

Municipal Solid Waste Management in the Greater Banjul Area and Brikama LGA of The Gambia

¹E.A. Uyamadu and ¹R.A. Kuye
¹School of Medicine and Allied Health Sciences, Department of Public and Environmental Health University of The Gambia, West Africa.

Corresponding Author:
R.A. Kuye, as above

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Abstract

One of the main environmental issues facing the Gambia with a population of 1,882,450 is Municipal solid waste management. This is exacerbated by indiscriminate disposal of waste from household and markets area, poor collection, and inappropriate disposal practices. The intensity of the Solid waste management problem increases with increased population due to the increased human activities and the solid wastes to be removed for disposal. The main causes of improper solid waste management in Greater Banjul Area and Brikama are due to lack of good and enough infrastructures, non-implementation of existing environmental sanitation laws, irregular and unplanned dumping of solid wastes, wrong lifestyle, population and urban growth due to rural-urban migration, insufficient capital to run solid waste management process and lack of new technology in waste disposal. Inadequate collection and improper disposal of solid wastes facilitates multiplication of pathogens causing diseases like cholera and diarrhea and provides good breeding site for disease vectors like mosquitoes (malaria), flies (diarrhea) and rodents. It is therefore necessary to look for and implement long –term integrated waste management strategies like segregation and recycling that ensures a sustainable approach for waste management services. Also proper and sustainable collection mechanisms should be available to have a lasting solution.

Introduction

Municipal solid waste management has become one of the problems of modern times in both developed and developing countries (Umerie 2000). Municipal solid waste is a heterogeneous mixture of

biodegradables and non-biodegradables (plastics, aluminums, glass, metals, papers,) and is the most complex solid waste stream, as opposed to the more homogeneous waste streams resulting from industrial or agricultural activities (Wang

and Nie 2001). A slight increase in income can cause consumption patterns of people to change, resulting in waste types and quantities that pose a greater challenge to the municipalities to handle (Medina, 1997).

Municipal Solid waste management in the Gambia still remains a major public and environmental health concern because of the care free attitude most people have towards it. Waste management is not a top priority to most ordinary Gambians including the literate ones. It only becomes a priority when it is bound or about to cause a threat and nuisance to human health. The littering and disposal of wastes into unpaved streets, roadsides, and vacant plots leads to the breeding of rats, flies, coach roaches and mosquitoes which may in turn lead to diseases. It also creates unsightliness and foul odor (Umerie 2000). Uncollected wastes often end up in drains, causing blockages which result in flooding and insanitary conditions. Dumps of wastes and vehicles block streets and other access ways. Poor infrastructure, coupled with inadequate financial resources work against the optimization of municipal solid waste disposal in the Gambia (Sanneh et al 2011).

The city of Banjul, Kanifing Municipality and some parts of West Coast Region referred to as the Greater Banjul Area (GBA), form the largest urban settlement. Fifty-seven Percent of the population of The Gambia lives within the GBA. This region has a total land area of 93 square kilometers with a population of 1.023 million out of the total national population of 1.8 million (Ampomah et al, 2012). This means that, an average of 11,032 people live within a square kilometer (that is 57% of the population live in <1% of total land area). Kanifing Municipality continued to grow throughout the last two decades (1990s and 2000s) and today it has become the largest urban settlement containing almost all the country's industries, national stadium, hotels and tourism facilities, and all 4 of the University of The Gambia campuses.

Brikama is one of the largest cities in the Gambia lying south of the country's capital,

Banjul. And its outlying vicinity are in the Kombo Central District, West Coast Region of The Gambia, in West Africa. It is the regional capital of the Western Region, the base for the headquarters of Brikama Area Council and it is the most populated Local Government Area in the country. Located inland, in the South Bank, the main urban settlement is about 35km southwest of the Banjul capital, and has an estimated population of 750,000 people (699,704 - 2013 census). The largest ethnic groups are the Mandinka, followed by the Wolof, Manjago, Jola, Fulani, Serer, Serahule, Laibe, Aku, Mauritians and others. Brikama is a market town and major trading centre for raw groundnuts palm oil (dende) and kernels. The local economy revolves around petty trading, soap making and tie & dye. Other livelihoods are horticulture, fruit and vegetable distribution, pottery making, batik and wood craft workshops. The town is famous for its traditional music heritage of the Kora jalis (griots), Brikama is known for wood carving and for its musicians. Local attractions include the Makasutu Culture Forest. Brikama is also home to numerous educational institutions including The Gambia College, which trains the nation's teachers, and the Regional Education Office for the Western Region of the country. In addition, there are four Secondary Schools (Kinderdorf Bottrop, Kunte Kinte, Maahad, and Methodist Academy) as well as a number of basic cycle schools.

Traditionally, municipalities have been considered the key actors in the collection of domestic and commercial wastes in the Gambia and among these the major ones are the Banjul City Council (BCC), Kanifing municipality council (KMC) and Brikama Area Council (BAC). Other municipalities like Kerewan, Mansankonko and Basse also collect wastes. Also where the coverage of the council does not reach, household owners do pay some private individuals to collect their waste. However, it is important to state that despite significant efforts within the last decades, the majority of municipalities in developing countries including the Gambia still cannot manage the growing volume of waste produced

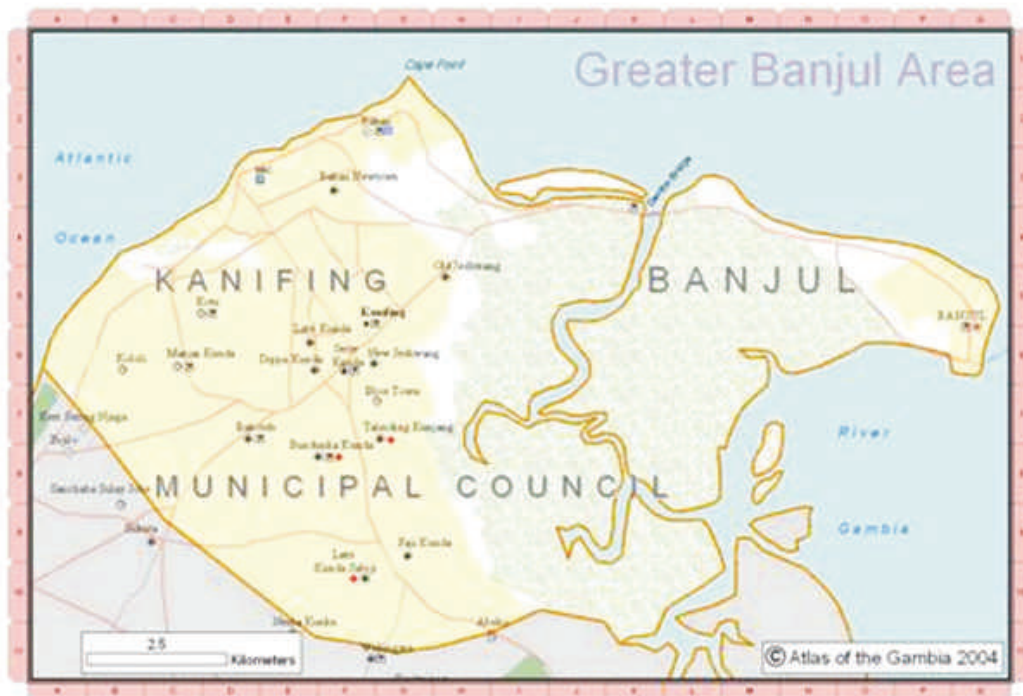


Figure 1: Greater Banjul Area. Yellow representing urbanized area



Map of Brikama

in their cities (Arnold van de Klundert 1995).

Solid waste from the city of Banjul is disposed off at the Mile 2 dump site, while that of Kanifing and Brikama municipalities are disposed at Bakoteh and Tambana dump sites respectively. However, all these places are merely open dumps and not sanitary landfills. As of 2002 the generation of solid wastes in the Kanifing municipality was estimated at 219 tons per day (Survey Report 2002).

Composition and Current Management System of Municipal Solid Waste (MSW) in Greater Banjul Area (GBA)

- a. *Composition:* Municipal solid waste (MSW) is a heterogeneous mixture of products with very different physicochemical properties. Its composition is variable and depends on the nature of the products, customs, the socioeconomic status, and the types of setting of the people. Six categories of waste have been identified within the greater Banjul area. These are organic matter, paper, cardboard, wood, rubber, glass, metals and textiles (Waste Survey Report, 2002).

Composition of MSW in GBA

The Table below gives the types of solid wastes generated in towns and growth centres of the GBA.

Table 1: Composition of Waste in The Gambia

Materials	Banjul (%)	Kanifing (%)	Brikama(%)
Sand	48.88	44.18	46.77
Organic	32.44	35.05	37.46
Paper/carton	9.19	11.42	8.52
Glass	1.48	2.22	-
Wood	2.35	0.18	5.37
Metals	1.40	3.11	1.71
Textile	2.25	2.44	0.17
Rubber	-	1.40	-
Other	2.01	-	-

Source: Solid Waste management study for GBA and Brikama---waste survey Report April 2002

b. *Generation:* Solid waste in the Gambia is generated from residences, industrial activities, commercial activities, institutions (schools, hospitals, prisons, governments centres), construction and demolition sites, Municipal services and agricultural activities and examples of solid wastes coming from such areas include food waste, plastics, paper, wood, yard wastes, batteries, metals, tires, glass, ashes, etc

In 2001, the average waste generation rate for BCC was 1.07kg per person per day and 0.54kg per person per day for KMC and BAC (Survey Report 2002). Solid waste in BCC, KMC and BAC has been projected to increase at the rate of 1% annually which is in line with that been assumed for

developing countries (Table 1,2). The quantity of municipal solid waste generated per day in BCC, KMC and BAC is approximately 748.0tons, as reported in 2010. It is expected that by 2020, this will have increased to 1,764.0 tons per day and in 2021, to 1,928. 5tons per day.(Survey Report,2002).

Waste generation in the Gambia is at its peak during the festive and rainy seasons and some parts of the dry season. In the festive season like Christmas , Tobaski and Koriteh (muslim feast) , the bulk of waste is composed of garbage (spoiled and left over food substances), plastics, paper, leaves, and e-wastes while in the dry and rainy season, agricultural wastes like grass, spoiled food, fruits and vegetable peels, form the bulk.

Table 2: Projections of population and Municipal Solid Waste Generation for the GBA from 2001-2021

Waste (tons /day)	BCC. Pop	Waste (tons /day)	KMC Pop	Waste (tons /day)	BAC Pop	Total waste generated (tons/day)	
2001	40,662	43.5	377,963	204.0	222,550	120.2	367.7
2002	40,459	43.7	402,531	219.5	244,616	133.4	396.6
2003	40,257	43.9	428,695	235.8	268,922	147.9	427.6
2004	40,056	44.1	456,560	253.8	295,696	164.4	462.3
2005	39,856	44.4	486,236	273.0	325,194	182.6	500.0
2006	39,656	44.6	517,841	293.6	357,702	202.8	541.0
2007	39,458	44.9	551,501	315.9	393,529	225.4	586.2
2008	39,261	45.0	587,349	339.8	433,021	250.5	635.3
2009	39,065	45.2	625,527	365.6	476,559	278.5	689.3
2010	38,870	45.5	666,186	393.0	524,565	309.5	748.0
2011	38,676	45.7	709,488	422.9	577,506	344.2	812.8
2012	38,483	45.9	755,605	454.9	635,898	382.9	883.7
2013	38,291	46.1	804,718	489.3	700,309	425.8	961.2
2014	38,099	46.4	857,025	526.4	771,373	473.8	1,046.6
2015	37,908	46.6	912,730	565.5	849,785	526.9	1,139.0
2016	37,718	46.9	972,057	608.9	936,317	586.6	1,242.4
2017	37,529	47.1	1,035,241	655.1	1,031,823	652.9	1,355.1
2018	37,341	47.3	1,102,532	704.6	1,137,247	726.8	1,478.7
2019	37,154	47.6	1,174,197	757.9	1,253,636	809.2	1,614.8
2020	36,968	47.8	1,250,520	815.2	1,382,145	901.0	1,764.0
2021	36,783	48.0	1,331,804	876.9	1,524,053	1,003.6	1,928.5

Source: Population based upon Municipal Database Report, UA-MTIP Studies, 2002

- c. *Storage*: Materials commonly used for the storage of solid wastes in the Gambia are plastic bags, empty sacks, old buckets, barrels, cartons, metal containers etc. These materials are without tightly fitting lids, not water proofed and not rust resistant and also not durable or strong enough to resist or discourage stray animals and scavengers from ripping them and also not durable. Source separation is not a common practice in most households in the Gambia therefore wastes are merely put together in different materials used for their storage.
- d. *Collection*: In most Gambian households waste is generated and stored for long without collection. In urban areas, different local authorities are responsible for collecting wastes from households and designated areas. In areas where the road network is poor, people do transport their wastes to temporal designated sites to be collected by the municipalities. Private individuals involved in waste collection include; Gomez Sanitary Services around the KMC, Kuyateh Cleansing Services in Serekunda, Metro Trash, and private scale smallhorse/donkey cart owners and wheelbarrow boys who charge D10:00 per waste load. The system of collection is both door-to-door and station type, where skips and trailers are placed in strategic locations for communal collection.
- e. *Transportation*: In the Gambia, different means of transportation are adopted for solid waste and these are in three categories: Human –powered(open hand cart, hand-cart with bins, wheel barrow and bicycle). Animal powered:(horse, cow and donkey carts) Vehicles : (trucks ,tractor and trailers).

f. Disposal:

Open dumping: This is the major method of disposal of solid wastes in GBA. Here the totality of the wastes generated in the GBA and Brikama do not receive final proper disposal (Survey Report 2002). Only a fraction of the wastes produced are collected, and these are disposed off at open dumps. Although Open dumping is usually the cheapest disposal method in developing countries like the Gambia, it however has a serious negative impact on public health and the environment. Strong leachates can pollute underground aquifers and surface waters in the vicinity of the dumps. Biological decomposition of organic materials generates methane, which can migrate and accumulate underground and accumulated methane can cause fires and explosions at the dumps and at any nearby buildings. Methane generation inside open dumps can continue for over 30 years. This therefore limits the future use of land that has open dumps even after they have been closed down, capped and covered with a layer of earth and landscaped. When methane is released into the atmosphere, it also contributes to global warming. Besides open dumping, other methods of disposal practiced in GBA include composting and incineration. Composting is not seen as a method of solid waste management but more as an agricultural practice. It is done principally at the rural settings where people usually dig big holes to put all the decomposable materials which they later take to their farms to serve as manure. This is done only on a small scale.

Incineration is done at major health facilities and Regional Health Management Team headquarters to incinerate hospital wastes such as needles, syringes, sharps etc. However not all hospital wastes in the country are incinerated. Some are also dumped openly at municipal dumps.

Waste reuse and recycling

Waste reuse is very common in the Gambia.

Some of the wastes reused are empty plastic water bottles used for storing water in the refrigerators at the home, selling of locally made juice such as “wonjo” and Baobab” and storing of traditional herbs and selling of oil in the markets. Tins and cans are used for measuring food stuffs such as rice, beans, millets, corn, etc in markets. Big tomato cans are converted into sieve frames for sifting flour and other ground or pounded cereals. Old clothes such as jeans are weaved in to ropes used for tying animals such as sheep and goats. Thick nylons are also processed to make shopping bags and slippers and left over fabrics from tailoring shops are processed to make foot mat used in homes. Recycling is done locally only on a small scale in the Gambia, mostly by blacksmiths who collect empty aluminum canned drinks to make cooking pots, spoons, colander, and grillers. They also use metal scraps to make charcoal stoves that are locally used for cooking.

Discussion

Municipal solid Waste management is a pressing issue facing many developing countries like the Gambia, since about 90% of waste is currently disposed of by open dumping (Sanneh et al 2011). The collection, transportation, and disposal of MSW in the Gambia are unscientific and chaotic, left entirely under the care of municipalities. The GBA and Brikama face serious problems regarding the insufficient collection and improper disposal of solid wastes. Insufficient collection and improper disposal lead to land, water and air pollution, as well as, pose risks to human health and the environment.

Uncollected wastes often are dumped at the nearest open space or burned by residents in areas that lack refuse collection. The wastes are not compacted or covered with layers of earth. Uncollected wastes dumped in open spaces, streets, or on environmentally sensitive areas, such as near mangroves, often create ideal breeding grounds for pathogens and can contribute to the spread of communicable diseases. Uncollected solid waste also has a

potential to promote the reproduction of vectors of diseases such as cockroaches, rats, flies, and mosquitoes. During rainy season, wastes can clog drains and cause floods.

Uncontrolled burning of refuse in open spaces leads to air pollution which in turn creates toxic gaseous emissions such as Dioxin and furans, especially when burning plastics and these are carcinogens. Fires on disposal sites as a result of methane gas can generate smoke causing major air pollution and reducing visibility. It also makes disposal sites dangerously unstable, causing explosions and the fire can even spread to adjacent property.

The fact that waste is not sorted at source also continues to add to the mounting problem of its management. Unfortunately, the situation is further compounded by the poor attitude of the public towards waste management, the acute shortage of collection vehicles, tools and equipment, as well as, the lack of heavy machinery to remove waste from the traditional dumps. Currently KMC has only 17 old tractors, 5 trucks and one skip truck, all of which have actually outlived their economic lives. If efficient waste collection and disposal is to be assured these vehicles need to be replaced with new ones. Consequently the routine house to house collection of waste is now almost not feasible considering the twenty five markets and major streets and highways that have to be serviced daily (KMC Report, 2015). Attempts have been made to clear waste by door-to-door collection using dumper trucks. However, this has proven unsustainable, for the trucks are expensive to buy. KMC is responsible for waste collection and disposal but cannot afford the resources.

However, proper management cannot be achieved without a well-designed waste management plan. Integrated Solid Waste Management (ISWM) system has been proposed as an option, and this is a comprehensive waste prevention, recycling, composting and disposal program. An effective ISWM system considers how to prevent, recycle, and manage solid waste in ways that most effectively protect human health and the environment. Also, according to Rossel and Jorge (1999), waste management

planning strategies should advocate avoiding waste generation, using cleaner technology, promoting waste recycling and recovery, using suitable treatment for generated waste and also adequate final disposal of the waste.

At the core of the problem of solid waste management is an absence of policies, legislations, and an environmentally stimulated and enlightened public. Government policies on the environment are piecemeal where they exist and are poorly implemented. Public enlightenment programs lack the needed coverage, intensity, and continuity to correct the apathetic attitude of the public towards the environment. Successful solid waste management will require a holistic program that will integrate all the technical, economic, social, cultural, and psychological factors that are often ignored in solid waste program.

The waste collection system used in the Gambia is not regular, it does not separate waste and there are not enough vehicles to cover a large area. As a result, there is indiscriminate disposal of waste within neighborhoods and commercial areas. In most Gambian households waste is generated and stored for long periods without being collected. Waste collection should include not only the gathering or picking up of waste from the various sources but the hauling of the wastes to locations where contents of the collection vehicle are emptied. However, proper management cannot be achieved without a well-designed waste management plan. Several means exist in which the amount of solid waste going to a landfill can be reduced, such as incineration with energy production, composting of organic wastes, and materials recovery through recycling, which are all considered sustainable methods by which to manage MSW (Troschinetz 2005).

It has been argued that the effectiveness of solid waste management in a city is one of the indices for assessing good governance (Whiteman et al, 2001). A major focus of the millennium development goals (MGDs) is on poverty reduction, while in most countries of the world, waste strategies aim at increasing recycling rates (Hassan et al 2005; Wilson et al 2006). It has been noted that in some countries of the world, the contribution of the informal

recycling sector towards the attainment of these goals could be significant (Coad 2006; Medina 2006). Recycling of Municipal Solid Waste (MSW) in the Gambia possesses development potential (Sanneh et al 2011). Recycling in the broadest sense encompasses the full range of resource recovery and reuse techniques including repair, manufacture, materials recovery and energy conversion of refuse materials (Ologbobo, 1994). Recycling is an essential element of sustainable waste handling (Anonymous, 1997). Sustained economies for countries and cities have been achieved through recycling.

Conclusion

Municipal solid waste management in the Gambia is still far from being efficient. In recent years, a significant increase in MSW has been recorded in the Gambia, yet there is still no efficient system for its treatment. Looking at the composition of MSW in GBA, to effectively manage those wastes, segregation should be done first. The non biodegradables should be reused and recycled, the organic waste should be composted. This will help to reduce the quantity of waste going to the dumps as well as solve the problem of collection and transportation. Attempts should be made to educate and mobilize society to segregate recyclables to produce satisfactory results. Society's awareness in this field needs to be raised. The inadequate information on quantification and characterization of waste; and the negative health, social, economic, and environmental impact of MSW management is a common occurrence in the Gambia. Waste management so far in the Gambia has not properly integrated other factors like collection, treatment, supply for reuse, reprocessing, and final disposal. The system has also not delivered optimum economic and environmental results for now and has not provided enough room to adapt to future pressures. The rapid increase in the volume of unattended solid wastes with the associated risk to human health is a source of concern. There is also a steady increase in the cost and logistical difficulties of municipal

solid waste management. This has been putting increasing pressures on the infrastructure and authorities responsible for the management of solid waste. Open spaces for the dumping of wastes are diminishing and there is difficulty in finding suitable sites. It is therefore necessary to look for and implement long-term integrated waste management strategies like recycling plants that ensure a sustainable approach for waste management services.

To meet the goals of sustainable society and to respond to a growing concern over the environmental impacts of MSW, an integrated solid waste management system should be instituted. Recycling of materials lessens environmental burdens, lowers the costs of waste disposal, and reduce dependence on resources and can also create job opportunities and increase our GDP. The recycling system should be integrated to the point that communities, local garbage collection teams, scrap dealers can all work together in a seamless fashion to carry out recycling activities.

Recently, the government of the Gambia has banned the use and importation of plastic bags in an attempt to manage plastic wastes. This will help to reduce the quantity of plastic wastes generated as well as the health hazards associated with indiscriminate burning of plastic wastes.

An irregular and unreliable collection service still exists. This means that there are shortcomings in the existing SWM system that needs correction. To effectively manage MSW in the Gambia, proper and sustainable collection mechanisms should be available to have a lasting solution, thus we propose the use of motor bicycles with trailers. Motor bicycles are cheaper and easier to maintain, while the trailers can be made locally. The introduction of motor bicycles with trailers, along with separation of waste and establishment of a recycling plant would help to solve the waste management problem in the Gambia. Some of the streets are narrow and inaccessible, it is hoped that with motorbikes and trailers, the entire municipality can be accessed. Also several proposals have been made to rehabilitate the Bakoteh dump site and to introduce recycling but these are yet to be implemented.

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