

**THE CHALLENGES OF SOLID WASTE DISPOSAL IN RAPIDLY URBANIZING CITIES:
A CASE OF HIGHFIELD SUBURB IN HARARE, ZIMBABWE**

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ABSTRACT

In developing countries there is an increase in the demand for urban services due to the rapid rates of urbanization driven primarily by rural-urban migration. In most suburbs of the developing third world cities, the supply of basic services such as waste removal and clean piped water supply has not kept pace with the increasing demand.

Highfield is one of the poorest and oldest suburbs in Harare, Zimbabwe. This study deals with the issue of providing household solid waste management services to the growing urban population. The rationale of the study is to scrutinize the waste disposal problems in an urban suburb with the view to formulate sustainable solid waste management strategies in rapidly urbanizing cities like Harare. Highfield suburb is used as an example. This issue of solid waste disposal is of great concern to the field of environmental management, considering widespread land, air and water pollution that emanates from solid waste.

The problem is investigated using a questionnaire, interviews and observation methods of data collection. Results show that waste collection and disposal infrastructure and equipment is rather old, unserviceable and inadequate. The study recommends community awareness on viability of recycling, composting and proper dumping. Stakeholders in waste management have been identified and the roles they should play. These stakeholders play an important role in the successful implementation of an Integrated Solid Waste Management strategy at a local level.

Keywords: composting, household, Integrated Solid Waste Management strategy, recycling, solid waste disposal, solid waste infrastructure and equipment, waste management

INTRODUCTION

Solid waste management has become a critical problem in Harare since the economic meltdown that came with the recent land reform program that began in Zimbabwe in the year 2000. This created a financial paralysis of the city to the extent that solid waste collection and disposal service provision is nothing but skeletal. Hardoy et al (2001) states that the conventional large-truck oriented house-to-house collection service can also be wasteful of resources and inappropriate for many

municipalities where roads are too narrow for the trucks or unpassable when it rains. A number of roads in Highfield suburb (a high density suburb in Harare) especially in Engineering and Paradise sections are narrow, pot-holed and poor for refuse trucks to transport wastes smoothly.

Solid waste may not be perceived as a serious problem by some residents of Highfield. Residents often dump their wastes in drainage ditches and roadsides whenever their bins are full. Others burn or bury the waste in the yard, especially if it is organic. According to Miller (1988), some people are litterbugs who get rid of their solid waste by throwing bottles, cans, fast-food containers and other items on the street or out of car windows. Zimbabwe's "throw-away-society" is putting a strain on the current waste management systems in Harare. These are some of the many challenges that need to be solved urgently. Most municipalities have failed to provide an efficient waste collection and disposal system, resulting in residents' indiscriminately dumping waste thereby causing environmental pollution. Some residents in Highfield are resorting to digging deep trenches for dumping waste. However, most of the trenches are left open and are now potential breeding grounds for mosquitoes, rodents and flies. Children in Highfield are also exposed to injury and poisoning by hazardous waste. Conyers, (2001) states that Harare city council employed the contract system for collection of waste in 1997, but a year later, in 1998, and due to non-collection of wastes, the council decided to terminate the contracts and resume waste collection themselves. However a closer scrutiny of the problem indicated that delays in paying companies were due to cash flow problems within the council leading to service delays. The same challenges are still dogging Harare city council. According to Hardoy et al (2001), "lack of regular waste-collection services in most urban areas, especially for the lower income areas", is one of the challenges confronting urbanizing cities like Harare. The problem is acute in poor, high density suburbs like Highfield. A significant amount of the generated waste is not collected.

Harare municipality has been dogged by serious refuse collection and disposal challenges. Lack of refuse collection trucks and shortage of fuel have been sighted as some of the reasons behind the proliferation of massive mounts of stench litter. Litter in the form of solid waste pollutes and poses a health threat to the community.

It is the intention of this study to identify the challenges of present waste management strategies and infrastructure in dealing with solid waste disposal in Highfield. The problems in Highfield are symptomatic of problems in other suburbs.

BACKGROUND

Mbanga (2011) commenting on service provision in Zimbabwe says, in most cities and towns, rubbish goes uncollected for weeks because the councils have no serviceable refuse trucks. Waste collection is a big challenge for a number of municipalities. The problem is not peculiar to Zimbabwean cities, it's a worldwide problem, even the US Bureau of Solid Waste Management (1970) states that, costs of waste handling are rising. When this is combined with concentration of the problem in dense, revenue – limited urban areas, the efficiency of solid waste management is of major importance. This argument is reinforced by Omara-Ojunga (1992) who states that in several cities in Africa, there are inadequate garbage storage and collection systems. Harare is a typical example of a failing city when it comes to solid waste management.

Mapira (2001) gives a similar view when he states that, “city budgets are usually under strain in developing countries”. This scenario usually exacerbates the waste disposal problem.

Waste is a critical environmental challenge in a number of developing countries. Zimbabwe’s politically engineered economic meltdown has resulted in a severe collapse of solid waste management in most urban areas. Harare, the capital city has been no exception. In Highfield, solid waste disposal is a big environmental challenge. In a bid to redress the problem, the Ministry of Environment and Natural Resources Management is to initiate a baseline assessment for developing an integrated solid waste management plan for the country (Mawire, 2010). The study deals with an issue of growing concern, that is, challenges of waste disposal in the sprawling suburb.

Illegal dumping of solid waste is reported to be affecting sewer systems due to blockages, especially from plastic objects which are not biodegradable. Chifamba (2007) observes that accumulation of copper (Cu), lead (Pb), and zinc (Zn) is found within waste disposal sites. Mismanagement of solid wastes not only pollutes the land but also contaminates surface and underground water.

Harare municipality generally finances trash collection using a flat rate fee. Payment under this kind of arrangement is not proportional to the amount of waste generated. Because of this reason, the residents do not opt for recycling or waste minimization in their households. This study intends to establish an inventory of waste infrastructure and waste sources with a view to advocate for an integrated solid waste management strategy or system in Harare.

Munowenyu, (1997:111) observes that, “urban areas are not completely free of problems especially in view of the fact that they are becoming bigger and bigger in terms of population size”. Over a period of years, the amount of urban domestic solid waste has grown tremendously due to urbanization. Kirov (1995:01) warns that, “with increasing population densities and escalating solid waste generation rates, the greater quantities of solid waste produced for a given area are placing increasingly heavy demands on existing collection and disposal systems”. Such scenarios are typical of what is happening in Highfield, Harare, Zimbabwe.

There is an increase in the number of people per room per house. According to Mutsvangwa et al (2006: 250), “in 1988 the average number of people per house in Chitungwiza was estimated at 17”. Chitungwiza is the third biggest city in Zimbabwe and was created as a dormitory town for the capital Harare. Although such statistics are no replica for Harare, almost similar trends are still evident in high density suburbs like Highfield. Tisdell (1991:13) states that, “wastes and pollution are end-products of economic production and consumption.” The rapid increase in population in Highfield means an increase in the quantities of household garbage that the municipality has to handle.

Dumping of solid waste in Highfield is more widespread and diverse and does not face litigation for its illegality. Proliferation of solid wastes is thus directly linked to population growth. This argument is reinforced by Omara-Ojunga

(1992:172) who asserts that, “in several cities in Africa, there is inadequate garbage storage and collection system”. Therefore such an extra-ordinary growth in urban population also requires extra-ordinary waste collection and disposal.

STUDY AREA

Highfield suburb is to the south-west of Harare. It is bound by A4 (Simon Mazorodze road) to the south-east, High- Glen road to the south-west and Willowvale road to the north. High-Glen road connects A4 and A5 highways that radiates from Harare Central Business District (CBD). The study area (see arrow) is shown in figure 1 in the Appendix.

METHODOLOGY

The researcher used the descriptive survey research design. Best and Kahn (1993) suggest that the survey research design entails collecting detailed data by asking questions that seek to establish the current state of issues under study for the purposes of making judgments and decisions. The descriptive survey suits the selected study area which represents third world high density suburbs. Summary statistics are used to summarize the findings of this research.

There are 49 municipal wards in Harare. Highfield had a total population of 70 959(C.S.O,2002), that is for ward 24 and 25. It has 2 wards. The researcher sampled all wards. The wards were considered as clusters. A systematic convenient random sample was selected. This involved knocking on every fifth housing unit until a given number of households had filled the questionnaire for this cluster. This gave representation of the two wards of Highfield. A convenient sample size was 70 people out of the total population of 70 959 in Highfield. This represents a smaller fraction of the total population but is justifiable because it is a manageable size for a suburb with a homogeneous population (poor low class).

The main instruments used in this research are questionnaires, interviews and observations. These methods were widely used in data collection. Field counts, measurements and newspaper articles are other instruments used in this research as part of the data triangulation process.

The questionnaire deals with demographic data of respondents, sources of solid waste, economic conditions prevailing, waste transportation infrastructure and equipment problem issues in the waste management sector and sustainable waste management practices going forward. The questionnaire had close –ended questions and open -ended questions. With close-ended questions, respondents were guided by given options already set out. Open-ended questions gave respondents room to express their views freely.

DATA ANALYSIS AND RESEARCH STRATEGY

Prior to the process of data collection, all the 70 questionnaires were checked for errors such as inconsistencies in data filling, response entries and completeness of the data. This was done to avoid obvious errors.

The responses in the questionnaires were pre-coded. Coding entailed a process involving assigning each answer on a questionnaire a corresponding numerical value. (Raubenheimer, 2010:27). Every response was assigned to the proper category. Each listed response had to fit into one of the categories and one and only one category.

A codebook prepared in Microsoft excel was devised to indicate attributes comprising each value. The coding was applied to close-ended questions only. A few open ended questions were also used.

RESULTS AND DISCUSSION

According to the information provided by the Directorate of Waste Management Department of Harare City Council, the total population served by authorities ranges from 50 000-100 000. However according to the 2002 population census, Highfield population stood at 70 959. Public places that are major sources of waste include Machipisa shopping centre, Gazaland shopping centre, and Lusaka Farmers Market.

The Directorate also indicated that the equipment and infrastructure shown in table 1(in Appendix) is available for waste management in Highfield suburb, Harare. There is a serious shortfall on the part of municipality in meeting basic waste disposal services in Harare due to inadequate equipment and infrastructure.

Table 1 illustrates infrastructural challenges. From the table, skip trucks, tractors, and skip bins are generally old and inadequate, whilst refuse trucks are new but few. There are 6 old skip trucks and only 4 new skip trucks. Refuse trucks total 30 instead of the desired 50, but fortunate enough 20 are new. The municipality is also struggling to provide the desired number of tractors. A total of 10 tractors are in operation but 6 of them are old and 4 are new. There are 40 available new skip trucks and a shortfall of 10. Infrastructure is important in the successful implementation of solid waste disposal policies set by Harare City Council and legislative acts. Equipment and infrastructure is far below the desired number, which poses serious challenges for waste collection and disposal not only in Highfield suburb, but in Harare. Equipment and infrastructure play a critical role in the provision of an efficient and effective solid waste disposal service to the growing population of Highfields

Like any other suburb or urban centre in the world, waste generation is on the increase in Highfield due to population density, levels of income and attitude. A greater percentage of the respondents were from Old Highfield (14.29%). Old Highfield, as the name implies, is the oldest section of Highfield and serves as the heart and soul of the suburb. Most of the household views were collected from the head of the household (husband or wife) and this helped to get opinions that are representative of the family. Different people staying at a house may not cooperate to carry bins to the nearest skip bin but the household head is usually duty bound to do so. Although it was established that there is co-operation among residents, at times, a child is sent to empty the bin next to the skip bin. Piles of litter next to half full skip bins were observed.

42.86% of the respondents in the sample earn between US\$100 and US\$299 per month. The relationship between income and waste generation is a complex one as waste generation is dependent on attitude as well. Those in the high income group tend to buy more and thus also contribute a considerable amount of waste. The head of the household tend to be more responsible than the relative or child who might be careless about the health, environmental and aesthetic well-being of the housing structure. The majority of the respondents were females (61.43%) and this helped to get a closer picture of the waste challenge in the suburb, since women are the most affected when environmental problems like odour, cholera and fires affect the community.

Married respondents had the highest percentage of responses (40%). This category of respondents gave a fair picture of the waste management situation in Highfield suburb. A greater percentage of respondents were of the age group 30-39, that is, 35.71% which comprises the working class, who constitute the majority in Harare. Their views on waste management are generally progressive in comparison to the younger generations below 20 years who may not embrace new approaches like the use of separate bins in order to facilitate recycling. This may be attributed to lack of a sense of responsibility in the younger generation.

However, there is a high percentage of residents renting (60%) from a resident owner and this increases the amount of waste generated. The problem of overcrowding is a result of housing shortage and poverty. According to Mapira (2001:146), “research also suggests that in 1995 about 66% of Harare’s population were renting”. Almost everything that is eaten or used for other purposes is packaged and the current economic hardships have resulted in people buying in smaller quantities and more frequently, increasing generated waste. This contributes to littering. An increase in people per unit area contributes to further waste problems.

The environmental crisis in the area under study also relates to the level of education, almost 55.71% indicated that they attained secondary education which is ideal for the dissemination of environmental education and clean up campaigns. In a number of households (30.00%), occupants exceeded 10. The community needs to be informed that plastics don’t litter, but people do litter. The bigger the household, the greater the amount of litter. In environmental studies:

$$I = PAT$$

Where: I = Environmental Impact, P = Population size, A = Affluence

T = Technology (Redelinghuys, 2010)

The amount of litter is influenced by the size of the household to a larger extent. There is a need to avoid littering by also setting a cap to the number of people who can occupy a housing unit. The current scenario poses a waste challenge. The waste challenge in High field also emanates from the mechanism of waste collection. The collection frequency of once per week is only ideal in a multiple tenant –free suburb.

Most of the people in Highfield (54.28%) are earning below US\$ 300 per month, which is well below the Poverty Datum Line (PDL), according to the cost of living threshold in Zimbabwe. Although from a consumptive side, this does not generate a lot of waste, it also affects the capacity of residents to pay for municipal rates and levies that are meant to be channeled towards waste collection and disposal. The inability of residents to pay municipal rates and levies violates two environmental principles, that is, User Pays Principle (UPP) and Polluter Pays Principle (PPP). The people of Highfield suburb use collection services rendered by the city council and are responsible for waste generation which pollutes air, water and land and are therefore supposed to pay for these.

It was noted during the study that most of the housing structures are small, but significant number have been extended for renting out to sub-tenants (or subletting). In 2001, 78% of Harare's citizens were renting/sub-renting compared to 70% of the urban dwellers countrywide. This creates waste management challenges, (Mapira, 2001:141). Most of the respondents (60%) in the sample indicated that they are renting, compared to 70% of the urban dwellers countrywide. This creates waste management challenges, (Mapira, 2001). There is need to encourage house ownership in Highfield to encourage a sense of responsibility in waste disposal.

The challenge of littering is compounded by the presence of street vendors at various undesignated places where several food stuffs and other goods are sold. These trends have been encouraged by population density, unemployment and poverty which has pushed almost every resident into street vending. Street vending helps to supplement family income.

The waste problem is blamed on the lack of specific policies on high density dwelling and on outdated policies. For example the Zimbabwean Environmental Management (Effluent and Solid Waste Disposal) Regulations, 2007 are not only outdated but the fees charged are tantamount to encouraging littering. The figures are very low and unlikely to have a deterrent effect. The municipal quarterly fees for, Blue, Green, Yellow and Red disposal licenses are still pegged in Zimbabwean dollars yet multiple currencies are the legal tender. The Zimbabwean dollar is no longer in use.

In the study 68.57% of the respondents were in agreement that equipment and trucks used by the municipality is generally appropriate, however, what is required is to provide the adequate numbers. The frequency of garbage collection is inadequate and many people resort to illegal dumping and burning of waste. The research suggest that population density contribute to waste generation, littering and the inability of the Waste Management Department to cope with waste collection.

A significant number of respondents use plastic bins (bags) for storage of waste, these however are not durable. Some of the residents of Highfield use metal bins, however the majority of them are old and leak terribly. Due to challenges of shortage of spare parts, shortage of fuel and breakdown of trucks highlighted by the respondents and the directorate of waste management erratic waste collection leaves a lot of uncollected garbage. Excess litter is supposed to be taken to the skip bin which may not be ideal for everybody. Such a collection mechanism encourages the disposal of litter on illegal sites.

According to the residents, some of the waste management challenges faced by the waste management department in the smooth transportation of solid waste include: scolding of waste collectors, jeering of waste collectors, rude personnel, fuel shortage, poor equipment, shortage of fuel, shortage of trucks, old sewage pipes, breakdown of trucks, poor salaries, limited personnel, financial ruin of municipality, inadequate bins, corroded bins, lack of proper equipment such as inhalers, gloves, gumboots.

Interviews revealed that illegal dumping is occurring in the suburb due to lack of skip bins to empty plastic bins that fill up early (within two days). The waste collection frequency by the municipality is weekly. These seemingly insurmountable challenges emanate from the financial bankruptcy of the municipality and institutional weaknesses. More than 60% of the respondents agree that garbage is not being collected as per weekly schedule; only 35% indicated that waste is collected weekly. This kind of status quo does not auger well for a suburb where overcrowding and illegal dumping of waste is rampant.

Observations done during waste collection showed that workers did not wear their protective clothing. Another observation parameter was presence of scavengers and salvagers (ranging from people, dogs and birds). Observations at dumpsites showed that scavengers and salvagers can cause accidents, fires and fights. Problems that are rampant in Highfield include odour; where 38% and 34% agreed and strongly agreed respectively that odour is a serious challenge that needs immediate attention. Nearly, 24% and 40% of the respondents agreed and strongly agreed that rodents are a nuisance in households. The outbreak of fires at dumpsites is not so uncommon in the area studied, which causes serious problems of air pollution and associated respiratory ailments.

A total of 37.14% of the respondents agree that solid waste is an eyesore. A further 34.29% strongly agree that it is an eyesore. Trash affects the aesthetic beauty of the suburb. The city has lost tidiness because of solid waste that litters the streets. This challenge is even made worse by the breakage of sewage pipes that result in faeces flowing in the streets. This to a greater extent explains the outbreak of cholera in the greater city in 2008 that killed more than 4000 people.

Harare city council has lost the confidence of the majority of the residents of Highfield when it comes to issues of waste collection. The city authorities are not reliable in collecting waste according to schedule. In some sections like Paradise waste has gone for several weeks uncollected. Therefore in the majority of the cases the state of affairs forces the people to indiscriminately dump refuse.

The municipal workforce lacks courtesy to a greater extent. A significant number of the waste collectors are inconsiderate and disrespectful. At times bins are stashed with thick stuff (like porridge) and are so heavy to the extent that they can not be loaded into refuse trucks. Waste collectors scold and curse the people they are supposed to serve. This could partly be attributed to lack of training on the part of waste management personnel.

When there is a problem in the collection of waste the municipality does not inform the people it is supposed to serve in time. Therefore there is a serious lack of assurance on the part of the Harare city council. These are some of the critical challenges being encountered. It is a common practice world over that queries or reports are forwarded to relevant authorities for immediate attention. However, there are strong indications that problems and complaints like broken sewage pipes and delays in waste collection are not attended to within the shortest possible time.

It was not expected that the respondents would agree to suggestions of paying more for improved waste collection services, but most agreed. This suggests to the fact that attitude and perceptions of respondents towards sound waste management systems is very positive and encouraging. However, a smaller number is adamant in their opposition to suggestions for hiking waste collection levies. They point to poor services as the main reason and for some, its poverty. House ownership encourages a sense of environmental care of the neighbourhood, renting works against the “NIMBY Syndrome”, that is, anything environmentally unfriendly yes but Not in My Backyard (NIMBY). Renting results in a tragedy of the commons in as far as littering of the neighborhood is concerned. Considering that there are no property rights, there is not enough incentives for environmental care and to prevent negative externalities.

A greater number of respondents (98.57%) are aware that glass should be recycled. This is not so surprising considering that consumers are familiar with the bottle deposit refund system, which not only benefits the business and community but also benefits the environment. The recycling of paper got the nod of the respondents, their high level (97.14% of respondent) of awareness on the recycling of paper emanates from the fact that parents often buy recycled toilet paper and school exercise books.

Asked whether plastics should be recycled, an overwhelming majority (97.14%) are aware of the need for recycling of plastics. Just like bottles, people are familiar with the system of returnable plastic bottles when buying various products. Moreover, waste recyclers who collect plastics in exchange for popcorn and writing pens help raise awareness. A large number (57.14% of respondents) are aware and agree that metals should be recycled. Most of the respondents were even aware that metals are recycled in Mt Hampden, north of the capital city, Harare.

A slightly lesser percentage (84.29% of respondents) are of the view that textiles should be recycled. Old textiles are usually used to make cushions and even pillows which is a positive move in the direction of environmental sustainability. People in Highfield are cognisant (90.00%) of the need to recycle bones possibly for the manufacture of ornaments and wares. The buying and selling of meat bones is a common practice in Zimbabwe. This helps to reduce wastes and prolong the lifespan of landfills and filling up of dumpsites like Pomona on the outskirts of Harare.

Whilst the majority of the people are aware of the need to recycle glass, paper, plastics, metals, textiles and bones, a slightly lower percentage (64.29% of respondents) are willing to put glass in separate bins in order to facilitate recycling. When asked if they are prepared to put paper in separate bins in order to facilitate recycling a significant percentage (35.71%) indicated

“no”. This could be driven by low levels of economic benefits derived from paper recycling in comparison to other waste types like glass, plastics, metals, textiles and bones.

There is a greater chance of plastics being recycled considering that there is a significant number of respondents (64.29%) who are willing to put them in separate bins to enhance small scale recycling projects. Metals can be recycled and this was agreeable (57.14%) by the residents of Highfield suburb. It seems there is a strong feeling for the need to separate metals for recycling purposes considering that metals cause serious injuries to children. Parents see immediate financial benefits of sorting them out as opposed to mixing with other rubbles and garbage.

Fewer people (45.71%) are prepared to separate textiles in order to enhance efforts of recycling them. The lower percentage could again be a result of lack of immediate economic benefits in comparison to glass, plastics and metals that bring immediate financial rewards. The number of respondents who are ready to put bones in separate bins in order to facilitate recycling and those who are against the idea of sorting bones at source are equal. People are aware that bones can be used to make products like kitchenware, chinaware and ornaments. Recycling has several advantages like saving energy. Those who are against the idea of separating waste could be explained by the fact that meat bone recyclers don't pay much for old bones. Other residents are of the view that it takes long to accumulate meaningful heaps of bones that fetch reasonable cash from bone dealers and buyers.

Composting of waste could form an integral package of measures under the integrated solid waste management strategy that can be implemented in the suburb to deal with the challenges currently facing Harare. A significant number (64.29%) of respondents were of the view that organic waste can be composted. Although a considerably number of respondents are of the opinion that composting is a feasible alternative in dealing with organic wastes, a larger percentage (55.71%) of residents do not have a compost or pit to manage their organic wastes. It is hoped that through environmental education and awareness campaigns, the community can be conscientized on the need to compost organic waste. The compost can be used as a fertilizer in the production of vegetables, which is a common practice in every household in Highfield, Harare.

Some of the suggested solutions to the challenges facing solid waste disposal service include, raising of levies and raising of salaries of waste management personnel as a motivating measure, to hire more waste collectors, employ experienced workers and put waste management monitoring personnel in public places, provision of bins, increasing the number of trucks, procurement of fuel in bulk and buying spare parts to services broken trucks, increasing the number of skip bins, putting and enforcing deterrent and strict laws, fixing and supplying quality pipes, providing litter bins in public places and providing more durable bins, and separate bins for different materials, use contract system and trained personnel, responding to residents complaints and suggestions and increasing the frequency of refuse collection, increasing environmental health officers, putting competent environmental inspectors in the suburb, provision of environmental education, awareness campaigns, digging pits for composting, composting incentives and incineration of wastes. All these measures suggested are good but are viable as part of an integrated solid waste management strategy that can be implemented to deal holistically with this environmental challenge. However, co-operation is vital for its success.

Observations show that there are no posters for awareness campaigns. Policies are supposed to be communicated to people through awareness campaigns. The results of this research indicate that there are no recycling and composting campaigns. People are only aware of HIV/AIDS awareness campaigns. More needs to be done to enlighten the residents in the direction of environmental education and frequent public clean up campaigns.

The majority of the respondents attained secondary education, 57.89% and they agreed to the suggestions of raising waste levies. As expected, highly educated respondents who got to tertiary level, 63.16% said “yes” when asked on the need to capacitate the municipality financially by applying the User Pays Principle (UPP). Those with no education at all, who seem to be less environmentally sensitized and conscientized on waste management issues are also skeptical on suggestions of paying more for improved services considering that 50% said “yes” and 50% said “no” to the question on raising levies.

Urban waste problems such as littering and illegal dumping of waste can not be resolved by regulations alone. The regulations are not likely to be obeyed nor can the problem be resolved by just supplying bins and skip bins as they are likely not to be used. Commenting on environmental legislation, Kidd (2008:106) says, “Legislation at present, however, only addresses litter through the method of prohibition and enforcement of these prohibitions certainly seems patchy at best”. Therefore current allocation of sites for dumping purposes can leave future generations in short supply because future needs are not taken cognizant of. Recycling paper, cans, bottles and E-wastes by residents serves them from falling victim to the polluter pays principle. Therefore, to some extent, the polluter pays principle helps to address issues of equity between current and future generations of waste producers in terms of access to resources like wood, ores and land.

Motivation and attitude must be considered and these can be changed by environmental awareness and clean-up campaigns. Perceptions can also be changed by environmental education if these programs target school going age groups. Most of the domestic solid waste in Highfield location can be recycled. Consumers need to bear the cost of disposal through green taxation. Residents can be encouraged to recover their money by retaining their used recyclable products to collection centers. Although this is currently being done, the collection centre are too far and do not cover all products. Green taxes are economic instruments that are used worldwide and are often advocated as a better alternative to command and control approaches to regulating waste. Refundable deposits for every recyclable waste are the way to go.

It has been shown in this discussion that problems of waste management are multi-faceted and people view these waste challenges differently, however, most of the problems can be overcome, all that is required is a unity of purpose between the municipality, national government, residents, street vendors, business operators and waste collection personnel. This unity of purpose helps to deal with the problem of waste disposal.

RECOMMENDATIONS

Urban areas produce more solid waste than any other sector in the form of garbage. Although much of the waste is catered for by garbage removal trucks, the success of these methods are not environmentally convincing and depends entirely on

municipal will, government will and infrastructural and institutional arrangement. The situation in Highfield is not environmentally friendly. The generation of solid waste is on the increase, the collection of garbage is erratic and the dumping of waste on undesignated places is rampant. Littering as evidenced by widespread paper, banana peels and other organic substances is virtually done everywhere, including public places like shopping centers and taxi ranks.

From the findings, it is revealed that current waste management strategies and infrastructure can not cope with volumes of refuse given the high rates of urbanization taking place in Harare. Overcrowding, inadequate bins, erratic collection of waste, illegal dumping, shortage of trucks and attitude and perception of Highfield residents towards waste, can not ensure sustainability of waste management going forward. Moreover, the issuing of bins is supposed to be based on number of people and not on the basis of house number. It is the view of the researcher that a holistic, comprehensive but pragmatic integrated solid waste management strategy should be the way to go, for the future generations of Harare to enjoy a healthy, safe, clean, beautiful and green environment. Recycling, reusing and composting are the key strategies suggested.

Solving the challenges outlined in this research requires the involvement and cooperation of all stakeholders. The main stakeholders include Harare City Council, Harare United Residents Association (HURA), Ministries of Local Government, National Housing, Natural Resources and Environment Affairs, Education, Sports and Culture, Manufacturers, Business Community, Highfield residents and street vendors. All these stakeholders underpin the Integrated Solid Waste Management strategy advocated for by the writer. For the ISWM strategy to work each of the identified stakeholders have to play a part.

CONCLUSION

In this article various sources of waste have been discussed. The research revealed that population density contributes to waste generation and littering. The inability of the Waste Management Department to cope with waste collection has been portrayed. The shortage of waste management infrastructure and equipment which poses a serious challenge has been exposed. Findings from both the waste management directorate and households show serious flaws in municipal capacity to deal with waste. Suggestions on sustainable waste management strategies are given with a statistical backing.

There is a greater chance of plastics being recycled considering that there is a significant number of respondents who are willing to put them in separate bins to enhance small scale recycling projects. Composting of waste could form an integral package of measures under the integrated solid waste management strategy that can be implemented in the suburb to deal with the challenges currently facing Harare. It is hoped that through environmental education and awareness campaigns, the community can be conscientized on the need to compost organic waste. The compost can be used as a fertilizer in the production of vegetables, which is a common practice in every household in Highfield, Harare.

It has been shown in the discussion that problems of waste management are multi-faceted and people view these waste challenges differently, however, most of the problems can be overcome; all that is required is a unity of purpose between the municipality, national government, residents, street vendors, business operators and waste collection personnel.

The problem of waste being dumped almost everywhere, although linked to population growth and urbanization, is not only a waste problem, but also a planning and implementation problem. Although pieces of legislation related to waste management have been updated as of 2007, more still needs to be done with regards to implementation of policies set by the Ministry of Natural Resources and Environmental Affairs. It is a manageable problem if it is tackled from a holistic point of view. The practical solutions suggested have to be implemented from an integrated solid waste management system approach. All these recommendations can only succeed if there is adequate funding, political will, community participation and teamwork. Technical and financial assistance should be sought from local and international development agencies as well as the business community. Corruption which may hamper the successful management of waste at any level must be guarded against since funds may be diverted, reduced or misappropriated. Corruption may negatively affect use of financial and infrastructural resources like trucks and other equipment, frustrating efforts in waste management.

Appendix

STUDY AREA-HIGHFIELD IN HARARE

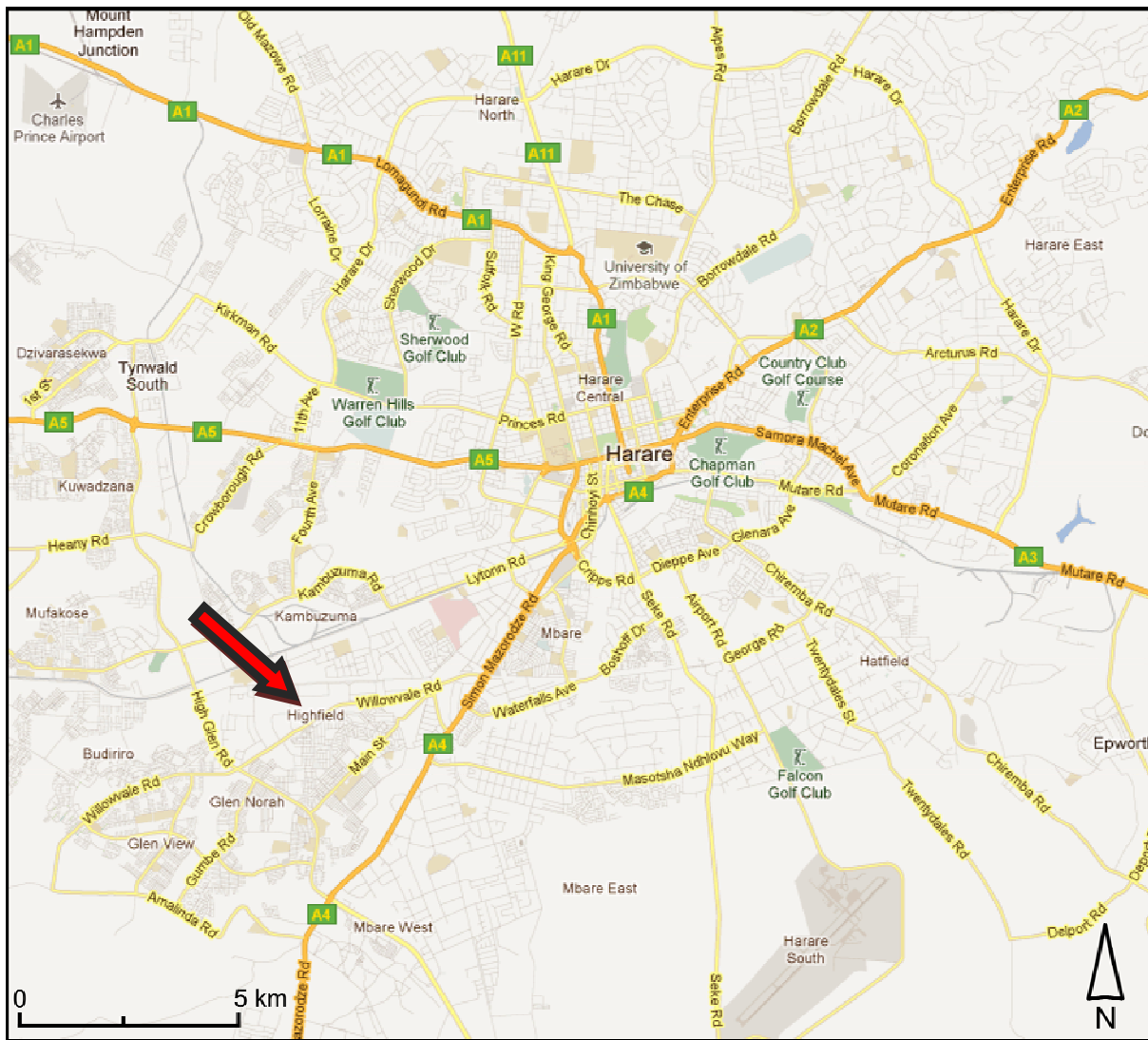


Figure 1 Map of Harare showing the location of study area Highfield suburb: <http://www.google.co.za/maps> [Accessed 13 September 2011].

Table 1 Equipment and Infrastructure in Highfield (year 2011)

Equipment or infrastructure	Total available	Old	New	Desired Number
Skip trucks	10	6	4	20
Refuse trucks	30	10	20	50
Tractors	10	6	4	20
Skip bins	40	40	0	50

Research findings

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