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Assessment of Community Participation in Solid Waste Management in Lindi Municipal Council, Tanzania

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Abstract
The study examined determinants of community participation in solid waste management in Lindi Municipal Council, Tanzania. The results of the first objective found that majority (92%) of household members were willing to pay for solid waste management services. Female were more willing to pay by (94%) in comparison with males (88%). In the second objective, 87 (64%) respondents reported that motivating factors to pay for solid waste management services was for them to make their environment clean. The other findings indicated that respondents 79 (59%) were not satisfied with the services of solid waste management provided by Lindi Municipality. Further findings revealed that (88%) of the penalties imposed on those who breach solid waste laws and regulations agreement were weak. It is recommended to community and all the stakeholders to cooperate in participation and willingness to pay for solid waste management services. Further, the Municipalities, Ministries of the Environment, Health and Social Services, Education, Water and energy resources, Policy makers, NGOs, CBOs, as well as private-public partnerships (PPPs) must collaborate in coordination, facilitation, monitoring and evaluation on solid waste management in Tanzania. There should be a separate department to deal directly with waste management in the country to enhance effectiveness.

Keywords: *Community, participation, solid waste management, Municipalities*

1.0 INTRODUCTION

Waste is directly linked to human development, both technologically and socially. The composition of different wastes varied over time and location, with industrial development and innovation directly linked to waste materials. Some components of waste have economic value and can be recycled once correctly recovered (Awunyo *et al*., 2013). Low community participation of households comprises issues such as low community priority for solid waste management, low willingness to participate in collection systems and in keeping public spaces clean, and low willingness to pay. Fees payments can be based on the amount of garbage generated the income level of the household and the introduction of subsidies. Community Based Organization (Lauwo, 2005) in Korogwe Town Tanga, Tanzania & NGOs (Muzvendwa, 2021) in Nyanga Township Zimbzbwe, could be an important institutions in facilitating the improvement of solid waste Management, also participate in formulating by-laws, and enforcement of the regulations. This helps to generate some income, and conserve the sanitation of the environment.

Waste includes all items that people no longer have use for, which they either intend to get rid of or have already discarded. Examples, household rubbish, sewage sludge, wastes from manufacturing activities, packaging items, discarded cars, old televisions, garden waste, and old paint containers (European Environment Agency, 2013). The municipal waste problem is frequently discussed, and it has become the main issue in urban management. The issue of waste management is more complex and challenging in the future due to the tremendous growth in urban populations and their consumption patterns. Environmental Protection Agency (Environmental Protection Agency, 2020) predicts a three-fold increase in waste production in low-income countries by 2050. It is argued that the greater the economic prosperity and the higher the percentage of urbanization, the greater the amount of solid waste produced, and managing waste become more complex (Hassan, 2000).

Solid Waste Management is a crucial public service issue affecting both the environment and public health. It is not only limited to the collection of waste and its disposal, it requires clear strategies for the collection, transportation, sorting, and recycling of waste. Municipal waste is generated by households, commercial activities, and other sources whose activities are similar to those of households and commercial enterprises. Municipal waste is made up to residual waste, bulky waste, secondary materials from separate collections like paper and glass, household hazardous waste, street sweepings, and litter collections. It is made up of materials such as paper, cardboard, metals, textiles, organics from food and garden waste, and wood (European Environment Agency, 2013).

Every task, from preparing a meal to manufacturing a computer and so forth, is accompanied by the production of waste material that cannot be used for other things and needs to be disposed of effectively (Awunyo *et al.*, 2013). That means if waste is not contained and handled appropriately and in a sanitary manner, there is a great chance of creating favourable conditions for causing public health problems such as diseases like cholera, diarrhoea, and typhoid including favourable breeding grounds for flies, cockroaches, mosquitoes as well as potential environmental and the air pollution. At this time the world is now facing an extreme situation of waste management from both sides, from industrial and municipal waste management especially in underdeveloped countries (Kamara, 2011).

In Tanzania, Local Government has been given the duty to manage and minimize solid waste (Environmental Management Act, 2004). Furthermore, the authority has been assigned the duty to perform and undertake services of solid and liquid waste management (Public Health Act, 2009). Despite having good laws and regulations, as well as bylaws on SWM, the situation of solid waste management is not convincing, the problem here is how these laws and regulations are enforced. Implementation and enforcement of waste regulations and conventions is severely constrained by the lack of good governance, transparency, and the prevalence of corruption in some cases. Lack of

awareness, community participation and appreciation of best practices for environmentally sound management of waste is a major constraint (Jumanne, 2010).

However, the challenges of SWM in Lindi Municipality like other municipalities in developing countries continue to be one of the most pressing challenges if the relevant mitigation measures are not taken for the coming decades. The magnitude of the problem is likely to increase with the population growth and potential economic activities in the southern zone in particular Lindi municipality following the exploration of natural gas and other economic opportunities in Lindi Region.

There is a need to address the problems in such a way that should be solution which can give proper management of both kinds of waste. For this purpose, public awareness about the waste management can play a crucial role in controlling the waste generated by community members. The obstructed mindset, that SWM has generally been the local government's responsibility, in terms of planning and financing through own sources allocated, thus making the municipal authority to have sole responsibility for waste collection and transfer to final disposal (Jumanne, 2010). The situation tends to increase the irresponsibility to the household as well as individual community members not to care for the waste they produce, and this accelerate in indiscriminate disposal of waste.

The average municipal waste produced in Lindi Municipality is 55.66 tons per day (Lindi Municipal Annual Report, 2013) while according to reports of the Municipality, the capacity for collection for disposal per day is 13.3 (24%) this means 42.36 (76%) tons remains accumulating within the residential surroundings. The situation is unhealthy, it provides favourable breeding ground for vermin and insects to breed and creates a potential source for air pollution, contamination to surface and underground water sources. In the nearby future it is expected to have an influx of people in Lindi with a huge exploration of natural gas. According to the prevailing situation Lindi Municipal Council, the problems of solid waste collection and disposal is well beyond the ability of the Council own sources to tackle. Therefore, there are necessity of effective involvement of the community in SWM for the improvement of the situation. Thus, this study examined determinants hindering community participation in solid waste management in the Lindi Municipal Council, Tanzania.

2.0 MATERIALS AND METHODS

2.1 The Study Area

Lindi Municipal Council in Lindi Region is situated at latitude 9º 45' and 10º45' south of the Equator; Longitude 39º50' and 39º36' East of Greenwich (Figure 1). It is surrounded by Lindi District Council on both sides except on the eastern side where there is an Indian Ocean. Administratively, the Lindi Municipal Council is divided into 3 divisions, 18 wards and 83 streets.

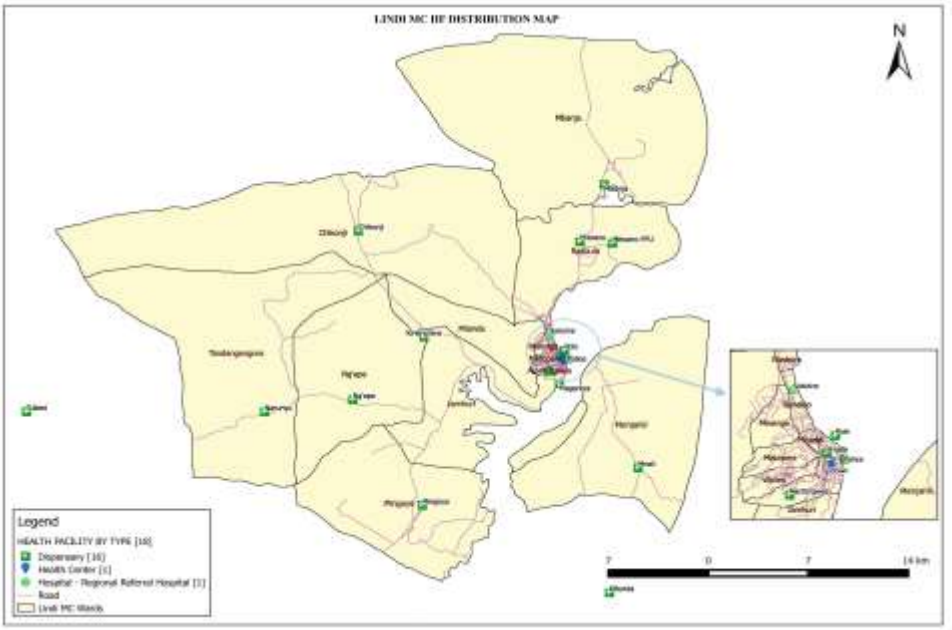

Figure 1: Map of Lindi Municipality showing the study area
Source: Lindi Municipality, 2023

A cross-sectional survey was used to capture data from large number of different categories of respondents at a particular point in time. According to Mugenda and Mugenda (2003), this design is used when the study aims at collecting data from respondents without the need to make a follow-up of the same respondents thus enabling the researcher to save time in collecting the necessary information. Data was collected using mainly interviews and questionnaires and analyzed using descriptive analysis.

2.2 Sampling Procedure and Techniques

This study employed both qualitative and quantitative methods for the purpose of triangulation. The use of both quantitative and qualitative approaches was suitable because the study intended to capture participants' views regarding community participation in solid waste management as part of validating quantitative data and this mixed method allowed the computation of variables, percentages, frequencies, correlation coefficient and at last drawing up the conclusion from the findings. The stratified random sampling was used to obtain respondents from the study using household as sample unit. Three strata were established according to the wealth of the community that is low, middle and high income which was determined according to area of residence of the participants. The sampling frame of the households was established with the help of ward executive officer.

The sample size of 135 households was drawn from three wards (Rahaleo, Mwenge and Mtanda). A sampling frame of the household was established from

the register of ward executive officer and street chairperson. A sample of 5% was selected using simple random sampling (Lauwo, 2005; Noor *et al.,* 2023). The respondent was selected from three categories that is low income, Middle- and High-income classes according to settlement areas in those three Wards in Table 1. The income categories of the household were determined by key informers within the area. The target participants of this study were community members such as head of the households and officials of the health department.

Table 1: Sampling procedure

Wards	No. Population	No. Household	No. household Selected (sample size)
Rahaleo (Low income)	2,111	596	30
Mwenge (middle income)	2,808	806	40
Mtanda (high income)	5,683	1,524	65
Total Population	**10,602**	**2,926**	**135**

2.3 Data Collection Methods

Both primary and secondary sources of data were collected. The primary sources included the respondents whereas the secondary sources were a variety of published and unpublished written materials. The multiple methods used in data collection were questionnaire, interviews and documentary review as described hereunder.

Semi-structured interview was used to ensure that there was consistency in the collection process; the interviews were structured with fixed questions whose wording sequence was identical for every respondent. The questionnaire on community participation on solid waste management were provided to the sampled heads of households in Lindi Municipal. Closed-ended questions were used to collect data and other information from respondents in a short period. Documentary review helped the researcher to get relevant information from the primary sources for the analysis of the study. These included quarterly and annual reports on Environmental sanitation in Lindi. The information from these sources was used to determine the level of community participation in solid waste management.

2.4 Data Analysis

The analysis of data was done according to the information gathered and edited by the researcher. The response of respondents was coded by using numbers in different questions and tabulation of data collected, processed into tables and charts for meaningful and easy interpretation (Kothari, 2004). Data collected through questionnaires and documentary review on how community participate on solid wastes management was entered and processed by using Statistical Packages for Social Sciences (SPSS, version 20). In addition, Microsoft Excel program was used for drawing some charts with multiple responses to simplify interpretation of the data so collected. Qualitative analysis was done to provide the necessary explanations to quantify data, and to share observations made

through the interviews. The interview data were subjected to content analysis. All responses were read, and the main ideas were extracted to obtain the core meaning (Cohen *et al*., 2000) description and presented in percentages.

3.0 RESULTS AND DISCUSSION

3.1 Education level and the length of staying in the study area

Education level was considered among the variable to measure the level of willingness to pay for solid waste management. The findings revealed that majority of the respondents 78 (57.8%) had primary education level, 32 (23.7%) had secondary education while 10 (7.4%) had no education. Out of the total 135 respondents 6 (4.4%) had degree and above, 7 (5.25) had an ordinary diploma level while 2 (1.5%) had certificate education level. Further, findings indicated that 125 (92.6%) had formal education with 10 (7.4%) of the respondents had no formal education as in Table 2.

Table 2: Respondents' Level of Education

Education level	N = 135	Percentage
Had no education	10	7.4
Primary Education	78	57.8
Secondary Education	32	23.7
Had Certificate	2	1.5
Had Diploma	7	5.25
Degree & above	6	4.4
Had formal Education	125	92.6
Had non-formal Education	10	7.4

Length of stay of the respondents was measured as one of the variables that might influence an individual to participate and pay for the improvement of solid waste management. Most respondents, 78 (57.8%) had more than 20 years' time of stay in Lindi Municipal Council. 16 (11.9%) had a few years of stay that range between 1- 3 years. The total mean average time of stay for all the respondents was 4.6 years.

3.2 Respondents Level of Satisfaction regarding Services Provided

The level of satisfaction was measured in relation to service of solid waste management in the Lindi Municipal Council. The respondents were asked to give opinion on satisfaction for the services provided. The findings indicated that, majority of respondents 79 (59%) were not satisfied with the services of solid waste management provided in Lindi Municipal Council. On the other hand, 32 (23.7%) of the respondents were satisfied with the services of solid waste management provided. Out of 135 respondents, 24 (17.8) respondents were undecided, not either side of satisfied or dissatisfied.

The research also evaluated the efforts in solving the challenges by asking the respondents to give their views on the efforts made by the Lindi Municipal Council to solve the problem of solid waste management. Responses revealed

that 62 (46%) of respondents reported that solid waste management services provided in Lindi Municipal Council is poor. While 45 (33%) of the respondents claimed that the effort to provide solid waste management in the Lindi Municipal Council is fair. And 28 (21%) of respondents reported that the services provided is good.

3.3 The fairness of the penalties imposed by the Municipality

The respondents were asked to evaluate the fairness of penalties provided by Lindi Municipal Council in case of breaching rules and regulations on solid waste management. Majority of participants 88 (65%) responded that penalties imposed were very weak. But 24 (18%) of the respondents stated that penalties provided was fair. Another small group of respondents reported that the penalties provided were strong 23 (17%). Majority 93 (69%) of the participants said that they were aware of the presence of the rules and the regulations on solid waste management. But 105 (78%) of the participants indicated that they had never seen violators of the rules and the regulations on solid waste management penalized.

3.4 Knowledge of waste separation at household level

Different options of waste separation at the point of generation in household level were assessed to see whether it is practiced or otherwise. The findings show that majority of the respondents 107 (79%) do not separate the types of waste produced at the household level. There were 17 (13%) respondents said they usually separate wastes by burning the dry wastes and giving food waste to their animals. However, about 11 (8%) of the respondents reported practicing separation by keeping dry and wet waste in different containers. When asked the reasons for not separating the waste majority 78 (58%) responded that they do not have knowledge of separation. About 91 (67%) of the respondents, said that there are no micro or macro enterprises that deal with solid waste collection in their areas. 127 (94%) respondents claimed that the location of their houses are not barrier for waste collection services.

3.5 Willingness to pay in improving solid waste management

The respondents in the study area were assessed on their willingness to pay to improve solid waste management. Majority of the participants 124 (92%) were willing to pay to improve waste collection services. Only 8 (6%) respondents replied that they were not willing to pay for solid waste management services. Out of 135 interviewed respondents, there were 3 (2%) respondents reported that they do not know whether there are payments. The findings revealed that in Rahaleo Ward, which was categorized as low income, 28 (93%) were willing to pay to improve solid waste services while 2 (7%) respondents were not willing to pay. In Mwenge Ward, categorized as middle income about 36 (90%) respondents were willing to pay and 4 (10%) were not willing to pay. Mtanda Ward, a high income, 60 (92%) of the respondents were willing to pay while 5

(8%) were not willing to pay. Percentage of willingness to pay did not differ very much in both Wards.

3.5 Willingness to pay with respect to gender and the three Wards

Willingness to pay was compared with respect to gender and the findings shows that out of 84 females 79 (94%) and out of 51 male respondents 45 (88%) were willing to pay for solid waste management services. Thus, it implies that the female respondents were more willing to pay for solid waste management services in comparison to the male respondents. The research was interested to know at what amount they would pay per month; it was revealed that majority of those who were willing to pay 120 (97%) could pay the amount number of Tanzanian shillings 1000/= to 5000/= per month for solid waste management services. Very few 2 (1.6%) respondents reported to pay an amount ranging between Tanzania shillings 6000/= to 10, 000/= and above up to 16,000/= Tanzanian shillings (Tshs).

Respondents' willingness to pay were also analysed in according to the Wards of the respondents and findings revealed that 4 (3.2%) of the respondents in Mtanda Ward were willing to pay more than Tshs 5000/= than the other two Wards as shown in Table 3.

Table 3: Willing to pay in improving solid waste management with respect to gender in 3 Wards

Categories	N = 135	Percentage
Willingness to pay	124	92
Not willing to pay	8	6
Out of 84 Women	79	92
Out of 51 Men	45	88
Paying 1,000 - 5,000/= a month	120	97
Paying 6,000 - 16,000/= a month	2	1.6
Mtanda High Income Ward to pay More than Tshs 5,000/=	60	92
Mwenge Middle Income	36	90
Rahaleo Low Income	28	93

3.6 Health problems on knowledge associated with poor solid waste management

The respondents were asked to air out their different opinions on the health aspect of solid waste management in the Lindi Municipal Council. Majority of the participants 95 (70%) strongly agreed that they know about public health problems which are associated with the poor solid waste management. Less than half of the respondents 56 (41%) indicated that the laws and regulations on solid waste management were imposed to those who do not act in accordance. Only 40 (30%) of the participants indicated that the community is well educated and informed about solid waste management in their respective areas in order to avoid health problems.

3.7 The average solid waste generated per month per household

The research also assessed the average solid waste generated per month and the response indicated that solid waste reported as high generated in household per month was ashes (39%), plastic or textile wastes (30%), grasses/leaves (26%) and food wastes (21%). Conversely, very small solid wastes that household generated per month was Bones (47%), metal (46%), woods (30%) and papers (22%) (Table 4).

Table 4: Average solid waste generated per month per household

S/No.	Type of waste	Amount generated in percentage
1	Bones	47
2	Metal	46
3	Ashes	39
4	textile wastes	30
5	Woods	30
6	grasses/leaves	26
7	Papers	22
8	food wastes	21

3.8 Reasons for not collecting solid waste in the respective locations

Findings of this part revealed that there were 49 (36%) respondents reported that the absence of waste collection by Municipality services in their areas was the main reason for them not getting solid waste collected. About 35 (26%) of the participants responded that lack of motivation to waste collectors was one of the reasons. There were 21 (15%) respondents who said that poor Municipal Council coordination of waste management was an obstacle for waste collection services to their areas. Another 13 (10%) respondents reported that poor equipment for waste collection was the reasons. Only 12 (9%) of the participants responded that they don't know.

3.9 The options for Household waste disposal & who is responsible for solid waste management

The findings revealed that out of total interviewed 52 (39%) participants reported to keep the waste at home until the collectors arrive. A fair number 47 (35%) of the respondents do not dump their waste in the open space far from main roads. A good number 63 (47%) of the respondents do not throw waste in sewerage systems while, 66 (49%) respondents do not dump waste along the ocean shores and 44 (33%) mentioned to dig holes around their houses and burn the solid waste.

44 (33%) respondents said the household members were responsible for solid waste management in Lindi Municipal Council. Only 38 (28%) responded that Municipal Council is responsible for solid waste disposal in Lind Region. A number of 27 (20%) respondents said that Municipal Council and Households

are all responsible for solid waste management while 26 (19%) responded that all stakeholders are responsible for solid waste disposal in their particular areas.

3.10 Motivating factors influencing Household members to manage solid waste

The findings show that majority of the participants 87 (64%) reported that the motivating factors to manage solid waste were to make their environment clean. And 20 (15%) participants reported that the motivating factors was the ability to pay. About 15 (11%) of the respondents reported that motivating factors was to prevent environmental pollution and the spread of the infectious diseases. And few respondents 4 (3%) like to manage solid waste because of the enforcement of the bylaws and the regulations.

4.0 DISCUSSIONS

The findings revealed the number of female respondents was higher compared to that of males in the study on solid waste management in Lindi Municipal Council Tanzania. The same trend was observed in the study conducted in Durban-South Africa on the importance of gender in waste management planning (Poswa, 2004). Other findings from Mengistie and Baraki (2010) in Kersa Woreda eastern Ethiopia indicated that 98.4% responsibility of waste management was left to women and the girls. Lindi Region in Tanzania is among the Regions which the indigenous people believe in matrilineal practice. This might contribute to some extent males to become less active in some issues related to household affairs including handling of waste management.

The study found that majority of the respondents were married and said were more willing to participate and pay for solid waste management than other groups. The study conducted in Kampala Uganda by (Okot *et al.* 2012) on households' willingness to pay to improve Municipal solid waste management services was similar that married people are likely to be more responsible to keep the environment clean and willingness to pay for the improvement of solid waste management.

The findings revealed that majority of the respondents had formal education that means primary to degree education levels. With this level of majority having formal education, the level of understanding of the respondents on the consequences of unsanitary disposal of solid waste is high. The study conducted in Uganda on households' willingness to pay for improved Municipality solid waste in Kampala City revealed the same that household respondents who had attained secondary, post-secondary and graduate level of education were more willing to pay for improved solid waste management (ibid). Family size was related to the number of individuals in the household who have direct relationship with waste generation and the number of individuals who might affect positively or negatively the willingness to pay for the improved solid waste management services. Households with big family size generate more

solid waste. The study by Niringiye (2010) in Kampala indicated that the greater number of people in the household the more waste generation hence disposal become problem, thus they are more willing to pay to keep a clean environment. This can happen in Lindi Municipality by the authorities to organize appropriate mechanism to involve the community to pay for solid waste management services.

It was revealed that more than half of the total respondents were not satisfied with solid waste services provided by the Lindi Municipal Council, while a third was satisfied with the services of solid waste management. A quarter of the respondents were neither satisfied nor dissatisfied with the services provided. With a greater number of the respondents who are not satisfied, this implies that the situation of solid waste management in the Lindi Municipality is in uncertainty state. This is similar with the study conducted in Urban Accra Ghana that more than a half of the households were not satisfied with solid waste management services, (Yoada *et al.*, 2014).

The study conducted on solid waste management in Dar es Salaam, to Privatize and Improve revenue collection by ILO (2007) and International Ocean Institute (2009), revealed the same trend that residents were not satisfied with the quality of the services provided by the private agents. The major reasons pointed out included poor infrastructure and equipment arrangement were not adequately coordinated. A study conducted in Morogoro Municipal Council by Jumanne (2010), on community participation in solid waste management in informal settlement; found they failed to achieve an effective community participation in solid waste management due lack of the appropriate organization, mobilization and coordination of local resource including community empowerment. The situation that prevailed in Morogoro may also exist in Lindi Municipality if there are no appropriate organization, mobilization, and coordination in dealing with solid waste management.

Lauwo (2005) revealed that Community Based Organization (CBOs) are important tools for facilitating the improvement of solid waste management and effective enforcement of legislation as the best ways of incorporate community in solid waste management. This indicates that if community is full involved and participate in the solid waste management with firmly enforcement of legislation it is expected that even the level of satisfaction of the community on solid waste management may become higher. When comparing the findings on the satisfaction level of waste management services and the efforts made so far, it was found the satisfaction was in the level of very good, good and fair. Despite of the higher level of appreciation by the respondents, still the proportion of those who were not appreciating the efforts made by the Municipal Council in solid waste management were relatively higher, poor and very poor.

The majority of the respondents urged that penalties imposed to enhance solid waste management are weak/very weak. It is not the issue whether the penalties

provided is strong or weak, but the presence of these rules and regulations, including the bylaw is one step, while the main challenges which face most of the Councils is how, who and when to enforce bylaws. Lauwo (2015) in the study conducted in Korogwe Town Council –Tanzania indicated that bylaws could help to improve solid waste disposal in townships. She suggested the effective enforcement of legislations were found to be the best way of incorporating community on solid waste management.

Information gathered from Environmental Department of Lindi Municipality revealed that there were no proper arrangement and coordination of the enforcement of the by-laws and the other existing environmental regulations to the violators. Thus, there is a need to strengthen the coordination to institute appropriate arrangement and mobilization of local resources including the enforcement of existing rules and regulations of solid waste management for improvements. The findings show that majority of the respondents do not practice waste separation at the household level. Despite the fact that the remaining few respondents reported to practice separation in different approaches. This is very common to most of the households in Africa as reflected in other studies in African cities, by (Peter, 2021). The situation creates favourable environments for vermin and vectors to breed hence pose threat to the public health. However, most of the respondents urged that they do not have knowledge of solid waste separation while one third do not visualize importance of separation of waste. The study conducted in the Urban Accra Ghana (Yoad *et al.* 2014), indicated the same trend. There is a need to strengthen education on solid waste management with the intention of changing the behaviour of individuals towards solid waste management. Despite that majority of the respondents agreed that the amount of waste generated in their household has the direct link to their lifestyles, still there was very little effort made to ensure sanitary disposal of the solid waste generated. The prevailing situation is the major constraints to the community's willingness to implement the sound environmental management practices. It is high time for the Municipality authorities to implement and enforce waste management rules and regulations, strengthen the community participation in solid waste management.

Although, majority of respondents reported that they were aware of the existing rules and regulations of solid waste management, still there had never seen the breach of the rules and the regulations of solid waste management being penalized, thus there is low enforcements. Also, majority of respondents reported that the regulations are weak, and a few said that regulations are strong. A few responded that Municipal Council does not apply the existing regulations at all, while others said that they are not aware if the Municipality impose the regulations to those violators in Lindi (Mniwasa & Shauri, 2001). Information gathered from the Lindi Environmental Department indicated that for those violators, the penalty was Tshs 50,000/= according to Lindi Municipality bylaw. The concern of interest is how the bylaws are enforced to the violators of solid

waste management. This implies that there is a lack of appropriate organization, mobilization, and coordination in solid waste management. Most of the respondents urged that there are no micro or macro enterprises that collect solid waste at homes, while one third reported that there were micro or macro enterprises that collect solid waste from collection sites. The research findings show that there is little involvement of the Community Based Organizations (CBOs) in the solid waste management. This is another area which needs more investigation to look upon the roles and responsibilities of the CBOs on solid waste management in Lindi Municipal Council. The study conducted in Khulna city Bangladesh indicated that 9 to 12% of total generated wastes were collected from door-to-door collection system was provided by Non-Governmental Organizations (NGOs) and CBOs using non-motorized van, (Ahsan *et al.,* 2012). The importance of private sectors to participate in solid waste management is well stipulated in the Sustainable Development Goals 3, 6, 11 & 15 (Yoada *et al.,* 2014). Respondents were asked whether location of their house is the barrier to facilitate waste collection. Most interviewee said that the location of their houses does not hamper the collection of the solid waste from their premises.

The study findings revealed that most of the respondents were willing to pay for solid waste management services. Yoada *et al.* (2014) indicated that more of the community members would be willing to pay when better waste disposal management practices are employed. This situation provides evidence that even in Lindi Municipality community can participate to improve solid waste services if the authorities institute a well-functioning mechanism which is appropriate and affordable. It was observed that willingness to pay does not differ very significantly in all wards in spite of the wealth and income categories. A few respondents from Mtanda Ward who are well off were willing to pay from Tshs 6000/= to Tshs 16,000/= compared to the rest of the respondents of Mwenge and Rahaleo Wards. A study conducted in Accra Ghana revealed that households were not satisfied with solid waste management services in the community due to the irregular pattern in waste collection and high costs of contracting the private collectors (Yoada *et al.,* 2014). It further indicated that the community was willing to pay more when better waste disposal practices were employed (ibid). This implies that the community members were willing to pay the costs subject to the service provided.

The willingness to pay were compared between gender and trend revealed that most females interviewed and about half males interviewed were willing to pay for the service respectively. Data shows that females were more willing to pay by 6% compared to males. This reflects many other studies which support that female have more positive influence to pay for solid waste management services than males (Afroz *et al.* 2009; Addai and Danson-Abbeam, (2014).

Regarding public health related problems associated with unsanitary solid waste management, the findings revealed that majority of the respondents were aware

of the public health problems related poor solid waste management. They were even aware that improper solid waste management might lead to diseases such as cholera, typhoid, intestinal worms and diarrhoea, that account among the top ten diseases in the hospitals. These findings reflect that education level increase awareness of solid waste management, hence has the positive relationship to willingness to pay (Kamara, 2009). However, the recordable level of understanding in the study area does not correspond to the observed practices as there are evidence of heaps of solid waste abandon on the roadside, street drains and even in open spaces through observation. The findings are inconsistent to Kampala city study that revealed that the level of understanding does not have direct influence on the willingness to pay for improvement of waste management, (Niringiye, 2010). More efforts are desired to be established by Municipality authority to ensure that levels of understanding negative adverse impacts on poor solid waste management showed by respondents are used as a milestone for the changing mind-set of community toward positive practices of solid waste management. Further findings show that very few respondents perceived that Municipality has the capacity of providing solid waste management services to the satisfaction level of the community. It was found that almost half of total respondents were willing to pay for solid waste management services. Similarly, a study conducted in Khulna, Bangladesh, recorded that people perceived that city authority has the responsibility of providing nuisance free habitats as they pay taxes. In fact, the community would appreciate and be more willing to pay for the services when they observe the positive impact of the services with the respect of their taxes. A study in Accra Ghana (Yoada *et al.*, 2014) shows that the community would be willing to pay more when better disposal practices are employed. Strictly use of the exiting by-law regarding solid waste management would help in improving solid waste practice, (Lauwo, 2005). Information gathered from Lindi Environmental department indicated that the Municipality has the bylaws in place, although the challenges remain in the strict enforcement.

Attention is normally taken by the policy makers when a mass of people dies through the outbreak of unsanitary related diseases such as cholera. The findings indicated that ashes were also produced which reflects firewood and charcoal was used as the sources of fuel at the household level involved in this study. This is reflected on issues of environmental and forests degradation due to massive cutting of trees for charcoal production and firewood as a source of power. Plastics type of waste rank second grass and food waste. These findings differ relatively from the study conducted by Fobil *et al.* (2007) at Urban Accra, Ghana which shows that waste generated in high amount was food debris (93%), plastics (64%), papers (47%) and clothes (21%) respectively.

Plastic waste generation is increasing as it is fashionable package replaced other form of packaging and these have likely implications on the disposal since

plastics are not biodegradable. The situation supports the finding that plastic waste generation is increasing in Africa cities (Achankeng, 2003).

Further, the finding indicates about half of respondents claimed that there were no waste collectors to their areas, which might reflect the truth. It was indicated that the household head refuses to pay waste collectors for services provided because they did not get satisfied due to irregular schedules of collection, hence made them to find other alternatives (Personal communication in this study). Very challenging issue on solid waste collectors is motivation as half of the respondents mentioned the lack of motivation. It was observed almost available waste collectors do not have protective gears and proper equipment for handling waste. Another reason which hinders the service was mentioned to be poor council management. Studies conducted in Dar es salaam, (International Ocean Institute, 2009), Morogoro Municipal Council (Jumanne, 2010) both indicated that lack of proper organization, coordination and management arrangement contribute to failure in achieving solid waste management services. The observed situation that happened Dar es Salaam and Morogoro by then could be the same in Lindi Municipality.

Although findings show the respondents do not throw waste in seashores, sewerage system and in open spaces, but these findings do not reflect the real situation in the ground. Observation indicated that there is evidence of heaps of wastes indiscriminately dumped in the open spaces, roadsides and even backyard of houses. This is inconsistent to 1960s philosophy of disposal practices which was governed by thinking "out of sight, out of mind" (Yoada *et al.*, 2014). These findings implied that indiscriminate disposal of wastes was exiting that provide a favourable environment for the breeding of vermin and vectors responsible for the transmission of diseases such as cholera, diarrhoea, trachoma, and other environmental sanitation related illness (Achankeng, 2003).

Furthermore, the study findings show that there is sense of sharing responsibilities, hence half of the respondents reported that the responsibilities belong to all stakeholders both Municipality and the households. Other half respondents indicated household members are responsible for solid waste management. This maintains the policy statement that environmental management must be everybody's responsibility. The findings revealed that the perceptions that the Municipality has the sole responsibility for solid waste management still account. The study conducted in Dar es Salaam (International Ocean Institute, 2009) and Urban Accra Ghana study (Yoada *et al*. 2014; Peter, 2021) show similar notions that dwellers perceived government has the responsibility to provide solid waste services free of charge. However, few respondents reported that both Municipality and household members have the responsibilities which concur with those reported that all stakeholders are responsible.

The individual earnings were not assessed in relation to the determinants influencing willingness to pay for service in this study. On the other hand, a study conducted in Dar es Salaam by Kibonde (2014) revealed that were not complying with solid waste collection charges as it has been high and also the poor perception that the government has the sole responsibility to provide services for solid waste management free of charge.

5.0 CONCLUSION AND RECOMMENDATION

The main objective of this study was to investigate the factors affecting community participation in solid waste management in Lindi Municipal Council Tanzania. Majority household members were willing to pay for solid waste management services provided that solid waste management services are done at a level of the community to appreciate the positive impact of the improved services. There was very low coverage of solid waste management education to community on how to disposal waste generated at household level in hygienic manner which increase risks of public health and environmental pollution problems.

Lack of enforcement of solid waste management laws, by-laws and regulations encourage indiscriminate solid waste disposal. Despite the Municipal Council to have Solid waste management bylaws in place, there is no effective enforcement which contributes to inefficiency implementation of solid waste management services and hence community members continue with solid waste malpractices. Regardless of the efforts made in the improvement of solid waste management, it was found that a high proportion of the respondents were not satisfied with solid waste management services provided in Lindi Municipal Council. Generally, it was revealed that the penalty imposed to those who breach the solid waste laws and regulations were weak but still they were willing to pay the expenses for solid waste management after Municipality improving the services.

According to results from this study of the determinants affecting community participation on solid waste management in Lindi Municipal Council – Tanzania, Therefore, the researcher recommends that community members should adhere to the Environmental Policy statement that everybody has the responsibility to make the environment clean through participating in solid waste management services provided in the Municipal Councils. Ward Executive officers and hamlet chairpersons should emphasis community and other stakeholders in their respective areas for sanitary collection and disposal of waste to the designated place according to existing Municipal Council bylaw. The community should be informed and educated that there are solid waste management rules, regulations and bylaw, and penalties will be imposed upon contravene. The Municipal Council should strengthen the Environmental Department at the level capable of providing good solid waste management services at the satisfaction of the community and according to existing rules and regulations. The Ministries of the Environment, Health and Social Welfare

Services, Education Sector, Water and energy resources, Policy makers, NGOs, CBOs, as well as all private-public partnerships (PPPs) must collaborate in coordination, facilitation, monitoring and evaluation on solid waste management in Tanzania. There should be a separate department to deal directly with waste management in the country to enhance effectiveness. Thus, proper organization and coordination for the enforcement of rules and regulations of solid waste management should be roused up in cooperation with all the stakeholders. The success in solid waste management in the Municipal Councils require collaborative approaches of communities, NGOs, CBOs, Private institutions, and the Government make clean environment.

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