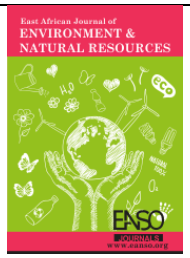

East African Journal of Environment and Natural Resources
eajenr.eanso.org
Volume 8, Issue 1, 2025
Print ISSN: 2707-4234 | Online ISSN: 2707-4242
Title DOI: https://doi.org/10.37284/2707-4242

EAST AFRICAN NATURE & SCIENCE ORGANIZATION

Original Article

The Role of Youths in Promoting Sustainable Waste Management Practices in Bujumbura, Burundi

Irumva Emmanuel[1*], *Robert Turyamureeba*[1] *& Prize Tayebwa*[1]

[1] Bishop Stuart University, P. O. Box 09, Mbarara, Uganda.
[*] Correspondence ORCID ID; https://orcid.org/0009-0000-0252-3217; Email: irumva2015@gmail.com

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

Date Published: *08 May 2025*

Keywords:

Youth, Sustainable, Waste, Management & Burundi.

ABSTRACT

The inefficiency of waste management services in Bujumbura persists despite the efforts of the Burundian government through the National Sanitation Plan. This can be attributed to various factors such as the city's rapid population increase, unchecked urbanization, economic activity, and insufficient environmental governance and technical capacities. With an emphasis on the role of youth, this study examines the prospects and problems in Bujumbura, Burundi's solid waste management industry. To create an inventory of the challenges brought on by the city's distribution of municipal solid trash, we conducted an on-site visit between March and June of 2024 where we interacted with waste managers and observed the management of solid waste across the three municipalities that make up Bujumbura (Ntahangwa, Mukaza, and Muha). We also used the survey method, whereby 80 questionnaires were given to 80 randomly selected city residents who had stayed there for at least one year. The survey findings were examined both quantitatively and qualitatively in graphical form. We then used SPSS 22 to handle the descriptive and analytical statistics of this study. Key findings point to a reasonable acknowledgement of youth's critical role in waste management. Still, they also draw attention to important obstacles such as a lack of funding, a lack of government backing, and the limited success of educational initiatives. The research highlights the necessity of improving educational programs, allocating more resources, fortifying regulations, providing thorough training, and fostering better stakeholder participation. Adopting an integrated strategy that acknowledges and incorporates unofficial garbage collectors, encouraging community involvement, and making investments in contemporary infrastructure are among the recommendations. To increase youth involvement and raise the general effectiveness of Bujumbura's waste management procedures, our study calls for focused interventions and policies.

APA CITATION

Irumva, E., Turyamureeba, R. & Tayebwa, P. (2025). The Role of Youths in Promoting Sustainable Waste Management Practices in Bujumbura, Burundi. *East African Journal of Environment and Natural Resources*, *8*(1), 374-388. https://doi.org/10.37284/eajenr.8.1.2966.

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

CHICAGO CITATION

Irumva, Emmanuel, Robert Turyamureeba & Prize Tayebwa. 2025. "The Role of Youths in Promoting Sustainable Waste Management Practices in Bujumbura, Burundi". *East African Journal of Environment and Natural Resources* 8 (1), 374-388. https://doi.org/10.37284/eajenr.8.1.2966

HARVARD CITATION

Irumva, E., Turyamureeba, R. & Tayebwa, P. (2025) "The Role of Youths in Promoting Sustainable Waste Management Practices in Bujumbura, Burundi", *East African Journal of Environment and Natural Resources*, 8 (1), pp. 374-388. doi: 10.37284/eajenr.8.1.2966.

IEEE CITATION

E., Irumva, R., Turyamureeba & P., Tayebwa "The Role of Youths in Promoting Sustainable Waste Management Practices in Bujumbura, Burundi", *EAJENR*, vol. 8, no. 1, pp. 374-388, May. 2025. doi: 10.37284/eajenr.8.1.2966

MLA CITATION

Irumva, Emmanuel, Robert Turyamureeba & Prize Tayebwa. "The Role of Youths in Promoting Sustainable Waste Management Practices in Bujumbura, Burundi". *East African Journal of Environment and Natural Resources*, Vol. 8, no. 1, May 2025, pp. 374-388, doi:10.37284/eajenr.8.1.2966

INTRODUCTION

According to the World Bank (2016), 2.01 billion tons of solid garbage are produced worldwide annually. Global garbage generation per person each day averages 0.74 kg, although it can vary greatly depending on living standards, ranging from 0.11 to 4.54 kg. Roughly 34% (683 million tons) of this waste is produced in high-income countries. Solid trash generation is minimal in low-income areas like South Asia, the Middle East, and Sub-Saharan Africa. Nonetheless, by 2050, the World Bank predicts that the generation rate will quadruple. Household garbage and associated materials are frequently produced by various anthropogenic activities (Miezah et al., 2015).

Numerous studies revealed that in developing nations, families generate between 55 and 88 percent of the garbage produced, with the commercial or market sectors producing the remaining 10 to 30 percent (Nabegu, 2010; Nagabooshnam, 2011; Okot-Okumu, 2012). In developing nations, solid waste management could seem less of an issue than air or water pollution (Jules, 2015). In urban areas, waste management has grown to be a significant issue that requires storage, collection, transportation, and ultimate treatment or disposal (ADB 2002; Kaseva & Mbuligwe 2005; Okot-Okumu & Nyenje 2011; Rotich et al., 2006). Solid waste management is a major challenge and a direct contradiction to sustainable growth and ecological responsibility in the majority of DC cities (Zalissa, 2013).

The management of solid waste is becoming increasingly difficult due to a rise in its generation (Al-Katib et al., 2010). Solid waste management is therefore essential. The control of the generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a way that complies with the highest standards of engineering, economics, public health, conservation, aesthetics, and other environmental considerations while also being sensitive to public opinion is known as solid waste management. Solid waste management, however, is frequently disregarded (Masood et al., 2013). Concerns with solid waste management in Burundi include improper trash disposal, ineffective waste collection, and a shortage of disposal facilities (Matunog & Awa, 2013; Senate Economic Planning Office, 2017).

Furthermore, improper solid waste management can lead to many socioeconomic issues, environmental issues such as air pollution and flooding, water and soil contamination, and health risks for locals (Abu Qdais, 2007; Sharholy et al., 2008). The Southeast Asian archipelago nation is called Burundi. Due to its big and youthful population, growing middle class, and growing urbanization, it has a dynamic and fast-growing economy (World Bank, 2020). In light of this, Burundi's production of solid waste

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

likewise rises (Castillo & Otoma, 2013). Solid waste is any abandoned residential, commercial, non-hazardous institutional and industrial garbage, street sweepings, building debris, agricultural waste, and other non-hazardous/non-toxic solid waste, according to Republic Act No. 9003 (Ecological Solid Waste Management Act of 2000). It is also clear that the production of solid waste is rising elsewhere. The World Bank (2019) projects that by 2050, the amount of garbage generated globally will have increased from 2.01 billion tons in 2016 to 3.40 billion tons yearly, a 70% increase. The management of solid waste is becoming increasingly difficult due to a rise in its generation (Al-Katib et al., 2010).

The fast rise in trash generation has made solid waste management (SWM) an urgent global concern. The World Bank (2016) estimates that the global waste creation rate is 0.74 kg per day per person, or 2.01 billion tons of solid waste generated annually. However, depending on living levels, this number fluctuates greatly, ranging from 0.11 to 4.54 kilograms each day. Despite making up a smaller portion of the world's population, high-income countries are accountable for about 34% (683 million tons) of the waste produced worldwide. By comparison, low-income regions like the Middle East, South Asia, and Sub-Saharan Africa produce less garbage than they do now, but by 2050, waste creation in these regions is predicted to increase thrice (World Bank, 2019).

Households in developing nations are the main producers of solid waste, making up 55% to 88% of all waste generated, with the commercial or market sectors following at 10% to 30% (Nabegu, 2010; Nagabooshnam, 2011; Okot-Okumu, 2012). Even while solid waste management in developing country urban centres presents a greater problem than air or water pollution, it is still a substantial challenge. These involve handling garbage in ways that frequently violate ecological prudence and sustainable development principles, such as during storage, collection, transportation, and final disposal (ADB, 2002; Kaseva & Mbuligwe, 2005; Okot-Okumu & Nyenje, 2011; Rotich et al., 2006; Zalissa, 2013).

Context

Burundi is an East African country. Due to its big and youthful population, growing middle class, and growing urbanization, it has a dynamic and fast-growing economy (World Bank, 2020). In light of this, Burundi's production of solid waste likewise rises (Castillo & Otoma, 2013). The term "municipal solid waste" (MSW) is typically used to describe a diverse range of wastes generated in urban areas, with variations in their composition across different regions. The features and amount of solid waste produced in an area depend not only on the standard of living and way of life of the local populace but also on the number and kind of natural resources found there. It is also clear that the production of solid waste is rising elsewhere. The World Bank (2019) projects that by 2050, the amount of garbage generated globally will have increased from 2.01 billion tons in 2016 to 3.40 billion tons yearly, a 70% increase.

Burundi is a prime example of these solid waste management difficulties. Solid waste output is increasing due to a fast-urbanizing population and expanding middle class (Castillo & Otoma, 2013). The economic city of Bujumbura experiences serious environmental and health issues as a result of citizens disposing of rubbish in streets and rivers due to sporadic waste collection. These include the spread of vermin, tainted water supplies, deforestation, and air pollution, all of which raise the risk of sickness and make people more susceptible to the consequences of climate change.

Innovative solutions and immediate attention are needed for Bujumbura, Burundi's expanding solid waste management problem. Solid waste management is crucial, but it is frequently disregarded, which leads to inappropriate disposal, ineffective trash collection, and inadequate disposal facilities (Masood et al, 2013; Matunog & Awa,

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

2013; Senate Economic Planning Office, 2017). Significant health risks, environmental difficulties like soil and water contamination, air pollution, and socioeconomic problems like flooding have resulted from this negligence (Abu Qdais, 2007; Sharholy et al., 2008; Senate Economic Planning Office, 2017). In reaction to these difficulties, young people's potential to advance environmentally friendly trash management techniques is becoming increasingly apparent. Young people, who make up a sizable and vibrant portion of the population, are in a good position to spearhead change via creative and long-lasting solutions. However, because they don't formally participate in waste management programs, their potential is still underused. Thus, the purpose of this study is to investigate how young people in Bujumbura, Burundi, might support environmentally friendly trash management techniques. This research intends to identify ways to harness young potential in tackling the crucial issue of solid waste management in the region by analysing the opportunities and challenges for youth engagement. The general and specific objectives of this report are to assess the contributions, challenges, and strategies for proper waste management practices, especially by the youths in Bujumbura, Burundi.

LITERATURE REVIEW

Yoshida (2012) identifies four phases in the global history of garbage management. Ensuring public health and establishing waste collection and transportation services in cities are the initial steps. To minimize the negative effects on the environment, the collected solid waste must be disposed of appropriately in the second phase. Reducing the final waste volume and introducing intermediate processing technologies is the third phase. Creating a material cycle society or circular economy is the fourth step toward managing waste and using resources wisely for sustainable development. Public health in the city of Bujumbura is essentially guaranteed by the adoption of institutional sanitation and hygiene policies, as well as legal and regulatory documents.

Furthermore, Mizero et al. (2015) point out that the collection of HRW has improved dramatically (46%), considering that in 2010 the municipal technical services only gathered 8% of the HRW before turning over these obligations to private operators. The reason for the collection's efficiency is the rise in private investors' interest in garbage transportation and collection following the progressive departure of municipal technical services from this market. But the issue of how they will ultimately dispose of the garbage they collect comes up.

As Burundi recovers from protracted decades of civil conflict, the government has been investing since 2005 in the expansion of socioeconomic infrastructures to provide modern areas where people can easily conduct their daily lives. Ten contemporary public markets, arranged from north to south, can be found in Bujumbura alone. They are located at Kinema, Kamenge, Niagara, Jabe, Buyenzi I (sometimes called "Ruvumera"), Buyenzi II ("said at Siyoni"), a portion of the Central Market, Cotebu, Kinindo, and Kanyosha. Despite ignorance of the quantity generated and the quality of its composition, the activities conducted in these public facilities and from other sites generate large volumes of garbage per day. Planning a solid waste management system, however, requires an understanding of the amount of trash generated in a particular setting to more accurately estimate the size of the waste storage centre and collection and treatment facilities (Charnay, 2005; Aina, 2006). Determining management strategies and potentially advancing treatment and recovery channels are made feasible by understanding the waste's qualitative makeup (Aloueimine, 2006).

Thus, it is essential to establish infrastructures with cutting-edge amenities to enable the measurement and qualitative analysis of the trash generated in Bujumbura. Currently, the only uncontrolled landfill is situated less than a kilometre from Lake

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

Tanganyika in the Mugaruro section of the Buterere zone, next to the water treatment plant. It's also crucial to note that this open dumpsite is directly close to the Kinyankonge River, a tributary of Lake Tanganyika, suggesting a significant likelihood of pollutant transfer between these two water sources (Nsavyimana, 2015). Additionally, there are homes located less than 200 meters away from this open dumpsite that are constantly complaining about the foul smell coming from the trash that is fermenting in the open air there and are afraid for their health. Even worse, the amount of mud and trash that has been dumped in complete disarray on the road leading to this landfill has made it impassable for several weeks (Iwacu, 2019). The risks to the health of the unofficial waste collectors who visit the landfill regularly in quest of recoverable or instantly edible materials or products are extremely significant.

However, given that many of these households are vulnerable, Yoshida (2018) states that "insufficient management of the final disposal site [of household and related waste] is dangerous for residents and causes environmental pollution." Because of this, the local population is at risk of a health catastrophe and is one of the strongest markers of the spread of endemic foci and the return of infectious illnesses. This is concerning because the trash comes from hospitals, industries, and home sources, carrying a significant risk of infection and frequently having an unclear composition. There is no selective sorting done either at the source or by the collectors. From the foregoing, it is clear that should the municipal authorities successfully address the issues raised by the SWM in the city of Bujumbura, the establishment of a sanitary landfill that complies with sound environmental and social norms should take precedence.

The lack of regularity in the collection and transportation of HRW by different actors, coupled with inadequate storage facilities and trash being dumped in public areas and along the banks of rivers that traverse the city of Bujumbura, led to several open dump sites. Ben and Foully (2008) state that "the waste collection rate is rarely efficient, except in specific privileged neighbourhoods (shopping centres, tourist areas, residential neighbourhoods in High Standards)," which is true of most towns in poor nations. Although it is often between 50 and 70 percent, working-class neighbourhoods have substantially lower rates. Residents frequently block pipes or create illegal dumps in these situations by disposing of their trash in gutters, drains, and empty lots.

Similarly, conspicuous waste mounds may be found throughout Bujumbura's most outlying and unplanned communities, which are home to impoverished people unable to pay for the services of private cooperatives involved in the collection, transportation, and disposal of HRW. This demonstrates why Bujumbura must embrace the "polluter pays" theory. It is imperative to scale up initiatives that have the potential to boost public participation across the HRW management chain. However, the unfortunate demise of the Bujumbura Cleaning Company (BCCO) ought to teach the relevant parties a lesson, letting them know that a solution that doesn't rely on the established, informal system would not be able to meet the task. Everyone needs to be active in the current complex and dangerous situation in the city of Bujumbura.

The integrated sustainable management of solid waste is unquestionably the greatest strategy to adopt to combat HRW in Bujumbura. This three-dimensional approach, which considers the actors, elements, and characteristics that are all condensed in the sustainability process, is dependent on society, and the leaders' commitment to follow that road will determine whether or not it is implemented. The formal sector (Municipal Technical Services, commercial businesses, and community-based organizations) and informal collectors (trash pickers) are the main actors involved. One of the errors committed by the Bujumbura municipal authorities was the removal of the Municipal Technical Services from the

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

HRW's management chain at a time when they could have played a major role.

To divert some waste from landfills, it is necessary to incorporate and recognize the informal sector while simultaneously strengthening the official sector. People who earn a living by selling recyclable materials discovered in rubbish are referred to as informal waste collectors. They can be found in municipal trucks that gather and deliver waste to disposal facilities, landfills, and city streets (Wilson et al., 2006; Scheinberg et al., 2011). These community members are frequently disregarded in Bujumbura's traditional and conventional solid waste management plans, where it is still difficult to recycle and get rid of home and similar waste. Sonia (2016) claims that frequent trash feeding into the recycling market might extend the life of garbage disposal systems. The informal recovery industry in the majority of poor nations handles 15–25% of garbage, which benefits municipalities greatly both monetarily and environmentally (Gupta, 2012).

Unsorted municipal solid waste (MSW) is dumped in open landfills in the majority of developing countries (DCs). This practice has detrimental effects on the environment, which makes it a topic of ongoing discussion. Unsorted garbage is the main cause of pollution in the environment because it can include a variety of dangerous substances that poison the soil and produce leachate that contaminates the air and groundwater. Elevated rates of biodiversity loss could potentially be attributed to elevated levels of dangerous substances. To prevent people from developing chronic or epidemic diseases, appropriate solutions to the issue of soil contamination in these open dumps must be proposed.

Furthermore, the presently closed open dumps in metropolitan areas, particularly in the northern portion of Bujumbura town, the economic capital, are being utilized for residential or agricultural purposes. The ecosystem is negatively impacted by this land usage, and human health is particularly affected. Sorting solid garbage by homeowners is one way to prevent some contamination. It's a simple, low-cost method that enables sustainable waste management and the recovery of sorted fractions for the population's benefit.

Nonetheless, many factors, including the "Moral Standard" (moral judgment of right and wrong), and attitude toward MSW sorting as a result of lacking basic tools like garbage cans, space, time, and human collaboration, affect how families behave when it comes to sorting MSW at the source. Ezechi et al. brought attention to the identical circumstances in Nigeria. The authors suggested that everyone take part in garbage management. Conversely, the reference demonstrated that following the inclusion of paths impacted by improved accessibility features and increased government awareness of garbage sorting, the relationship between intent and behaviour in China has diminished. This is a rare practice in poor nations, especially Burundi.

METHODOLOGY

The economic centre of Burundi, Bujumbura city, which comprises the three municipalities of Ntahangwa in the north, Mukaza in the centre, and Muha in the south, was the site of this study from March to June of 2024. To create an inventory of the challenges brought on by the city's distribution of municipal solid trash, we conducted an on-site visit on a methodological level. We also used the survey method whereby 80 questionnaires were given to 80 randomly selected city residents who had stayed there for at least one year. These questions were meant to elicit information on people's perceptions of municipal solid waste, as well as information about present management practices, obstacles to solid waste management at the source of urban solid waste, and suggestions for improved management. For better understanding, the survey findings were examined both quantitatively and qualitatively in graphical form. SPSS 22 was then used to handle the descriptive and analytical statistics. Following a discussion of the findings, suggestions are made for the environmentally friendly handling of municipal

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

solid waste in the capital city of one of the developing nations, Bujumbura.

FINDINGS

Bujumbura's MSW Management: obstacles upon visiting the many municipalities within the city of Bujumbura, it is evident that all household-generated solid municipal waste is gathered in an unsorted manner and disposed of in an unmonitored open-air dump. Ten years after its closure, an ongoing investigation reveals that the soil of the Buterere site (Fig. 1), a former unsorted garbage landfill, maintains high levels of pollutants. While the nonbiodegradable portion of the trash remains, the fermentable portion is converted into compost. Presently, all unsorted municipal solid trash is received by the Mubone landfill (Fig. 2), which is currently operational. Strong odorous emanations are regrettable on this site. However, polluted leachate from rainwater seeping through affects groundwater and seeps into nearby streams and agricultural areas.

Figure 1: Persistent Unsorted Solid Waste at the Old Landfill of Buterere-Bujumbura city

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

Figure 2: Unsorted Solid Waste at the Current Landfill of Mubone-Bujumbura city

The examination of this study's findings demonstrates how urgently and critically the city of Bujumbura needs to manage its municipal solid garbage. It is possible to change how citizens behave concerning their everyday garbage so they can participate in sustainable management. From scientists to decision-makers, from decision-makers to citizens in public spaces and to students in schools, an intervention at the level of enlightening people must be viewed from the top down. In fact, in the absence of this installation, waste is now sent unsorted from the point of origin (the streets) to the uncontrolled landfill, resulting in annoyance and degradation of the environment. This result is in line with other researchers' findings from poor nations.

Results on Youth Participation in Waste Management

Response	Mean	Std. Deviation
How strongly do you agree that youth play a crucial role in promoting sustainable waste management practices in Bujumbura?	3.1550	1.31350
To what extent do you believe that educational programs about waste management are effective in empowering youth to take action?	2.7700	1.14033
How important is it for youth to be actively involved in community-based waste management initiatives?	2.5600	1.37153
How significant are the challenges, such as lack of resources and support, that youth face in implementing waste management practices?	2.7850	1.25007
To what degree do you agree that government policies and support are sufficient to encourage youth participation in waste management?	2.9900	1.12831
How strongly do you agree that access to financial and material resources is essential for youth to effectively contribute to waste management?	2.7350	1.11709

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

Response	Mean	Std. Deviation
How important is training and capacity building for youth to develop skills in sustainable waste management practices?	2.6600	1.04265
To what extent do you believe that youth can contribute innovative solutions to address waste management issues in Bujumbura?	2.3000	1.41244
How important is the collaboration between youth and other community stakeholders (e.g., local businesses, NGOs) in promoting effective waste management practices?	2.5950	.98661
How strongly do you agree that youth-led waste management initiatives have a positive impact on reducing waste and promoting sustainability in Bujumbura?	2.4750	.88958
Valid N (listwise)		

The results show that there is a moderate consensus that young people are essential in advancing environmentally friendly waste management techniques in Bujumbura. This is in line with the body of research that highlights how crucial it is for young people to lead innovation and transformation in the waste management industry (World Bank, 2020). The rather low mean indicates that participants thought educational initiatives may empower young people to some extent. This is consistent with the findings of Miezah, et al. (2015) and other research that highlight the need for increased awareness and education to increase youth involvement in garbage management. The low mean score suggests that youth participation in community-based activities is not highly prioritized by the respondents. This could indicate a discrepancy between the acknowledgement of young people's potential and their real involvement, as proposed by Masood et al, (2013).

The moderate mean indicates that major obstacles, like a lack of funding and assistance for young people in waste management, are acknowledged by the respondents. The work highlighting the different challenges that young people encounter lends credence to this (Masood et al., 2013; Abu Qdais, 2007). Mixed sentiments regarding the adequacy of government programs and assistance are indicated by a mean score that is close to the neutral point. This is consistent with research that indicates that even while certain policies are in place, they might not be sufficiently implemented or enforced (Senate Economic Planning Office, 2017). The low mean is indicative of the view that, while access to resources is necessary, it is currently insufficient. The results of Mizero et al. (2015) and other studies emphasizing the need for improved resource allocation are consistent with this. The low mean suggests that while respondents think training and capacity building are vital, they are not given enough of them. This aligns with the body of literature advocating for improved training initiatives (Aloueimine, 2006). The low mean raises doubts about how much youth contribute to creative solutions. This might be an indication that young people's efforts need more encouragement and appreciation (Charnay, 2005).

The low mean score indicates that while respondents value collaboration, it may not be practised enough. Multi-stakeholder collaboration is necessary to improve waste management efforts, according to the literature (Gupta, 2012). The low mean score suggests that there is a perception that the influence of youth-led initiatives is limited. This could be attributed to the existing inefficiencies and lack of support that have been noted in the literature (Iwacu, 2019). The complexity and difficulties with waste management in Bujumbura that have been mentioned in the literature are reflected in the survey results. The majority of the items with moderate to low mean scores show that youth potential is acknowledged, but they also draw attention to important obstacles such as a lack of

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

funding, poor training, and a lack of government assistance.

These results are in line with the research (Yoshida, 2018; Mizero et al., 2015; Nsavyimana, 2015) which highlights the need for improved policy enforcement, an integrated approach including all stakeholders, and more investment in infrastructure and education. The uncontrolled landfill in Mugaruro and the absence of a systematic trash sorting program are two issues that are consistent with the current condition of waste management in Bujumbura, which is marked by poor collection and disposal systems (Nsavyimana, 2015). A multifaceted strategy is needed to address these problems, including expanding community involvement and education, especially for young people, as well as fortifying the formal waste management industry and merging the unofficial sector (Wilson et al., 2006; Scheinberg et al., 2011).

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
To what extent do you agree that young people play a vital role in driving sustainable waste management practices in Bujumbura?	Between-Groups	383.734	2	191.867	250.024	.000
	Within-Groups	304.656	397	.767		
	Total	688.390	399			
To what extent do you believe that educational programs about waste management are effective in empowering youth to take action?	Between-Groups	214.645	2	107.323	140.065	.000
	Within-Groups	304.195	397	.766		
	Total	518.840	399			

Source: *Field Data, 2024*

The data suggests that there is greater variability between groups than within them, as evidenced by the substantial difference between the between-group sum of squares and the within-group sum of squares. With an F-value of 250.024, which is rather high, there is a large difference between the group means. Given that the p-value (.000) is below the traditional threshold of.05, it can be concluded that there is statistical significance in the differences between the groups. Responses from various categories about how young people can support sustainable waste management techniques varied statistically significantly. This implies that there are large differences in views, which could be caused by various demographic characteristics or by disparities in engagement and knowledge levels.

As in the first question, there is a considerable difference between the groups based on the huge Sum of Squares (Between Groups) compared to the Sum of Squares (Within Groups). Moreover, the F-value of 140.065 is remarkably high, indicating a substantial variation in the group means. Once more, the statistical significance of the observed differences is indicated by the p-value of.000. Regarding how well educational programs empower young people to take action, there is a statistically significant variation in the responses. This implies that different groups have varying opinions about how good educational programs are, underscoring the necessity for specialized instructional tactics to meet these differences.

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

The findings of the ANOVA demonstrate that opinions regarding the contribution of young people to sustainable waste management methods as well as the efficacy of educational initiatives in empowering young people varied significantly. The statistical significance in both situations ($p < .05$) indicates that there are significant differences in perceptions between the groups. These results highlight the necessity of focused interventions and policies that take into account these various points of view to improve the overall effect of youth involvement and education in Bujumbura's waste management practices.

Summary

This examination of this study's findings demonstrates how urgently and critically the city of Bujumbura needs to manage its municipal solid garbage. It is possible to change how citizens behave concerning their everyday garbage so they can participate in sustainable management. From scientists to decision-makers, from decision-makers to citizens in public spaces and to students in schools, an intervention at the level of enlightening people must be viewed from the top down. In fact, in the absence of this installation, waste is now sent unsorted from the point of origin (the streets) to the uncontrolled landfill, resulting in annoyance and degradation of the environment. The results of other researchers in poor nations are in line with this one.

Sample of respondents in this study, spanning all age groups starting at age 10. As a result, the level of basic information lacking among city residents is low, particularly for those between the ages of 20 and 39 who fall into the group of active individuals who make decisions. Encouraging the city of Bujumbura to address its weaknesses in the sustainable management of municipal solid waste will address the waste issue from an economic development perspective as well as the city's health issue.

There is a modicum of consensus that young people are essential in advancing environmentally friendly garbage management techniques. This is consistent with previous research showing how young people may lead innovation and transformation in the waste management industry. According to the respondents, educational programs do a fair job of empowering young people. The mean score, however, points to the need for better instructional tactics since it indicates that the programs in place are not very effective.

The inclusion of youth in community-based trash management programs is not given much priority. This illustrates a disconnect between youth's potential recognition and real participation. It is acknowledged that there are significant obstacles, like a lack of resources and assistance. These hindrances correspond with scholarly works that highlight the challenges encountered by young people in waste management endeavours. Regarding the adequacy of government policies and assistance, opinions differ, with some arguing that although certain laws are in place, they might not be properly implemented or enforced.

Although considered necessary, access to material and financial resources is currently insufficient, underscoring the need for improved resource allocation. Although not given enough attention, training, and capacity building are recognized as crucial, suggesting the need for improved training initiatives. There is doubt over the degree to which young people contribute to creative solutions, indicating a need for increased encouragement and acknowledgement of young people's work. Although not done enough, youth and other community stakeholders view collaboration as vital. It is believed that youth-led projects only have a little effect, which is a reflection of the present inefficiencies and lack of funding.

CONCLUSION

The results show that youth's contribution to sustainable waste management is somewhat acknowledged, but they also point to important obstacles and hurdles that prevent them from

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

reaching their full potential. It is believed that access to resources, government assistance, and educational initiatives are important areas that require development. Encouraging youth involvement in waste management requires customized interventions, and policies, as seen by the differing opinions regarding the efficacy of present measures. The bulk of Bujumbura's population does not sort waste, according to survey results used in this study. A variety of issues are dealt with, including inadequate knowledge about municipal solid waste management, a lack of distinct containers, garbage collection according to classifications, and a lack of collection services. The following specific points of intervention are highlighted and are of concern to ensure solid waste management in Bujumbura: the development of waste collection and recycling services, local administration, media dissemination of information, and environmental education through the Burundian education system.

Recommendations

The findings lead to the following recommendations being put forth:

- The government should improve Instructional Initiatives by creating and executing more efficient educational initiatives to equip young people with the know-how and abilities required for environmentally friendly waste management techniques. To actively involve children, these programs must be interactive and incorporate real-world elements.
- The government and its development partners should boost resource allocation which will ensure sufficient material and financial resources to assist waste management initiatives led by young people. This could entail financial support from the public and corporate sectors, plus foreign help.
- There is also a need to bolster government directives by examining and improving current government regulations to effectively encourage young participate in garbage management. This would entail certain laws that are properly implemented as well as developing incentives to encourage young people to participate.
- Provide Learning and Skills Building: the Bujumbura city administration should come up with extensive training initiatives to increase young people's proficiency with environmentally friendly waste management techniques. Project management, innovation, and technical proficiency should be the main focuses of training.
- Encourage Collaboration: efforts should be made by all stakeholders to encourage cooperation between young people and other community members, such as nearby companies, non-governmental organizations, and governmental organizations. Trash Management Initiatives can be made more sustainable and effective through collaboration.
- There is a need to adopt an Integrated Approach: Use a comprehensive strategy for managing garbage that incorporates both the public and private sectors. This entails acknowledging the function of unofficial waste collectors and establishing an incorporated waste management framework.
- Efforts should be made to secure community Involvement by raising awareness of the value of sustainable community waste management practices. Public campaigns, neighbourhood gatherings, and educational outreach initiatives can all be a part of this initiative.
- Focus should be put on infrastructure development to solve the existing shortcomings in the system, by investing in new, state-of-the-art waste management

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

infrastructure, including appropriate facilities for collection, transportation, and disposal.

As Burundi continues to navigate the complexities of urbanization and environmental sustainability, the role of youths in promoting sustainable waste management practices in Bujumbura will be pivotal. By empowering young people with knowledge, skills, and opportunities, we can foster a culture of environmental stewardship that benefits both current and future generations. This study highlights the potential for youths to drive positive change in waste management practices, from awareness-raising and education to innovative solutions and community engagement. As we look to the future, it is essential to build on these efforts and create an enabling environment that supports youth-led initiatives. By working together, governments, organizations, and communities can unlock the potential of Burundian youths to create a cleaner, healthier, and more sustainable Bujumbura. Together, we can shape a future where waste management is a collective responsibility and a catalyst for positive change.

REFERENCES

Abu-Qdais, Hani. (2007). Techno-economic assessment of municipal solid waste management in Jordan. Waste management (New York, N.Y.). 27. 1666-72. 10.1016/j.wasman.2006.08.004.

ADB. 2002. Report Prepared for Sustainable Development and Poverty Reduction Unit: Solid Waste Management Options for Africa. Côte d'Ivoire.

Aina, M. P. 2006. Expertises des centres d'enfouissement techniques des déchets urbains dans les PED : contribution à l'élaboration d'un guide méthodologique et à sa validation expérimentale sur site. Université de Limoges, Thèse, inédit

Aloueimine, S. O. 2006. Méthodologie de caractérisation des déchets ménagers à Nouakchott (Mauritanie) : Contribution à la gestion des déchets et outils d'aide à la décision. Université de Limoges, Thèse, inédit.

Castillo, A. and Otoma, S. (2013). Status of Solid Waste Management in the Philippines. Retrieved from https://www.jstage.jst.go.jp/article/jsmcwm/24/0/24_677/article

Charnay, F. 2005. Compostage des déchets urbains dans les pays en développement : Elaboration d'une démarche méthodologique pour une production pérenne de compost. Université de Limoges, Thèse, inédit

Ezechi, E. H., Nwabuko, C. G., Enyinnaya, O.C., and Babington, C. J., "Municipal solid waste management in Aba, Nigeria: Challenges and prospects". Environmental Engineering Research, 2017, 22(3), pp. 231-236.

Gupta, S. K. 2012. Intégrer le secteur informer pour une meilleure gestion des déchets. Secteur privé et Développement, n°15/Otobre p12-16.

Iwacu, December 9, 2019

Jules Raymond Ngambi. 2015. Déchets solides ménagers de la ville de Yaoundé (Cameroun) : de la gestion linéaire vers une économie circulaire. Géographie. Université du Maine, Français. ffNNT: 2015LEMA3001ff. fftel-01262368

Kaseva, M.E., Mbuligwe, S.E. 2005. Appraisal of solid waste collection following private sector involvement in Dar es Salaam. Habit. Intern: 29, 353-366.

Khatib, Akram & Monou, Maria & Zahra, Abdul & Shaheen, Hafez & Kassinos, Despo. (2010). Solid waste characterization, quantification and management practices in developing countries. A case study: Nablus district - Palestine. Journal of environmental management. 91. 1131-8. 10.1016/j.jenvman.2010.01.003.

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

Masood, Maryam & Barlow, Claire. (2013). Framework for integration of informal waste management sector with the formal sector in Pakistan. Waste management & research: The Journal of the International Solid Wastes and Public Cleansing Association, ISWA. 31. 10.1177/0734242X13499811.

Matunog, V. E., & Awa, A. L. (2013). Solid Waste Generation Rate in Ozamiz City, Philippines. Journal of Multidisciplinary Studies, 1(1), 73-92.

Miezah, Kodwo & Obiri-Danso, Kwasi & Kádár, Zsófia & Fei-Baffoe, Bernard & Mensah, Moses. (2015). Municipal Solid Waste Characterisation and Quantification as a Measure Towards Effective Waste Management in Ghana. Waste management (New York, N.Y.). 46. 10.1016/j.wasman.2015.09.009.

Mizero, M., Ndikumana, T., and Jung.C.G, "Quantification, caractérisation et voies de valorisation des déchets solides municipaux dans la ville de Bujumbura". Bulletin Scientifique sur l'environnement et la biodiversité 2015, 1 pp. 1-7.

Mizero, M., Ndikumana, Th., et Jung, G. 2015. Quantification, caractérisation et voies de valorisation des déchets solides municipaux dans la ville de Bujumbura. Bull. Scient. Envir. Biodiv., 1: 1-7

Nabegu, A. B. (2010). An Analysis of Municipal Solid Waste in Kano Metropolis, Nigeria. Journal of Human Ecology, 31, 111-119.

Nagabooshnam, J. K. (2011) Solid Waste Generation and Composition in Gaborone, Botswana, Potential for Resource Recovery. Master Thesis, Department of Management Engineering, Linkoping University, Sweden.

Nsavyimana, G. 2015. Modélisation des processus physiques et biologiques dans des fosses septiques et voies de valorisation des boues de vidange : application à Bujumbura Burundi, Thèse de Doctorat, Université de Liège, 427 p.

Okot-Okumu, J., Nyenje, R. 2011. "Municipal solid waste management under decentralization in Uganda." Habitat International 35, Pp. 537 543

Rong, L., Zhang, C., Jin, D., and Dai, Z., "Assessment of the potential utilization of municipal solid waste from a closed irregular landfill". Journal of Cleaner Production, 2017, 142: 413–419.

Rotich, H. K., Yongsheng, Z., & Jun, D. (2006). Municipal solid waste management challenges in developing countries: Kenyan case study. Waste Manag. 26 (1): 92-100

Scheinberg, Anne. (2011). Value added: Modes of sustainable recycling in the modernisation of waste management systems. Biochemistry - BIOCHEMISTRY-USA.

Sharholy, M. (2008) Municipal Solid Waste Management in Indian Cities—A Review. Waste Management, 28, 459- 467. http://dx.doi.org/10.1016/j.wasman.2007.02.008

Sonia, M. D. (2016). Waste pickers and cities. *Environment and Urbanization*, *28*(1), 1–16. https://doi.org/10.1177/0956247815628003

Wilson, D. C., Velis C, Cheeseman C. R. 2006. "Role of the Informal Sector Recycling in Waste Management in Developing Countries." Habit. Intern 30: 797-808.

World Bank, 2018. What a waste 2.0 A Global Snapshot of Solid Waste Management to 2050, 38 p. Yin, R. K. 1994. Case study research: Design and methods Second. Sage Publications.

Yoshida, M. 2011. Phased Development of Municipal Solid Waste Management and Needs for International Technical Assistance in Developing Countries. Proceedings of 2011

Article DOI: https://doi.org/10.37284/eajenr.8.1.2966

World Congress of International Solid Waste Association (ISWA), 485-495.

Yoshida, M. 2012. Development of Inclusive and Dynamic Solid Waste Management – Challenge for International Technical Cooperation with Developing Countries-. Urban Cleans (Toshi Seiso), 65, 439–444.

Yoshida, M. 2018. Situation of Municipal Solid Waste Management in African Cities – An Interpretation of the Information provided by the First ACCP Meeting, The Second Meeting of African Clean Cities Platform (ACCP), June 2018, Rabat.

Yoshida, M., 2016. Political Economy of Municipal Solid Waste Management in Urban Areas of Developing Countries and Framework of Capacity Development Support. Intern. Jour. Environ. Engin. 3(3): 80-85

Zalissa, K. 2013. Problématique liée à la gestion des déchets urbains dans le 9ème arrondissement de Ouagadougou (Burkina Faso), Mémoire de Master, 76 p.

