

**Full Length Research**

# **Solid Waste Management Practices and its Challenges in Gambella Town, Gambella Regional States, Ethiopia**

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**Solid waste management practice, which is the major problems of many developing countries, needs more attention. Gambella City, like other cities in African countries, faces challenges related with poor solid waste management Practices. This study was intended to assess practices and challenges of solid waste management in Gambella town. The study was conducted in: 01, 03 and 05 kebeles of Gambella town. Different sampling method was used; Simple random sampling and purposive sampling to select elements of study units. More of qualitative data were collected due to its nature and supported by quantitative information through survey. The study discovers that waste management practices in the cities are waste collection and transportation for disposal, handling to microenterprises, composting, burning and waste reuse. Lack of hiring skilled man power, open burning of refuse, less community awareness, lack of proper functioning of equipments, lack of proper collection system, lack of budget allocation, and illegal dumping are the challenges of solid waste management in the town. Furthermore, the study indicates there is a poor solid waste management practice and challenges in the town to manage solid wastes. Finally, the study recommend the town administration to aware the community on Solid waste management practices and strength community based waste management system to find long-term sustainable Solid Waste Management practices through cooperation.**

**Keywords:** Solid Waste Management, Disposal practices, waste management challenges

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## **INTRODUCTION**

Solid waste management is one of the major environmental problems that most of the cities are dealing with. Waste was an early problem of mankind, and a growing one, that is major concern to every nation of the world (Allende, 2009). Waste management issues are coming to the forefront of the global environmental agenda at an increasing frequency, as population and consumption growth result in increasing quantities of

waste (Birhanu and Berisa, 2015).

Most of African cities are dealing with the environmental costs of rapid growth and Urbanization, which represent phenomenal change especially in areas of solid waste management. While cities are generating an ever-increasing volume of waste, the effectiveness of their solid waste collection and disposal systems are declining. In urban centers throughout African region, less than half of the solid waste produced is collected, and 95 percent of that amount is either indiscriminately

thrown away at various dumping sites on the periphery of urban centers, or at a number of so-called temporary sites, typically empty lots scattered throughout the city (Mohammed, 2003). The insufficient handling of solid waste represents a source of water, land and air pollution affecting the urban environment and the health of the people living in the cities and is one of the most critical environmental problems that cities in Africa are facing today. The current capacity of most solid waste management systems in Africa is inadequate and too slow to meet the increasing demand of the solid waste generated (Mihreteab, 2011).

In Ethiopia, alike developing countries, the increase of solid waste generation is resulted from rapid urbanization and population booming. According to (Dawit and Alebel 2003), the amount of solid waste in Addis Ababa and other fast growing areas in the country has been increasing over time, largely attributed to rapid population growth rate. The same authors indicated that from the total solid waste released by the population in the city, about 50-60% was collected and the rest was unattended. Recently the municipality has increased its coverage to about 85% (AACG-SPBA-2005)

Solid waste management development in Gambella town also has resulted in the accumulation of waste on open lands, in drains and in the residential areas, causing a nuisance and foul-smelling pools, environmental pollution through leachate from piles (water and soil pollution) and burning of waste (air pollution), clogging of drains like other towns in the other region (Belay, 2016). The same author again indicate that Even though the town is in way to development the solid waste collection service coverage is very low which means the major portion of the solid waste generated within the city is uncontrolled and improperly disposed, which creates unhealthy environment to live and work in (Belay, 2016). And this leads to the deterioration of environment and brings different impacts to the community. So to fill the gap of the problem it's important to study the practices and the challenges of solid waste management in the town.

## RESEARCH METHODOLOGY

### Description of study area

Gambella Town is 777 km away from Addis Ababa to the south west of the country. The survey was conducted in three kebeles (01, 03 and 05). Gambella town has a total population of around 65,000. Gambella town is located within the arid zone where the altitude is below 500 meter above sea level, and the temperature is 25 °C and above. The hottest months occur between January and May. Gambella usually receives rainfall between May and October, and the remaining months are dry. Its total

annual rainfall is about 1036.9 mm.

### Data source and type

Both primary and secondary sources were utilized to collect the required data. Primary data was collected from household survey, Questionnaires and field observation, Interview, focus group discussion. Secondary data was collected from different sources, including journal articles, statistical abstracts, books, and other unpublished materials.

### Sample techniques

The study employed both probability and non-probability sampling techniques. Probability sampling was used to minimize bias and to ensure representativeness of the study. Simple random sampling was adopted to select Household respondents. Purposive sampling methods techniques were used due to the fact that, on 01 there is poor management of waste and 03 and 05 there is some better management practices. Therefore, sample populations from the three kebeles were taken using the following sample size formula developed by (Krejcie and Morgan 1970)

$$s = X^2 NP (1 - P) \div d^2 (N - 1) + X^2 P (1 - P).$$

Where,

s = required sample size.

$X^2$  = the table value of chi-square for 1 degree of freedom at 0.05 confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

$$3.841 \times 6492 \times 0.50(1 - 0.50) \div 0.0025(6492 - 1) + 3.841 \times 0.50(1 - 0.50) = \underline{363}$$

### Data collection and analysis

Structured questionnaire, interview guideline and field observation were used to obtain data and information for the study. Structured questionnaire was used to get the information required for the assessment regarding solid waste management practice and its challenge in Gambella town. Field observation was employed for understanding households' solid waste handling practices, illegal dumping, solid waste collection and transportation systems. Photographs were taken during field observation for illegal SWM community/HH practices across the town and transport practices.

Data obtained from various sources were analyzed using qualitative and quantitative data analysis techniques. The qualitative information was gathered using direct observation, and interview, analyzed and transcribed using qualitative techniques, whereas the quantitative data generated by questionnaire were analyzed using descriptive statistics. Descriptive statistics such as frequency, percentage was used. Statistical Package for Social Science (SPSS) version 20 was used as the tools of analysis.

## RESULT AND DISCUSSION

### Solid waste Sources and composition

The survey result reveals that SW source are more from households, shops (commercial areas), hotel and restaurants, and street cleaning which accounts 41.7%, 29.17%, 27.78, 1.39% respectively, See figure (1). This is also similar with other towns, Like Addis Ababa which the source of solid waste are: house holds 76%, institutional /Commercial, factories, hotels and health centers, 18% and 6% from street sweeping (AASBPDA, 2003)

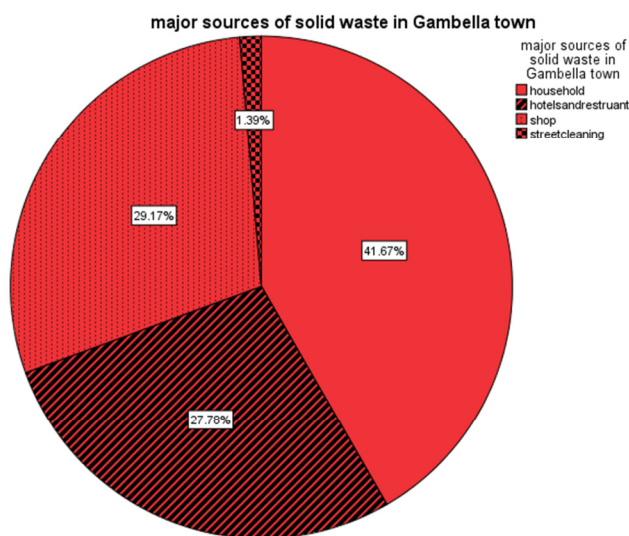


Figure 1. Major Source of Solid waste in Gambella city

The composition of solid waste varies greatly from area to area and changes significantly with time. Waste can be classified into several types. Which further distinguish between food waste, rubbish, special waste, and ashes and residue as illustrated by Tchobanoglous et al, (1993). In Gambella town the survey shows that more of the wastes which came out from households are typically classified food wastes like food, kitchen waste, following by a plastic, rubber, glass, bottles, metals and etc. And this study survey also similar with other towns like Guadalajara-Mexico, Perez *et al.*, (2001), Makurdi-Nigeria, Sha' Ato et al (2006), Jigjiga-Ethiopia (Birhanu and Berisa, 2015), Gambella-Ethiopia (Belay, 2016).

### Solid waste management and practices

#### Collection and Transportation

From interview, 80% of the respondent's stated that the

bulk of primary waste collection equipments are sacks whereas few said they use open area. According to Nigatu R et al (2011) there are three basic types of collection equipments: Human powered, Animal powered, and Engine powered.

Even though the collection equipments aren't same in study kebeles of the city, both human and animal collection equipment are being used in Gambella City. With regard to the human aspect, transportation of wastes to the disposal place is possible using hands. The survey showed that the existing waste management system isn't completely satisfactory.

People throw the waste on the street, due to the fact that there is no any container in the researched kebeles. In some kebeles Almost all of the people collect the wastes and throw it discriminately with the sack, but on other hand in other kebeles there is access of handling the waste to the micro enterprises. The micro enterprises has some materials to collect this waste from household and dispose to the proper disposing place, Even though



source field survey 2016  
Figure 2 waste transportation

the means of their waste transportation is not much satisfactory see figure (2). However, some of the respondents state that they have their own waste disposal or storage means. As the survey shows most of waste is collected by house hold themselves and transport by using the hand and throw it outside of their door.

### Waste reuse

Waste Reuse is an important factor to reduce the amount of waste to be dumped at the final disposal site. The study result indicates there is little or almost none practice of waste reuse for some purposes. Almost all of the household hold their materials from market by plastic bags, but only few household who reuse plastic bags 11.1% (source own study).

Few household reuse it to carry materials and use to set fire on charcoal, others they just throw it, due to lack of awareness. And other is liquid container plastic because of the climate condition in the area there is high demand for fluid, so the people after the use this packed fluid from plastic they just throw it on street.

According to Kofoworola (2006) Recycling can render social, economic, and environmental benefits. It provides an income to the scavengers who recover recyclable materials. But from the survey, few of business areas and street vendors, use this plastic container again for selling it with local water. Compare with these wastes other wastes they don't have any places for reuse. In general, as far as waste reuse is concerned, there is no formal practice in the city.

### Composting

Composting provides an environmentally friendly method which not only mitigates problems of atmospheric pollution but also conserves soil fertility and biodiversity,

R.V. Misra, et al (2003). With regard to composting, the households practicing composting almost none, during the study, it was observed that around 35% (source own study) people who know at least the use of organic waste for soil fertility improvement. The problem is that due to lack of awareness and piece of land for urban agriculture people aren't practicing. This result is also the same with another study which take place city like Jigjiga (Birhanu and Berisa, 2015)

### Waste Disposal

Waste disposal is one of the most important management activities which needs to be carefully planned, Nigatu R et al (2011). The waste disposal at transfer station, the study identified that almost all solid waste generated in households is indiscriminately disposed together. There are no practices of separating any wastes from each other at household levels. In this study, it was observed that disposing household waste into a river system is a common practice in the study area. The result of the study also reveals that there are households who dispose the waste in to a river/ stream, drainage system and any open place. This is particularly observed in the case behind of Gonder area Baro River see figure(3) also around the Dalkoch areas wastes are thrown indiscriminately in funeral locations see figure (4)

Regarding improper waste disposal at a transfer stations, respondents blame the town authority not plan and prepare any container and also micro enterprises not taking wastes everyday but they come once in two weeks.





Source Field survey 2016

**Figure 3 Gonder area**



Source Field survey 2016

**Figure 4 Dalkoch areas**

### **Impacts of solid waste**

SW is a major part of environment pollution; it is responsible for spreading many harmful and infectious diseases. As the population increases, the demand for food and other essentials also increases such that waste is also increased. As described by (Tadesse 2004), public health, aesthetic and ecological concerns are the major impacts associated with the solid waste generation.

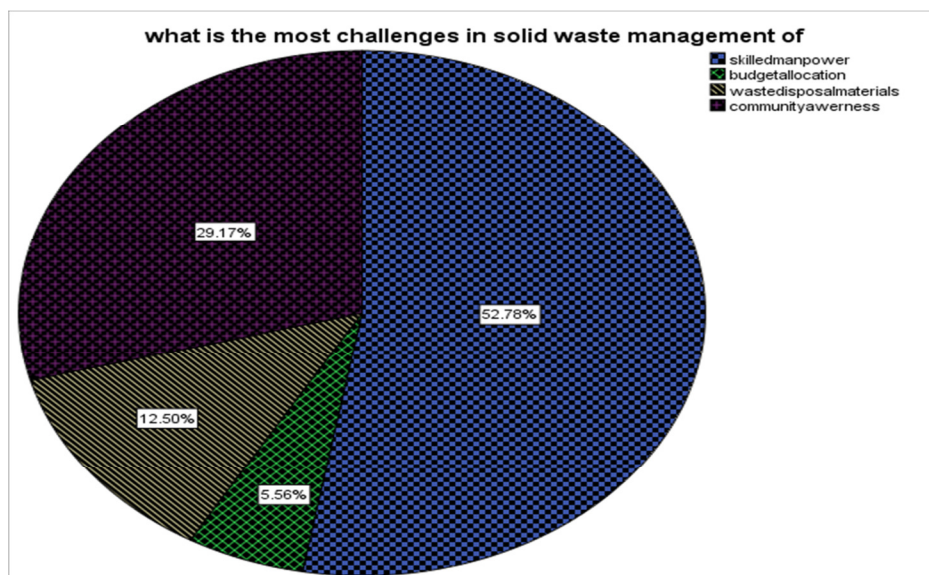
As the researcher observed from the survey above 50% people throw the waste into streets, roads, near water and at other public places, which attracts flies, insects, and etc. This results in different diseases like malaria, common cold, water borne diseases. In addition to this wastes release bad odor or polluting the environment and also disturb the beauty aesthetics of the town.

### **Challenges of solid waste**

Solid waste is the major problem in the Gambella town;

with regard to the challenges more than 65% of the respondents stated the Management of Solid Waste is one of the problems that town is facing from its poor practices. Even though communities have some knowledge of Solid Waste but they are facing many challenges from its poor management. More than half of the respondents stated that the main challenge related with the solid waste management is lack of hiring skilled man power, that the town administration didn't employ enough man power to aware the community on management of solid waste.

As a result the community throws the waste every place near street, public places and near water also. Furthermore, the town authority not giving more places for proper practices of solid waste management and there is also lack of budget allocation, see figure (5). Generally there is no waste disposal material in the town and the town is facing this challenges.



Source own study

Figure 5. Challenges of solid waste management

## CONCLUSION AND RECOMMENDATION

SWM is one of the important compulsory functions of not only urban local authorities but also of rural local bodies. However, this essential service is not efficiently and properly performed by the concerned bodies of Gambella. The main source of SW in town is household were households poorly manage the waste and the major types of this waste is plastics and rubbers that highly affecting public healthy and aesthetic of the town. Most of the people throw the waste on street, public places and around water stream due to lack of containers in the town and public awareness then thus resulting in diseases like malaria, common cold, typhoid. Waste management problem is complex because it involves a multitude of scientific, technical, economic and social factors. Similarly, it is observed that lack of Skilled man power public awareness's financial resources, institutional weakness, improper selection of technology, transportation systems and disposal options, As a recommendation therefore, the town administration must have to aware the community on Solid waste management practices and strength community based waste management system to find long-term sustainable Solid Waste Management practices through cooperation. The town municipality must also hire skilled man power to improve and keep the aesthetic of town and healthy of community in addition to giving people awareness on SWM. Like another capital cities of regions, Gambella town municipal must provide waste disposal container in all kebeles of the town which help community to dispose waste in container and strength micro enterprises plus to community based solid waste management system.

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