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Solid waste management in Chapra (Bihar): Problems and prospects

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Abstract

Solid waste management ought to be "everyone's concern," but it has historically been "nobody's business." The difference between enforcers and implementers is significant. One of the fundamentally important services offered by municipalities is solid waste management. Due to inadequate planning, Chapra's solid waste management issue is becoming worse every day. The city of Chapra produces a significant amount of rubbish and garbage each day. An average of 87-92 tonnes of solid trash are produced daily in Chapra City, according to estimates. Chapra City's fast population increase, urbanisation, development, and shifting lifestyles have also altered the waste composition, which is now mostly composed of organic and plastic trash. The lack of a monitoring system, garbage collection trucks, and management makes the transportation and disposal of solid waste more difficult. It is also found that most of the people throw garbage on open space, in water bodies etc, it's a challenging task for cleaning. So, this paper illustrated the various aspects of solid waste management issues in Chapra. Regularly garbage collection, promotion of 'Reduce, Reuse and Recycle (R-R-R)', participation of NGOs and local people are needed. Societies also acknowledge the necessity of handling waste in a safe and responsible manner.

Keywords: Solid waste, management, garbage, population growth, participation etc.

1. Introduction

The new word used globally to describe non-liquid waste material arising from mining, industrial, commercial, agricultural, and residential operations is solid waste. The term "solid waste" describes undesirable and waste products from homes, sweepings, streets, businesses, and agricultural activities. A variety of plastics, papers, fabrics, rags, and non-biodegradable, recyclable, and flammable materials are mixed together to form this combination. In India's various cities, solid waste is one of the most significant issues. The enormous growth in the production of solid waste, especially in big cities like Chapra, will have a significant effect on the amount of land required for garbage or waste disposal.

One of the largest cities and the administrative centre of the Saran district is Chapra. There are 45 wards in the city. The Chapra is 16.96 km² in size. Chapra City generates a numerous type of solid waste, including waste from homes, businesses, healthcare facilities, hospitals, industrial areas, animal husbandry facilities, dairy farms, and slaughterhouses. There is no proper sewage system in the city of Chapra, endangering public health and cleanliness. Another solid waste-related issue is the clogging of drains (nallahs) during rainy seasons as a result of poor solid waste management, which causes issues with water logging throughout the city. A significant amount of debris and waste produced daily in the city of Chapra. Chapra City is thought to produce between 87 and 92 tonnes of solid waste every day on average. Urbanization and population growth are correlated with an increase in the annual amount of waste generated. The waste mix of Chapra City has shifted from being primarily organic to being primarily plastic due to the city's rapid population increase, urbanization, development, and changing lifestyles.

2. Objectives of the Study

The present study has certain specific objectives. These are given below:

- To examine the existing condition of solid waste in Chapra.
- To know the processes of solid waste management in Chapra.
- To examine the socio-economic conditions of the people and their daily solid waste generation and disposal process.

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- To understand the impact and awareness among people about the solid waste management.
- To suggest some recommendations of solid waste in aspect of proper management.

3. Data Source and Methodology

Finding out how solid waste affects the environment in Chapra is the primary goal of this investigation. Primary and secondary, both the data were used for this research paper. A variety of quantitative and qualitative methods, as well as visual aids like maps and diagrams, are utilised to interpret the collected data. Primary survey using self-administered questionnaires and in-person interviews to collect data from people's first-hand experiences. Secondary data is associated with the information collected from various departments associated with Solid Waste and their management.

The goals of the study dictate whether qualitative, quantitative, or a combination of the two approaches should be used. To verify, analyse, interpret, and comprehend human environments and all types of experiences,

qualitative research is generally concerned with elucidating them within a variety of conceptual frameworks in order to reveal what was previously thought to be unknowable, such as feelings, attitudes, perceptions, and cognition. Qualitative research methods consists of in-depth interviews, individual as well as focus groups, and casual observations are employed to get there. By using a variety of approaches, such as individual interviews and group discussions, able to gain new insights on the same topic from a variety of perspectives.

4. Solid Waste in Chapra: Source and Characterization

Waste is becoming increasingly concentrated in megacities like Chapra as a result of shifts in population distribution and consumption patterns. Growth in Chapra's population, urbanisation, and standard of living have all been accompanied by a corresponding rise in the city's garbage output. Here are some numbers to consider about trash collection in Chapra:

Table 1: Solid Waste Statistics

Number of household in Chapra	32585
Number of non-residential premises in Chapra	5155
Number of administrative ward in Chapra	45
Estimated quantity of solid waste generated in the local body area per day metric tonnes (TPD)	87
Quantity of solid waster collected per day (TPD)	87
Per capita waster collected per day (gm/capita/day)	43
Quantity of solid waster processed (TPD)	10
Quantity of solid waster disposed at dumpsite/landfill	77

Source: Bihar State Pollution Control Board, Patna

The generation and forms of solid waste in the city Chapra at the present-day must be understood before research can move further on the other properties of solid waste in the

Chapra city. The table illustrate the source of solid waste in different area of Chapra:

Table 2: Important Solid Waste in Chapra: Generators and Types

Sources	Generators of Waste	Types of Solid Waste
Residential/Household Area	Individual House, Apartments etc.	Food Waste, Paper, Plastic, Textiles, Leather, Wood, Glass, Metal, Ash, Electronic Waste (Computer, Television, Phone etc.), Tyres, Household hazardous waste such as paints, aerosols, motor oil, cleaning waste, gas tanks waste containing mercury, Special types of waste like batteries, oil, heavy consumer able items.
Commercial Area	Hotels, Shops, Restaurants, Markets etc.	Food Waste, Paper, Plastic, Electronic Waste, Wood waste, Metal, Special Waste, Hazardous Waste, Glass etc.
Institutional Area	School, College, Hospital, Government Building and Offices etc.	Almost Same as above mentioned Commercial Waste
Construction and Demolition Sites	Road, New building (Government and Private), Renovation sites, Demolition of Old Building etc.	Metal like iron, steel, aluminium, Wood, Concrete, Bricks, Tiles, Plastics Packets etc.

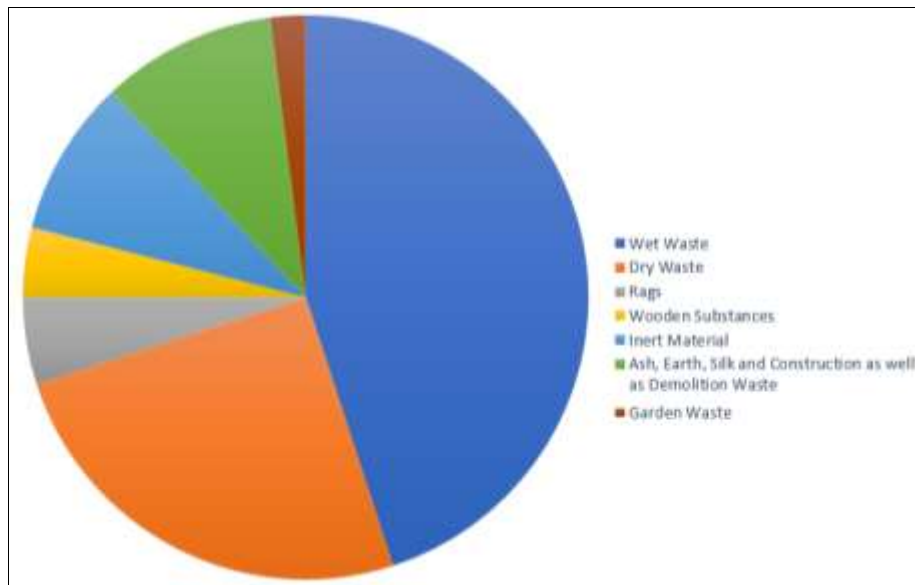
Physical components analysis (in average) of waste in Chapra based upon the sample survey provided by

Municipal Corporation of Chapra, are as below:

Table 3: Physical Components Analysis (in average)

Sl. No.	Waste Types	Average Percentage (%)
1.	Wet Waste	45-50
2.	Dry Waste	25-30
3.	Rags	05-06
4.	Wooden Substances	03-05
5.	Inert Material	08-10
6.	Ash, Earth, Silk and Construction as well as Demolition Waste	10-12
7.	Garden Waste	01-03 (Depends on Heavy Plants)
Density of Total Waste		370-410 kgs/m ³

Note: Single use plastic, mosquito net, thermocol, back packs generate volume but not mass



Source: Municipal Corporation, Chapra, 2021

Fig 1: Average percentage

5. Solid Waste Management Scenario in Chapra

The environmental and health risks caused by garbage can be mitigated with an effective waste management system. Similar issues with waste collection, transportation, and disposal are plaguing Chapra as they do in other communities. Annual per capita generation of solid waste is proven to increase in urban regions. Due to the city's distinctive layout and population density, as well as its waste's physical composition, density, temperature and rainfall, activity for recyclable separation, treatment capacity, insufficiency, and limited resources, Chapra's Municipal Corporation has major obstacles. The collection effectiveness of Chapra's current solid waste systems is very low because of a lack of garbage cans and a disorganised management structure. The city as a whole is plagued by the

widespread use of open dumping, open waste burning, and the lack of properly built sanitary landfills. This remark claims that no part of Chapra has a suitable system for collecting and disposing of municipal and hazardous trash.

6. Solid Waste Management Problems in Chapra

Improper solid waste management has been linked to a number of environmental and health problems. The following numbers illustrate the inefficient management of waste collection, which is a direct result of a lack of planning related with waste management. Chapra Municipal Corporation has a small number of garbage trucks and most of them are quite old and need constant maintenance, garbage collection is irregular at best.



Photo 1: Collection bins and transportation vehicles for garbage collection

The solid waste's dampness is severely damaging Chapra's ecology. Everywhere in the city, from Bhagwan Bazar and Gudri to Ramli Mathia (between the Chapra Junction Railway Station and the Bus Stand), Salempur and Sahebganj to the vicinity of Gandhi Chawk and Mauna Chawk and the Bazar Samiti, the negative effects of improper solid waste dumping on the environment are plain to see. Because of the lack of forethought and financing, the solid waste management situation in Chapra is deteriorating rapidly. The district court, government offices, hospital,

school (private and public), market, etc. are all conveniently located in Chapra, making it an attractive choice for residents in the surrounding area. Since the population is increasing rapidly, and the pace of urbanisation is slightly above average, this indicates an increase in solid waste. Open dumping of solid waste is spreading several diseases in the research region, and the city is facing unpleasant solid waste management crises due to inadequate financing and legislation execution.

The research finds that increasing population and a lack of societal awareness are major contributors to the issues of solid waste and the damage it does to the environment. The primary survey found that 92% of Chapra residents are aware of solid waste, with 89% holding the opinion that this type of garbage is a substantial contributor to environmental damage. Sixty-three percent of respondents agreed that the land and biosphere are the primary targets of solid waste. Approximately 74% of Chapra residents are unhappy with the city's garbage management services. The residential neighbourhood has an extremely haphazard waste collection and sorting system. 67% of the population is fine with the fact that there are no bins in the immediate area. Poor sanitation and living conditions are the result of residents' lack of education and access to financial resources. Community environmental degradation may be exacerbated by an ineffective solid waste management system. The city's environment has deteriorated and its population has become sick due to the widespread practise of dumping solid trash in illegal locations.

7. Exiting Solid Waste Management Systems in Chapra: Challenges

Solid garbage collection is provided by Municipal Corporation, Chapra, throughout the city. Numerous problems related to the transportation and disposal of solid waste are caused by inadequate management, an inadequate number of garbage collection vehicles, and a monitoring system. Between Municipal Corporation and Bihar Urban Infrastructure Development Corporation Ltd (BUIDCO), there are numerous problems. The areas next to the shared storage facilities were found to be entirely disorganized. It is also discovered that the majority of individuals discard their trash in open areas, near bodies of water, etc., making clean-up difficult. The infrequency of garbage collection is caused by a lack of vehicles.

Chapra Municipal Corporation does not currently have a suitable landfill or place to dispose of waste. In Chapra City, open dumping, open burning of waste, and the disposal of solid waste in unplanned landfill sites are all common practices. Hospital and chemical wastes, among other hazardous waste kinds, are also improperly disposed of. Medical waste, as defined by the World Health Organization, includes all waste resulting from immunizations, COVID-19 testing, and patient care in hospitals and homes. Thus, this includes all of the personal protective equipment (PPE) used by medical personnel, including masks and aprons, as well as caregivers and the patients themselves. It also includes vials, testing reagents, testing swabs, and vaccine needles. It's gigantic in terms of scale. The majority of States and Union Territories in India have outgrown the capacity of the current treatment and disposal facilities. Effective handling of biomedical waste (BMW) is a major priority for the Municipal Corporation of Chapra.

Solid Waste in Chapra: Some Observation

- **Segregation at Source:** Not done at Household and through Collection time.
- **Storage at Source:** Basically done in polythene bags, plastic buckets, cartoons etc. throw garbage outside on street, open space etc. show less civic awareness.
- **Primary Collection:** Door to Door Collection available but not regular.

- **Secondary Collection:** available but irregular
- **Street Sweeping:** Daily sweeping (at evening after sunset) is done especially in market and posh area. Garbage left on road side.
- **Transportation:** Largely manual loading through tractors, small truck. Using of JCB machines are very less.
- **Disposal:** There is no any facility / infrastructure for treatment and safe disposal of the collected waste. All collected waste disposed along the highway and open space.
- **Community or NGO Partnership:** At present None.
- **Private Partnership:** Contractor for collection, transportation and disposal of waste.
- **Public Private Partnership (PPP):** At present None.
- **Planning and Management:** On Paper yes but problems at ground level.
- **Regulatory Aspect:** Compliance to Municipal Solid waste (Management & Handling) Rules 2000.
- **Public Awareness:** Through Rally, Wall painting, hording etc.

8. Conclusion

Poor waste management infrastructure prevents most emerging nations from serving their whole populations. Outside of Chapra and along the roadsides, trash is regularly deposited. Air pollution is caused by the burning of trash at open dumps, which also clogs drains, encourages the hatching of flies, and can spread infectious diseases. Chapra's current solid waste management system is inadequate because of a lack of resources (both financial and otherwise). Waste collection efficiency is especially low in outlying sections of the city. Dangerous garbage from hospitals and other sources has been categorised as general trash. Open dumping and open burning have far-reaching consequences and should be discouraged in every way possible. Additionally, societies acknowledge the importance of proper waste management. Solid waste management has been 'Nobody's business' whereas it should be 'Everybody's Concern.' There is a significant difference between enforcers and implementers. Enforcing agencies ought to have a clearer understanding of their responsibilities and begin helping corporations include administrative and financial provisions in their annual plans. Regularly garbage collection, promotion of 'Reduce, Reuse and Recycle (R-R-R)', participation of NGOs and local people are needed. Open burning and open dumping have numerous detrimental effects that make them behaviours that need to be firmly discouraged. Societies also acknowledge the necessity of handling trash in a safe and responsible manner.

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