Current Status Of Solid Waste Management Strategies In Akure Municipality, Ondo State

Igbinadolor Ikponmwosa J.1, Jerumeh T. R.2, Jerumeh E.G.3 and Ohemu T. L.4

1,4Department of Pharmacology and Traditional Medicine, University Of Jos, Jos, Nigeria
2,3Department of Agricultural Economics, University of Ibadan, Nigeria

ABSTRACT
Waste management is an issue of global concern as all human activities generate wastes which if not properly managed could have serious implications on public health, environment and aesthetics. Thus, the study investigated the current status of waste management strategies in Akure municipality. Primary data from 174 households were reconnoitred with the aid of a well-structured questionnaire using multistage sampling procedure. Analysis was done using descriptive statistics and Severity index technique. The study identified three main methods of waste collection in Akure municipality. These are dustbins, polyethylene bags and backyard disposal and the percentages of households employing these methods were 73%, 24% and 3.6% respectively. Majority of the respondents (48.6%) employed the services of waste collection agencies while about 6.9% dump their refuse in open spaces with land filling only marginally represented (0.6%). Severity index values obtained for the various solid waste management issues ranged from 41.0% and 69.7%. Efficient refuse collection and disposal have been shown to be complicated by poor funding, inadequate vehicles and lack of trained and skilled man power. Given the current state of solid waste management in Akure, the study therefore recommends the need to recognise and facilitate public-private partnership in waste management while engaging a multipronged approach that focuses on the 3R principle of Reduce, Reuse and Recycle.

Keywords: Solid waste, Waste management, health, open dumping, Severity Index

INTRODUCTION
Waste management is an issue of global concern as all human activities generate wastes which if not properly managed could have serious implications on public health, environment or aesthetics. Hoornweg (1999) emphasized that waste is inseparable from life because as long as man is alive, he stores up, uses, and disposes off materials and the complexity of waste which modern civilization produced is directly related to the living standard, socio-economic and cultural attributes of that particular environment. Waste may be defined as substances or objects discarded, worthless, unwanted, and defective or of no value from a consumption or manufacturing process (Ayuba, 2005). The production of waste material, which could be in liquid, solid or gaseous form, is known as the waste stream and includes the entire variety of refuse generated during domestic, industrial, construction and commercial processes (Babatola, 2008). Although gaseous and liquid waste are naturally transmitted from their production sites to other locations, solid wastes are not free flowing and can cause severe health hazards if poorly managed. Solid wastes could be defined as non-liquid and nongaseous products of human activities, regarded as being useless which could take the forms of refuse, garbage and sludge (Leton and Omotosho, 2004). Solid waste management is therefore defined as the process of collecting, storing, treatment and disposal of solid wastes in such a way that they are harmless to humans, plants, animals, the
ecology and the environment generally (Adeniran and Oyemade, 2016). Waste generation, waste composition, waste collection and transportation, and waste treatment and disposal have been mentioned as the main elements of solid waste management system (Asase et. al, 2009). The four common methods of managing waste according to Seo et al. (2004) are land filling, incineration (burning), composting and anaerobic digestion. With the exception of land filling, these disposal technologies convert the waste materials to a more reduced form.

Inadequate waste management poses serious threat to the overall human health and the natural environment. Handlers and residents proximal to disposal sites with no proper management are at a high health risks as these wastes carry along rodents, insects and other vermin, which could transmit diseases such as typhoid fever, dysentery, diarrhoea, cholera, yaws, and other related diseases (Oreyemi, 1998). In addition to the health problems, the presence of waste deteriorates and vitiates the aesthetic values of places where they are situated. According to Pichtel (2005), the environmental impacts can be clustered into six categories which include: global warming, photochemical oxidant creation, abiotic resource depletion, acidification, and eutrophication. It should however be noted that an effective and sustainable solid waste management should be based on preventive and minimization measures. Solid waste management methods should be primarily concerned with waste minimization, reuse and recycling (Sridhar and Hammed, 2014).

According to Jerie and Tevera (2014), waste minimization measures include waste prevention, internal recycling of production waste, and source-oriented improvement of waste quality and reuse of products for the same purpose. Jerie and Tevera (2014) further added external recycling, sorting of waste, reuse for another purpose, and energy recovery as other waste management measures. Concentrating efforts on these measures is expected to engender improvement in environmental sanitation standard as well as supplement the quality and visual appeal of the environment especially in some major cities in Nigeria where improper waste disposal is at its peak. This study therefore seeks to examine the present state of municipal solid waste management systems in Akure municipality.

Solid Waste Management in Nigeria

A world population approaching seven billion that produces more than ten million metric tons of waste per day (Lacoste and Chalmin 2007) brings to the fore the issue of waste management and the associated effect of improper waste disposal on health and the environment. In Nigeria, indiscriminate disposal of waste, particularly in urban areas, has not only reduced the aesthetic value of the environment but has led to the outbreak of infectious diseases like cholera, malaria, dysentery, diarrhoea etc. The problem becomes compounded during the rainy season when water no longer flow freely along drainage systems or remains stagnant thereby creating a conducive brooding environment for mosquitoes and vector borne diseases like malaria (Coker et al, 1998). Unlike urban cities, in rural communities municipal solid waste quantity are less and managed in household backyards by burning, composting, as feeds to animals and occasionally disposed at dump sites (Abila and Kantola, 2013). Poor management of Nigeria’s environment is costing the nation roughly US$5 billion annually (Babatola, 2008). Improper waste disposal has been a major impediment to nation’s goal of achieving sound and healthy environment which will foster sustainable development. The situation became so bad that a pragmatist approach was adopted requiring residents to spend the last Saturday morning – each month – cleaning their property; and the refuse to be placed on the streets for collection. This of course does not always happen and the rubbish piles up (Sangodoyin, 1995).

According to Abila and Kantola (2013), the processes involved in the management of waste in Nigeria are, storage, collection, transportation and disposal at dumpsites with the most prominently employed waste management technique being open dumping, land fill and open burning. The author further revealed that due to the absence of formal recycling sectors in Nigeria, wastes are recycled informally by scavengers who buy un-used valuables from people and visit legal and illegal dumpsites in search of materials that can be re-used and recycled.
Uwadiegwu and Chukwu (2013) also identified two major approaches to waste management in Nigeria. They are private and public arrangements. The private approach is a contractual agreement of waste disposal between private collection agencies and individuals or group of people who consent to the agreement. Both parties usually agree on a given amount which is payable at the end of a given time period usually at the end of the month. This practice however has been found to be more prevalent among the middle and high income earners. The public system is more conventional in which case the government establishes a waste disposal agency whose responsibility it is to collect waste from waste generators and dispose them at disposal depots. Many state governments opt for outsourcing to private agents in order to save cost, sustain hygiene while taking advantage of the associated health benefits. Uwadiegwu and Chukwu (2013) also revealed that some cities adopt the combination of the two systems particularly when the public system is ineffective to cope with the volume of waste generation; the private system is adopted to compliment the efforts of the public arrangement. This hybrid arrangement is quite common in Nigerian Cities such as Enugu, Port Harcourt, Aba, Owerri, Ibadan and Kano (FMHE, 1983). Combination of these two systems tends to increase the efficiency of the private sectors as they tend to improve their services in a bid to attract more customers. These could include prompt waste collection, proper waste disposal, offering of incentives among others. Omuta (1988) opined that this motive in turn ensures that efficiency is maintained.

METHODOLOGY
Data Source and Design
The data used for this study were mainly primary. Personally administered structured questionnaires were designed, pretested and validated for use in this study. These questionnaires were administered to two main categories of respondents: Key staff of waste management agencies (both public and private) and households from six residential areas in Akure. For the waste generators, the study employed a multistage sampling procedure to select the sampled respondents. The first stage involves the purposive selection of 6 residential areas namely Oke Aro, Araromi, Orita-Obele, FUTA community, Ijapo Estate and Alagbaka. These residential areas were purposively selected because they are highly representative of the different zones to which they belong (Table 4). These are the high, medium and low density zones. The second stage involves the random selection of 30 respondents from each residential area giving a total of 180 respondents. The survey was conducted by interviewing household heads in the sampled areas and in situations where they were unavailable, the next knowledgeable household member was interviewed in proxy. Data collection took place between September and October, 2017. Although 180 questionnaires were administered, only 174 were analyzed due incomplete information supplied by 6 respondents.

For the waste collection agencies, 20 questionnaires were designed and administered to key staff members to obtain information on the method of waste collection, disposal techniques and the major constraints to effective waste management. In totality, the study analyzed 200 questionnaires to assess waste management strategies in Akure Metropolis.

Method of data analysis
Data obtained from the study were analysed using a number of analytical techniques. These include descriptive statistics and severity index. Descriptive statistics like tables, charts, frequencies, measures of central tendency, and dispersion were used in the study to describe socioeconomic characteristics of the sampled households and to examine the current situation of solid waste management strategies in Akure.
Severity Index
Relative index ranking technique is a non-parametric technique widely used for analyzing response data involving ordinal measurement of attitudes (Idrus, 2001; Egemenn and Mohammed, 2006). One form of this technique is the severity index analysis which uses weighted percentage scores to compare relative importance (Al-Hammad, 2000; Ballal, 2000) which the study employed for ranking the perceptions of the sampled waste generators on waste management issues. Following Al-Hamme and Assaf (1996), the severity index (SI) is calculated using the equation below:

\[ SI = \frac{\sum_{i=0}^{4} \alpha_i x_i}{\sum_{i=0}^{4} x_i} \times 100 \]

Where
\( \alpha_i \) = the index of a class; constant expressing the weight given to the class
\( x_i \) = the frequency of response
\( i = 0, 1, 2, 3, 4 \)
\( x_0, x_1, x_2, x_3, x_4 \) are the frequencies of the respondents’ responses corresponding to \( a_0 = 0, a_1 = 1, a_2 = 2, a_3 = 3, a_4 = 4, \) respectively.

The perceptions of waste generators on solid waste management, measured using Likert Scale, were rated following Majid and McCaffé’s (1997) rating classification shown as follows:
- \( a_0 \) = strongly disagree \( 0.00 \leq SI < 12.5 \)
- \( a_1 \) = Disagree \( 12.5 \leq SI < 37.5 \)
- \( a_2 \) = Neutral \( 37.5 \leq SI < 62.5 \)
- \( a_3 \) = Agree \( 62.5 \leq SI < 87.5 \)
- \( a_4 \) = strongly agree \( 87.5 \leq SI < 100 \)

RESULTS AND DISCUSSIONS
Demographic Characterization of the Sampled Households
The descriptive statistics of the demographic characteristics of the sampled respondents in Akure municipality are shown in Table 1. As shown in Table 1, the gender profile indicates that about 59% of those interviewed were males while 41% were females. Although the result shows more male representation, there is no clear indication as to whether an individual’s gender greatly affects his or her ability to manage waste. However, Ehrampoush and Moghadam (2005) showed that gender difference could influence people’s perception on solid waste management. The mean age of the sampled household members was found to be 39 years and the modal age class was observed to be less than 30 years (29.31%). Respondents in the elderly age group (older than 50 years) were shown to be least represented (21%). Age is expected to play a significant role as maturity could affect level of awareness on environmental health and sanitation (Bradley et al., 1999; Eagles and Demare, 1999). Since only about 30 percent of the respondents were younger than 30 years, a significant proportion of the respondents can be considered to be matured and this is expected to positively influence proper waste management. In terms of marital status, married individuals were shown in be in the majority (57%). High level of education was also recorded among residents in selected areas in Akure. About two-thirds of the sampled respondents had more than 12 years of education (tertiary education), whereas a marginal but equal representation of those having primary school or no education at all (9.6% in each case) were observed. A relatively small household size (≤ 4 persons) was observed among the respondents as individuals in this category represent nearly two-third of the...
respondents. Households having 5 to 6 members were about 31% of the respondents with those having 7 persons or more being slightly represented (8%).

Further analysis of the socio-economic characteristics of the respondents show that 37% were employed by the government, 39% were in private sectors, 13% were self-employed while about 11% were involved in other income generating activities. The average monthly income of the respondents was found to be majorly between ₦10,000- ₦50,000 with about 24% and 33% earning less than ₦10,000 and over ₦50,000, respectively.

Table 1: Socio-Demographic Characteristics of Respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (n=174)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>102</td>
<td>58.62</td>
</tr>
<tr>
<td>Female</td>
<td>72</td>
<td>41.38</td>
</tr>
<tr>
<td>Age (Years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>51</td>
<td>29.31</td>
</tr>
<tr>
<td>30-40</td>
<td>49</td>
<td>28.16</td>
</tr>
<tr>
<td>41-50</td>
<td>38</td>
<td>21.84</td>
</tr>
<tr>
<td>&gt;50</td>
<td>36</td>
<td>20.69</td>
</tr>
<tr>
<td>Average</td>
<td>39.36</td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>14.67</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>74</td>
<td>42.77</td>
</tr>
<tr>
<td>Married</td>
<td>99</td>
<td>57.23</td>
</tr>
<tr>
<td>Years of Formal Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>16</td>
<td>9.58</td>
</tr>
<tr>
<td>1-6</td>
<td>16</td>
<td>9.58</td>
</tr>
<tr>
<td>7-12</td>
<td>34</td>
<td>20.36</td>
</tr>
<tr>
<td>&gt;12</td>
<td>101</td>
<td>60.48</td>
</tr>
<tr>
<td>Average</td>
<td>12.62</td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>5.26</td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 4 persons</td>
<td>102</td>
<td>61.08</td>
</tr>
<tr>
<td>5-6 persons</td>
<td>52</td>
<td>31.14</td>
</tr>
<tr>
<td>≥ 7 persons</td>
<td>13</td>
<td>7.78</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>63</td>
<td>37.28</td>
</tr>
<tr>
<td>Private sector</td>
<td>66</td>
<td>39.05</td>
</tr>
<tr>
<td>Self-employed</td>
<td>22</td>
<td>13.02</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
<td>10.65</td>
</tr>
<tr>
<td>Monthly Income (₦)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; ₦10,000</td>
<td>42</td>
<td>24.28</td>
</tr>
<tr>
<td>₦10000- ₦50,000</td>
<td>74</td>
<td>42.77</td>
</tr>
<tr>
<td>&gt; ₦50,000</td>
<td>57</td>
<td>32.95</td>
</tr>
</tbody>
</table>

Source: Author’s Field Survey 2017

4.2 Method of Waste Collection

Waste collection has been identified as an important component of any waste management system. The study considers the various methods used by households in keeping their wastes before final disposal. As shown in Figure 1, the study identified three main methods of waste collection in Akure municipality. These are dustbins, polyethene bags and backyard disposal.
From Figure 1 above, the use of dustbins appears to be the principal means through which respondents store their waste and this was shown to account for about 73% to the total response elicited for waste collection methods. It becomes increasingly clear than high proportion of the households are accepting the use of dustbin as a conventional method for collecting waste. About 24 % used polyethene bags while only 3.6 % dump their refuse at a designated location in their compound.

4.3 Method of Waste Disposal

After waste collection, the next important factor to consider is the means of refuse disposal employed by the households. The results on how respondents within the study area dispose their waste revealed that 20.8% dispose wastes in dumpsites, 12.7 % use burning/incineration, while 10.4% use cart pushers (Figure 2). Majority of the respondents (48.6%) employed the services of waste collection agencies (private or public) while about 6.9% dump their refuse in open spaces. Those who employed land filling were shown to be marginally represented (0.6%). Although they were not the most widely represented, an appreciable number of the respondents were found to dump their wastes indiscriminately or burn them. Improper waste disposal has been shown to constitute breeding grounds for rodents, flies, mosquitoes, snake and harbour for other dangerous animals as well as hindering the free flow of run-off (Fakere et al, 2012).
The study observed that respondents who engaged in indiscriminate refuse disposal do so for a number of reasons. As shown in Figure 3, 37.8% of the respondents dump their waste indiscriminately because of the nearness of the unauthorised dumping sites to their residence while 12.8% claimed the absence of waste collection agency. 11.1% of the respondents revealed lack of affordable alternative as the major challenge to proper waste disposal while a higher percentage of the respondents (38.4%) gave no reason at all.

**Figure 3: Causes of improper waste disposal**
Source: Field Survey 2017

**Current situation of waste disposal systems**
Here, the study considers the perception of the sampled respondents on the present state of waste disposal system in Akure, the state of indiscriminate waste disposal over the past 5 years as well their views on certain waste management issues. As shown in Figure 4, a high percentage of the sampled respondents (64%) adjudged the present state of waste disposal systems in Akure as not good enough while 10.9% believed that they are satisfactory. However, 25.3% of the total study sample did not express their views on this issue.

**Figure 4: Residents’ perception of the present state of waste disposal system**
The study further attempted to analyse the state of indiscriminate waste disposal over the past 5 years in order to ascertain whether or not the waste disposal systems in Akure has been largely inadequate as earlier presented. About 48.9% of the respondents indicated that indiscriminate waste disposal has increased in Akure over the past 5 years while 32.18% believed it has remained the same. Only about 19% of the total sampled respondents were of the opinion that indiscriminate waste disposal has decreased over the years. This result is not surprising as Fakere et al (2012) showed that Akure has been experiencing expansion in terms of population density and explosion and this phenomenon is concomitant with multiplication of waste which therefore makes waste management a major challenge. Spontaneous development, population increase and changes in consumption pattern have directly (and indirectly) resulted in the generation of enormous amount of waste, ranging from biodegradable to synthetic waste (Ayuba et al., 2013) and in the absence of effective waste management system, indiscriminate waste disposal will inevitably be on the increase.

**Figure 5: Analysis of the state of indiscriminate waste disposal over 5 years**

Source: Field Survey 2017

**Respondents’ Opinions on Solid Waste Management Systems**

With respect to solid waste management systems in Akure, three issues were examined: presence of organised waste disposal system, satisfaction with the services of collection agencies as well as their perceived effectiveness in waste disposal. Table 2 presents results on the assessment of the general attitude of the sampled respondents to solid waste management issues. It also reveals the values of the severity indices of the general attitude of the respondents to solid waste management. It can be observed that the severity index values obtained for the various solid waste management issues ranged from 41.0% and 69.7% with the most important (Ranked as 1st on Table 2) being respondents’ perception of the effectiveness of private service operators over their public counterparts in terms of waste collection and disposal.
Table 2: Analysis of Respondents’ perception on solid waste management systems

<table>
<thead>
<tr>
<th>Views on Waste management system</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
<th>SI (%)</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Presence of organized waste disposal system in my area</td>
<td>F 44</td>
<td>33</td>
<td>59</td>
<td>18</td>
<td>20</td>
<td>41.0</td>
<td>3</td>
</tr>
<tr>
<td>2. I am satisfied with the services of waste collection agencies in my area</td>
<td>P 25.3</td>
<td>19.0</td>
<td>33.9</td>
<td>10.3</td>
<td>11.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Private service operators are more effective than their public counterparts</td>
<td>F 6</td>
<td>58</td>
<td>37</td>
<td>65</td>
<td>8</td>
<td>51.1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>P 3.5</td>
<td>33.3</td>
<td>21.3</td>
<td>37.4</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SD – Strongly Disagree; D- Disagree; N- Neutral: A-Agree; SA- Strongly Agree; SI- Severity Index; R- Ranking; F-Frequency of respondents; P- Percentage

Source: Field Survey 2017

From Figure 6, with the exception of the respondents’ attitude towards the effectiveness of the waste collection agencies, it can be seen that the severity index values of other solid waste management issues fall within the neutral opinion range (37.5 \(\leq SI < 62.5\)). In other words, majority of the sampled respondents in the study area held neutral views on the state of waste disposal system as well as the nature of their services. The perception that private service operators are more effective than the government owned collection agencies was found to be in the “Agree” range (62.5 \(\leq SI < 87.5\)) and having a severity index of 69.7%. The fact that a high percentage of the respondents considered private service operators to be more effective than government owned agencies further strengthen the earlier assertion regarding irregularities in the quality of service provided by the latter. It therefore behoves on the authorities to pay keen attention to problems arising from the management of solid waste by the LGA and the perceptions of the citizens at different socio-economic levels (Rahman et al., 2005).

Figure 6: Severity Index of Respondents’ Attitude on waste management system
Source: Field Survey 2017

An Assessment of Waste Collection Agencies in Akure Metropolis

In assessing the functionality of waste collection agencies in Akure, a number of key stakeholders involved with solid waste management were identified and interviewed. These include government owned solid waste management agency (Ondo State Waste Management Authority, OSWMA) and other private service operators such as Zapheth cleaners, Ileraloro Waste and Irewole Environmental. Interviews were conducted with the Environmental officers, scientific
officers and Cleaning supervisors. Others interviewed were Engineers, Accountants and Field labourers.

The Ondo State Waste Management Authority (OSWMA) is primarily in charge of setting up guidelines for solid waste management, environmental quality standards and putting up measures to prevent defiance from ensuring a pollution free environment. This is done by ensuring compliance to bi-weekly compulsory sanitation exercise and allocating waste trolleys at strategic places such as markets, hospitals, government offices and educational institutions around the city (Oloruntade et al., 2013). This is in addition to the mandatory environmental sanitation that takes place on every last Saturday of the month. However due to poor sanitation habits of some of the citizens and shortfalls of the collection agencies, piles of wastes are still seen defacing many areas in the state.

Significant quantities of solid wastes are generated by households in the study area and are these are mainly assembled from house-to-house or from the communal containers. The wastes are either collected from households where they have been previously stored in polythene bags and waste bins or from open storage enclosures or waste trolleys placed at strategic places such as markets, institutions, hospitals etc. The solid wastes collected are then loaded in Trucks, tractor, tippers or automatic compaction vehicles before being transported to authorised disposal sites. The study identified three main methods of solid waste disposal employed by waste collection agencies and these are open dumping, burning and incineration. The most common method of waste disposal is open dumping as reported by about 66.7% of the waste collection agencies while the second most popular method, having 28.6% representation, is burning/incineration.

Efficient refuse collection and disposal have been shown to be complicated by poor funding, inadequate vehicles and lack of trained and skilled man power. Shortage of containers and poor roads has also been identified as other challenges faced by waste agencies. Providing lasting solution to these challenges is not just government’s responsibility, the public is expected to contribute to waste management by participating in environmental sanitation, donating transport vehicles and being aware of the hazards of poor sanitation. To ensure effective waste disposal, an appreciable number of the individuals interviewed believed that fines or sanctions should be introduced for non-compliance to proper waste disposal.

CONCLUSION

Analysis of the current status of solid waste management strategies in Akure municipality has revealed its inadequacy in terms of proper waste collection and disposal. Increased waste generation combined with deficient waste management practices have been a major barrier to sustainable and effective waste management. Results from the study reveal that solid wastes are not only heaped in huge quantities at illegal dumpsites but also thrown indiscriminately on the streets and major roads thereby degenerating and degrading the aesthetic value of the affected areas. Even though concerted efforts are being made by the state government which include outsourcing waste management to private service operators and waste minimization, sustainable waste management is yet to be achieved. The success of waste management objectives is being fraught by a number of factors and these include poor funding, inadequate vehicles and lack of trained and skilled man power. Shortages of containers and poor roads have also been identified as other challenges to effective waste management. There is therefore a need for pre-emptive waste management strategies in Akure which would focus on improved environmental practices fuelled through increased funding as well as educating the public on the merits of waste prevention and minimization while desisting from poor sanitation practices.
REFERENCES


