

Categories of Waste Recovered by Ragpickers from Garbage Dumps in Bamako, Mali

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ABSTRACT

Bamako's landfill sites are becoming more and more like vast construction sites, with several players carrying out different activities. This study was carried out with a view to identifying the players involved and the categories of waste recovered by them from the said landfills.

A participatory descriptive survey was carried out at four (4) landfills in June 2018 in Bamako. Among the interviewed actors we have reclaimers (93.3% of actors), wholesalers and recyclers (artisans) who, together, contribute to giving a second life to reclaimed objects.

The quantity of objects recovered per day by a ragpicker on the dumps was between 10 and 20 kg. Aluminum objects were the most sought-after (60% of cases) among scrap metals. Aluminum, bronze and copper objects were transformed into jewelry and other decorative items by craftsmen. Glass bottles are recovered for reuse. Plastic waste (PET and PVC) was recycled by household goods manufacturing units. Food leftovers were mainly sorted by women. The players set up a recovery system that resembles a circular economy principle.

Keywords: *Categories, waste, ragpickers, dumps, Bamako.*

1. INTRODUCTION

The daily production of household waste in the city was 2100 m³/day in 2005, with a collection rate of 60% [1]. Household waste has become a public health problem in urban centers, particularly in Bamako. This is why its management has become a major concern for the Malian authorities.

The growth of the city of Bamako and the non-application of various rational urban waste management strategies are the main sources of insalubrity [1].

Solid waste management encompasses a number of important practices to ensure environmental sanitation.

Collection and evacuation to landfill sites are carried out by a range of actors, including MSEs, road workers and "Ozone" (Moroccan company).

Garbage deposited in municipal containers is removed by municipal vehicles. Garbage collected from households is taken directly to the city's landfill sites. Landfill remains the most common method of waste disposal. However, it is not without consequences. In fact, the absence of an improved landfill for treatment leads to a number of nuisances, including air, soil and water pollution.

When it comes to waste disposal, another option is to recycle waste [2].

In fact, a large number of people work on Bamako's landfill sites. They are involved in the recovery of end-of-life objects. This

helps to reduce the amount of waste on landfill sites, cut the cost of waste treatment and improve the quality of life for the local population.

However, little is known about the various professions and recovery practices used by those working on these sites.

As part of the internalization of waste, these players deserve support from the government.

The stakes involved in waste recovery are all the higher, as activities on landfill sites need to be better supervised.

The aim of this study is to describe the role of ragpickers in waste management in Bamako, and to identify the typology of objects recovered.

2. MATERIALS & METHODS

2.1. Methods

A descriptive survey was carried out at four (4) sites comprising three (3) active landfills and one decommissioned (out-of-service) landfill. The sites in operation were Badalabougou (commune V), Lafiabougou (commune IV) and Médina-coura (commune II), while the former Boukassoumbougou site (commune I) was no longer in operation.

Interviewees were randomly selected from the landfills, regardless of sex or age, 10 per site, for a total of 40 people.

The questions asked enabled us to identify the players and their role in waste management at Bamako's landfill sites. Questions concerning the actors' professions, the recovery and sale of objects, the actors' health situation and their roles were addressed.

A semi-structured questionnaire was used to gather essential information. It is arranged in such a way as to facilitate the collection of information. Information is either quantitative [N] (figure or percentage) or qualitative [Q]. The data collected was summarized, illustrated with photos and commented on using information from the field visits.

2.2. Materials

The equipment used for the landfill activity survey included a questionnaire, camera, markers, Garmin GPS (GPSmap76CSx), field survey sheets, list of landfills, laptop computer, SPSS software (IBM SPSS Statistics 21.0).

3. RESULT

3.1. Garbage collection and transport to landfills

Garbage collection and transportation to landfill sites are handled by a number of players, including urban services, private services and other government technical structures.

The diagram below (Fig.1) describes the collection and transportation circuit for household waste in the city of Bamako. Garbage is collected from households either through voluntary drop-off or door-to-door collection.

Garbage deposited in municipal containers is then removed by road vehicles to landfill sites in the city. Garbage collected door-to-door by MSEs is transported directly to the city's landfill sites.

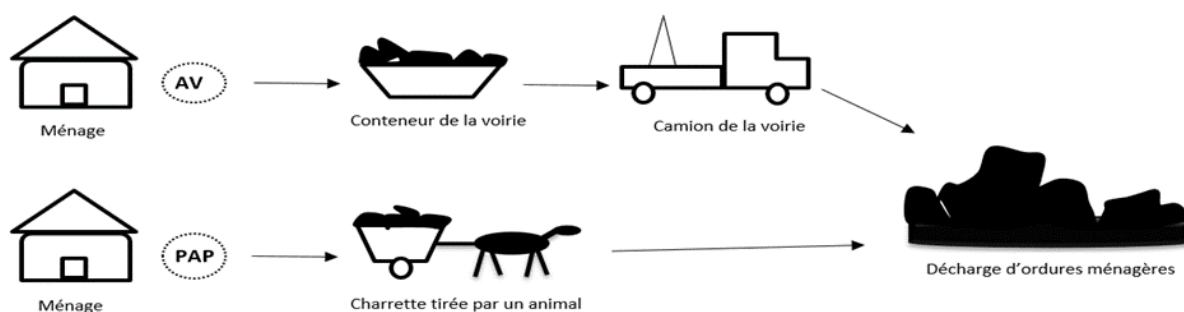


Fig. 1: Descriptive diagram of the organization of household waste management in Bamako, (Source: Adamou, 2021)

3.2. People working on landfill sites

A large number of people working in a variety of occupations have been observed on the sites. However, it is very difficult to estimate the number of people involved, as there is no satisfactory census to date. The majority of those questioned (76.7%) said they didn't know exactly how many people worked on the sites.

The people working on the sites are both male and female. In fact, 73.3% of workers were women, compared with 26.7% men. Children (of both sexes) often accompanied their mothers to the sites.

Men and women were involved in the same activities. However, the women were the most numerous livings on the sites in makeshift sheds next to which they frequently stored and resold plastic waste.

Actors on the sites varied in age, with 60% married and 30% single. The number of children per actor ranged from 0 to 8. Most of the children did not attend school. This explains the high presence of children on the sites.

3.3 Reasons that led people to work in the various occupations on the landfill sites

There are many and varied reasons why people engage in a given activity on the sites. Extreme poverty was singled out as the main cause encouraging actors to carry out their activities on the sites (90% of cases). A large proportion of the players had no schooling and had never received any vocational training.

So, to support their families, many chose to work on the dumps. What's more, many of them (mostly men) came from villages in the Mopti region in search of a better future. Since 2013, the populations of the central regions have been facing major problems of insecurity due to inter-community conflict, terrorism and famine. What's more, in the current context of our country Mali, it's difficult for young people leaving the regions to find work. All these factors could explain the presence of these nationals in large numbers on the rubbish dumps.

Most players discover the environmental impact of waste recovery later on. The women remain convinced that they will be able to better organize their businesses if they obtain more support and recognition from the country's authorities.

3.4. Working hours per day on the sites

Work on the sites took place almost every day, and for long hours. The maximum daily working time on the sites was 11 hours.

Most of the players (93.3%) on the sites were reclaimers, wholesalers and traders, according to the investigations.

Reclaimers sell items to wholesalers, who in turn resell them to retailers. The wholesalers in turn sell to local craftsmen and industries. Some items are sold by retailers to be reused for other purposes.

The vast majority (66.7%) had been working on the sites for more than two (2) years, while the minority had been working on the sites for between 3 and 6 months.

The strong presence of workers on the sites was observed in the mornings between 9 and 10 a.m., and during the unloading of road service vehicles. In fact, 60% of reclaimers worked individually and on their own account, compared with 40% who worked in groups. Wholesalers also employed reclaimers.

A wholesaler may employ several young people as ragpickers in conditions akin to a form of slavery. The most vulnerable are exploited without any time off, often during the day.

3.5. Categories of waste recovered from garbage dumps in Bamako

The proportions of waste categories recovered depended on their possible uses. Each ragpicker collected around 10 to 20 kg of items per day, most of which were destined for sale, or for recycling on or off the sites.

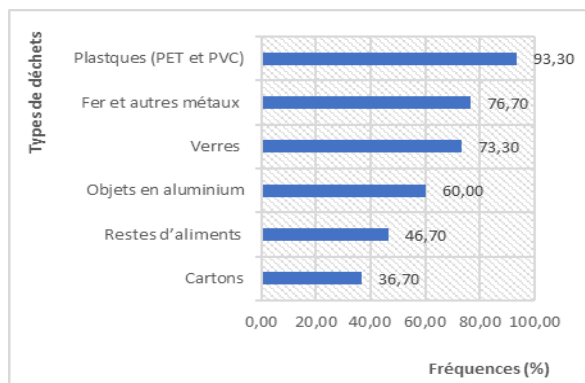


Fig.2: Types of waste identified in the depots

3.6.1. Food scraps



Fig. 3: food scraps recovered from the Badalabougou site (Source: Adamou, 2021)

3.6.2. Plastic articles

Plastics were the items most frequently recovered from landfill sites. Women were the main actors in the recovery of plastic objects. The type of plastic objects recovered depended essentially on the needs of the buyers. However, most of the objects consisted of white sachets, old mineral water and bleach cans (Fig. 4).

Food scraps were much coveted by women on the dumpsites. They sorted them and left them to dry on plastic supports recovered from the dumps. They consisted of leftover cooked rice, millet paste and bread. After drying, they were packed in 50 or 100 kg plastic bags and sold to cattle breeders or taken home by the ragpickers to feed their animals.

However, we noticed that some reclaimers were feeding on out-of-date and/or expired canned goods. The photo below shows food scraps (bread, rice, etc.) spread out on old plastic mats for drying

Recycling was based on an “open” cycle. The cleanliness of a recovered object was often one of the factors that guaranteed its good quality to buyers. To this end, women did not hesitate to soak them in any kind of water to rid them of sand and other impurities, at the risk of being infested by microbes from unhealthy waters.



Fig.4.: Recovered plastics made from old bleach packaging and white sachets (Source: Adamou, 2021)

3.6.3. Metal items

Men were much more likely than women to salvage metal objects from rubbish dumps. Items were compacted and sold by the kilogram. Aluminum, bronze and copper objects were mainly sold to small craftsmen who transformed them into jewelry and other decorative items (Fig. 5 - B).

Blacksmiths also made kitchen utensils from recycled and melted-down beverage cans (Fig 5 - A). Iron objects were sold to

large craftsmen who transformed them into wheelbarrows, ploughs, knives and other kitchen utensils.

With the opening of the market to China, wholesalers prefer to sell their goods to the Chinese at high prices.

In Bamako, to make their investment profitable, some Chinese have preferred to set up local recycling factories that manufacture concrete reinforcing bars from recycled iron items.



Fig.5: Device for melting beverage cans (A) and jewelry made from recycled objects (B)

3.6.4. Other articles recovered from garbage dumps in Bamako

Another type of player has appeared on landfill sites in recent years. These are animal hide and horn reclaimers from

Nigeria and Ghana. These entrepreneurs recover horns and skins, which they transform into feed for captive-bred fish (Fig. 6).



Fig. 6: Recovered animal horns (A) and pieces of animal skins (B)

3.6.5. Daily earnings and expenses of ragpickers

Reclaimers and other actors earned 1,000 FCFA per day. On rare occasions, some actors earned as much as 5,000 FCFA. However, there were days when they received nothing. In terms of expenses, the reclaimers spent around 1,500 FCFA a day on food, water and transport. They spent

around 1000 FCFA a month on medical care. Because of poverty, they preferred to seek treatment from therapists rather than visit health centers.

3.6.6. Medical care for ragpickers and animals used to transport garbage

Waste pickers on rubbish dumps face major health problems. Illnesses commonly

contracted by these people include respiratory diseases, dermatitis, malaria, typhoid fever and tuberculosis. The lack of preventive measures increases the risk of serious illness. The majority of those interviewed (90%) stated that the costs of healthcare are borne by themselves, and confirmed that they do not receive any support from the Malian government for healthcare.

The carts are frequently overloaded, exhausting the animals and causing injuries to their flanks (Fig. 6 - A). The donkeys used suffer greatly because of the poor treatment.

International NGOs such as SPANA-Mali, whose mission is to protect draught animals, provide medical care and follow-up for the animals used to transport household waste to landfill sites (Fig. 6 - B).



Fig. 7: A donkey in difficulty (A) and a vehicle belonging to an NGO that cares for donkeys (B)

3.7. Other landfill activities

3.7.1. Composting

On landfill sites, we've seen people sifting through waste to obtain a finer fraction, which they then piled up and sold as compost. The people producing this compost took no account of the moisture content or the quality of the substrate. They mainly referred to the color (black) of the substrate when choosing it. Whereas the black color of the waste can be attributed to charcoal. It is clear that if these people were trained in composting techniques, they could contribute to the development of the sector and generate more income.

3.8. Animal husbandry

The practice of livestock rearing on landfill sites is one of the most surprising activities, given the incalculable number of dangers to which the animals may be exposed. However, this practice was visible at the Lafiabougou landfill and at the former Boukassoumbougou site (Fig. 8).

The animals often stayed in their enclosures, where they received scraps of salvaged food. Sometimes, shepherds would walk them around the dumps during the day and bring them back to their pens in the afternoons. On landfill sites, animals can consume more plastics than anywhere else.



Fig. 8: Animals in enclosures on landfill sites

3.9 Difficulties encountered by on-site ragpickers

The difficulties encountered by reclaimers on the sites are numerous. The main ones are multiple illnesses contracted on the sites, the lack of organization and recognition of the reclaimers' profession, and extreme poverty.

On the sites, 73% of reclaimers have already been injured, and 86.7% have contracted an infectious disease on the sites. Personal protective equipment (PPE) is not used by reclaimers on the sites, according to those interviewed (76%). The government has never organized a vaccination campaign or an awareness-raising campaign on the health risks associated with working on landfill sites.

DISCUSSION

In 2008, the quantity of waste evacuated to landfill sites in Bamako was only around 1,500 m³/day, representing around 60% of the quantity produced [3]. In 2016, Ozone-Mali, a Moroccan company which ensures the delegated management of cleaning services in the city of Bamako, collected an average volume of 2,709 m³ of waste per day [4]. The collection rate is estimated at 54% in 2010 according to DSUVA [5].

After collecting the waste at the household level, it is then deposited in landfills where men and women work as rag pickers. Women are the most numerous actors on the dumps. Indeed, a study carried out in 2022 revealed that 90.5% of the ragpickers encountered were women [6].

The composition of the objects recovered by ragpickers from landfills in Bamako is very varied. Based on their biochemical nature, we can cite:

- on the one hand, the biodegradable type, including slaughterhouse waste and food waste, the latter being little recovered by ragpickers [7]. According to one study, household solid waste from developing countries that ends up on landfill sites consists mainly of fermentable matter (67%) [8];

- On the other hand, the non-biodegradable type, including glass, sand, ceramics, non-biodegradable plastics, rubber, etc. Among these, plastic and metal objects are the most popular in landfills in Bamako due to the possibilities of recovery. Most objects sold to intermediary players and other companies are composed of these elements.

The composition of objects generated by populations is also influenced by the typology of households and the standard of living of the populations [9].

The recovery of biodegradable objects such as animal skins and horns is recent in the capital of Mali. Until now, this recovery is largely practiced by foreigners who transport them to neighboring countries. However, there are craftsmen who are interested in horns to make decorative objects.

It is obvious that plastic objects are the most collected in dumpsites. Once collected, they are generally transformed into granules by small units on landfills, before being transported to large processing units. They were made of polyethylene material; some are high density and used for the manufacture of milk or bleach bottles and others are low density like those used for the manufacture of plastic bags. There are also plastics based on polyethylene terephthalate ethylene which are used for packaging alcoholic beverages, juices and water; polyvinyl chloride (PVC) and polystyrene, etc. [9].

In Bamako, the plastic objects sold are transformed into tanks for water storage, buckets and other materials used in construction and in households.

Although the incorporation of these plastic objects into the economic cycle is beneficial, this type of waste can cause damage to the environment and human health. Aware of the danger that plastic waste can represent, the Malian authorities promulgated Law No. 2014-024/ of July 3, 2014, which prohibits the production and marketing of non-biodegradable plastic bags

in the Republic of Mali. However, the authorities are struggling to implement this Law, which, from an environmental point of view, could constitute an effective legal tool in the fight against various pollutions and the degradation of ecosystems.

The recovery of metal objects is very profitable. In general, it is MSEs agents who collect household waste and itinerant buyers of used metal objects who collect it. Blacksmiths and construction equipment manufacturing plants recycle these materials. Metal drums and aluminum objects are the most recycled by blacksmiths.

Landfills can provide more opportunities for the private sector and even the state. However, no steps have yet been taken to formalize the sector. It is obvious that, economically speaking, it is the resellers who generate the most income. Despite the dangers to which women and children are exposed on the dumps, they do not benefit from their efforts.

It is undeniable that waste pickers face several dangers when carrying out their profession. It is common to suffer injuries and infections on dumpsites.

Injuries occur through cuts, which can be prevented by wearing personal protective equipment. Tuberculosis and other respiratory infections are the most feared diseases.

Mycobacterium tuberculosis contamination occurs by inhalation in most cases. This information was corroborated in 2012 by researchers who reported that *Mycobacterium tuberculosis* is only transmitted by air [10]. However, some species of *Mycobacteria* invade the skin causing *cutaneous tuberculosis*. During a descriptive study in Bamako on 4269 files, 61 cases of *cutaneous tuberculosis* were recorded [11].

CONCLUSION

The activities carried out at these landfills make a major contribution to improving the living conditions of workers. They reduce

the amount of waste generated and dumped, with negligible environmental impact.

The ragpickers take part in a process of recycling these objects, creating eco-industrial park configurations in which services and products are exchanged. Landfills can offer more opportunities for the private sector if activities are properly organized and coordinated. However, the potential risks to the health of those involved are still a cause for concern, and must be kept under control if the ragpicker's trade is to become more viable in the long term.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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