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The Role of Waste Pickers in Enhancing Recycling Initiatives and Promoting Sustainable Urban Landfills: A Case Study of Tanga City, Tanzania

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Abstract

Waste management poses a significant challenge, especially in developing countries. In this context, the role of waste pickers is essential. They play a vital part in recovering recyclables from municipal waste, mitigating environmental pollution and landfill overflow, and offering economic opportunities to marginalized communities. This study examines the role of waste pickers in enhancing recycling initiatives and promoting sustainable landfills in Tanga City. Convenience sampling was deployed to obtain 20 landfill waste pickers, and 15 street waste pickers; while a purposive sampling technique was used to select four key informants. Data was collected through field observation, in-depth interviews, key informant interviews, and focus group discussions. The findings reveal that waste pickers are crucial to recycling initiatives, landfill sustainability, and environmental sanitation, as they help divert waste from landfills and reduce greenhouse gas emissions. However, waste pickers face several challenges, including economic vulnerability, hazardous working conditions, and social stigma. The study suggests that local governments should incorporate waste pickers into formal waste management systems through financial assistance, organizing waste picker unions, and formal recognition to increase their contribution and improve their standard of living. Additionally, the government should provide capacity-building initiatives focused on recycling, composting, waste sorting and adherence to health and safety measures.

Keywords: *waste pickers, landfill sustainability, circular economy, environmental sanitation*

1. Introduction

Rapid urbanization, industrialization and population growth have increased waste generation worldwide, posing enormous problems to municipal waste management systems. Only 19% of the more than two billion tons of municipal solid waste generated each year is recycled or composted (WB, 2020). Inadequate waste management infrastructure leads to environmental damage, public health hazards, and an increase in landfill overflows in many developing countries (UN-Habitat, 2021). Ineffective landfill management exacerbates climate change and poses a threat to human health by contributing to air pollution, groundwater contamination, and greenhouse gas emissions (Siddiqua et al., 2022).

The developed nations have implemented integrated waste management strategies that prioritize recovery, recycling and waste reduction to lessen the

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adverse effects of undisposed waste. To reduce their reliance on landfills, countries like Germany, the Netherlands, and Sweden have effectively adopted sophisticated recycling programmes, waste-to-energy technologies, and composting (Laureti et al., 2024; Kumar et al., 2025). To the contrary, formal waste collection services are still insufficient in developing countries, so waste pickers are essential in keeping recyclables out of disposal sites (Gutberlet & Carenzo, 2020; Harfadli et al., 2024). By recovering and reintegrating recyclable materials into the production cycle, these waste pickers help reduce landfill pressure and promote resource conservation, aligning their efforts with the core principles of the circular economy.

Waste pickers—who recover 20–30% of municipal recyclables from streets, markets and dumpsites—are the backbone of recycling programmes in many African cities (Morais & Santos, 2022). Their initiatives reduce environmental pollution and landfill overflow, and provide underprivileged groups with access to economic opportunities. Even so, waste pickers still have to deal with issues such as financial instability, dangerous working conditions, and social stigma (Uhunamure et al., 2021; Uddin et al., 2022). Many are exposed to exploitation by middlemen and scrap dealers because they lack formal recognition and access to stable markets (ILO, 2019).

Tanzania, like many other developing countries in Africa, is confronted with increasing waste management issues as a result of rapid urbanization and inadequate waste disposal infrastructure. Solid waste management is governed by laws such as the Environmental Management Act (EMA) of 2004 and the Local Government Act of 1982, but enforcement is still lax, and many urban areas still rely on uncontrolled dumpsites (Kihila et al., 2021; Onesmo et al., 2023). Municipal efforts to improve waste diversion remain insufficient, and recycling rates are still low. Similar to the case in other African countries, waste pickers in Tanzania make a substantial contribution by removing recyclables from landfills (Godfrey et al., 2019). However, because they are not included in organized waste management systems, their contribution to waste recycling efforts is made less effective (Kumar et al., 2022).

Although sanitary landfill projects have been initiated in a few cities in Tanzania—including Tanga, Dodoma, Mbeya, and Mwanza—these initiatives remain insufficient due to the absence of efficient waste diversion plans that formally incorporate waste pickers. As a result, waste pickers often lack access to financial opportunities that could improve their livelihoods and promote sustainable waste management practices (Kihila et al., 2021).

This study sought to examine the role of waste pickers in enhancing recycling initiatives and promoting sustainable urban landfills in Tanga city. The study aimed to produce insights that would guide policies supporting the sustainability, social inclusion, and economic resilience of waste pickers by examining their role in the waste value chain. Strengthening waste management strategies, and ensuring waste pickers' contributions are utilized to improve environmental sustainability, require acknowledging and resolving the difficulties they face.

2. Theoretical Framework

This study is grounded on the circular economy model (CEM) and the sustainable livelihoods framework (SLF); two complementary theoretical frameworks that offer an understanding of waste pickers' contributions to landfill sustainability and environmental sanitation in Tanga City, Tanzania. When it comes to describing the extent to which waste picking is an essential livelihood strategy for marginalized urban communities that encounter obstacles to formal employment, Chambers and Conway's (1992) SLF is especially pertinent. According to Morse (2025), this framework emphasizes how people use various capital assets—human, social, natural, financial, and physical—to support their livelihoods in the face of vulnerabilities like dangerous working conditions, unstable income, and social exclusion. The SLF facilitates a more comprehensive examination of how waste pickers in Tanga address environmental and socioeconomic challenges, while significantly enhancing waste management.

Although the SLF does a good job in capturing the dynamics of waste pickers' livelihoods, it has come under criticism for focusing more on coping strategies than structural adjustments. It overlooks more significant systemic obstacles that hinder economic empowerment and policy inclusion. The CEM is incorporated into the study to overcome these constraints by offering an environmental and economic perspective that goes beyond personal livelihood tactics to comprehend waste picking. The CEM is especially relevant to this study because it supports the idea that waste pickers should not only be viewed as survivalists but also as crucial actors in Tanga's larger waste management system, advocating for their formal recognition and integration into the municipal recycling framework.

On its part, the CEM challenges the conventional 'take-make-dispose' waste management model (Rizos et al., 2017) by advocating for a shift towards a closed-loop system where materials are continuously reclaimed, recycled, and reintegrated into the production cycle. Notwithstanding its advantages, the CEM has been criticised for being overly market-driven and frequently ignoring issues of social justice and the hazardous working conditions faced by unorganized waste pickers. The study aims to address this shortcoming by integrating the SLF and CEM to enable a thorough examination of the ecological and socioeconomic aspects of waste picking, which ensures that waste pickers receive sustainable employment opportunities in addition to recognition for their contributions to environmental sustainability. Hence, the study combines the livelihood-focused perspective of the SLF, and the sustainability-driven approach of the CEM to highlight the importance of formalized waste management strategies in Tanga City and beyond, both for improving recycling initiatives, landfill sustainability, and the economic well-being of waste pickers.

3. Methodology

The study was conducted in Tanga City, Tanzania, from August to September 2023. The city was chosen because of its growing waste generation due to rapid

urbanization. The Mpirani Sanitary Landfill (MSL) (Photo 1) was specifically selected because it is a cutting-edge waste disposal facility with active waste pickers, providing an essential environment for waste diversion and landfill sustainability. Moreover, the presence of intermediary traders purchasing recyclables from street waste pickers, made three streets in Chumbageni, Central, and Majengo wards ideal locations to study the dynamics of waste trade and the economic contribution to waste pickers.

Photo 1: Mpirani Sanitary Landfill
Source: Fieldwork, 2023

The livelihoods, working conditions, and environmental contributions of waste pickers were examined using a qualitative research design. Key informants—including a landfill representative, two city waste and environmental officers, and a waste picker leader—were purposefully chosen to provide insightful information about landfill operations, policy frameworks, and the role of waste pickers in urban waste management. A convenient sampling strategy was used to select 20 landfill-based waste pickers and 15 street waste pickers. To ensure a thorough and triangulated data collection approach, focus group discussions (FGDs), in-depth interviews, key informant interviews (KIIs), and field observations were used. Two focus group discussions, each with 8–10 participants, were conducted at the MSL and a street location to collect data. These sessions allowed for discussions on waste-picking practices, economic challenges, and contributions to environmental sustainability. This was followed by 35 in-depth interviews, which researched firsthand accounts of people's experiences with occupational hazards, recycling market dynamics, and income stability. To investigate the obstacles to waste picker integration and potential solutions, 4 KIIs were conducted with municipal stakeholders. The self-reported data were validated by field observation at the landfill and collection sites, which recorded

waste recovery procedures and working conditions. Transcribed qualitative data were subjected to thematic analysis; which revealed essential trends in the contributions, difficulties, and opportunities for the integration of waste pickers into the city's waste management system.

4. Results and Discussion

4.1 The Dominance of Street and Landfill Recyclable Waste Pickers

The study findings highlight that waste picking operations at the MSL and on the streets are divided by age and gender. In particular, while the majority of waste pickers in the landfill were women, the majority of street waste pickers were men. This disparity arises from the intricate interaction of structural, cultural, and socioeconomic elements that influence access to chances for earning a living in waste picking. One respondent gave the following account:

> *"I had no choice but to start working at the dump. Since I had neither money nor formal education, it was my sole means of providing for my kids. I work alone here, sifting trash for sale. It puts food on the table despite its lack of dignity."* (***Female Respondent, MSL, August 2023***)

This testimony emphasizes how women with little to no education have few job options, which usually forces them to take on unofficial and often hazardous jobs. It also demonstrates the financial hardship that forces many women to pick wastes from landfills as a last resort rather than doing it voluntarily. The quote also highlights the lack of social mobility since women are unable to transition into other types of employment due to the lack of funding or support systems.

On the other hand, street waste-picking, which involves walking through cities to collect recyclables, was being handled mainly by males. Two male waste pickers supported this:

> *"I normally organize my collecting routes on the streets, concentrating on locations like marketplaces, retail stores, and dining establishments where I am aware that discarded materials often consist of plastics, aluminium cans, and – on some occasions – electronics."* (***Street Waste Picker, Male Aged 35, August 2023***).
>
> *"I have to trek around all day, dragging big loads while competing with other pickers, which makes my job difficult. While some business owners are kind, others chase us away because they believe we are thieves; or we are becoming bothersome. Nevertheless, I prefer this kind of employment. If I work hard and start early, I earn enough money to buy food and provide for my family."* (***Street Waste Picker, Male, Aged 35, August 2023***).

The first quote highlights the tactical approaches used by male waste pickers in their work, emphasising how they utilise their mobility, in-depth knowledge of waste accumulation locations, and skilled negotiating abilities to increase their collections. Street waste pickers aggressively seek and target valuable recyclable materials, in contrast to their counterparts in landfill sites, who are restricted to a specific area; and are dependent on the flow of waste. By using a variety of dynamic waste streams, this proactive approach allows them to maximize their income potential greatly.

The second quote highlights the significant social and physical challenges that street waste pickers face, including competition from other collectors and negative perceptions from the general public. This suggests that waste pickers can transition into more structured, independent, and long-term positions in the waste management sector with a proper support, such as training in waste sorting methods, and occupational health and safety practices.

The gendered waste picking pattern—where males are better at picking waste on the streets while women are more adept at picking waste in landfills—reflects more significant worldwide tendencies (Nepal et al., (2022). Safety concerns, caregiving obligations, and restricted access to urban waste collection infrastructures are the main reasons why women are less mobile, as shown by a study done in Brazil by Gunsilius et al. (2011). Similarly, another report by GA Circular (2019) found that in India, Indonesia, the Philippines, and Vietnam, the waste-picking sector is dominated by men.

4.2 The Role of Waste Pickers in Environmental Sanitation and Landfill Sustainability

4.2.1 Waste Diversion and Recycling Activities

Waste pickers significantly contribute to the sustainability of the MSL by recovering and rerouting recyclable materials from the landfill (Photo 2). By recovering plastics, metals, glass, and paper, their activities significantly reduce landfill congestion, which would have otherwise worsened environmental degradation.

Photo 2: Landfill Waste Pickers with the Recovered Waste

Source: Fieldwork, 2023

By making it easier to reuse and repurpose waste materials, material recovery reduces the amount of waste that must be disposed of, and promotes the concept of a circular economy. In terms of volume, waste pickers at the MSL are said to recover roughly two tons of recyclable plastic per month, which helps prolong the landfill's operational life. Furthermore, street waste pickers enhance waste diversion even further by keeping recyclables out of landfills as they collect recyclables from homes, businesses, and public areas.

4.2.2 Reduction of Environmental Pollution and Greenhouse Gas Emissions

Waste pickers enhance landfill sustainability by diverting biodegradable waste such as food residues and paper products, which in turn lowers methane emissions. Also, waste pickers help avoid leachate pollution, a significant environmental concern in landfills. Rainwater can contaminate the soil and groundwater by producing harmful leachate as it filters through decomposing garbage. Waste pickers indirectly contribute to reducing the production of harmful leachate by recovering materials before they break down, thereby enhancing the environmental safety of the landfill site. Moreover, to reduce the risk of pollution, a layer of soil is put over the remaining waste and compacted after waste pickers have removed the recyclable waste materials from the dump (Photos 3 and 4).

Photos 3 & 4: Waste Before and After Compaction

Source: Fieldwork, 2023

Additionally, it was reported that investors have recently expressed interest in establishing composting and biogas processing facilities at the Mpirani landfill,

indicating the possibility of developing waste-to-energy and upcycling projects in Tanga City. If effectively carried out, such programmes might incorporate waste pickers into organized waste processing systems; thereby not only improving landfill sustainability, but also generating new job possibilities. The city sanitation officer testified to this development:

> *"Some recycling businesses have expressed interest in establishing trash processing facilities at the landfill, and another investor wants to start composting activities. These efforts will greatly decrease the amount of rubbish that needs to be compacted, which will also enable landfill waste pickers to earn money."* (***Tanga City Waste Management and Sanitation Officer, August 2023).***

Studies confirm that by capturing recyclables in landfills before they break down, waste pickers play a crucial role in reducing greenhouse gas emissions and mitigating environmental degradation. Methane, a greenhouse gas with 25 times the potential for global warming as carbon dioxide, is also produced when organic waste decomposes in landfills (Abubakar et al., 2022; Mebratu & Mbandi, 2022). Hence, through waste diversion by collecting recyclables before they break down and decompose, waste pickers contribute to cleaner urban environments and longer landfill lifespans (Samwine, 2017; Owusu-Sekyere et al., 2024).

4.2.3 Estimated Volume of Recoverable Materials at the MSL

The results reveal a discrepancy between the total amount of waste generated in the city and the number of recyclable materials that can be recovered, suggesting intervening obstacles that prevent waste from reaching the MSL. Waste pickers complained that they collect a small amount of recyclables, mainly plastic, which could be estimated to be two tons per month. They added that a sizable portion of waste was likely being picked up by their competitors or remained trapped on the streets. Some of the competitors are the waste truck drivers and loaders who are reported to pick valuable recyclables for their financial gain. This concern was echoed by the MSL operations officer, who confirmed that plastic waste makes up the highest proportion of materials reaching the landfill:

> *"In the waste types that ends up in landfills, approximately 75% consists of plastic materials. Wrappers and sacks make up 10% of the remaining components, and scrap metal makes up 5%. Wood, food scraps, and other items comprise the remaining 5%."* ***(MSL Operations Officer, August 2023).***

The effectiveness of waste management and socioeconomic fairness is significantly impacted when workers in the formal waste collection sector monopolise recyclable materials. First, the efficiency of coordinated recycling initiatives is compromised when significant amounts of recyclables are removed through unregulated channels, which also contributes to waste leakage and environmental contamination. Secondly, because they have less access to valuable recyclables, waste pickers who rely entirely on salvaged

materials for their livelihoods are experiencing a growing financial hardship.

This marginalization of waste pickers in developing nations, where competition for recyclable materials poses serious obstacles, has been reported elsewhere. Wilson et al. (2013) found that landfill employees and drivers of municipal waste trucks in Mexico City frequently sold expensive recyclables directly to recycling companies. In Accra, Ghana, waste transport operators are reported to selectively collect high-value recyclables, which consequently restricts the ability of landfill waste pickers to recover these economically significant materials (Owusu-Sekyere et al., 2020). Likewise, Medina (2007) and Hande (2019) report that municipal garbage contractors in Delhi, India, started removing valuable objects before disposing them, leaving landfill waste pickers with depleted sources from which to pick recyclables. Further, research in South Africa by Viljoen et al. (2016) revealed that landfill workers exploited their access to recyclables.

4.3 Challenges Faced by Waste Pickers in Tanga City

4.3.1 Declining Access to Recyclables and Income Instability

The results indicate a significant challenge for waste pickers at the MSL, as the quality of residual materials arriving at the landfill is significantly impacted by the early removal of valuable recyclables during the collection process. The primary cause of this is associated with the activities of street waste pickers and waste collection truck drivers, who select valuable recyclables before they are sent to disposal sites. One interviewee was quoted saying:

> *"I begin my activities at sunrise and spend many hours sorting through the trash. Unfortunately, waste collection truck drivers and street pickers, remove a sizable quantity of valuable recyclables before the items reach our location. This early extraction significantly lowers our efficiency because we rely on what is left over, which often has little money worth."* ***(In-depth Interviewee at MSL, August 2023).***

The ability to choose high-value recyclables is advantageous to those located higher in the waste management chain, such as waste trucks. As a result, there is little opportunity for landfill waste pickers to reclaim valuable and reasonable amounts of materials that can fetch reasonable prices (Bouvier & Dias, 2021). Numerous studies have reported on this trend of waste collection procedures rewarding individuals who have early access to waste streams (UN-HABITAT, 2019). Furthermore, research conducted in South Africa by Viljoen et al. (2016) revealed that landfill workers officials prevented landfill waste pickers from accessing valuable recyclables, thus solidifying the waste sector's economic marginalization.

4.3.2 Lack of Safety and Protective Gear

The results revealed that waste pickers are at great risk of health problems due to the lack of proper protective gear. Many waste pickers operate without masks, gloves, or appropriate footwear; which makes them more susceptible to

infections, accidents, and exposure to harmful materials. There has been little external assistance to improve their safety despite the hazardous circumstances in which they operate. Two street pickers admitted:

> *"We run the risk of getting hurt all the time. We might inhale toxic chemicals, trip over shattered glass, or even sustain injuries from sharp objects. I sometimes have cuts on my hands and feet when I go home. We would definitely be safer if we had gloves, boots, and masks; but sadly, nobody is worried about this safety."* ***(Street Waste Picker, Male aged 32, August 2023).***

> *"It is disheartening to note that since waste-picking operations began at Mpirani in 2020, only one oil processing firm has offered assistance with protective gear."* (***FGD Male Participant No. 6 at MSL, August 2023).***

The narratives of these waste pickers highlight the hazardous working conditions they face due to the lack of occupational safety regulations and inadequate protective gear. They are regularly exposed to hazardous gases, sharp metals, shattered glass, and unhygienic waste: all of which can lead to infections, respiratory illnesses, and other serious health issues. Similar challenges have been noted in other countries, especially in the developing ones in Africa, India and Latin America (Cruvinel et al., 2019; Uhunamure et al., 2021). Waste pickers frequently get wounded, and contract lung infections and skin disorders due to little or no access to protective gear (Uhunamure et al., 2021).

4.3.3 Lack of Formal Recognition and Integration into Municipal Waste Management

It was found that the waste pickers are not recognized and integrated into the city's formal waste management channel; in other words, they lack official recognition and/or accreditation from the local authority. They also operate without a union, which means they lack collective representation and, consequently, have limited bargaining power. This lack of formal recognition aggravates the cycle of vulnerability and restricted opportunities among waste pickers. Further, working in such conditions does not guarantee them improved income.

The research findings confirm previous studies, which have demonstrated that the absence of official recognition reduces waste pickers' visibility and ability to fight for improved working conditions (Gutberlet & Oloko, 2022; Kain et al., 2022). Wilson et al. (2006) and Dias (2016) reveal that although South African and Brazilian waste pickers play an essential role in recycling, they receive less recognition, leading to their economic and social marginalization. Hence, the lack of official recognition impedes waste pickers' negotiating power and access to economic opportunities.

4.3.4 Lack of Technical Skills for Adding Value to Potential Waste Materials

The findings confirm that many waste pickers lack the technological know-how and skills needed to improve the effectiveness of resource recovery from recyclable

materials by adding value to materials. Two officers report as follows:

> *"Many waste materials are still not collected, particularly organic waste, which holds great promise for the growth of the black soldier fly, composting, and biogas production. The inherent value of unrecovered materials which could otherwise increase industrial productivity, generate employment possibilities, and support local economic growth is eventually lost when dumped in uncontrolled dumpsites. Additionally, this waste management inefficiency hinders our ability to attain the best sustainability results, and challenges our environmental responsibility."* ***(Tanga City Waste Management and Sanitation Officer, August 2023).***

> *"The recovery efforts could improve procedures that provide value for waste materials and further improve equipment repair. Partnerships between garbage collector organizations and organizations like the Small Industries Development Organization (SIDO) for foundational training, and the Vocational Education and Training Authority (VETA) for capacity building, would greatly increase the quality of the products. Using locally manufactured contemporary tools and equipment, as well as cutting-edge technology and industry best practices: this approach seeks to maximize the recovery potential of waste materials."* ***(Tanga City Waste Management and Sanitation Officer, August 2023).***

The results expose existing problems in waste management, and highlight the critical need for focused interventions such as educational training and workshops to improve waste picker's performance. Multiple studies, such as Ayilara et al. (2020) and Yusuf and Ismail (2024), validate this claim through their findings on how waste picker skills development improves the efficiency of material recovery, and economic profitability. Training programmes designed specifically for waste pickers lead to improved efficiency because they enable waste pickers to retrieve valuable materials, which they would have otherwise missed (Lahl & Zeschmar-Lahl, 2024). Similarly, Marello and Helwege (2018) present evidence that waste pickers can improve both their sustainability and economic performance through better sorting techniques, along with an understanding of market demands. Also, according to Dias (2016) and Chadha (2020), the integration of waste pickers in Brazil and India, respectively, into cooperatives through small-scale recycling training resulted in enhanced income levels; and boosted economic activity within their local communities. In the same vein, Yusuf and Ismail (2024), in a study on Yola North, Nigeria, illustrate the financial potential of waste recovery activities that can emerge when waste pickers obtain appropriate training.

5. Conclusion and Recommendations

This article emphasizes how important waste pickers are to livelihoods, environmental sanitation, and landfill sustainability. The CEM, which encourages waste recovery and reintegration into production cycles, aligns with the potential of recovering recyclables to prolong landfill lifespan, reduce greenhouse gas emissions, and prevent soil contamination. Waste pickers endure economic instabilities, hazardous working conditions, social stigma,

and uncertain access to recyclables. According to the SLF, waste picking is a survival strategy for marginalized urban populations. However, because they are not officially recognized, they have limited negotiating power and access to steady incomes.

This study recommends that waste pickers be incorporated into municipal waste management systems as part of policy interventions to address the challenges they face. Their economic stability would be improved by financial assistance, the formation of cooperatives, and legal recognition. Moreover, to lower occupational hazards, authorities should assist waste pickers with protective gears, and provide routine health check-ups. Also, waste-to-energy projects should be supported; and resource recovery be maximized with training on sorting, recycling, composting, and biogas production. To improve waste value addition, organizations such as SIDO and VETA should offer technical training to waste pickers. All these actions will further ensure landfill sustainability, environmental sanitation, and equitable economic growth.

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