

# ANALYZING CONSTRAINTS FOR PRACTISING SOLID WASTE MANAGEMENT IN SLUMS - A CASE FOR CITY GWALIOR

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**Abstract** - The procedure of handling the waste i.e storage, collection and disposal of waste determines risk to environment and health. The poverty pockets in cities of India, problems and issues of municipal solid waste management are of immense public health scrutiny. Municipal boards and health care providers are facing major challenges in the management and recycling especially in urban slum. Understanding community concern and willing toward involvement in solid waste management improving is critical for informing interventions in slums. India being the second most populous country comprises 17.87 % of the world population. It is going to be the most populous country by 2022. Approximately 32.8 % of its population is urban and its population is increasing at a rate of 3.5 % per annum. Waste generation per capita is being increased by 1.3 %. There are only 53 cities, (as per the data from ministry of environment, forest and climate change, GOI) where 78- 80 % of municipal waste gets collected and much lesser 22 – 28% of this waste is processed and treated for bio-fuel and recycling. The percentage is increasing from the last two decades.

This paper analyses the constraints and examines the ways to improve waste clearing and management in slums and squatter settlements in the city.

**Key Words:** - Slum, Solid waste management, Gwalior

## 1. INTRODUCTION

1. In India as per municipal solid waste rule 2016, local administrative body has the responsibility of handling solid waste. Each local body must provide the facility with respect to collection, storage, segregation, transport the facilities in urban slum and make existing public and private sector services available and accessible, treatment and disposal of municipal solid waste. Urban health resource center recommended to the urban slum dwellers. It's been concluded that basic sanitation, safe water and proper solid waste management are the key aspects for betterment in deprived settlements. With increase in urbanization and changing life styles, urban region now generates eight times more solid waste than in 1947. Planning commission report (2014) reveals that 37 crore people residing in urban area generate 62 million tonnes of MSW per annum currently and it is to be projected.

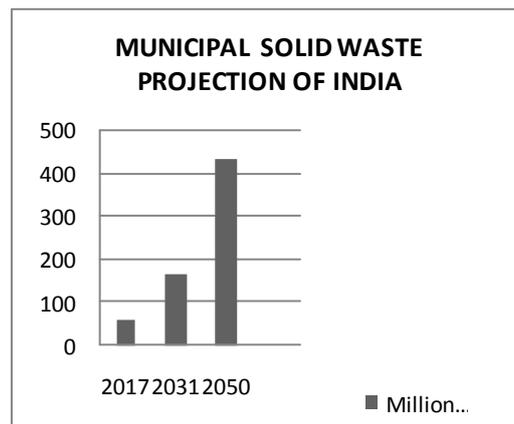
**Sanitation is more way than just a household access: the full cycle of segregation, safe collection, transport, reuse or treatment is still a challenge – a bigger challenge for slum settlements when safe collection and conveyance pose a numerous challenges**

## 2. Waste Forecasting For Upcoming Years

There is generally a correlation between the amount of municipal waste generation and the gross domestic product of the country. Higher the GDP of a country, higher is the waste produced. Various studies have revealed the stronger correlation between solid waste composition and socio-economic factors. Since couple of decades the socio- economic condition of India have been fast changing.

The per capita income of India has changed from US\$ 17.22 to US \$ 253.78 and GDP from US \$ 9382.62 million to US \$ 2716750 million during 1971 – 2018

**Source** Rajendra Kumar Kaushal et al. / International Journal of Engineering Science and Technology (IJEST)



Source - (GOI, Ministry of environment, forest & climate change)

### 3. Change Of Waste Composition In Recent Years

With increase in modernization & technology, the waste generation pattern is also changing. It is worth examining the changes in the composition of waste in India in the previous years. This table gives the changing composition of solid Waste over the last three decades and is attributed to the changing life styles and increasing consumerism.

Year	biodegradables	paper	Plastic / rubber	metal	Glass	rags	others	inert
1996	42.21	3.63	0.6	0.49	0.6	-	-	45.13
2005	47.43	8.13	9.22	0.5	1.01	4.49	4.02	24.15
2011	42.51	9.63	10.11	0.63	0.96	-	-	17

Source – Planning Commission Report

#### 3.1 Composition And Characteristics Of Indian Municipal Solid Waste

The Following major categories of waste are generally found in solid waste of India

- Biodegradable solid waste : food and garden waste , green waste ( vegetable, flowers , leaver, fruits ) and paper, wood.
- Recyclable materials waste : paper , glass , bottle , cans , metals , certain plastic , etc.
- Inert waste matter: Construction & Demolition , Dirt, debris.
- Composite waste : waste clothing , tetra pack , plastic such as toys
- Domestic hazardous waste (also called “household hazardous waste”) and toxic solid waste.

Waste medicine, paint, chemicals, light bulbs, e waste, spray cans, pesticide fertilizer and fertilizer, batteries and shoe polishes. MSW in India has approximate 40 – 55 compostable, 35 – 50% inert waste and 10 % to 30 % recyclable. analysis carried out by NEERI reveals that in totality Indian waste consist of nitrogenous content (.64 to .85) % , phosphorus range (.67 ± 0.15) % , potassium range ( 0.68± 0.15) % and C/N ratio (26±5) % .Change in the physical and chemical composition of India MSW with time.

### 4. Waste Generation Rate In India

Per capital waste generation rate			
Population size	waste generation* ( kg / person / day)	waste generation* ( kg / person / day)	waste generation* *5( kg / person / day)
1 2000000	0.43		0.55
2 1000000 – 20000000	0.39		0.46
3 500000 – 1000000	0.38		0.48

4	100000 – 50000	0.39	0.46
5	100000	0.36	-
Source - CPCB Report * R K Annepu** (2012)			

**5. Slu.ms**

“Socially Slum is a way of life, a special character which has its own set of norms and values reflected in poor sanitation, health values, health practices, deviant behavior and social isolation . “

(Planning commission)

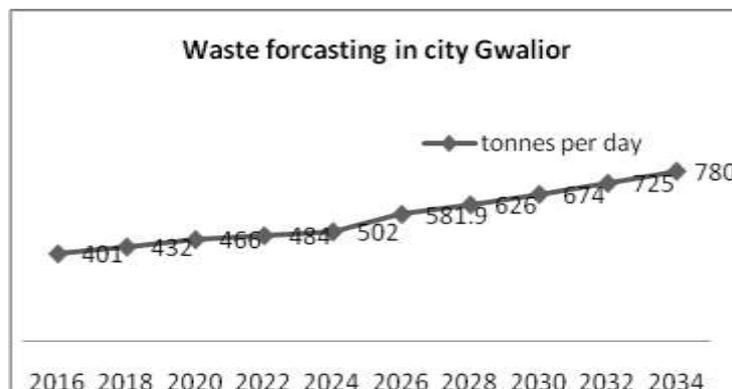
This challenge is not unique to India, 86.3 crore people around the world live in similar squatter settlements. India and China have the highest number of slum dwellers, with 50 million plus inhabitants living in critical shelter poverty. The United Nations’ Sustainable Development Goals recognize the sustainable growth of future generations is contingent upon active improvement in quality of life. The Sustainable Development Goals aspire to halve the proportion of people living in slums within each country by 2030. Given the very nature of informality, surveying the number of households defined as slums is challenging, but in India this implies improving quality of life of at least 60 lacks household.

**6. Gwalior**

Gwalior, is a historical city of central India with the co ordinates: 26.2183° N, 78.1828° E , having municipal area of 375sq km. the urban population is 12.5 lacks where 2.9 lacks lives in notified and un- notified slums . The Gwalior Municipal corporation is divided in 25 zones subdivided in 66 wards, the city is having a population density of 6157 persons / km.

**6.1 Waste Generation Scenario in Gwalior**

- The waste generation will be increased from 401 tonnes / day in 2016 to 780 tonnes / day in 2034 @ 3.68 % growth rate



Source – GMC (2016)

**6.2 Slums Status In Gwalior**

Being a prominent city of north central India, is having a population of more than 1.4 million at present. Gwalior is having significance in term of historic and religious aspects. Total 218 notified slum pockets and 256 illegal colonies in Gwalior city is allocated. These slum have population of 4,78,000 which is about 57.8 % of the city population ( as per the data from slum free city plan 2015) . Slums are spread in the entire city but major concentrated is in zone no 1, 3 , 7 .

Few slums are spread around Swarnrekha river ( now became the main waste water drain for the city ) slum in Gwalior are spread in 53 municipal wards . Seven wards are free of slum pockets or any scattered settlements. Approximately 17 % of the slum population is under BPL\*.

- Sanitation scenario in Gwalior, Madhya Pradesh ; world bank 2009

Total house holds in city	Total house holds in poverty pockets	No of house holds having facility of solid waste door to door	No of house holds having facility of solid waste to neighborhood points	Households dumping solid waste in open	No of house holds throwing solid waste in drains
2.23000	60787	19257	9095	23355	30

### 6.3 Solid Waste Scenario

Gwalior is facing difficulties for being a typical tier 3 city in India. The city is still struggling for a permanent solution for segregation collection transportation and disposal of municipal solid waste. Despite the fact that lower income group is generating the least of MSW as compared to other income groups, it is recommended to work on their solid waste management quickly. The improper disposal methods are creating gap to meet the cleaning goals. There are various challenges for practicing solid waste methodologies in slum.

### 7. Challenges In Practicing Solid Waste Management In Slum

#### 1. Inadequate basic infrastructure.

The absence of roads, drainages, open spaces, electricity are the first and foremost reason for poor solid waste management in developing countries. The functioning of S W M lead for a more adverse situation when there is unavailability of infrastructural facility. Absence of road led to inaccessibility for collection of waste where as drainage shortage led to mixing of solid waste with the sewerage. As well as unavailability of electricity led to cut off for chances for decentralizing techniques in S W M.

#### 2. Lack of education.

68 % of the street children are illiterate and 40 % of them work in the unorganized sector.

In India, decent primary education is a still privilege in slum region, resulting in a gap for socio-economic growth and living standards. For most poor families, educating their children is the last thing on their minds. Children in slum up to the age of 14 is entitled to free schooling, but the government schools they attend are poorly resourced and have low teaching standards. As slum children grow up, parental pressure to leave school and start work increases, and the majority of youngsters leave school by the age of 16. This causes insensitivity towards cleanliness.

#### 3. Unaware of adverse effects of poor solid waste management.

Technically slums are the byproduct of the prospered society, they themselves are unaware about the consequence of poor solid waste management.

The impact are-

**Environment effect** - Ground water sullying, Bad scent rodents, wind blow litter waste spread in the surroundings, Fire inside the waste dump.

**Social exclusion** - Undesirable neighborhood

**Economic loss**-Decrease the value of premise, Increment of taxation for waste collection and other amenities, if any .

**Health effect** - Increase chances of catching malaria, Chest torment disturbance of nose, Dermatitis, , Epidemics.

#### 4. Inattentive behavior of local bodies

The local bodies plays a very important role in development of slums by providing infrastructure like electricity , roads, water , amenities like solid waste disposal facility , sanitation facility and primary education and health. Sometimes, insensitive behavior of local bodies toward the poverty pocket causes failure or delay in providing various services. The demand and supply gap always restrict for a comprehensive growth of the slum.

## 5. Improper orientation of the developed slum.

Slums are the organic settlements, arranged by the inhabitants creating insufficient road sizes. Generally slums are located near nalas, or the low lying areas in the city, which occasionally causing floods and further inaccessibility. The pockets are unplanned having unnecessary openings or blockages, insufficiency of open spaces, sharp and slope turns. These provisions result in inability to access, to each and every corner in the slum.

## 6. Private agencies unwilling to work for the slum.

Since the slum consumes a high population density with low literacy rate and low socio-economical conditions, it is very hard to execute the waste management practices within the pockets. The waste managing private agencies avoid to work even at higher tender quotation rates, due to the reasons of lack of cooperation from the pockets, theft and the additional burdens of reduced infrastructural facility.

## 7. Insufficient funding for slum solid waste disposal.

With the population growth, challenges to provide adequate infrastructure in slums and new methods are important. Most of the slums are running beyond their infrastructural capacity in large cities. There are problems in managing solid waste due to inadequate financial support. Due to the financial crunch ULBs do not have adequate infrastructure to provide solution. This results in inefficient services and maintenance in management of waste.

## 8. Government Initiative Programs For Slum Sanitation

**1 JNNURM ( Jawahar Lal Nehru National Urban Renewal Mission )** - In 2005, government launched a very ambitious program for small and medium towns for reforming and strengthening urban infrastructural provision and delivering services. To bridge the gap between the issues of rapid urban growth and cope with its challenges, government to draw up a coherent strategy to implement scheme in 63 cities. The JNNURM main aim was accorded to the development of basic services to the urban poor in the city. The objectives were: Housing, Water supply, Sanitation, Solid waste management.

**2 National Urban Sanitation Policy ( 2008)**- Despite the efforts, a large portion of people living in informal settlement in cities still bear deleterious effects of poor sanitation. In 2008 government launched NSUP with a vision to make all Indian town sanitized. The policy recognizes some key problems to the urban poor and un-served scattered settlements need to be addressed to achieve the vision:

- Raising awareness regarding inherent linkages between sanitation and public health
- Creating a city wide approach to sanitation and
- Resolving constraints of lack of tenure space or affordability in informal settlements.

**3 Slum Sanitation Strategies** - Traditional approaches to sanitation investments have majorly involved in focusing on providing infrastructure with less emphasis on service delivery. As a result urban projects of water and sanitation have not rendered the delivering services. By April 2014, about 1 state governments had formulated their state wide sanitation service targets, and estimated financing needs covering both capital expenditure and maintenance cost) required to achieve these targets based on normative gaps and transition path at a household level and at the network level.

**4 City Sanitation Plan** - In order to realize its vision of 100 percent total sanitized Indian cities and towns, NSP envisages all Indian states develop state sanitation schemes and all Indian cities formulates CSPs. The policy provides the necessary framework for the state governments and municipalities to approach sanitation in an integral manner. It also considers in improving and extension of sanitation infrastructure including toilet access, confinement, transport treatment and disposal of waste with all related technical, financial, institutional and social aspects. Further, issues related to governance, awareness creation and capacity building are also detailed in the CSPs.

**5. National Sanitation Ranking And Service Level Benchmarking**- The two major national level initiatives in support of implementing, the NSUP include: national sanitation rating of cities ( 2009-0) and service level benchmarking ( SLB) of ULBs.

**6. Swachh Bharat Mission ( Urban ) 2014 -19** - In keeping with the vision of the NUSP and government's priority to make India clean, litter free and ODF, the Swachh Bharat Mission was launched in October 2014. Estimated at a cost of approximately 62 lakh crore, the SBM urban has the following objective:

- Eliminate open defecation
- Eradicate manual scavenging
- 100% collection and scientific processing / disposal of MSW
- Bring about a behavioral change in people regarding healthy sanitation practices.
- Generate awareness among citizens about the sanitation and its linkages with public health
- Strengthen local body to design, execute and operation systems.
- Create an enabling environment for private sector participation in capital and operation expenditure.

## 9. Recommendations & Conclusion

**Decentralization Of Waste** - The study concludes that installation of decentralized solid waste processing modules in town & development of formal recycling industry from informal sector is the need of the decade in developing countries like India. For slums, decentralized composting prototypes should be setup through community participation, the biodegradable waste from units collected then disposed into these decentralized composite units.

### Community Approach For Management -

- Initiative for I C E
- Community led initiative in solid waste management
- Initiatives towards training & capacity building.

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