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Waste disposal pattern of Mamelodi township in Tshwane Metropolitan Municipality

Abstract

Waste disposal is a challenge for all societies around the world. This study focuses on the understanding of waste disposal patterns and perceives impact of littering in Mamelodi township in Pretoria. Based on the data collected from 135 respondents, the study found that numerous reasons were provided for littering in the township. These vary from a lack of environmental education and information, laziness and a "don't care" attitude to not having enough rubbish bins and a lack of accessibility to appropriate infrastructure. A small number of respondents state that the culture of littering and dirty places perpetuates the littering behavior and some say they are creating employment opportunities for waste pickers. There is willingness amongst residents to embrace the concept of a green environment in Mamelodi.

Keywords: waste disposal, Mamelodi, littering behaviors, environment.
JEL Classification: M00, Q5.

Introduction

Littering is one of many options of disposing waste. The generation of waste is a major feature of consumer culture and it is a consequence of the clustered and urbanized lifestyle of today (Perry, Juhlin & Normark, 2010, p. 76). It has a detrimental impact on the health of humans and domestic animals, discourages business development opportunities and local business investment, reduces the value of property and could encourage further littering (Khan & Ghouri, 2011, p. 276).

The studies conducted by Davies, Fahy and Taylor (1999, p. 153) revealed a high level of concern about issues related to landfill sites, illegal dumping, weak regulation and enforcement agencies, the ignorant and disinterested public and poor recycling facilities. It is clear that urbanization, economic growth and industrialization are at the core of any viable emerging economy, but as they unfold to benefit the society in terms of self-sufficiency and financial freedom, they come at a premium. Overcrowding in urban areas, mushrooming of informal settlements, exponential waste generation and limited basic resources are some of the problems facing most municipalities in the country. Insufficient capacity for waste management has therefore led to environmental degradation as a result of littering and illegal dumping (Council for Scientific and Industrial Research, 2011, p. 72).

Littering and illegal dumping have become the norm in South African communities; especially in townships (Naidoo, 2009, p. 40). Motorists litter through windows from moving taxis, private cars, buses and trains. The outside of shopping complexes and homes reflect the residents' negative attitude to their environment. Such culture and practices exert enormous pressure on the local municipality in terms of service delivery (waste removal and cleaning up illegal dumps). That burden is exacerbated by the rapidly increasing establishment of informal settlements.

Hence the objectives of this study were to explore the understanding the waste disposal patterns; measuring the perceived impact of litter, and the awareness level of the illegal dumping and waste disposal pattern in Mamelodi township.

1. Literature review

Hansmann and Scholz (2003, p. 753) define litter as the careless, incorrect disposal of small amounts of waste. Littering may be an incorrect method of disposing waste, but it is widely practised. Even though litter is considered as one of the most derelict forms of environmental degradation, it is the most visible one (Finnie, 1973, p. 123). From the earliest civilizations waste generation has been part of human existence. Cardinali (2001, p. 197) observes that the older generation had the option of burning their waste or to dump it in a hole. With time, civilization, habits, culture, urbanization and lifestyle evolution, it became environmentally detrimental to continue to dispose waste using primitive or outdated methods.

The current waste disposal pattern (littering behavior) causes the accumulation of litter, illegal dumping sites, environmental degradation and at times the spreading of diseases. It is a common culture mainly in emerging economies where economic activity yields low returns. Littering is more prevalent in areas that have poor infrastructure and are poverty stricken. Residents of areas such as informal settlements face a range of challenges, including economic and social challenges (Naidoo, 2009, p. 40). Littering differs from other kinds of pollution in

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that it is produced by the collective action of many individuals rather than by a small number of people (Feld, as quoted by Torgler, Garcia-Valinas & Macintyre, 2008, p. 5).

Although littering is caused by human activities, weather also plays a role in that autumn weather may cause withered trees and leaves blown by the wind to clog drains (Keep Australia Beautiful Council, 2003, p. 20).

Different settings and circumstances yield different results. Culture is another contributing factor. In African countries where it is believed that it is the duty of a woman to clean the house such beliefs and attitudes are not conducive to environmental management (Ojendokun & Balogun, 2011, p. 70).

Environmental consciousness has been raised by heads of states, environmentalists and diverse environmental summits, including the Rio Declaration, Agenda 21 and COP17, to name a few. Time, civilization, urbanization and education have changed waste management over the years. Hence the distinction between litter (the item) and littering (the behavior or pattern) has been acknowledged.

1.1. Waste disposal patterns and dumping behavior. The waste disposal pattern is part of a complex phenomenon in waste disposal management. Littering has been considered a social behavioral problem, the National Litter Education and Prevention Organization in the United States found that people litter for three reasons: lack a sense of ownership; believe that someone else has to pick up their litter and the area is already littered Marais, Armitage and Wise (2004, p. 470).

Perry, Juhlin and Normark (2010, p. 78) state that, once individuals regard things as having no economic value, they discard them. The reality is that products lose economic life or value but retain some physical form that is eventually discarded.

Some authors differentiate between passive and active littering behavior. The former means that litter is not deliberately discarded in the environment while the latter means that litter is placed or left unbinned in the environment. Respondents to the study by the above researchers had various reasons for littering. Torgler, Garcia-Valinas and Macintyre (2008, p. 5) confirm that if people notice others littering, their tolerance to littering increases to the point where it becomes socially accepted behavior.

South Africa is part of the global village where the consumer culture is a way of life for the upper-level income group. Industrialization and economic activity enable people to buy vast quantities of products beyond what they need. Most of these products are packaged in plastic in the form of bottles, crates, bags, containers, polystyrene blocks and straps (Marais, Armitage & Wise, 2004, p. 470). Paper, rotten fruit and occasionally car parts and carcases of domestic animals, mattresses and old clothing are among the waste that is scattered all over, according to Marais, Armitage and Wise (2004, p. 470).

According to Schultz et al. (2011, p. 3), the widely accepted conclusions of various studies are that littering is more common among males, young adults and individuals living in rural areas than in cities. Geers (2012) confirms this, based on research by the group Keep America Beautiful, and adds that males are twice likely to litter than females. They also found that young people under the age of 35 are twice as likely to litter as people in the age group 35-49 and three times as likely to litter as people older than 50 years.

Davies, Fahy and Taylor (2009, p. 161) mentioned that the practical aspect of disposing of waste in the correct manner may be a challenge to households willing to do so. Some of the challenges they list are lack of time, information or money and difficulty in accessing transport and recycling facilities.

The findings on littering behavior of an Australian study on littering by Williams, Curnow & Streker (1997, p. 7) are that Australian residents were observed both to littering and to use bins appropriately. Men and women were equally likely to litter. Children below the age of 15 are less likely to litter and all adults above that age litter more than this group. Unemployed and uneducated respondents had higher rates of littering than educated and employed people. A lack of bins was a major factor in littering because a lot of littering takes places within a few metres of bins.

The general practice of not covering litter with soil promotes scattering of waste, lack of control of informal salvagers, and the spread of disease and pests are a great concern (Naidoo, 2009, p. 41).

Illegal dumping is also known as fly dumping, midnight dumping and wildcat dumping and is a habit that contributes to environmental degradation (United States Environmental Protection Agency, 1998, p. 1). It raises concerns about public health and safety, property value and quality of life. An effective illegal dumping prevention program should be customized to each environment to address the factors contributing to the problems in that specific community.

Naidoo (2009, p. 41) states that informal settlement areas play a significant role in illegal dumping. Due to no definite ownership, stability, adequate facilities and infrastructure, they are susceptible to dum-

ping waste and littering caused by the apathetic conditions in those settlements. The basic infrastructural necessities that are needed for urban management in the informal settlements are lacking and therefore municipalities fail to deliver on their mandate.

Waste collection interruptions and municipal employee strikes are thought to be among the reasons why residents turn to dumping and disposing of waste illegally. The practice of illegal dumping has a huge environmental impact through the contamination of land, pollution of water bodies and an extremely negative impact on human and domestic animal health, according to the Council for Scientific and Industrial Research (2011, p. 71). These negative impacts often cause situations where respondents may not want to associate themselves with that environment, even if they live or have lived there.

According to Ichinose and Yamamoto (2010, pp. 79-80), the dumping of waste is viewed as a serious environmental concern in most countries. Among many factors, a shortage of proper waste treatment facilities and the introduction of unit pricing of waste by municipalities are thought to encourage illegal dumping. The insufficient proper waste treatment facilities have a positive correlation with the increase in the cost incurred for cleaning illegal dumping by the municipalities or contracted service providers.

1.2. Causes and impact of littering. Uncontrolled dumps have a significant environmental impact. The United States Environmental Protection Agency (1998, p. 6) acknowledges that some dumps have grown from small to large unmanageable waste sites over the years. As waste decomposes it produces leachate (a mixture of toxic and non-toxic liquids and rainwater) that could contaminate the drinking water. Also areas used for illegal dumping are accessible to the general public, especially children and domestic animals, who are vulnerable to the physical and chemical hazard posed by waste (United States Environmental Protection Agency, 1998, p. 3).

Naidoo (2009, p. 41) and Marchand (1996, p. 15) perceived that challenges brought by urbanization as a peripheral establishment deprived of the basic necessities, including a lack of a supply of clean water and electricity, scarcity of economic opportunities, lack of communications and road infrastructure, insufficient waste disposal management and health and basic education, and no proper housing settlements, which are critical for business development.

Several authors seem to agree that a clean and attractive environment is a prerequisite for long-term economic growth, according to the United Nations Economic Commission for Africa (2002, p. 45). A growing economy is desired for its positive social and economic benefits, hence rural masses are drawn to metropolitan cities in an endeavour to pursue economic opportunities that will address their basic needs and beyond.

New types of waste are surfacing at an alarming rate due to the increased disposable income propelled by industrialization and increased economic activity. Waste models have emerged to address the challenge confronting governments and municipalities to dispose in an environmentally friendly manner. For waste management solutions to be sustainable, they should be socially, environmentally and economically embraced, as emphasized by Morrissey and Brown (2004, p. 298). Hence awareness and environmental education should be part of the services provisioned by local municipalities.

1.3. Global and general approach to waste management. Cardinali (2001, p. 197) is of an opinion that waste management should not be viewed as an isolated factor in the economy and the society. An intertwined relationship between poverty, environmental degradation, economic activity and urbanization has been observed. Therefore, waste disposal management forms an integral part of the economy. When neglected, it has dire consequences that could bring economic activity to a halt.

Governments and municipalities have welcomed an integrated approach towards waste disposal management. According to Morrissey and Browne (2004, p. 298), such an approach includes administration, legal, planning and engineering functions. Finance plays a crucial role because it provides the capability to build the required capacity through education and training, infrastructure and maintenance of the landfill, as well as outsourcing appropriate tools and services.

1.4. Social problems associated with dumping. Tunneell (2008, p. 29) states that illegal dumping is a social problem that greatly affects some rural and urban areas and that it occurs as both small-scale and large-scale dumping in the form of open dumping sites and roadside trash. In the United States of America, Rural Kentucky states that the crime rate has increased by 131% since 1960. Drug arrests have skyrocketed by 266% since 1980. The production of illegal substances at private homes has mushroomed because there is a market for it. These problems along with illegal dumping indicate the social disorganization in Kentucky (Tunneell, 2008, p. 38). They further add that decentralized communities lack collective efficacy, which impedes their ability to address their commonly shared problems.

They are politically impotent, that is, they have little collective ability to win or receive government resources for their basic needs.

High poverty levels further exacerbate illegal dumping. It has been found that large and small illegal dumping in Kentucky is further entrenched by rural (and urban) poverty (Tunneell, 2008, p. 29). Poverty and illegal dumping, it seems, are significantly related, just as poverty and poor health, poverty and shorter lifespan, poverty and victimization, and poverty and a distressed economy. The Tshwane Municipality might find it challenging to nurture the spirit of entrepreneurship when most possible business spots are in a deplorable state.

1.5. Environmental participants in littering. Diverse groups and factors contribute to littering. For different reasons and in different ways, litter is considered a genuine issue by the majority of shareholders. However, it appears to have a lower priority than other issues with an environmental impact, such as hazardous waste and water pollution in Western Australia (Keep Australia Beautiful Council, 2003, p. 6). More often than not stakeholders are more concerned with the social and economic impact dimension of litter than with its environmental impact. Various programs are in place that focuses on cleaning up rather than addressing the causes and behaviors that result in littering.

Women, by virtue of being caregivers, exhibit a higher concern than men for quality of life and therefore the environment. Formal as well as informal education is seen as significant in influencing behavior. Hence, there is a positive relationship between education, employed people, wealthy people and lower littering levels. It is also argued that wealthier individuals have a higher demand for a clean environment and they are also willing and able to finance the necessary actions towards that end (Torgler, Garcia-Valinas & Macintyre, 2008, p. 5).

2. Research problem

Mamelodi Township is situated about 21 km east of Pretoria, the capital city of South Africa. According to a report by the Council for Scientific and Industrial Research (2011, p. 74), the population was around 2.3 million people in 2007. The amenities include one public and one private hospital, several clinics, several primary and secondary schools and churches, one university, a number of colleges, Dennlyn Mall, Mahube Complex, many other viable businesses, Eerstefabriek and Denneboom train stations, two police stations and numerous taxi ranks.

Mamelodi is characterized by diverse economic classes of people. There are the "haves" (professionals, business, educated, skilled, and semi-skilled workers) and "have nots" (unskilled people who depend on government grants for survival and those who commit crime for survival). A significant number of residents fall in the category of the "have nots" and therefore.

The City of Tshwane Metropolitan Municipality (CTMM) has contracted independent contractors to collect waste from households, pick up litter and remove illegally dumped material. The current contract will run for three years and they work on all public holidays except on Christmas Day. However, the city is faced by the challenge that a significant number of people lives in backyards as tenants. They generate waste and it is difficult to recoup the cost of waste removal since they do not have a direct contract and contact with the municipality, was confirmed on email by municipality authorities. Visible efforts by the municipality have been noticed. In an interview with Buys (2012) she stated that the municipality provides 85-litre containers, one plastic bag for informal settlement dwellers and five cubic metre containers at formal trade venues, but residents still dump their waste next to the containers in some areas. Accessibility to informal settlements by road is a challenge, especially during the rainy season.

A small number of schools have been painted artistically to create awareness of a clean environment. In an endeavour to beautify Mamelodi and to create employment opportunities, the municipality has launched campaigns that create awareness and encourage the public to embrace these initiatives. The campaigns include operation Vat Alles, where the municipality collects all kinds of waste, and Adopt a Spot, which assists community members in acquiring a piece of land for agricultural purposes.

The Hatherley landfill is located on the outskirts of Mamelodi East. Scavengers play a significant role by separating, recycling and earning a living from waste. The odour of the landfill is unbearable. At dusk when people are preparing supper and want to keep warm in the informal settlement areas, clouds of smoke cover the area. Such activities create greenhouse emissions into the atmosphere. Illegal dumps and the spreading of diseases are prevalent in informal settlements. In Mamelodi township, dumping spots are clearly visible. Illegal dumping sites are two kilometres apart from each other on average. Even after they have been cleaned, people will most probably dump there again. The odour and environmental outlook make the area deplorable. Dumping spots encourage people to dump even more waste as it is an easy way of disposing of waste without being penalized in South Africa.

Based on the above the following objectives were identified for this study:

1. To understand the waste disposal pattern of the residents of the Mamelodi township.
2. To measure the perceived impact of litter and illegal dumping on the land area and other environments.
3. To the assess awareness level of illegal dumping and littering in Mamelodi.

Data were collected using a self-designed questionnaire and quantitative analysis technique whereby graphs and charts were used to convert the data into useful information.

The study was conducted only in Mamelodi, the township within the Tshwane Municipality. Participants in the study were local residents, people who lived outside Mamelodi but work there and are frequent visitors of Mamelodi township.

3. Construction of the questionnaire

The initial questionnaires were accompanied by a cover letter that explained the purpose of the study and indicated the researcher's contact details. The design of the questionnaire was based on the three objectives of the study. Apart from the objectives the biographical information was extracted to form part of the questionnaire. The purpose was to understand the characteristics of the citizens and their waste disposal behavior patterns. The first objective was to understand the disposal patterns of the residents of Mamelodi. Five sets of questions were aimed at investigating whether the respondents understood what irresponsible waste disposal was. The second objective was to measure the perceived impact of littering and illegal dumping on diverse environments. The environments were limited to the local businesses, the health of citizens and domestic animals and the land environment. Two questions addressed this objective. The last objective was to study the awareness level of dumping and littering in the township. Set of seven questions were aimed at obtaining this information. The last subsection of the questionnaire assessed whether people were willing to change their behavior in order to address the waste disposal pattern challenge. Two sets of questions were posed for this purpose.

The language usage was in a form that it could be easily understood by people who are able to read and write English. A pilot study was then conducted on six people. They were asked to be critical in their responses. Their constructive feedback prompted the researcher to revisit the language use, rephrase some of the questions and remove some questions before the full roll-out of the final questionnaire.

4. Data collection

The structured questionnaires were circulated to collect primary data on the reasons why people litter and dispose of waste outside the designated areas. The population of Mamelodi has increased exponentially. The targeted sample consisted of 400 people from the township, selected randomly. There were 153 responses received, which was more than a third of the sample (38.25%). The sample consisted of people who worked or lived or both worked and lived in Mamelodi. The Cronbach reliability test was performed and it measured 0.715 and the questionnaire therefore had construct validity.

5. Data analysis

5.1. Demographics and biographical information. Out of 153 participants responded, 68 were males (44%) and 85 were females (56%). More than 36 years and less than 20 years age categories constituted 64% of women respondents, while 59% of men respondents were in this category. This suggests that respondents in the age category of 21-35 year were about 40% for male and female category. The majority of the respondents were between the age 15-20 and 36 and above. This represented a potential good supply of relatively experienced people for the labor force.

5.2. Measuring awareness level of littering and illegal dumping spots. The data collected confirmed that littering behaviour was indisputably a normal practice in Mamelodi. People littered outside designated areas for various reasons. More than 80% of the residents litter, whether nobody is watching, or whether they are in group or outside the designated area. Respondents 'do not' care attitude and their laziness makes them litter consciously and unconsciously.

The respondents acknowledged that people littered outside designated areas. Ninety-one percent of respondents (49% of males and 42% of females) confessed to seeing individuals littering when thinking no one was watching. Also, 78% of female respondents confirmed that people tend to litter more when they are in groups than when they are alone. All these observations emphasize the significance of the challenge faced by the township.

From the collected data, people understand that littering behavior is a habit that needs to be discouraged and changed. More than 90% of respondents in the study indicated that they appreciated and embraced a green, clean environment, while 85% of respondents said they had not heard of or seen anti-littering campaigns. Only 2% had participated and 13% had heard about them.

5.3. Assessing the understanding of irresponsible waste disposal patterns in Mamelodi. More than 95% of respondents agreed that keeping the environment green was a good idea. When asked if they would be willing to pay for extra services to keep Mamelodi clean, varying responses were received, but 19% of males and 23% of females were willing to pay for extra services to keep the township cleaner. However this does not mean they can afford to pay, but only that they have an attitude that is in favor of a green environment. They placed significant value on clean environment. Significantly high percentages of people disputed that they had ever seen, heard about or participated in anti-littering campaigns. 41% have not seen them, 43% have not heard about them, 13% did not indicate anything and only 2% have participated in anti-littering campaigns organized in Mamelodi. However, 87% of men and 92% of women were willing to participate in anti-littering campaigns. They indicated that the campaigns should not be held too often.

The respondents who were highly likely and likely to change constituted 74% of the total number of respondents. With such attitude and appropriate resources from the municipality the problem could be eventually resolved. With the overwhelming percentage of willingness to change, the municipality could devise a strategy targeting the residents and package environmental information in such a way that it is community-inclusive, easy to understand and follow, and possible to carry out.

5.4. Perceived impact of littering and illegal dumping spots. As time passes, irresponsible waste disposal patterns have devastating negative effects on diverse environments. The respondnets felt that the land was the mostly negatively impacted, followed by local businesses and human health. The least impacted was seen to be the health of domestic animals. The medium impact was felt largely by business people.

Another finding was that respondents thought that a small impact of littering and illegal dumping was also greatly felt by local businesses. Although they do not prioritize business over life, they still see business as an integral part of society.

The encouraging conclusion from the data collected was that people had a positive attitude to environmental preservation, irrespective of their waste disposal patterns. Some residents were willing to pay more to assist the Tshwane municipality in improving the waste removal services. Most residents were willing to participate in anti-littering campaigns in order to clean and educate people around the township. Such an attitude creates a favorable platform for all stakeholders to gather and devise a sustainable solution in Mamelodi.

6. Limitation of the study

Due to limited resources, that is, time and funds, the research was conducted in only one of the townships within the Tshwane Metropolitan Municipality. This study was conducted based on a sample of residents in Mamelodi and people outside Mamelodi but who works and frequently visits Mamelodi. The respondents included pupils, local business owners, home owners, pedestrians and random people in Mamelodi.

6.1. Discussion. *6.1.1. Understanding the waste disposal patterns of residents of Mamelodi township.* Marais, Armitage and Wise (2004, p. 470), indicate that people litter because they lack a sense of ownership, the place is littered already and they believe that someone else will pick up their litter. This is particularly true in informal settlements where people stay temporarily while pursuing economic opportunities.

Circumstances play a role in discouraging or encouraging irresponsible waste disposal pattern. The Keep Australia Beautiful Council (2003, p. 16) indicates that younger people admit to littering more readily than older people. They often use bins more often than older people. However, they tend to litter more when they are in group situations than when they are alone. The study findings are supported by the data collected, which also indicated that people tend to litter often when in groups.

Most Mamelodi residents fall in the lowest income bracket. About 41% of the total respondents are willing to pay for extra services that might be offered by the Tshwane Municipality to improve service delivery in terms of waste disposal management. Their willingness to spend more money indicates that they care and know how critical it is to preserve the limited resources they possess as a community.

6.1.2. Impact of irresponsible waste disposal and illegal dumping on different environments. Unique and diverse environments highlighted on the questionnaire included the local businesses, land, and the health of humans and domestic animals. The highest impact of irresponsible waste disposal was regarded to be on the land, mainly because it is highly visible and exposed. A medium impact is thought to be on human health and local businesses. Any productive and energetic labor force needs to be healthy for them to contribute positively to the economy and be self-sustainable.

Although business development and entrepreneurship are important, local businesses were thought to be less impacted (medium and small impact) than the other environments. The assumption is that people value life more than they value material goods and services.

6.1.3. Assessing awareness level of waste disposal pattern in Mamelodi. Several researchers, including Al-Khatib et al. (2009) and Arafat, Daoud and Shwahneh (2007), reported that socio-cultural factors such as gender, race, marital status, monthly income, education level and residential area had a significant influence on littering behavior. It was further stated that educated and employed people tended to be more environmentally aware than unemployed and uneducated people.

Conclusion

An irresponsible waste disposal pattern or behavior is a phenomenon that impacts all of us directly or indirectly. The direct impact is the spreading of diseases, environmental degradation and more, while the indirect impact is generally through resource allocation to cleaning the dumps and rehabilitating environments negatively impacted by litter. Such challenges are not unique to Mamelodi and South Africa, but are encountered worldwide.

Environmental awareness is being elevated through formal and informal education. State officials, environmentalists, Friends of the Earth and diverse environmental summits are some of the measures through which governments attempt to educate their constituencies. The general public should understand that everyone can make a positive contribution to using the limited natural resources properly and preserving them.

Crime, poverty, a lack of a good education system and littered environment are all associated with the negative projection of people's self-esteem. Such characteristics are generally found in emerging economies like that of South Africa amongst others. Interestingly, the residents in Mamelodi are willing to change their behavior and adopt eco-friendly methods and patterns of disposing of waste.

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