

Practices of Solid Waste Management by Municipality and Community in Oromia Regional State of Ethiopia: a Case of Adama City, Ethiopia

Asefa Abahumna Woldetsadik

Associate Professor, School of Social sciences & Liberal Arts, Adama Science and Technology University, (ASTU), Adama, Ethiopia

Abstract

Due to rapid increase in urbanization, industrialization and population, the generation rate of municipal solid waste in Adama city Administration is also increasing due to which the city is facing several difficulties in providing proper Solid waste management services to its population. This study employed descriptive research design. 378 questionnaires were distributed and 322 were filled and returned. In the city there are 60 different micro enterprises of 10 members each engaged in collecting solid waste from door to door. 203 door to door collectors are randomly taken while available sampling technique is used for taking 1 plc enterprise owner and 10 experts authorized for sanitary purposes of the city administration, a sanitarian from 18 kebeles or county each and 90 households from 18(5 households from each county or kebele) kebeles or county are considered. The study showed that Adama municipal solid waste management practices is mainly focusing on collection, transport and disposal of wastes. It is viewed that uncollected waste negative effect on environments and public health. But the municipality seems not yet properly utilizing this opportunity and create awareness. It revealed that wastes are disposed in the night time on the road-sides, empty spaces; dumped arbitrarily in the streets and in drains, on the bank of rivers, among the bushes and besides neighbors' fence. It seems there is interest and willingness from the community side to pay the charges for the service provided. It seems there are serious challenges maintaining Hazardous Waste Storage Depot, Recycling Plant, Composting Plant, and disposing sites.

Keywords: waste collection, disposal, community participation, government waste management practices

I. INTRODUCTION

Studies on solid waste show that in many cities, solid waste generated from human and animal waste. Dangerous chemicals, pollutants and materials which cause disease and injury, particularly to children generated from human and animal waste. A high percentage of people who handle and live near or on disposal sites are infected with gastrointestinal

parasites, worms, and related organisms. Poor and marginal urban areas mostly finding difficulties in collecting and disposing waste due to lack of services and infrastructure (Akolkar, A.B. , 2005).

Ways of waste created by human activities is handled, stored, collected, and disposed cause risks to the environment and to public health. Reviews show that in urban areas, especially in the rapidly urbanizing cities problems and issues of municipal solid waste management (MSWM) are of immediate importance. Most governments have acknowledged the importance of MSWM; however, a rapid population growth overwhelms the capacity of most municipal authorities to provide even the most basic services (CPCB, 2000).

According to a United Nations Development Programme survey of 151, Mayors from around the world acknowledged that the most serious problem that city dwellers face (after unemployment) is deficient solid waste disposal (UNDP 1997). The uncollected waste is dumped arbitrarily in the streets and in drains, contributing to flooding, breeding of insect and rodent vectors, and spreading of diseases. Even waste that is collected is often disposed of in uncontrolled dumpsites or burned, polluting water resources and the air.

The implementation of MSWM practices benefits both public health and environmental quality directly and considerably by preventing transmission of various pathogenic agents to a specific population. Unless organic waste is managed appropriately, its adverse impact continues until it has fully decomposed or otherwise stabilized (UNDP 1997). Because of unplanned, possibly unauthorized strategies and technologies adopted for service provision, in low income settlements waste collection is often non-existent with narrow and unpaved streets and lanes (MOUDPA, 2000).

A. Waste Composition

Domestic waste generated from industries and various households covers papers, plastics, glasses, and metals. Domestic wastes with a large proportion of materials contain high moisture and very dense (high weight per unit volume).Therefore, Vehicles and

systems that operate with low-density wastes are not suitable for heavy wastes of such nature. Study shows that combination of extra weight and the static materials causes corrosiveness which lead to very rapid corrosion of equipment or Vehicles. Since waste that contains a high proportion of moisture is not possible for burning, it should be ruled out as option for waste treatment (Ranjith Kharvel Annepu et al, 2012)

B. Awareness and Attitudes

Public awareness and attitudes toward waste can affect the entire SWM system unless wisely handled. Every step which is taken from household waste storage to waste collection, separation, recycling, amount of waste dumped to the street, willingness to pay for services, and residing near by the treatment and disposal site depend on public awareness and participation. Thus, awareness and attitudes are crucial to the success or failure of a SWM system. Government policy on the role of SWM should give priority for the system to be part of public's concern since strengthens involvement of various agencies such as trade unions can have an important influence on what can be done. As Ranjith Kharvel Annepu, (2012) indicated there is a world – wide consensus that the informal sector should be integrated in the formal system since there are numerous initiatives enable them working with such goal. According to the World Bank, International Bank for Reconstruction and Development, of 2008 report, improper incineration and uncontrolled disposal of waste, are major contributors to greenhouse gas emissions. The report has disclosed that anaerobic degradation of waste in landfills produces methane, a gas that is 21 times more potent than carbon dioxide.

Study on the subject also reveals that in urban areas, especially in the rapidly urbanizing cities, problems and issues of municipal solid and liquid waste management (MSLWM) are of immediate importance. Most governments have acknowledged the importance of MSLWM; however, rapid population growths overwhelm the capacity of most municipal authorities to provide even the most basic services. Waste that is collected is often disposed in uncontrolled dumpsites or burned, polluting water resources and the air.

The current waste management services proofs keeping up heavy expenditure on the municipalities that came to be a potential threat to the public health and deterioration of environmental quality as well as causes climate change which greatly affects the normal life of the citizens. Sequentially the expense for disposing the waste becomes enormous unless its disposal systems are designed as to support financing the disposal process by means of reusing or recycling the waste as to generate income.

The Indian practices justify the challenges the country is currently facing as a result of solid waste management. For instance, in 53 cities with a million plus population, generate 86,000 TPD (31.5 million tons per year) of municipal solid waste (MSW) at a per capita waste generation rate of 500 grams/day. The total MSW generated in urban India is estimated to be 68.8 million tons per year (TPY) or 188,500 tons per day (TPD) of MSW. (Ranjith Kharvel Annepu, (2012).

It is realized that as a result of increased quantities of waste, practices of facing tremendous pressure on resource shortage of states and lack of infrastructure has opened ways for private sector to involve in urban waste collection activities. Nevertheless, budgetary problems, and scarcity of suitable landfill sites is a major constraint that the private sectors are subsequently facing. Since managing waste requires planning, financing, construction and operation of facilities for the collection, transportation, recycling and finally disposition of the waste, such sorts of packages are not available in most municipal level of developing countries both for government and private sector as to enable them involve efficiently in improving the waste management scheme.

C. Solid waste situation in Adama City Administration

Adama is one of the fastest growing cities both in-terms of physical areas and population. According to Socio- economic profile report (June 2016), the city has 356,344 inhabitants while the annual average population growth rate is 4.8 %. Its population growth is increasing rapidly due to its location on major crossing roads that serve export /import goods of the entire country and its being the hub of various Industries as well as business sectors. An issue of municipal solid waste management (MSWM) in Adama is becoming an immediate importance since the way solid waste is handled, stored, collected, and disposed are direct threat to the public health. Municipal Authorities have acknowledged the risk of solid waste to public health nevertheless, the scarcities of equipment including heavy and light tracks, disposal site and rapid population growth overwhelming the capacity of most municipal authorities to provide even the most basic services.



Figure: One of the waste disposal sites in Adama Town, November, 2016

Due to such and other restricting issues, coverage of sanitation in the city is found insignificant. The sanitation and hygiene situation, particularly in low income or congested areas (kebeles) is very poor. Besides to the accumulation of solid waste, the city is also facing great challenges of collecting and dumping liquid waste. It is observed that only 30% of liquid sludge produced from pit latrines and septic tanks is collected and dumped in a pond located about 9.2 km outside of Adama city Administration. The remaining sludge is leaked into the drainage system and infiltrate to the ground water; polluting both the surface and groundwater. As a result of Wastewater flows, the drains are source of mosquito breeding.

There is also an increased exposure to Pathogens and water borne diseases, as the surface water are used downstream for urban agriculture. It is understood from the health personnel's concern that vegetables cultivated with such waste water can be polluted by pathogens by which health risks result in an increase in the spread of diseases and eventual child mortality. In such fast growing city, the concern that is given to waste handling, storing, collecting, and disposing seems beyond the capacity of the municipality. Since such issue has direct threat to the public health, it is realized that equivalent action seems not in place. As study reveals issues of municipal solid waste management (MSWM) are of immediate importance of the authorities and the concern of the community as a whole.

II. THE PURPOSE OF THE STUDY

This study attempts to investigate Municipal solid waste collection and disposal practices of Adama City Administration and recommend certain mechanism as how to improve and manage to involve community in solid waste collection businesses so-that burden of the municipal could be shared and city's sanitation level could be improved.

III. RESEARCH METHODS

The purpose of this study is to investigate solid waste management practices in Adama city Administration and determine how the city is collecting and disposing solid waste (MSW) in-order to protect the environment from pollution and minimizes public health risk. Municipal Authorities those who have direct responsibility over hygiene of the city, Door to door solid collectors, and privately involved in solid waste management business were sources of data of this study. Authorities over hygiene, door to door collectors and privately involved this business were randomly selected.

In due course, the following basic questions are used as guiding principle to investigate Adama city Municipal solid waste practices.

1. What is the perception of residents regarding municipal solid waste management practices of Adama City Administration?
2. What are the resident's view regarding the impact of waste on environment and human health?
3. Do the community made aware about the importance of their participation in waste management practices?

A. Research Instrument

Data were collected from the literature, communicating professionals, wide-range of field visit representing all sizes of private and government enterprises involved in the subject under study. The visits included travelling to informal solid waste hubs, landfills sites, and municipal offices within Adama City. The visits gave opportunity to closely observe the existing practices of waste management initiatives in Adama city Administration. In meeting the purpose of this study, 29 decision statements arranged in a seven Likert point scale ranging from strongly disagree to strongly agree. In-order to substantiate data collected using questionnaire, interview were conducted with Municipal heads authorized over sanitation and heads of privately involved in solid waste collection and disposal business.

B. Sample Size.

Of the total (378) questionnaire distributed, 322 were filled and returned. 10 employees accountable for Adama City sanitation, 60 heads of associations of door to door collectors, a plc owner, 1 representative (responsible for sanitation) each from 18 "kebele" or county, 90 households from all 18 "kebeles" or county and 199 door to door collectors were taken. The sample size was taken using availability sampling technique for 10 municipal employees, 60 heads of associations, 1 plc owner, and 18 from all "kebele" or county while simple random sampling technique is employed to select 90

households and 199 door to door solid waste collectors. To determine the existing practices of municipal solid waste management practices in Adama City, upon data obtained mean, standard deviation were employed.

IV. SCOPE OF THE STUDY

This study is limited to Adama City Administration of solid waste collection and disposal practices. The study attempts to explain the current situation of solid waste management

Practices, community participation and to suggesting possible measures which could be practiced to maintain Sustainable and efficient Waste Management practices.

V. DATA ANALYSIS AND INTERPRETATION

The main objective of this study was to assess the way the enormous quantity of solid wastes currently collected and disposed in Adama City Administration to reduce public and environmental risk that comes due to solid waste effect. Recovering materials and energy from wastes, in a cost effective and environmental friendly manner proved to be one of the employment sectors for the generation to come. Currently, Adama city generates 324 cubic meter daily CMD. To avoid further worsening of public health, polluting air, water and land resources, appropriate handling of the scenario is inhabitable. The other major contributor to the environment is open burning of solid wastes and landfill fires which emit large amount of tons of pollutants into the air per year (Muhammad Rafiq and Huma Salma Gillani and etal,(2015).

The primary data collected using questionnaires are computed and analyzed in the following four consolidated tables. The first table discloses the over Cronbach's alpha where as the other four tables displays solid waste management practices, solid waste impact of environments, solid waste disposal and the role of community in solid waste collection and disposal respectively.

Table- 1. Over all Cronbach's alphas.

Cronbach's Alpha	N of Items
.824	29

Source: own Computation

As shown in Table1 above Cronbach's alpha is used to test the reliability of the scale. Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items (Cronbach, 1970). A commonly accepted rule for describing internal consistency using Cronbach's alpha of 0.7 is considered acceptable and anything more

than 0.7 is considered a good indication of reliability of constructs. The calculated Cronbach's alpha as per Table 1 for over all alpha dimensions is .824 thereby indicating good constructs reliability.

Table. 2: Respondents' Perceptions of Solid Waste Management Practices (SWMP).

Measures of municipals' waste management practices	N	Mini	Max	Mean	Std. Deviation
Need for capacity-building of municipal technicians	322	1	5	1.33	.514
There are only few areas considered most in need of training	322	2	4	2.48	.716
There is no need for capacity-building of human resources in entities	322	1	6	2.97	1.342
There is no a coordinating body or agency responsible to oversee and support	322	2	5	3.05	.954
Re-use of materials makes life easy and save cost.	322	1	7	3.22	2.108
Municipality has adopted an official policy to reduce the generation of solid waste and improve its mgt	322	1	6	3.22	.970
Municipality has programmes to educate and raise public awareness	322	1	7	3.56	1.318
Households should be encouraged to bury the waste instead of burning.	322	1	7	3.70	2.013
Everybody should be responsible for waste prevention and management	322	1	7	3.83	1.522
It is gov's responsibility to look after the environment and address solid waste problems	322	1	7	3.93	1.635
Waste prevention is not my Responsibility	322	1	7	4.31	1.732
Valid N	322				

Source: Primary Data

As Table 2 above indicates the municipality is Facilitating to admit that solid waste collection and disposal is its responsibility. On the other hand coordinating responsible agencies to oversee the support of re-using waste materials as to make life easy and save cost is not observed. Similarly, adopting an official policy to reduce the generation of solid waste, setting programs to educate and raise public awareness, encouraging households to bury the waste instead of burning and look after the environment and address solid waste problems to public seems not well underway. It also seems unable to decide on the responsibility of waste prevention (Mean 4.13 and SD.1.732).

Table 3: Shows Respondents' Views On Solid Waste Impact Of Environments (SWE).

Measures of waste impact on environment	N	Min	Max	Mean	Std. Deviation
Waste prevention leads to better environment for present and future generations	322	2	7	3.52	1.693
Open burning of refuse is dangerous to human health and environment.	322	1	7	3.65	1.465
Solid waste management is one of the major environmental burdens	322	1	6	3.70	1.302
Waste prevention is beneficial for society and environment.	322	2	7	4.04	1.491
Improper disposal and management of wastes brings problems to public's health.	322	2	7	4.26	1.512
Valid N	322				

Source: Primary Data

As Table 3 above reveals that the higher means (4.04 and 4.26) scores value of solid waste impact on environment indicates that prevention and Improper waste disposal is not well perceived while most of the respondents expressed the negative effect of waste on human health. Similarly, it is disclosed that Open burning solid waste perceived as dangerous to human health and environmental burden. The community seems worried because of the quantity of waste accumulated all over the places in the city that may lead the community to be exposed to polluted environment.

Table 4: Indicates Respondents' Responses on Solid Waste Disposal (SWD).

Measures of waste disposal	N	Min	Max	Mean	Std. Deviation
Municipality has Municipal Recycling Plant.	322	1	2	1.74	.440
Municipality has Hazardous Waste Storage Depot.	322	1	4	2.48	.652
Municipality has Curbside Recycling Programme.	322	1	4	3.30	.805
Harmful waste disposed separately from other municipal Wastes.	322	1	7	3.66	1.464
The quality of solid waste disposal service provided by private waste collectors is satisfactory.	322	2	7	3.78	1.505
The 3R – reduce, reuse and recycle are important to waste management	322	1	7	4.04	1.759
Wastes are properly disposed off in the local government.	322	1	7	4.17	1.929
Municipality has Municipal Composting Plant	322	2	7	4.22	1.533
Valid N	322				

Source: Primary Data

Respondents are strongly agreed as mean value 1.74 and the standard deviation 0.44 shown in Table 4 above regarding owning recycling plant while Municipal Composting Plant (4.22 and 1.533, 4.17 ,1.929 and 4.04,1.759 mean values and standard deviation consecutively indicate that respondents are not sure whether the municipality is owning these facilities. Others viewed that they are somewhat agree on the practices of disposing harmful waste separating, and on quality service provided (Mean value 3.66 SD1.464 and Mean value 3.78 and SD. 1.505).

Table –5: Role of Community in Solid Waste Managing Practices (CSW)

Measures of community participation.	N	Min	Max	Mean	Std. Deviation
community is not willing to pay higher fee	322	1	7	3.74	1.512
Community is not willing to make changes to its consumption pattern and lifestyle choices	322	1	7	3.87	2.031
Community is not willing to sort its waste before disposing them.	322	1	7	3.87	1.898
Community is not willing to take part in the recycling programme.	322	2	7	4.30	1.831
Community is not willing to make changes to my lifestyle choices	322	2	7	4.74	1.702
Valid N	322				

Source: Primary Data

As Table 5 above reveals the first three measures (Mean 3.74 and SD. 1.512, Mean 3.87 and SD. 2.031, Mean 3.87 and SD. 1.898 respectively) indicate that community participation seems not satisfactory. On the other hand, community willingness in taking part in recycling programs and their willingness to make change in their life style is not known. As it is deduced on the analysis and consulted reviews, major occasions and festivals seems not properly used for awareness creation by the concerned body in particular Adama Municipality.

There is also indication that the community has interest to engage themselves in waste collection and disposal activities if they are asked or invited to do so. It is observed that the most effective way to ensure the right messages to reach all participants is launching a door-to-door awareness campaign.

VI. CONCLUSION

Due to population increase and change of lifestyles in the city (Adama and elsewhere), the quantity of MSW generated in the city is increasing rapidly. Equipments used for this purpose are not sufficiently available. Public awareness and attitudes toward waste collection and disposal learnt not well done by the concerned authorities. Since awareness and attitudes changes are crucial to the success or failure of a SWM system, managing to mobilizing the community towards waste storage and separation, recycling, and collection frequency, amount of waste, willingness to pay for services, and resistance to locating treatment sit is so fundamental.

Policies on the degree of community role and those who involve in this business formal or informal should made to play their at most role. Holistic approached is the only means to alleviate the current solid waste management crisis in Adama. Besides, long term strategy should be designed. It is only then that the current solid waste crisis in Adama could be maintained. Regional State Governments ought to play a practical role in supporting authorities to optimize the frequency of waste collection capacities of the concerned bodies.

Even though there a need for capacity building, the municipality is reluctant to arrange any kind of capacity building training for individuals or groups authorized to accountable for sanitary aspects of the city. There is also no official policies that reinforce both community and the authorized authorities to make them accountable for not accomplishing their missions.

Various approaches are not often practiced by the municipality to crate awareness towards solid waste collections and disposing as to not affect public health. Had various approaches used to provoke public to understand the negative impact of waste on their health, they would have involved by large in collection and disposing of waste. Reviews show that Improper SWM handling creates imminent danger to public health and environment.

According to the World Bank, International Bank for Reconstruction and Development, of 2008 report, improper incineration and uncontrolled disposal of waste, are major contributors to greenhouse gas emissions. The report has disclosed that anaerobic degradation of waste in landfills produces methane, a gas that is 21 times more potent than carbon dioxide. Study reveals quality of waste collection and disposal service is found unsatisfactory in Adama City. Besides, the municipality does not have harmful waste separation plant, hazardous waste storage depot and recycling or composting plant.

It is observed that increased quantities of waste, practices of facing tremendous pressure on resource shortage and lack of infrastructure has

opened ways for private sector to involve in urban waste collection activities. Nevertheless, budgetary problems, and scarcity of suitable landfill sites is a major constraint that the private sectors are subsequently facing. sorts of packages used collection, transportation, recycling and disposition of waste is the most obstacle phenomena to improve solid waste management scheme in Adama City Administration.

It is learnt from this and other study conducted on the subject, various Programs found exciting the public in-order to inspiring community participation in waste collection and disposal. Addressing the public about the life threatening of waste if not collected and disposed frequently through awareness creation programs is seen one of the most remedial strategies. In this regard a door-to-door campaign, commemorating major festivals events, arranging rallies among the public, organizing street plays, Organizing open forums in each locality, arranging school programs, involving well-esteemed religious leader, organizing competitions on selected garden establishments and involving media etc are an awareness raising campaign on waste management issues.

VII. RECOMMENDATION

The success of generating economically feasible aspects from waste is possible only if the waste of any kind collected, disposed and recycled properly. With this in mind on the basis of analysis as well as reviews made, the following recommendations are forwarded.

1. Approaching concerned municipal authorities, community leaders, elected community's representatives (in Ethiopian case, Elected "Kebele" members), schools, nongovernmental organizations, media, various associations, households, and the public in general is highly essential for proper SWM.
2. Involving stakeholders in developing a plan for achieving effective public participation should be taken into account.
3. Establishing solid waste task force including waste producers and industries as to participate in solid waste management practices.
4. Training on separation of Hazardous waste from other municipal wastes should be conducted frequently.
5. Capacity-building on SWM for municipal technicians and decision makers has to be considered.
6. Acknowledging the community not to ignore uncollected waste which becomes a factor in the spread of diseases of many kinds.
7. The City (Adama) should aware the importance of owning Recycling Plant, Hazardous Waste Storage Depot, Composting Plant and sufficient dumping site.

REFERENCE

- [1] Ahmed, S. A. and M. Ali. 2004. Partnerships for solid waste management in developing countries: Linking theories to realities. Habitat International, vol. 28,
- [2] Ahmedabad.(2005). Technical Committee Report, West Bengal SWM Mission2005 Government of West Bengal, Kolkata.
- [3] Akolkar, A.B. (2005). status of Solid Waste Management in India, implementation Status of Municipal Solid Wastes, Management and Handling Rules 2000, Central Pollution Control Board, New Delhi.
- [4] Asnani, P.U. (2004). United States Asia Environmental PartnershipReport, United States Agency for International Development,Centre for Environmental Planning and Technology,
- [5] CPCB (2000)Status of Municipal Solid Waste Generation,Collection Treatment, and Disposal in Class I Cities, Central Pollution Control Board, Ministry of Environment and Forests, Government of India, New Delhi.GOI (2003). Report of the Technology Advisory Group on Solid Waste Management, Government of India Publications, New Delhi.
- [6] Degnet Abebaw(2008) Determinant of solid waste disposal practices I urban areas of Ethiopia-household – level analysis.
- [7] Finance and Economic Development (2016), Socio- Economic Profile of Adama City, (PP-19&20).
- [8] Hayal Desta, Hailu Worku and Aramde Fetene, 2014. Assessment of the Contemporary Municipal Solid Waste Management in Urban Environment: The Case of Addis Ababa, Ethiopia. Journal of Environmental Science and Technology, 7: 107-122. Assessment of the Contemporary Municipal Solid Waste Management in Urban Environment: The Case of Addis Ababa, Ethiopia, March 29, 201
- [9] Ministry of Urban Development, Government of India, (1995). 'Strategy Paper on SWM in India' NewDelhi.
- [10] MOUDPA (2000). Manual on Solid Waste Management, Ministryof Urban Development and Poverty Alleviation, Governmentof India Publications, New Delhi.(2003). Draft Report of Core Group on Appropriate Technology,Research and Development (SWM),
- [11] Muhammad Rafiq and Huma Salma Gillani and etal (2015), Health and Economic Implication of Solid Waste Dumpsites: WU Journal of Social Sciences, Vol.9 .
- [12] Ranjith Kharvel Annepu asnd etal (2012) Sustainable Solid Waste Management in India
- [13] World Bank (1997a).What a Waste, World Bank, Washington, DC.(1997b).Per Capita Solid Waste Generation in Developed NationsWorld