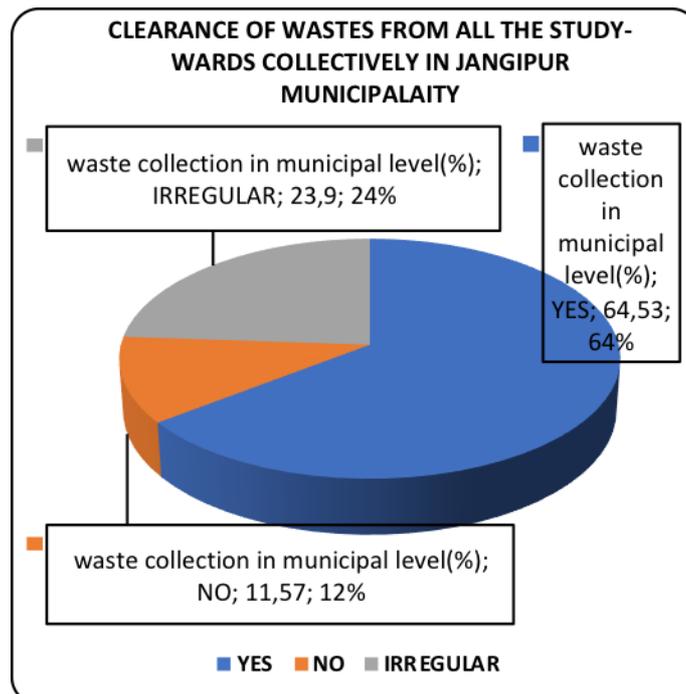


Figure 12: **Clearance of Waste from All the Study-Wards**

*Source: The Municipality of Jangipur.*

There are four types of garbage disposal systems found in Jangipur municipality. The respective diagram shows different types of garbage disposal methods in ward no. 15, 16, and 17 of Jangipur municipality. In ward no. 15, highest percentage (36%) of households use disposal bins for the disposal of garbage. 15% of total surveyed households dispose garbage in open field. In case of ward no. 16, (45%) of households use garbage disposal bin and on and around, 19% uses municipal van for disposing garbage. From the diagram, it's clear that in ward no. 17, highest percentage of households (36%) use a municipal van.

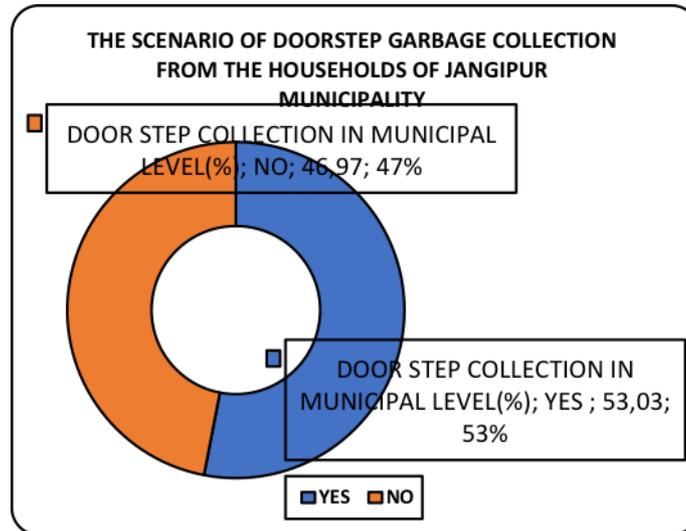


Figure 13: **The Scenario of Doorstep Garbage Collection**  
*Source: The Municipality of Jangipur.*

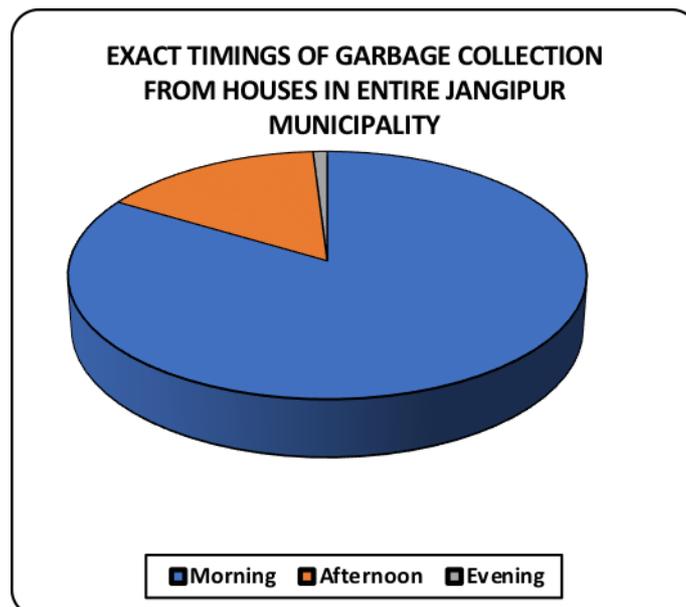


Figure 14: **Exact Timings of Garbage Collection from Houses in Jangipur**  
*Source: The Municipality of Jangipur.*

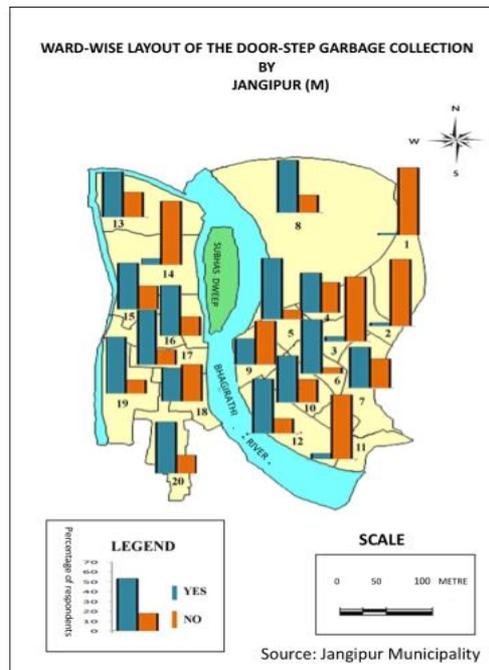


Figure 15: **Ward-wise Layout of the Doorstep Garbage Collection in Jangipur**  
 Source: The Municipality of Jangipur.

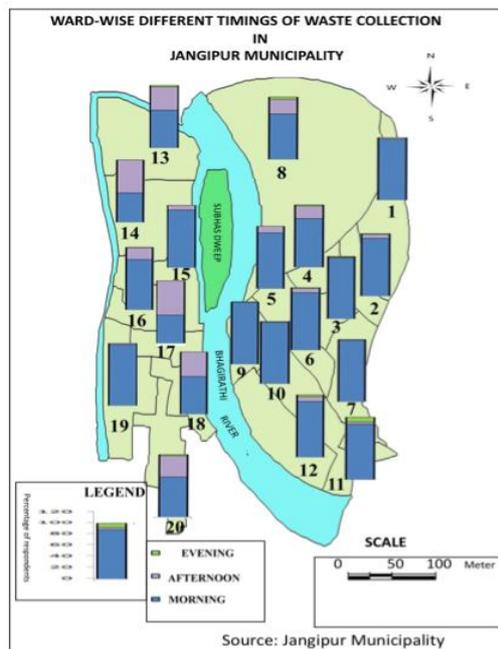


Figure 16: **Ward-wise Timings of Waste Collection in Jangipur**  
 Source: The Municipality of Jangipur.

The diagram reveals that the respondents of households in a considerable number dispose garbage at roadside in Jangipur Municipality. In houses respectively of ward nos. 15, 16 and 17, 81%,87% and 85% respondents don't dispose garbage at roadside and on the other hand, 19% 13% and15% of total households respectively respondents dump garbage at roadside in those respective wards [11], [12].

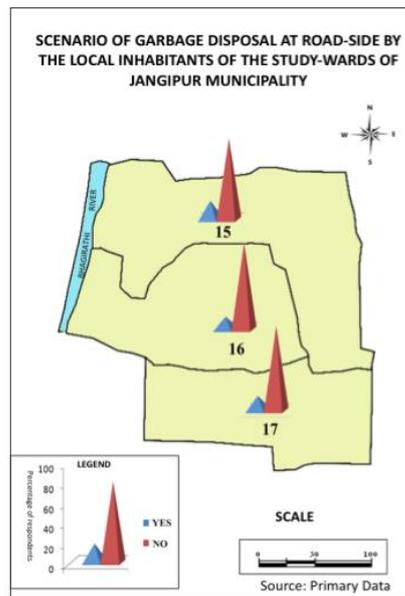


Figure 17: **Scenario of Garbage Disposal at the Roadside**  
*Source: The Author.*

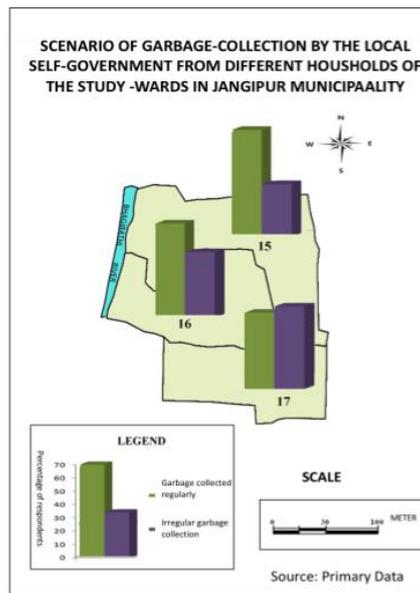


Figure 18: **Scenario of Garbage Collection by the Local Self-Government**  
*Source: The Author.*

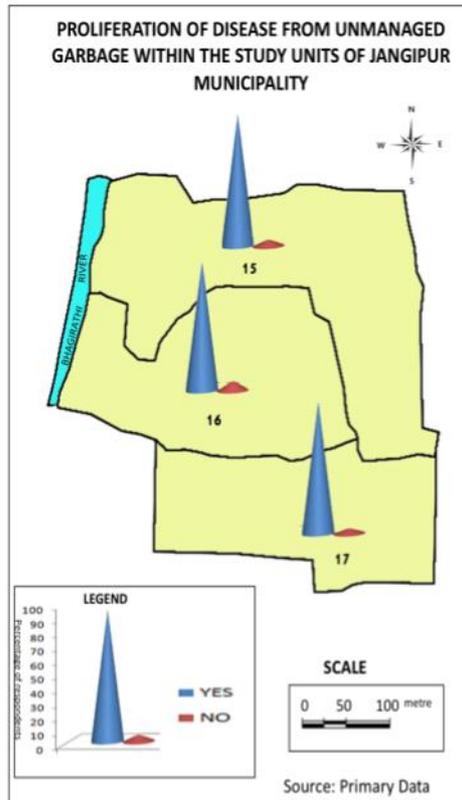


Figure 19: **Proliferation of Disease from Unmanaged Garbage**  
*Source:* The Author.

The Municipality provides two types of garbage collection methods. They collect garbage from individual households and sometimes they do collect the same from that of dumping ground. The accompanying diagram indicates that the high percentage of respondents of households in ward no. 15, 16 and 17 have said that their regular garbage is taken away by the municipality-staff from their individual houses. In ward no. 16, highest percentages of households (81%) have responded that municipality-staff collect garbage from dumping ground (Primary data).

The diagram reveals that the proliferation of disease from unmanaged garbage is very alarming in Jangipur municipality. In houses respectively of ward no.15, 16 and 17, within 80-90% respondents said that different types of diseases like; malaria, dengue, asthmatic disease etc. proliferated from these garbage [11], [12].

## **4. FINDINGS**

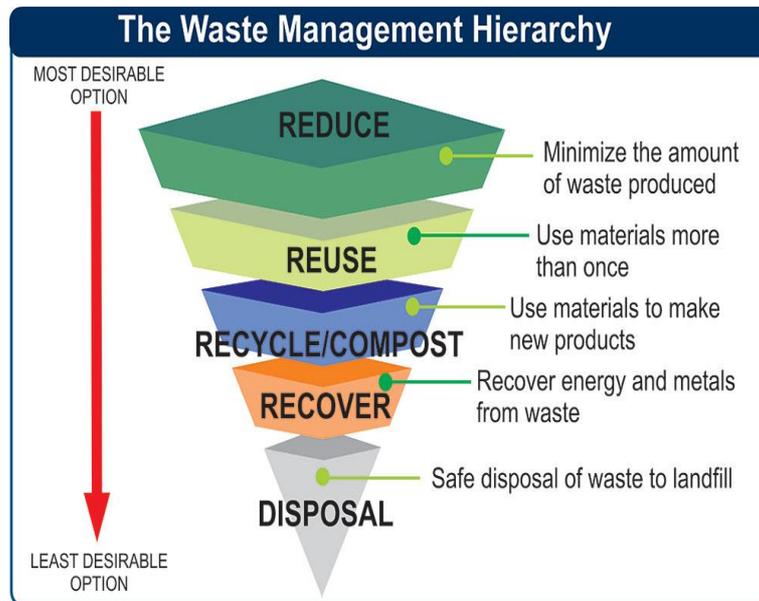
After the thorough questionnaire survey conducted in selected study-units of Jangipur Municipality and further verification of the primary databases with that of secondary ones, the researcher has reached to the following findings as well as conclusions and these are as follows.

### **4.1 Problems of the Solid Waste Management within the Jangipur Municipality**

1. In Jangipur solid waste is disposed traditionally. Every family disposes of the solid waste on roadside, near the house. There is no segregation of solid waste. Waste is then dumped in open ground for land filling. Total land engaged for this purpose is growing, thereby becoming a non-productive. Solid waste dumped openly on the common areas, so animals scattered anywhere. Local authority has no sufficient source for purchasing the vehicles. As well as high maintenance cost of vehicles. Collection of solid waste therefore becomes a crucial step in management of solid waste at Jangipur;
2. Garbage disposal systems are observed to be pretty satisfactory in ward no. 17 of Jangipur municipality;
3. The Local Self-government of Jangipur should pay adequate attention concerning a systematic garbage-clearance from the localities of ward no.-15 and ward number-16;
4. For scientific as well as an hygienic management of disposed garbage generated from the households regularly, the Urban Local Body of Jangipur will have to be more and more forward and awareness should also be generated through campaigning amongst the inhabitants of this Municipality, by the direct initiative from the end of its administrative authority.

### **4.2 Possible Solutions to the Solid Waste Management in Jangipur**

Unfortunately, a normally developing country like India does not have any proper solid waste management system in every municipal area. As a consequence, within the Jangipur Municipality, problems related to solid waste management arise.



**Figure 20: The Waste Management Hierarchy**

Hence, for the proper management of MSW within the Jangipur municipality, one appropriate way is to develop a sustainable waste management system. In this system MSW have been managed by reduce, reuse and recycle mechanism. There are many environmental benefits that can be derived from the use of these methods. They reduce or prevent greenhouse gas emissions, reduce the release of pollutants, conserve resources, save energy and reduce the demand for waste treatment technology and landfill space. Therefore, it is advisable that these methods be adopted and incorporated as part of the waste management plan.

The Hierarchy of Sustainable Waste Management developed by the Earth Engineering Center at Columbia University is widely used as a reference to sustainable solid waste management and disposal [15]. This study is presented in reference to this hierarchy. "Unsanitary Land filling and Open Burning" has been added to the original hierarchy of waste management which ends with sanitary landfills (SLFs). Unsanitary landfilling and open burning will represent the indiscriminate dumping and burning of MSW and represents the general situation of SWM in India and other developing countries.

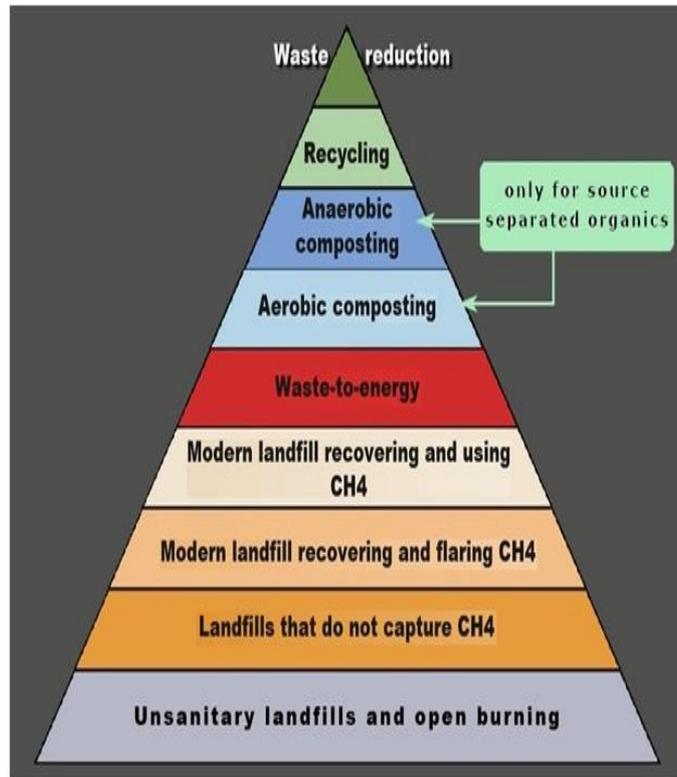


Figure 21: **The Hierarchy of Sustainable Waste Management for India and Other Developing Nations** [10]

## **5. CONCLUSION**

The existing solid waste management system in Jangipur municipality is effective in carrying out the functions of primary collection and transport. These wastes are used only for landfilling purposes and open burning. But this system is not sustainable and for this after a time the city environment has been totally destroyed. Finally concludes that the problem of solid waste needs some holistic approaches such as reuse of solid waste to produce energy and bio manures.

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