

ILLEGAL DUMPING CHALLENGES IN WEST RAND DISTRICT MUNICIPALITIES (WRDM), SOUTH AFRICA

E Muzenda, M Belaid, N Nkosi

University of Johannesburg, Department of Chemical Engineering Technology, PO Box 17011, 2028, South Africa

ABSTRACT

Increased population and urban migration in the West Rand District Municipality (WRDM) have significantly contributed towards increased waste generation and associated challenges. Increased waste generation exerts pressure, difficulties and constraints in waste management in the district with regards to storage facilities, receptacles, removal services and transportation. The lack or absence of waste management services in addition to other factors are catalysts and drivers for illegal dumping. In WRDM, illegal dumping is a result of rising waste disposal tariffs, lack of storage facilities, disrupted waste collection schedules, unsafe and inaccessible dumping sites particularly for in informal settlements. Illegal dumping is prevalent in low income and overpopulated areas. Ignorance, lack of minimum education and public awareness with regards to integrated waste management significantly contribute to illegal dumping which is threat to human life and the environment. Exploring energy and material recovery from waste opportunities plus recycling could contribute towards reduced illegal dumping.

Key Words: *Environment, Illegal Dumping, Landfill, Waste Management.*

NOMENCLATURE

WRDM West Rand District Municipalities LM Local Municipalities

1. INTRODUCTION

Illegal dumping refers to the disposal of waste in larger quantities compared to littered waste in unpermitted and unauthorised areas [1]. Due to community negligence, lack of knowledge on waste management effects and reduction practices, insufficient storage facilities, disturbed waste collection schedules and high cost of paying municipality services including disposal fees have often led to illegal dumping of waste in WRDM's four local municipalities (LM) i.e. Mogale City LM, Westonaria LM, Randfontein LM and Merafong City LM. Some places are seriously affected by illegal dumping and these are places where there is increased waste generated per square meter, highly dense population, low-income households, informal settlements and rural areas. These areas are commonly lacking costs for paying municipality waste management services. Poor road infrastructure is also a major contributor to the difficulty of gaining access to residential houses for waste removal. Unavailability of waste storage facilities also leads to illegal dumping and littering. Poor enforcement of laws related to illegal dumping and littering by government legislators is often experienced in WRDM [2].

In densely populated residential settings, illegal dumping is very high, especially where households are occupied by tenants with fewer stakes in the households due to residential owners not available for attending waste management issues as property owners. Households without occupants have a high rate of illegal dumping as polluters take advantage that no one sees them when dumping waste. Places with inefficient and insufficient lighting, overhead bridges, boarder gates, poorly supervised areas, dark places and bushes with dense trees are also victims of illegal dumping. Environmental polluters often avoid paying for waste disposal costs [2]. As a

result, they often dump waste illegally near building sites, along roadsides, provisional or temporal dumping sites, operational and non-operational landfill sites as shown in Figures 1 and 2.



FIGURE 1. Illegally dumped waste along roadside [1]



FIGURE 2. Illegal dumping in Krugersdorp [3]

2. STATUS QUO

Illegal dumping is a major problem and a serious concern in WRDM. Waste stream categories sent to WRDM landfill sites consist of illegally dumped waste cleaned up by the four local municipalities as shown in Figure 3 and this figure is projected to rise as waste generation increases if no urgent measures are implemented by the municipality to combat illegal dumping. Illegally dumped waste composition consists of paper, plastics, kitchen food waste, glass, cans, card boxes, pet coke bottles, building rubble, demolition waste, electronic waste, toxic waste, garden waste, animal carcasses, hazardous waste and electric appliances.

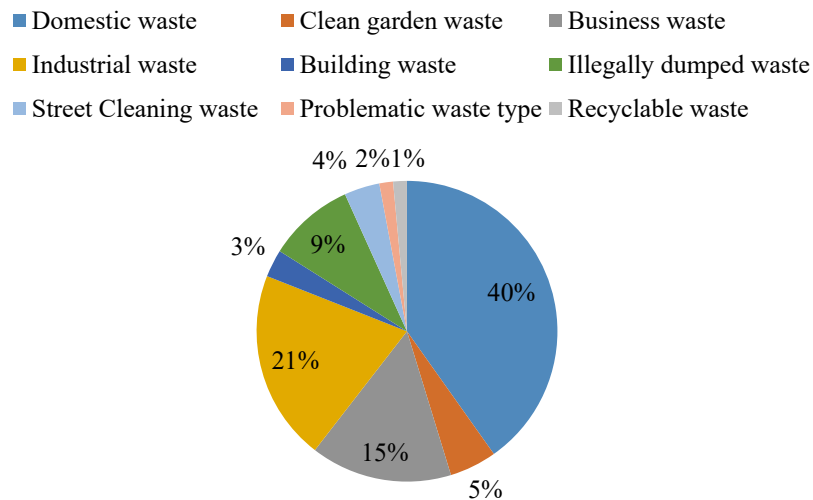


FIGURE 3. WRDM Waste classification for 2011

Illegally dumped and littered waste in WRDM is often found in plots without occupants, next to landfill sites as shown in Figure 4, unused open spaces, stormwater channels, dark corners, streets, taxi ranks, highly dense and populated areas, central business district, next to shops, abandoned premises, areas with broken fences, unpatrolled areas and along roadsides [4].



FIGURE 4. Illegally dumped waste in WRDM [4]

In low income and informal areas of WRDM, waste service provision is very minimal or absent due to inaccessibility to households for collection caused by bad road infrastructure and non-payment of municipality services. However, the municipality has provided these settlements with skips located in central points of their areas. Illegal dumping often occurs around the skips, settlements and roadsides etc as shown in Figures 5 to 8. When residents send their children to dispose of waste by the skips and due to height restriction, illegal dumping becomes an option and this often attracts other waste generators to dump illegally around the skips [5].

3. WASTE STORAGE

It is very difficult for municipalities to provide waste receptacles to rural, informal and low-income communities as they struggle to pay for waste services. Unavailability of storage facilities has a huge impact on the environment, which often face consequences of street littering and illegal dumping of domestic waste. To improve waste management system, municipalities need to supply waste storage facilities to the areas [6]. Many

households are unemployed in the WRDM, poor and receive low-income wages monthly and thus have an effect on the payment of municipal services. Municipality should incorporate such challenges in their waste management budget and at least provide them with affordable waste storage bags to minimise illegal dumping. The municipality should ensure waste storage facilities are sufficiently supplied to households, including backyard houses and any waste generator to prevent illegal dumping [7]. Increased waste generation also influences the capacity of waste storage receptacles. Current waste bins get filled up quickly and thus the municipality must provide larger and sufficient waste storage bins to prevent illegal dumping.



FIGURE 5. Illegally dumped waste around waste skip [5]



FIGURE 6. Illegal dumping next human settlements [5]

4. WASTE TRANSPORTATION

High waste generation challenges in WRDM eventually triggers the need for an increased collection frequency to avoid illegal dumping. Waste removal services in WRDM are hindered by poor road infrastructure in certain areas. Waste transportation is a very costly service rendered by the municipality. Municipalities have a mandate to revise the transport budget to meet efficient waste collection requirements. Lack of preventative maintenance, unavailability of spare parts, poor road infrastructure, old transport fleet (vehicles) and the loading of waste beyond required quantities are sources of transport breakdown faced by the municipalities. Transport breakdown comes with negative consequences in the waste management sector, including disturbed collection routines that often lead to environmental degradation through illegal dumping. Illegally dumping of waste becomes worse if

communities are located very far from waste drop off centres or where there is no provision of large mass containers placed at a central point for dumping accumulated waste from the residents [7].



FIGURE 7. Illegal dumping next to roads and settlement [5]



FIGURE 8. Illegal dumping is rife in the Princess informal settlement [5]

People in WRDM are not prepared to pay for extra waste management services incurred in addition to the normal rates thus it is essential that the local municipalities ensure their transport waste removal facilities are 100% effective to meet the waste management demand. Municipalities are facing a big challenge in management of waste removal in informal communities and rural areas. Major contributors to the challenge are bad existing roads and poor road construction, bad access and inconveniences to the residential houses due to damaged roads. Due to poor road maintenance, road conditions are worsening each and every day especially during rainy seasons, complicating the wastes removal process. In rural areas, it is very awkward for municipality to render collection services due to houses situated far apart, which needs a revised collection routine and thus increase opportunities of illegal dumping and municipality collection costs. The types of waste disposed at landfills also influence waste collection vehicles durability. These include sharp objects, broken glasses, chemical reactive substances and metal pieces, which often contribute to vehicle breakdowns. Spare parts are usually not readily available and some need to be imported and this creates a window for illegal dumping due to affected collection schedules [8].

5. COMBATING ILLEGAL DUMPING

Illegal dumping and littering can be reduced through the application of appropriate measures, which include education, community awareness, clean up campaigns, public involvement, provision of sufficient storage bins, effective waste collection schedules and consistent payment of municipal waste management services. Running the clean-up campaign is ideal in shifting the waste management issue to be owned by the communities and ensuring that they take full responsibility and ownership of improper waste disposal in such a way that they keep their places clean [9]. Municipalities need to put in extra efforts towards the provision of educational campaigns to communities, companies, industries, construction sites, schools, shop owners, street vendors and to the entire public in order to equip them with waste management knowledge. Conducting waste management and recycling summit and forum activities should be done on regular bases to minimise illegal dumping. Other illegal waste reduction methods can be communicated through advertisements on TVs, radios, newspapers, magazines, pamphlets, signs, websites, social media, posters, bill-boards as shown in Figure 9, street campaigns, pilot projects, brochures and handing out waste storage bags during campaigns [10]. Municipalities should also work towards building rubble and demolition waste crushing plant Capex to minimise illegal dumping of building, construction and demolition waste.



FIGURE 9. Illegal dumping combating billboard [10]

6. ILLEGAL DUMPING IMPACTS

Illegal dumping and littering have adverse negative effects on the environment, human health and the economy.

8.1. Human health

- Illegally dumped and littered waste pose a physical nuisance to human with unpleasant smells formed through the decomposition of organic waste, affecting the health of humans.
- Spread of diseases and infections from health care risk waste or medical waste illegally dumped when people come into contact with the toxic waste.
- Illegally dumped waste is a breeding space for harmful insects, mosquitoes, rodents, bugs and cockroaches.
- Illegal and littered waste can be playgrounds for children thus causing physical and chemical harm [11].

8.2. Environmental impacts

- Littered or illegally dumped waste can affect nature and other living species or animals. Livestock can eat littered plastics and other toxic substances, which often leads to their death. Poisonous substances contained by illegally dumped waste can be washed away by rain down through stormwater drains, which end up in water bodies and soils and often contaminate them. Contaminated water bodies kill fish

and other aquatic species. Contaminated soil becomes infertile and makes it difficult for plants and grass to grow.

- Illegally dumped waste reduces the quality of the environment and has the potential to cause soil, surface water and groundwater pollution.
- Illegally dumped or littered waste often blocks drains, blocking the circulation of water thus causing bad smells and contamination.
- Littered plastics and papers often catch uncontrolled fires causing loss of property, burnt forests and loss of resources.
- Illegally dumped building and demolition waste affects growing plants, grass and the soil.

8.3. Economic impacts

- Extra costs, energy, time consumption and resources are needed for illegal dumped waste cleanup.
- Loss of business is often encountered as illegally dumped waste and littered waste in the surroundings and premises often present misconceptions on quality and a negative image to businesses by clients.
- Recreational facilities with illegally and littered waste are affected, people tend to move away from visible nuisances.
- Improperly dumped waste causes a loss in the recycling industries; recyclables are lost through illegal dumping.

7. BY-LAWS

Gap analyses in the poor enforcement of WRDM By-laws on illegal dumping and littering has been identified. A process to develop and continuously update standards and By-Laws need to be initiated. By-Laws should include such issues as enforcing fines on littering and illegal dumping of waste, identify key personnel to ensure enforcement of standards and the following By-Laws:-

- *Extra Illegal dumping*

People are not allowed to dispose of waste or any unwanted or discarded items except if such deposit is made in accordance with the provision of the municipality regulations. Unauthorized dumping of items in any place is prohibited.

- *Litter*

No person may throw loose waste or push it through stormwater drains, roads or common open spaces, causing disruptions, removal and neglecting of stored items in storage facilities. Municipalities or property owners have a responsibility to remove litter or illegally dumped waste within limited time from their premises concerned to prevent the litter from becoming a nuisance.

- *Fines*

A person found littering or illegally dumping should be fined an amount not exceeding R3000, if failure of fine payment, a sentence of 3years in prison should be granted or both fine and imprisonment [13].

7. COMMUNITY PERSPECTIVES

The research question on whether the municipality should introduce other waste collection initiatives to reduce illegally dumped waste was posed through a face to face questionnaire to WRDM waste generators per Local Municipality. The most interviewed groups were communities, town householders, industries, shop owners and central business district. The answers or data obtained from the respondents determined their perspectives towards illegal dumping and waste management. However, their responses were also measured on whether they

strongly agree, agree or disagree on whether the municipality should introduce other waste collection initiatives to reduce illegally dumped waste.

8.1. Mogale City LM

96% of Mogale City LM community strongly agree that the municipality should introduce other waste collection initiatives to reduce illegally dumped waste [14] as shown in Figure 10. Waste removal services to landfill site are a very costly exercise in the waste management section. Municipalities often face difficulties in meeting planned versus actual waste collection routines due to insufficient budget. Interrupted waste collection and removal schedules result in illegal dumping and littering due to full storage bins, which needs to be emptied. To maintain and avoid vehicle breakdowns, it is essential that transport vehicles do not exceed maximum capacity of waste loaded.

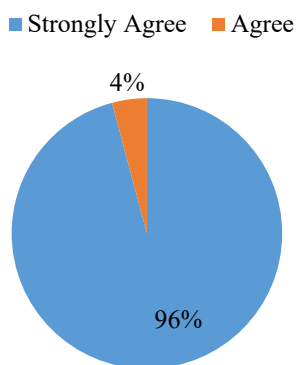


FIGURE 10. Introduction of other waste collection initiatives in Mogale City LM

8.2. Westonaria LM

96% of Westonaria LM community strongly agrees that the municipality should introduce other waste collection initiatives to reduce illegal dumping of waste as expressed in Figure 11. Current waste receptacles and street waste bins get filled up so quickly, which interrupts waste collection routine thus often contributes to littering and illegal dumping. This is severe in Westonaria LM city centre, streets, commercial centres, taxi ranks, shops and restaurants. These places are densely populated and waste generation is high. The Municipality must also introduce waste bins in busses and taxis since some people throw their waste over the windows [15].

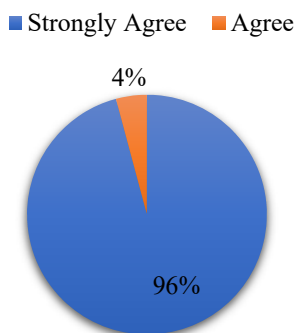


FIGURE 11. Introduction of other waste collection initiatives in Westonaria LM

8.3. Randfontein LM

85% of RLM people strongly agree that the municipality should introduce other waste collection initiatives to reduce illegally dumped waste Figure 12. Municipality must provide sufficient waste removal and storage facilities that will accommodate sorted waste and general waste, ensuring that they do not get mixed. Old vehicles are also used for waste collection due to very low budget and breakdowns often occur as no spare parts are readily kept. Waste transportation section of the waste management should be of utmost importance to the municipality to avoid illegal dumping. Illegal dumping is more severe in peak and busy months i.e. holidays and festive seasons where most waste quantities are generated due to certain occasions, functions and gatherings, which often leads to increased waste generation [16].

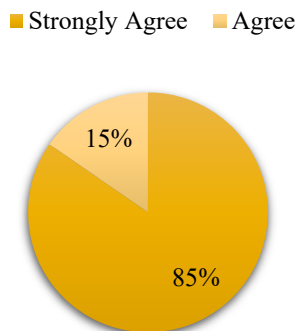


FIGURE 12. Introduction of other waste collection initiatives in Randfontein LM

8.4. Merafong City LM

93% of Merafong people strongly agree that the municipality should introduce other waste collection initiatives to reduce illegally dumped waste as shown in Figure 13. Not all residents make use of these designated dumping areas and the Merafong City LM does not provide enough bins or black bags to residents, thus causing large volumes of illegally dumped waste. 240l bins are provided to formal settlements excluding backyard rooms, making them to be filled quicker and requires other waste collection initiatives. Municipality should also plan for extra facilities during peak months that include festive seasons where more waste is generated and attention should be paid in very busy areas, taxi ranks, shops and commercial places. These places need to be provided with extra waste storage facilities and more frequent waste collection should be applied to prevent illegal dumping and littering [17].

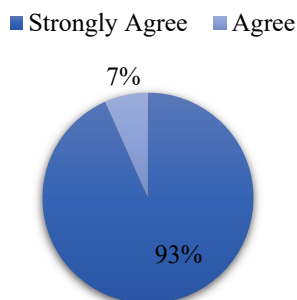


FIGURE 13. Introduction of other waste collection initiatives in Merafong City LM

4. CONCLUSIONS

This paper has highlighted illegal dumping challenges in the West Rand District, Gauteng, South Africa. It addressed some of the causes of illegal dumping and possible solutions were also provided. Perceptions of illegal dumping and waste management in WRDM were else investigated.

REFERENCES

- [1] Department of Environment and Conservation (2007). “*Crackdown on illegal dumping*”, handbook for government, pp. 7-38.
- [2] EPA905-B97-001 (1998). “*Illegal dumping prevention*” Guidebook, pp. 2-5.
- [3] Pikitup to turn illegal dumping sites into vegetable gardens (July 2017). Krugersdorp news.
- [4] IWMP Integrated Waste management Plan Report (2010). “*West Rand District Municipality*”, Strategic Environment Focus, pp. 10-35.
- [5] Residents share homes with rats as a result of illegal dumping (January 2019). Krugersdorp news.
- [6] Hanfman, E. (2005). “*A comprehensive assessment of illegal dumping*”, Illegal waste dumping article, pp. 1-5.
- [7] CSIR (2011). “*Municipal waste management - good practices*”, Edition 1, pp. 102-116.
- [8] Lohri, C. R., Camenzind, E. J. and Zurbrugg C. (2013). “Financial sustainability in municipal solid waste management”, *Waste management journal*, vol. 32, no. 2, pp. 543-547.
- [9] Department of environmental affairs South Africa (2010). “*Addressing challenges with waste service provision in South Africa*”, Municipal waste sector plan draft, pp. 2-5.
- [10] City of Johannesburg waste management plan, pp.38-45, 2011.
- [11] Pikitup (2013) “*Clean city illegal dumping strategy*” pp. 30-37.
- [12] Clean-up (2005) “*Cleanup Australia limited*” pp.1-2.
- [13] Mathebula, K. (2013). “*Summary of Gauteng Municipality waste management by-laws on litter and illegal dumping*”, Waste management presentation, pp. 9-12.
- [14] Oelofse, S. H. H. and Godfrey, L. (2008). “*Towards improved waste management services by local government*”, waste government perspective, pp. 1-7.
- [15] Plastics S. A (2011) “*Quick facts on waste management*” survey, pp.1-5.
- [16] Jerie, S. and Tevera, D. (2014). “Solid waste management practices in the informal sector of Gweru, Zimbabwe, *Journal of waste management*, pp. 1-7.
- [17] Nishio, C. and Takeuchi, T. (2005). Factors of household recycling and waste reduction behaviour, *Asia Pacific Advance Consumer research*, vol. 6, pp.46-51.