



HOUSEHOLDS SOLID WASTE MANAGEMENT PRACTICES: EXPERIENCE FROM MOROGORO MUNICIPALITY, TANZANIA

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ABSTRACT

An assessment of households (HH) solid waste management practices was conducted in Morogoro Municipality in Tanzania. Specifically the study aimed at determining the current status of households solid wastes management practices and recommend ways of improving HH solid wastes management practices. The study employed cross sectional research design whereby data were collected by using questionnaire survey, interview and physical field visit. Simple random technique was employed to identify the sample of 96 households whereby information regarding solid wastes management obtained. Research findings indicate households solid wastes management practices including categories of solid wastes generated ash 32%, food wastes 32%, grasses and leaves 11%, wood 16% and other wastes including plastic and bones 9%. Second, HH used temporary solid wastes storage facilities sack 66.7%, plastic bags 13.5%, baskets 10.4% Third, indicate HH has alternative solid waste disposal including burning 50%, private collector 3.3%, open space 14.6% and only 2.1 back yard. Fourth the study indicate varied time for HH solid waste disposal early morning 35.4%, during time of private collector 33.3%, early night 17.7%, late morning 7.3% and afternoon 6.3%. Lastly the study indicates the majority 91.7% of

HH did not separate solid wastes during disposal because they said it was not important to do so and it was not their responsibility.

The study recommends the households to be informed about the separation of wastes at source, increase awareness campaign of using private solid waste collectors, the household's willingness to pay for waste collection services should be improved and the municipality should penalize the households which violate the solid wastes management regulations.

Keywords: Households, solid wastes management, practice

1.0 BACKGROUND INFORMATION

Human and the act of production and consumption are always inseparable and in the process of utility maximization procedure there is unexpected externalities, waste. The wastes could be both solid and liquid types; and the way they are going to be handled, stored, and disposed can expose the environment and public health to risks (Zhu et al., 2013). Solid waste management (SWM) is a major public health and environmental concern in urban areas of many developing countries (Madinah, 2016). Municipal Solid Waste Management (MSWM) refers to waste in a solid form, produced in daily life from households and non-hazardous solid waste from commercial, industrial, and institutional establishments including hospitals, markets, yard and street sweeping (Solberg, 2012). Solid waste is a material that is not useful and does not represent any economic value to its owner (Kadam, 2016). The main constituents of solid waste in urban areas are organic waste (including kitchen waste and garden trimmings), paper, glass, metals and plastics. Ash, dust and street sweepings can also form a significant portion of the waste”.

Hundred and thousand years ago, the solid waste management system was not a big deal in the globe. One of the studies related to this stated that “The first humans did not worry much about waste management; rather they simply left their garbage where it dropped” (Net Industries, 2010). This implies that solid waste management task is becoming a serious concern due to the alarmingly increasing rate of population growth and the development of urbanization in the

world. The rapid urbanization and change life style has increased the waste load and thereby pollution loads on the urban environment to unmanageable and alarming proportions. The existing waste dumping sites are full beyond capacity and under unsanitary conditions leading to pollution of water sources, proliferation of vectors of communicable diseases, foul smell and odors, release of toxic metabolites, unaesthetic ambiance and eye sore etc. It is difficult to get new dumping yards. Constraints of land availability, dense population, environmental fragility and expectation for management of solid wastes rely on an overly centralized approach (Kadam, 2016). Therefore, the urbanization and population growth rate of a particular city/ nation is positively related with the generation rate of solid wastes. Hence, the city which shows increasing population growth and its urbanization should take the question of how to manage solid wastes without scarifying environmental and human health as an agenda.

SWM is a multi-dimensional issue: effective systems are not only based in technological solutions but also environmental, socio-cultural, legal, institutional and economic linkages that should be present to enable the overall system to function (Oteng-Ababio, 2011). Improving SWM in developing countries requires efforts to raise public awareness, increase funding, build expertise, and invest in infrastructure (McAllister, 2015). But the extent of their responsibility is varies depending on the approach that the town follows: either conventional based approach or community based approach (Lema, 2013); i.e. collection of wastes on temporary storage at the source and dump it on the given municipality material (conventional approach) or handover to the waste collectors (community based approach) is the responsibility of the households of a given area. Hence, these SWM approaches have an advantage to protect environment. Moreover, the primary objective of solid waste management activity is to make the environment sound and safe in human health via disposed off wastes in a well organized manner. However, through process the stakeholders of the management system, especially in the developed nations, did not stop on disposed off waste in open dump or landfill only; rather they tried to convert the trash/solid wastes/ to cash and make strong their economy in addition to environmental aspect.

The amount of solid waste generation depends on the size of the population and the level of income what each household obtain (Solberg, 2012); as cited by Solomon, 2006). It implies that when the population of a given area is increasing, the consumption of certain product will increase along with the waste generated from such consumable product. The same is true for the level of income as well. Solid waste management is one of the critical challenges of developing countries including Tanzania was because of the social, economic and environmental implications once not properly managed. One of the studies show that only 30-50% of the waste generated in developing countries is collected and managed properly (Dawit and Alebel, 2010). The rest is either burned or left to decompose in open space or dumped in unregulated landfills, which is damaging the environment. In addition, the study by SMSWG (2008) stated that mostly observed serious problems especially in low and middle income level countries are inadequate collection, storage, treatment and uncontrolled disposal of solid wastes in open dumps which easily expose to harsh hazards, like environmental pollution and health problem

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In recent years, the government issued a Public Notice to ban the manufacturing, importation, selling, buying, and use of plastic bags under 30 microns (or 0.03 mm) thickness and those with 65 microns (or 0.065 mm) thickness used for water and juice packaging. Also, it surtaxes other

types of plastic bags (commonly known as Rambo) with 30 microns (or 0.03 mm) thickness and above, by more than 100%. The bags and packets polluted the environment, increased the possibilities of transmitting diseases like malaria and cholera, blocked drainage ditches and sewage systems, impaired land productivity and endangered livestock and Industry owners and investors are encouraged to promote the production of alternative bags in place of plastic bags, such as paper manufactured bags. So in view of that the study intends to examine the determinant factors influencing the effectiveness of household solid waste management practice Morogoro municipality.

2.0 MATERIAL AND METHODS

2.1. The Study Area

Morogoro Municipal lies between Latitude 5° to 58° and 10° to 0° to the South of the equator and Longitude 35° to 25° and 30° to the East. Morogoro Municipal covers 260 square kilometres (100 sq mi) being bordered to the east and south by the Morogoro Rural District and to the north and west by Mvomero District. The municipal is under Morogoro region which is bordered by Coast region to the east, Dodoma and Iringa to the west, Ruvuma and Lindi to the south and Tanga and Manyara to the north. Morogoro municipal constitutes 19 administrative wards and based on 2012 national census the total population was 315,866 whereby 151,700 were males and 164,166 females making an average household size of 4.1 (National Bureau of Statistics 2013). Morogoro Municipal ethnic groups are Waluguru and mixed groups. Morogoro Municipality residents have mixed economic activities including civil workers, farmers, business enterprises and industries of various categories.

There are three main rivers with several tributaries, which form a number of alluvial flood plains. These rivers are the Morogoro, Kilakala, and Bigwa. Other sources of water are the Mindu Dam" which was built in the late 1980s to serve for the industrial activities as well as domestic purposes. The Morogoro Municipality was chosen because it's one of the municipalities in Tanzania with diverse development activities including business, agriculture and industries. Second Morogoro Municipality is rapidly urbanizing with over half of the population without

basic services (URT, 2005). Within 19 wards of Morogoro Municipality the Mafisa ward was randomly selected. Names of all wards in Morogoro Municipality were written on pieces of paper such that none could be seen. They were mixed in a basket and then one ward was picked from the basket randomly. The randomly selected ward was Mafisa.

2.2. Data Collection

Different methods were used for data collection. The methods included household questionnaire survey, interviews and field visits. The objective of using various methods was to triangulate the information so as to increase data reliability and validity. The details for each method are described below.

2.2.1. Household questionnaire surveys

Household questionnaires were administered to households who were picked using simple random sampling technique. Simple random sampling ensures that each subject has an equal chance of being picked. A total of 96 households were picked.

2.2.2. Interviews

Five street chairpersons and Ward Executive Officer with duties related to household's management of solid wastes were interviewed. Street and ward leader had worked in the respective streets for more than 2 years, implying that they had vast experiences in households solid wastes management related issues and/or problems.

2.2.3. Field visits

Site visits were undertaken in each street to assess the situation on the ground regarding the status of household's solid wastes management. Also information related to the physical status of the disposal sites, solid wastes disposal materials and compositions of solid wastes.

2.2.4. Data analyses

The collected data were mainly qualitative in nature; this necessitated the use of qualitative data analysis techniques such as content analysis and memoing. Descriptive statistics such as frequencies was also used in the analysis. Descriptive statistics were derived using the Statistical Package for the Social Sciences (SPSS) for Windows, version 20.0

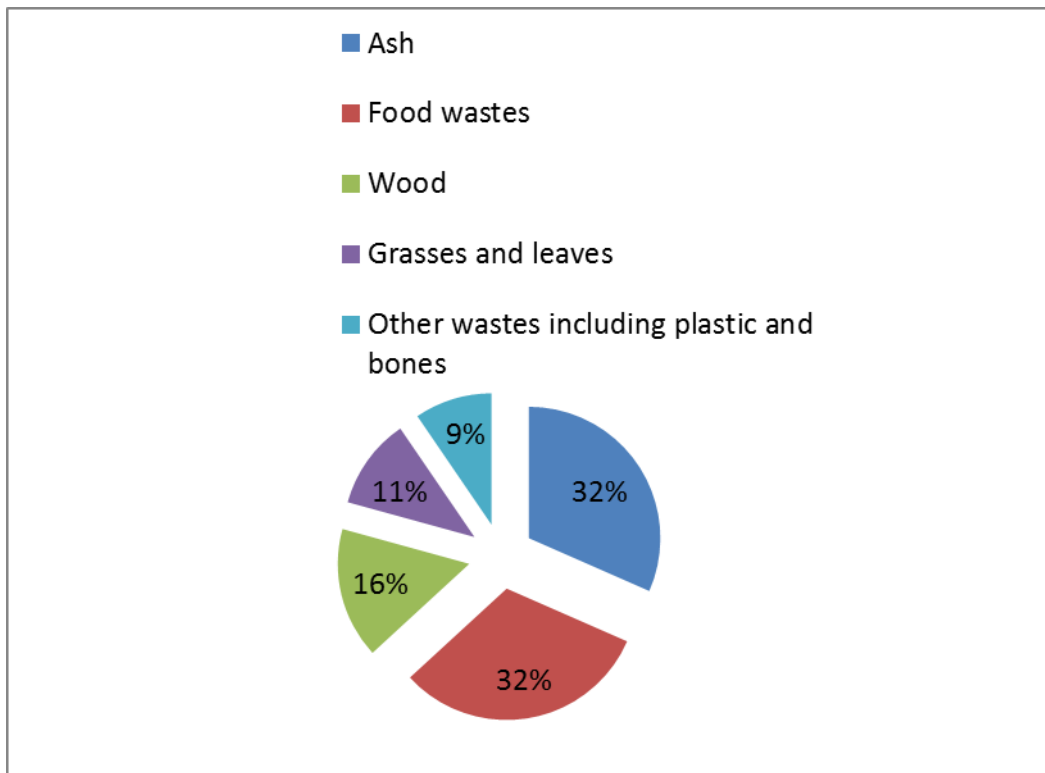
3.0 RESULTS AND DISCUSSION

3.1 Current Status of Household Solid Waste Management

3.1.1 Types of solid waste generated in the household

Figure 1, shows that 31.6% of household generate food waste and ash waste as well as wood waste which is being produced by 16.1%. However, 11.2% of household produce grasses and leaves and lastly 9.5% of household generate other solid waste like paper, bones, metal and plastic waste. This results indicate that most solid waste which is being generated directly from household were food waste as well as ash waste. It implies that solid waste generated directly from household level were ash, food waste, wood, grasses and leaves and others solid related waste like plastics and bones.

Figure 1: Types of solid waste generated in the household



3.1.2 Solid Waste Storage Materials at Household Level

Table 1, shows that all the respondents replied as they had temporary storage. Majority of the respondents used sack 66.7%, 13.5% plastic bag, 10.4% basket and 9.4% other storage material respectively. As one of waste collection facility, placing container in the municipal is very important for proper waste management. However the municipality recognizes the importance of container for waste management, but due to budget related problem still containers are not assigned in any parts of the ward".(Mafisa ward officer, 2015). This finding match with what has been stated by World Bank (2000) that since the municipal administration often fails to provide adequate number of containers; households are motivated to dispose their wastes on plastics bags, baskets, sack and other related storage materials respectively.

Table 1: Solid Waste Storage Materials at Household Level

Kind of storage material	Frequency	Percentage
Baskets	10	10.4
Plastics bags	13	13.5
Sack	64	66.7
Others	9	9.4
Total	96	100

3.1.3 Alternative sites of households to dispose their solid waste

Table 2, shows that the respondents reflected that they used other ways of disposal system. It means that only 50% of the households regularly burning their waste inside their fence while 33.3% used private waste collector's service. But the other alternative disposal methods were 14.6% of the respondents replied that they disposed their wastes in open space; similarly, about 2.1% of them were dumping their wastes on their back of their house. This finding implies that most of the households are forced to dispose their wastes in open space, burning and store in the back of their house because of unavailability of container and inadequate private waste collector service. The World Bank (2012) stated that since the municipal administration often fails to provide adequate number of containers, households are motivated to dispose their wastes on road, in sewerage, inside the ward or other open places

Table 2: Alternative sites of households to dispose their solid waste in the study area

Other alternatives	Frequency	Percentage
Open space	14	14.6
Burning	48	50
Private collector	32	33.3
Back yard	2	2.1
Total	96	100

3.1.4 Time for disposing household solid wastes

Table 3, shows that 35.4% of the respondents stated that they preferred to dispose off their wastes early in the morning. However, 33.3% responded that they disposed their solid wastes at the time when private waste collectors tour each household. Therefore, they store wastes in temporary storages at source and handover to door to door waste collectors at their regular schedule. Also, about 17.7% of households preferred to dispose their solid wastes at early in the night. The rest 7.3% they dispose their solid waste late in the morning and 6.3% of respondents often preferred afternoon. This finding imply that most of households prefer to dispose off their in early in the morning, at the time of private collectors arrive, early night, late morning and during afternoon.

Table 3: The time of disposal that the household prefer to dispose their solid wastes

Time	frequency	percentage
Early morning	34	35.4
Early night	17	17.7
Afternoon	6	6.3
Late morning	7	7.3
At the time of private collectors	32	33.3
Total	96	100

3.1.5 Solid waste separation practice at household level

Table 4, shows that 91.7% of respondents didn't separate solid waste while about 8.3% respondents stated that they collect and stored their solid waste separately based on its nature. This study imply that most of the household didn't separate the solid waste at their source which is due to low understanding on the consequences of solid waste separation. This finding in line with what has been stated by Schübeler (2010), that in order for household to separate solid waste at their source awareness should be developed and the households should be informed appropriately on the importance of solid waste separation at source.

Table 4: Solid waste separation practice at household level

Waste separation	Frequency	Percentage
Separate	7	8.3
Not separate	88	91.7
Total	96	100

3.1.6 The reason why the households did not apply waste separation at source

The finding in table 5, show that 36.7% of respondents didn't see the importance of waste separation while about 31.6% of respondent argue that it's not their responsibility to do that work of separation of waste however 21.% of respondents pay for private waste collectors and lastly lack of understanding on waste separation which comprise 10.2%. The finding imply that the households have inadequate information or lack of awareness related to the importance and the consequences of solid waste separation at sources. But always it does not mean the households were not informed by the responsible body rather though they are informed; there may be less motivation to do so.

Table 5: Reasons for households not apply waste separation

Reasons	Frequency	Percentage
It's not my responsibility	31	31.6
Lack of understanding	10	10.2
No importance of waste separation	36	36.7
I pay for services	21	21.5
Total	98	100

4.0 CONCLUSION AND RECOMMENDATIONS

Most of solid wastes generated in the household were ash, food waste, wood, grasses and leaves and plastic waste, bones and paper. Storage material used was basket, plastics and sack. Households mostly preferred to dispose their wastes at the time of early night, early morning, afternoon and late morning as well as at the time of private collector. The larger proportions of households believe that solid waste were useless which resulted to poor handling of solid waste. However the households have a good attitude to collect and dispose off generated wastes in a proper way despite they did not have information about the usefulness of solid wastes if it is to be managed well. Respondents who had information about solid waste management got information from the health institution, meeting and from different posters.

Also households have inadequate information about how to separate, recycle and even did not have clear information about the problems due to poor collection and management of solid wastes. The study recommends the households to be informed about the separation of waste at source, increase awareness campaign of using private solid waste collectors, the household's willingness to pay for waste collection services should be improved and the municipality should penalize the households which violate the solid wastes management regulations.

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