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Improper Solid Waste Disposal: A Cause for Concern in an Urban Environment

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Abstract: The purpose of this study was to determine effects of improper solid waste disposal on an urban environment. The qualitative research paradigm was adopted and a descriptive research design was used. In this study the population comprised of residents and Environmental Technicians (EHTs) in Empumalanga Township. For the sample, one hundred (100) households and three (3) EHTs out of twelve (12) EHTs were used. Convenience and purposive sampling techniques were used for the households and EHTs respectively. Questionnaire and interview guide were the preferred data collection instruments. The major findings were that Lack of awareness, knowledge on solid waste disposal is also contributing to littering and bush defecation. Negative attitude contributes factor to high levels of dumping. Most households do not even have a refuse bin which leads to a decrease in cleanliness. The study recommended that the local authority should collect refuse in all the areas and to also increase its collection frequency and waste management. Environmental Health Technicians (EHTs) and Environmental Health Officers (EHOs) should intensify education on the effects of improper solid waste disposal. Residents should be encouraged to recycle or compost bio-degradable waste materials and Legislation in the waste sector should be improved.
Key words: Solid waste disposal management, Refuse, environment, health, pollution.

INTRODUCTION

The management of solid and liquid waste constitutes a major problem in developing countries. This is evidenced by huge amounts of waste, littering streets causing pollution, odour and untidiness. More often than not, these household wastes end up in drains, rivers thereby causing environmental degradation through contaminated water, unhealthy soils, pollution and infectious diseases.

Background of Study

Solid waste management (SWM) is posing a challenge for most city authorities in developing countries. Indiscriminate disposal of solid waste is mainly through open dumpsite located within the urban areas. Open dumpsite approach is a primitive method of SWM in many parts of the world. The systems applied are unscientific, outdated and inefficient [1]. Solid waste comes in various forms such as dirt, rubbish and garbage that accumulate in residential, commercial and institutional areas. Health and social side effects are equally as important as environmental impacts when considering municipal solid waste management [2]. Waste management plays an integral part in human activity. This involves rational decision making about whether to bury, burn, recycle or produce less waste as well as consider impacts to health, society and the environment.

The rate at which domestic wastes are being generated is greater nowadays and only an organised waste management system can handle it without a challenge. In a bid to prevent disease outbreaks governments and policy makers are concerned with environmental sanitation. On the global scale, human beings have become dominant in the ecosystem thereby challenging the sustainability of the system. Human activities give rise to residual environment. People deliberately ignore dump sites located in their communities and throw solid waste in the open spaces and gutters. To combat this developed countries have accepted Integrated Solid Waste Management (ISWM) emerging from the policy shift away from landfilling and the push for a broader perspective that began in the 1990s. ISWM strikes a balance between three dimensions of waste management, that is, environmental effectiveness, social acceptability and economic affordability.

The problem of waste disposal is typified by overflowing dustbins, mountains of open refuse dumps at virtually every street corner and improperly operated landfills that are rodent infested with potential for surface and groundwater pollution. Solid waste management has emerged as one of the major challenges confronting almost all urban local authorities

in Zimbabwe [3]. Poverty is rampant in Zimbabwe mainly as a result of the country's decline in economy. Urban growth is growing at a faster rate as compared to the provision and expansion of infrastructure and services. Globalisation and changes in packaging material, use of old inefficient waste management technologies and low stakeholder participation hinder proper waste management. Makwara and Magudu [4] note that demographic changes contribute to the generation of waste. Consequently, waste management becoming inadequate as evidenced by the rise in illegal dumping, seemingly permanent piles of rubbish and blocking drains. There is an increase in sewage sludge from burst pipes across the cities. People urinating and defecating in open places is common.

Hwange urban is no exception to this waste phenomenon. There is an increase in the generation of waste. The ever increasing population levels, rapid urbanisation as a result of rural-urban-migration, up-coming of new mines for example Makomo Resources and Mota Engil, additional banking halls which saw the coming in of Stanbic in 2015 and supermarkets like OK Zimbabwe has resulted in an increase in the number of residents especially in Empumalanga Township. Furthermore, the rise in living standards as residents adopt the western culture through the use of diapers as baby towels, fast food and bottled water or drinks has all accelerated the municipal solid waste generation.

Empumalanga Township was established in 1974. The township is located in Hwange Urban. The District Administrator is responsible for all the affairs relating to the Empumalanga Township. District Administrators are key decision makers and the decisions they make impact on the living standard and social well-being of the population [5]. Hwange Local Board is responsible for the service provision, that is, water and sewer reticulation, collection and transportation of refuse, servicing and allocation of residential, industrial or commercial stands in the township. Social life of Empumalanga residents is varied, ranging from formally employed professionals to those who are employed in the informal sector. As a result of Zimbabwe's high unemployment and underemployment rate, a sizeable number of Empumalanga residents are unemployed. Shortage of housing has resulted in higher population density in the township and the emergence of slums. Lack of adequate financial resources by the Hwange Local Board has resulted in people being allocated residential stands on un-serviced land in Empumalanga Township.

Hwange urban is endowed with huge fossil fuel resources of world class quality and will for a long time be a major source of energy to Zimbabwe and the region. Certainly, with urbanisation and population growth, Hwange urban produces enormous amount of waste without adequate infrastructure to manage it. According to Moyo [6]. Hwange urban sits an elevation of 770 metres (2,530 ft) above sea level in Zimbabwe, located in Hwange District, in Matabeleland North Province, along the Bulawayo– ictoria Falls highway. It lies approximately 100 kilometres by road, southeast of Victoria Falls. A railway line from Bulawayo, Zimbabwe's second-largest city, to Victoria Falls runs through Hwange urban. It is close to the international borders with Botswana and Zambia. It has a number of operating coal collieries and also the site of a power station. Hwange urban is adjacent to the National Park that has significant tourist interest. Considering the current situation on solid waste disposal, people and tourists will shun the area and this will have a bad impression on the country, thereby leading to a reduction in earnings from tourism.

Empumalanga Township is now an unpleasant site and health hazard due to litter scattered all over. Failure by the local authority to collect refuses results in urban dwellers dumping it at open sites [7]. Unsightly and staunch blocked sewage pipes are noted all over the residential areas. Open defecating is also witnessed. These places have become potential breeding sites of flies, rodent's infestation and odours emanating. The improper handling of the solid waste and indiscriminate disposal in open spaces, road margins, also increases numerous potential risks to the environment and health.

Legally, in Zimbabwe, section 4(1) of the Environmental Management Act (EMA) Chapter 20:27 of 2002 as well as section 73 of the Constitution of Zimbabwe (Amendment 20) of 2013 state the environmental rights that every citizen is entitled to. These are a clean environment that is not harmful to health. The protection of the environment for the benefit of present and future generations and to participate in the implementation of the promulgation of reasonable legislative policy and other measures that prevent pollution and environmental degradation [8]. It is therefore paramount the disposing of litter is done in such a way that it does not deprive other citizens of their right to a clean and healthy environment. As well as protecting the environment for the benefit of present and future generations. EMA can fine an individual, company or even the local authorities for illegal dumping of refuse and the amounts range from US$1500 to US$5000 depending on the offence committed [9]. As such EMA periodically carries out environmental audits of projects and special emphasis is placed on the management of waste.

Statement of the problem

Despite several interventions over the years, waste management in Empumalanga Township remains low and as such the township has lost its anaesthetic value. Litter is scattered all over the township. Heaps of garbage are seen scattered all over alongside roadsides, open spaces and nearby bushes. Burst sewage pipes are a common site. Poor sewage reticulation is resulting in Empumalanga residents

resorting to the near-by bushes for toilet facilities. This has led to infestation of rodents, increase in fly population and unsightliness of the township.

Purpose of Study

The purpose of this study was to find out the effects of improper solid waste disposal on the environment in Empumalanga Township which is located in Hwange urban.

Research questions

The following research questions were formulated and investigated in this study:

- To what extent does level of awareness, knowledge and practices of solid waste management by Empumalanga residents contribute to proper environmental management?
- What are the methods being used for solid waste disposal by Empumalanga residents?
- To what extent does improper solid waste disposal affect the residents and the environment of Empumalanga Township?

Significance of study

The intended beneficiaries of the study were stakeholders such as the local authority, schools, community leaders, policy-makers, health workers and any other interested organisations to improve and encourage proper solid waste management. Parents and guardians gained insight on the effects of improper solid waste disposal and assisted children especially those at pre-school level to exercise caution when playing. The recommendations that were highlighted after the research would help reduce diarrhoea incidence rates which were affecting the Hwange community. The study enhanced environmental awareness in the community which in turn contributed to a cleaner local environment, maintaining of pure surface and ground water, healthy soils, clean air and also decreased the problems caused by malfunctioning Local Authority services through decentralised composting being combined with primary collection services. In addition, this promoted positive value to Hwange urban both at community level and for tourists.

REVIEW OF RELATED LITERATURE

Conceptual Framework

The concept underpinning this study is Integrated Sustainable Waste Management (ISWM) Model. According to Anschutz *et al*. [10] ISWM model was developed by advisers on urban environment and development and partners or organisations working in developing countries in the mid-1980s. The model was further developed by Collaborative Working Group (CWG) on SWM in the mid-1990s [10]. The concept focuses on cooperation and participation among stakeholders and the introduction of micro and small enterprises as well as community based organisations. ISWM concept takes four basic principles, that is, equity, effectiveness, efficiency and sustainability. Scheinberg, Klundert and Anschutz [11] aver that equity means that all citizens are entitled to an appropriate waste management system for environmental health reasons. Effectiveness of waste management model will lead to the safe removal of all waste. Efficiency makes the management of waste maximising the benefits, minimising costs and optimizing the use of resources. Lastly sustainability refers to the fact that waste management system should be appropriate to the local conditions and feasible from a technical, environment, social, economic, financial, institutional and political perspective. Hence, ISWM can maintain itself over time without exhausting the resources upon which it depends on. In addition, Scheinberg, Klundert and Anschutz [11] highlights the three dimensions of ISWM as the practical and technical elements of the waste system. Second, the aspects of the local context that should be taken into account when planning a waste management system. Lastly, the stakeholders involved in the waste management.

Effective Solid Waste Management

Douglas [12] describes waste as materials which arise from animal and human life and activities and is discarded as useless and unwanted. This suggests that solid waste is unwanted, useless and discarded waste materials resulting from domestic, commercial and public service. According to Omuta [13] solid waste management concerns the interplay, among generation, storage, collection and final disposal. This implies that SWM involves generation storage, collection and disposal. In addition, SWM includes processing treatment and transportation. Indeed, where solid waste is not properly collected or transported this result in heaps of garbage that can barricade streets or roads thereby leading to accidents, bad odour, unpleasant sites and the risk of diseases.

The waste is introduced into the environment as a result of day to day activities by humans. The major purpose of waste management is to isolate waste from human and the environment and consequently safeguard individual, family and community health. Omuta [13] suggests that the concept of waste management varies between countries and regions, the general concepts include waste hierarchy and this refers to "3Rs" reduce, reuse and recycle. Thus, reduced waste quantities do not have to be collected or even otherwise be managed. As a result of waste reduction reuse of wastes is achievable. In many developing countries due to poverty waste reduction occurs naturally because high value is placed on material resources by the people.

The waste hierarchy is the cornerstone of most waste minimization strategies. Barbalace [14] suggests that it aims to achieve maximum practical benefits from products and to generate the minimum amount of waste. Ideally, it is good to remember that throwing waste

away does not mean that it is goes way but rather the waste comes back in so many ways and none of them are good. For instance, waste from plastics contributes in choking sewer systems. Mansvelt [15] confirms that because plastic bag manufacturing uses non-renewable resource cited as petroleum plastic bags been noted to choke sewer systems as well as leading to floods through blocked storm drains. Such incidents pose damage and loss of property and are also a health hazard. Furthermore, plastics pose danger even to animal life. Cows can feed on these plastics and they do not biodegrade easily.

Causes of Improper Solid Waste Disposal

Technical and administrative capacity to properly implement sound mechanisms for waste management is weak. Makwara and Magudu [4] states lack of appropriate and effective technologies in waste management. Inadequate and inefficient waste management systems can be a function of rapid urbanisation and lack of funding of waste management services. The problem of funding in local authorities is characterised by shortage of foreign currency to purchase vehicles and spare parts and lack of skilled manpower. Collection of revenue from ratepayers has also been erratic since residents are also affected by the economic environment.

The influx on urban areas has resulted in an increase in waste generation. Asnani [16] states that the lifestyle changes especially in larger cities, lead to the use of more packaging material which in turn results in the overall increase in solid waste. This has resulted in an increase in the amount of waste being generated daily by each household. United Nations Environment Programme (UNEP) [17] notes that solid waste generated is not only a function of the living standard and lifestyle of the region's inhabitants but is also as a result of the abundance and type of the region's natural resources. Urbanisation and population growth are mainly responsible for the high increase rate of solid waste and its proper management is a challenge for municipalities and local authorities. Ikemike [18] states that the growth of human population in communities has resulted in high rates of solid waste generation. It has to be appreciated that every human activity involves the generation of waste in solid, liquid and gaseous forms. Whilst collection of waste should be practiced from house to house this is often irregular and inefficient.

UNEP [17] states that, due to the lack of funds, African, Asian and Latin American ministries give more attention to other issues they consider more urgent than solid waste management. Laws regarding waste management systems are fragmented, hence inadequate. Local authorities in urban areas yield less or no power to provide incentives for good waste practices. Blight and Mbande [19] admits that regulatory and legal frameworks required for effective waste management are not compiled with, because there are no well-developed mechanisms of enforcement that would effectively force the mass population to do so. There is need to address policy gaps that assist people to desist from throwing garbage in public areas.

Asnani [16] notes that a large portion of municipal budget is allocated for solid waste management; however most of it is spent on the wages of sanitation workers whose productivity is very low. There are no clear plans to enhance their efficiency or improve working conditions through the provision of equipment and protective clothing. It can be noted that improper SWM can be as a result of inadequate and inappropriate equipment as well as lack of proper protective equipment. This is witnessed in the old methods of transportation employed by the local authorities who can include wheelbarrows, tractors or open trucks, brake down in the equipment, irregularity in the collection of waste and inadequate protective gear for the sanitation workers.

Level of awareness, knowledge and practices of solid waste management

The level of awareness plays a paramount role at household level in SWM. Saungweme [20] found that most residents were not aware of regulatory policies on waste management. A good number of people do not participate in keeping the environment clean due to perceived perception that it is the duty of the local authority to maintain the township clean. This is witnessed by the fact that people just dispose of waste wherever they feel it is convenient to them. There is no coordination between residents and the local authority. The people play no role in waste management and the local authority just view residents as customers who are receiving a service they have paid for.

George [21] suggests that the perceptions and attitudes are learned and can therefore be modified through education. Formal education from different levels can help in understanding good waste management practices. A good number of women who are highly involved in day to day management of wastes are illiterate or have adult education which is probably due to the community settings and believes. Hygiene starts from home. Hence the urgent need to streamline and sensitize young minds on the environmental problems and concerns. It is education that makes human beings knowledgeable to environment and problems related to it. Kassim and Ali [22] suggests educating households, providing good services and creating good relationships with the households and collecting fees for services at the right time. Indeed clean-up campaigns have been very effective in areas where they have been exercised and they also allow for community participation.

Many studies in the past have attempted to predict environmental awareness and attitudes of people based on their socio-demographic characteristics.

Raudsepp [23] reports that age, education and gender have shown strong and consistent relationships with environmentalism. Chanda [24] acknowledges that environmental concerns among residents vary according to education and income levels, whilst age and gender do not have any significant influence on the concerned variation. Certainly, education and income levels bring a variation in the disposal of waste by residents. It cannot be denied that littering and poor disposal of waste is rampart in high density areas as compared to the low density areas. With the later appreciating a cleaner environment and are also aware of the benefits of exercising proper waste management. Conversely a clean and well maintained site discourages litter whereas littered sites tend to encourage further littering.

However, some researchers have given consistent attention on gender. Raudsepp [23] found that women were significantly more likely than men to be concerned with environmental problems. This gender difference is also notable between boys and girls. Many a times girls are made to carry out most of all the sweeping and cleaning activities, whilst their male counterparts perform maintenance tasks at home or in schools.

Lumbreras and Fernandez [25] highlights the need to improve public awareness and community participation (CP) in waste management as a necessary tool in creating SWM and promote environmental citizenship amongst community members. Asnani [16] agrees that CP has a direct bearing on efficient SWM. Yet, local authorities have failed to mobilize the community and educate citizens on the rudiments of handling waste and proper practices of storing it in their own bins at household, shop and establishment level. Meanwhile, Emeribe [26] says environmental education is necessary for improving environmental quality. Thus waste managers need to take steps to help align the information presented to the public with the knowledge that the individuals already have. Enlightened debates, public awareness and even outright opposition can promote a forum for dialogue and conflict resolution and eventually lead to balanced policies thereby enhancing public commitment. Furthermore, environmental education and awareness among decision makers will considerably help in a better integration of environmental issues, regarding solid waste management practice and help in disease prevention and sustenance of a healthy environment.

Impacts of improper solid waste disposal

There are a number of potential risks both to the environment and health that imminent as a result of improper handling of solid wastes. Health issues related to waste are complex and especially given the diversity of pollutants present, management methods and ways of exposure, knowledge remains imperfect and still need to be improved. Water is a natural resource essential to life. However in an unhealthy environment, water can directly or indirectly cause illness or death. Kafando *et al*. [27] affirms that contaminated water from wells is not treated according to hygiene standards but is still consumed by people.

Usually wet waste that decomposes releases bad odour. This bad odour affects people settled close to the dumpsite. Dumpsites are not just smelly but also have unsightly conditions. The conditions are worse in summer due to extreme temperatures that speed up the rate of bacterial action on biodegradable organic material. The dumpsites are also a problem to the environment especially the air that residents inhale. In addition, dump sites emit smoke that causes illness to people living in, around or closer to them. Ejaz *et al*. [9] notes that open burning of collected solid waste cause air pollution. Illegal burning of collected solid waste creates serious negative impacts on outdoor air quality; pollute the environment as well as causing illness and reducing visibility.

Not only are humans affected by improper disposal of waste but animals as well. Cats and dogs closer to dumpsites always feed in these places. These pets together with rodents carry diseases with them to nearby homesteads. Ejaz *et al*. [9] says proportion of food waste in open dumps and waste drains provide an attractive shelter for rats, which then spread disease, damage electrical cables and other materials. The provision of sanitation in most urban areas is grossly deficient. Most people do not have access to hygienic toilets owing to mushrooming of informal settlements and water shortages.

Solid waste disposal to urban environment and development

The chief challenge for illegal dumpsites is mainly a source of local environmental pollution. Refuse is a health hazard if it is uncollected [28]. The people at risk from the solid waste include residents in nearby areas where there are no proper waste disposal methods. People living close to a waste dump and those whose water supply has become contaminated due to waste dumping or leakage from landfill sites are also at risk [29]. As a result of solid waste water pollution problems are prevalent through the changes in the composition of air and water. Using water polluted by municipal solid wastes for bathing, food irrigation and as drinking water can expose individuals to disease organisms and other contaminants. A major environmental concern of solid waste disposal is the gas released by decomposing garbage.

Flies breed in some constituents of solid wastes and flies are very effective vectors that spread diseases. This challenge is worse in summer or in areas with high temperatures. Ejaz *et al*. [9] notes that dispersed solid waste from illegal open dumps often block the drains and sewers. In turn these blockages create flooding and unhygienic conditions. In addition,

blocked drains and waste water flooding greatly support the mosquitoes breed hence spread malaria and dengue.

RESEARCH METHODOLOGY

The researcher used the qualitative research paradigm. Babbie [30] confirms that qualitative research aims for in-depth and holistic understanding in an effort to do justice to the complexity of social life.

Research Design

The researcher used the descriptive research design to describe characteristics and behaviours of Empumalanga residents on effects of improper solid waste disposal. Descriptive research design explains the statement of affairs as it is presented with the researcher having no control over variable. Best and Khan [31] asserts that descriptive survey involves description, recording, analysing and interpreting of conditions.

The population

Best and Khan [31] assert that population is a group of individuals that has one or more characteristics in common that are of interest to the research. This implies that a population is made up of similar individuals or organisations that share similar characteristics. In this study the population comprised of residents in Mpumalanga Township. SWM target households, hence, the data were acquired from this particular population. This includes residents who exercise proper solid waste disposal and those failing to do so. Also included in the population were Environmental Health Technicians (EHTs) of Hwange urban.

Sample size

In this research the sample was extracted from the household heads or substitutes who usually supervise or direct the daily handling of sanitation in the home. One hundred (100) households and three (3) EHTs out of twelve (12) EHTs were sampled and represented all the technicians.

Sampling Procedure

To solicit information from the study area convenience sampling was used. Convenience sampling is a non-probability method which involves collecting a sample in a qualitative research from somewhere convenient to the researcher. Information from EHTs was collected using purposive sampling.

Research Instruments

In this research semi-structured questionnaire and interview guide were used to gather information from the selected respondents.

The Questionnaire

The questionnaire was written in English and then translated in vernacular (isiNdebele) to cater for those who are unable to read English and also considering that Empumalanga Township is located in Hwange, in Matabeleland North province where many can speak and read isiNdebele. Saunders, Lewis and Thornhill [32] view a questionnaire in general terms to include all techniques of data collection in which each person is asked to respond to the same set of questions in a predetermined order. Whereas, Chant [33] claims that a questionnaire is a document containing questions designed to solicit information appropriate for analysis. One hundred (100) questionnaires were distributed to households in Empumalanga Township. The questionnaires were employed to establish from respondents how much they knew about the effects of improper solid waste disposal to the environment in their community. Standard questions were given to the respondents in the same order so that the same information could be collected from the population sample. Since the researcher recorded the events as they happen the story therefore remains the same. The questionnaire had open-ended and close-ended questions each with three nominal pre-defined answers from which the participant selected the option that best expresses feeling and opinion. The names of the respondents were not be required and this helped in acquiring honest information since the respondents were not afraid of being victimised in the event of giving negative comments or responses. The advantages of a questionnaire is that data can be considered more reliable than qualitative data since each individual response answers precisely the same question in the same order, reliability is high and there is less travel expenses. Questionnaires can be used to collect large quantities of data from considerable numbers of people over a very short space of time. Furthermore, data collected through questionnaires can be analysed more scientifically and objectively. Figures produced can be checked by other researchers making it reliably high. Through the questionnaire the researcher was able to solicit a lot of data on how people viewed the study. Respondents were able to express themselves freely on their own which is not the case with interviews.

The Interviews

The researcher carried out face-to-face interviews with three (3) EHTs in Empumalanga Township. The researcher prepared structured questions to use for the interview. Meanwhile, Shaughnessy and Zechmeister [34], highlight that the interview guide involves a set of things or inquiries that may be organized and structured which are asked by a questioner in a vis-à-vis circumstance with the respondents. The interview guide includes the social occasion of information through immediate verbal connection between the researcher and the respondents.

The interview guide was chosen for this study because of its strengths which the researcher relied on to achieve the collection of valid and reliable data. It allowed the researcher to gather the required information instantly. Where appropriate the researcher rephrased the questions so that the respondents

understood, considering that the interviews were a face to face situation. According to Keyton [35], interviews allow the researcher to probe more deeply, and the researcher has an opportunity to collect both verbal and non-verbal cues. They are a wellspring of obtaining first hand data. The interviews achieved a good response rate since all questions were addressed on the spot. Yet another merit was that the interviews were flexible in the sense that the researcher repeated and rephrased questions for the respondents.

Meanwhile the interview guide is not without its limitations. Using the interview guide might result in respondents withholding valuable information. To avoid this, the researcher established a good rapport with the respondents in order to create a conducive atmosphere. Respondents were made to appreciate the purpose behind the interview. In addition, involving respondents with poor communication skills can be a challenge. To curb this researcher used simply language and where possible sought the help of an interpreter.

DATA COLLECTION TECHNIQUES

This refers to the means by which the researcher produces empirical or field data or evidence. The researcher distributed questionnaires to residents in person to ensure that all selected respondents would get them. To minimised chances of questionnaires being lost the researcher also collected them in person. The questionnaires were left with the respondents for two (2) weeks to give the respondents ample time to answer the questions. The researcher sought for the respondents' cooperation in answering the questions honestly through an attached letter on the state in which the responses were to be handled and maintenance of confidentiality. Scheduled interviews were carried out with EHTs from the Ministry of Health who were interviewed upon appointment on separate times. Responses were recorded in a notebook for analysis and feedback.

STUDY FINDINGS

Rate of return

One hundred (100) questionnaires were distributed to households and ninety seven (97) respondents filled in the questionnaires. Whilst three (3) respondents were not available at the time the questionnaires were collected. Of the 97 respondents that participated in the study 53 (54%) were female and 44(46%) were male. This implies that the population consists of the largest number of female-headed households. This can be justified as a result of Zimbabwe's harsh economic situation which has seen more males leaving the country to seek for employment across borders to fend for their families back home. In addition, the traditional culture in Zimbabwe results in male dominating the workforce, whilst the women take care of household chores and hence are more responsible for solid waste disposal.

Of the total respondents 53 (55%) households reside in rented accommodation while 44 (45%) households own the property. In most cases, those residing in rented accommodation share the accommodation with another family or two. A substantial number even reside on unserviced stands, hence have no proper toilet facilities and the local authority does not collect refuse from these areas.

The respondents were asked whether they have any knowledge of improper solid waste disposal. The majority of the respondents, that is, 86 (87%) indicated that they had knowledge of improper solid waste disposal. They understood improper solid waste disposal as the dumping of waste in undesignated areas. Some further explained that improper solid waste disposal includes defecating on open land. Respondents highlighted that the waste can be in the form of wood, plastics, tins, paper, left-over food and kaylites amongst others. It was highlighted that improper solid waste disposal leads of land pollution, is a health hazard and unsightly. All these responses give clear evidence that the respondents are indeed aware of what improper solid waste disposal involves. However, 11 (11%) of the respondents indicated that they had no knowledge of improper solid waste disposal.

On methods used for solid waste disposal 50 (52%) of the respondents indicated that they make use of the refuse bins to dispose of waste. Of these 50(52%), 10 (10%) of the households highlighted that their bins had no lids, 5 (5%) had metal bins with no bases, 13 (13%) use black bin liners which easily break and are also torn by dogs and baboons, 22 (22%) use either, sacks, *Tshangani* bags and boxes to store waste before it is collected by the local authority in areas which it collects. Yet still, 12 (13%) of the households dig a hole and make a compost heap in their yard. For sewage waste 75 (77%) use proper toilet facilities connected to the local sewer system or they have a septic tank. The remaining 22 (23%) have no toilet facilities and unfortunately, use the bush or open space as toilet facilities. This indeed is an unhealthy situation for humans, animals and the environment. Diseases are prone to be spread, the bushes are unsightly and animals can even feed on the human waste.

80 (82%) respondents indicated that the local authority collects refuse once a week, 1(1%) indicated that refuse is collected twice a week and for 16 (17%) households the refuse is rarely collected. Respondents were further asked on how they get rid of refuse that had not be collected. The highest number of 52 (54%) burn their waste if it is not collected within the stated period. Followed by 35 (36%) who dump the waste, whereas 10 (10%) at least put the waste in a compost heap. With such a high percentage of households burning their waste this is a clear indication that the households are not aware of the effects of burning both to the environment and to human health. Such practice

pollutes the air and causes respiratory problems as well as damage the ecosystem. Dumping is unsightly, attracts flies and block roads. Considering that every household has a garden the households should be encouraged to have compost in their backyard.

Respondents were asked about how their level of awareness, knowledge and practices of solid waste management contribute to proper environmental management. 75 (77%) of the respondents showed that the knowledge that they have assists them in knowing the importance of recycling. Their awareness also ensures that waste is properly managed so as to always keep the environment clean and healthy. As a family they then assist each other to properly dispose of litter. High level of awareness results in family member's consciously practicing correct solid waste disposal and chances of misplacing waste are drastically reduced. Proper knowledge and practices can even be cultivated from adults to children down to grandchildren. Such that they do not even throw litter from moving vehicles. Neighbours will also be assisted to practice proper solid waste disposal. 22 (23%) revealed that they were not aware of solid waste management practices. The respondents blamed the Environment Management Agency for failing to educate the community of proper practices of solid waste management. A better understanding of solid waste disposal reduces the frequency of cholera, typhoid and also avoids flooding and dumping of waste.

When asked to comment on how attitude may contribute to improper solid waste disposal the responses were as follows: All 97 (100%) respondents reflected that a negative attitude towards improper solid waste disposal leads many to see nothing wrong with littering, dumping or evening using the bush as a toilet. The respondents thought that it is not their responsibility to keep the environment clean. They even concluded that the waste will decompose with time. Failure in some cases by the local authority to collect refuse timeously will result in some opting to dumping, especially if the dump areas is not close to the houses. They conclude that the local authority will take care of the mess because they are paying taxes. People follow what others do.

97 (100%) of the households also highlighted that when people burn refuse which is dumped this causes air, water and land pollution through burning and dumping. During the rainy season the waste dumped can cover roads, yards or even dissolves into the soil and pollutes the nearby water sources and the environment. Waste end-up in drainage systems eventually causing flooding. Improper waste disposal create breeding places for mosquitoes, rodents and flies. This in turn causes diseases such as cholera, malaria, eye infections, respiratory infections and typhoid. There is an emission of gases like carbon monoxide which is not good for the health of humans. Bad odour is also experienced. 80 (82%) of the respondents highlighted that land is also wasted being designated for waste disposal. The environment is also made untidy. Resources meant for development are channelled on fighting the ills of poor waste disposal such as buying drugs for the sick, improving the environment, employment of staff to monitor the environment. Children in the community may be seen playing with waste if it is not properly disposed of. Bottle and tins exposes children to danger.

The interviews conducted with the three (3) EHTs indicated the following responses. Inadequate knowledge of the correct refuse disposal system. Lack of clearly laid out and sufficiently communicated waste management system. Expensive waste collection, transportation and final disposal methods. Landfills are very expensive to construct. Waste management lacks ability to financially support itself. The fees are too low and fines accrue to Environmental Management Agency will not apply the fine to the correction of the particular deviation. There is too much packaging material. There is negligence by households, not in my backyard attitude. Their responses show why there is litter and dumping around the township as well as blocked sewage pipes in a number of areas.

To solve improper solid waste disposal the EHTs think that there should be frequent house inspections and also inspection of disposal systems and sites by the Environment Management Agency. The local authority should also have policy on refuse bin allocations. This was last done in 2008 and not very household received a bin. The local authority to consistently provide waste receptacles to households, at public places and along streets. Punitive fines should be put in place for individuals found dumping waste and pollution by businesses. There is need of constant awareness and clean up campaigns both at community and school level. Encourage development and use of bio-degradable wrappers or containers. Establish and support solid waste reuse and recycling projects. The government should also fund the construction of engineered landfills as a show of commitment to the drive and leave local authorities running with maintenance costs.

CONCLUSION

Based on the findings, the study concluded that;

- Lack of awareness, knowledge on solid waste disposal is also contributing to littering and bush defecation.
- Attitude is another contributing factor to high levels of dumping.
- Some households do not even have a refuse bin which leads to a decrease in cleanliness.
- The local authorities is the sole provider of sewage and refuse collection but due to a limited budget

the collection frequency is low and does not cover all areas of the township.

RECOMANDATIONS

Accordingly, researchers recommend the following;

- The local authority to ensure that every household has a refuse bin at a nominal fee for storage of waste.
- The local authority to also collect refuse in all the areas and to also increase its collection frequency and waste management. This can be achieved through an increase of manpower, equipment and possibly partnering with other stakeholders to help them in the business of refuse management and bring an edge of sustainability in waste management.
- Environmental Health Technicians (EHTs) and Environmental Health Officers (EHOs) to intensify education on the effects of improper solid waste disposal.
- Residents to be encouraged to recycle or compost bio-degradable waste materials.
- Legislation in the waste sector should be improved.

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