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Role of Informal Waste Workers for Sustainable Waste Management in Nigeria and Nepal

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ABSTRACT. Informal waste workers (IWWs) play a vital role in recovery, disposal and recycling of waste materials. This study examines the current solid waste management practices in Nigeria and Nepal, with a particular focus on the roles of IWWs in effective waste management. Through comprehensive secondary literature reviews, including journal databases, books, reports, and websites, this study highlights the inadequate solid waste management systems in both countries, resulting in limited reuse of generated waste. Common challenges related to waste collection, transportation, sorting, processing, and final disposal were identified in Nigeria and Nepal. The important role played by IWWs in waste management activities, such as collection, sorting, recovery, and recycling, is evident. However, the lack of appropriate legislation addressing their involvement serves as a major hindrance. This study also presents key findings on Nigeria's waste generation, recycling rates, and reliance on the informal sector, as well as Nepal's municipal solid waste composition, recycling rates, and the significant role played by informal waste workers. The study emphasizes the need for inclusive waste management policies, strengthened waste collection and segregation systems, investment in recycling infrastructure, and enhanced collaboration among government agencies, waste management companies, and informal waste workers. Enforcing existing legislation and providing support to IWWs, including improved working conditions and social protection measures, are essential steps toward improving waste management practices. The study concludes by highlighting the importance of research, innovation, and international cooperation in developing sustainable waste management solutions for Nigeria and Nepal.

Keywords: informal waste workers, Nepal, Nigeria, solid waste, sustainability, waste management

1. Introduction

Integrated solid waste management (ISWM) and the circular economy are two approaches that prioritize sustainable waste management practices (Huang, et al., 1997). The circular economy principles aim to eliminate waste and pollution, promote the circulation of products and materials, and regenerate nature. In ISWM systems, the emphasis is placed on waste prevention, recycling, and environmentally sound disposal methods, with the lowest priority given to final disposal at sanitary landfills (Giri, 2021; Subedi et al., 2023). The least developed countries (LDCs) have been facing severe problems with solid waste management due to a lack of awareness among the population, insufficient skilled manpower to handle waste, and a lack of necessary equipment to manage waste in a sustainable manner (Cai et al., 2007; Khanal, 2022).

The Basel Convention, a global agreement established in substances or objects that are intended for disposal in accordance with national laws (Khan, 2016). According to the United Nations Environmental Programme, this definition includes substances or objects that undergo disposal operations, whether or not they offer possibilities for resource recovery, recycling, reclamation, direct reuse, or alternative methods (Moncayo, 2016). It encompasses various forms of waste generated by households, as well as a waste of similar nature from commercial and industrial premises, institutions such as schools, hospitals, care homes, prisons, and public spaces like streets, markets, slaughterhouses, public toilets, bus stops, parks, and gardens (Tomic and Dimishkovska, 2021). Most commercial and business waste falls under this definition, with the exception of waste from industrial processes and other hazardous waste.

In many developing nations, approximately 15 ~ 20% of waste is managed by the informal sector, providing both economic and environmental advantages to urban areas (Scheinberg et al., 2011). The role of the informal sector in waste management is increasingly recognized in developing countries, with a global consensus emerging that it should be integrated into formal waste management structures (Ferronato and Tor-

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retta, 2019). Informal waste workers play a crucial role in the dynamic model of production, consumption, recovery, disposal, and recycling of waste materials. They offer livelihood opportunities for immigrants and marginalized citizens in metropolitan areas, for whom income generation is a primary motivation (Ojeda-Benítez et al., 2002; Kumar et al., 2017).

Informal waste workers contribute to sustainable waste management through various means, including the reduction of air and water pollution, minimization of industrial waste, energy conservation, and decreased reliance on raw material imports through recycling activities (Medina, 2000). Their involvement also leads to higher recycling rates, which are vital for sustaining the livelihoods of workers and reducing the cost of solid waste management in cities (Kumar et al., 2017; Singh, 2021). Furthermore, their recycling efforts result in a substantial reduction in greenhouse gas emissions, playing a crucial role in combating the impacts of climate change (Chaturvedi, 2014).

The informal sector has taken on the responsibility of handling and recycling a significant portion of recyclable solid waste. This is exemplified by Lahiry's observations (2019) in Delhi, India, where the informal waste sector collects and recycles a large portion of recyclable waste, particularly electronic and plastic waste. In Nigeria, the informal sector often complements government efforts in waste management and, in some cities, serves as the primary provider of waste collection services (Imam et al., 2008). Similarly, in Nepal, the informal waste sector is highly active, but waste workers in this sector often lack knowledge regarding occupational health and safety issues (Khanal et al., 2021). In Shanghai, China, the informal recycling sector involves nearly 200,000 people and accounts for approximately 17 ~ 38% of municipal recycling activities (Linzner and Salhofer, 2014). It is necessary to scale up small projects, share best practices in low- to middle-income areas, and foster global partnerships to promote plastic and circular actions (Ferronato et al, 2023).

However, informal waste workers face numerous challenges globally. Due to a lack of protective equipment, they are exposed to unhealthy and hazardous working conditions (United States Environmental Protection Agency EPA, 2005). They also experience discrimination, harassment from government officials and the public, as well as low self-esteem and stigmatization (Scheinberg et al., 2011; Aparcana, 2017). There is a limited comprehensive understanding of the specific challenges faced by these workers in these countries. Further exploration and detailed examination of these challenges would enhance the understanding of the experiences of informal waste workers, offering valuable insights for the development of targeted interventions and support systems to enhance their working conditions and overall well-being. The study had three main objectives: (i) to identify the then-existing solid waste management practices in Nigeria and Nepal, (ii) to analyze the roles of informal waste workers for effective solid waste management in Nigeria and Nepal, and (iii) to assess the then-current policy measures related to informal waste workers. By achieving these objectives, this research aimed to contribute to the development of targeted interventions and support systems that could enhance the working conditions and overall well-being of informal waste workers, while also improving solid waste management practices.

This paper underscores the significance of integrating informal waste workers into formal waste management structures, reflecting the global consensus on recognizing and incorporating their contributions. Moreover, the study addresses the occupational health and safety challenges encountered by informal waste workers, emphasizing the necessity of implementing policy measures and enhancing infrastructure to effectively address solid waste management. Countries especially African and Asian countries are the ones mostly hit by the devastating effect of waste due to the lack of strict policies and infrastructure to tackle the menace of solid waste. For this article, Nigeria and Nepal were studied due to the fact that the countries share similarities in terms of their solid waste management practices with active role of informal waste workers. By focusing on Nigeria and Nepal, this study offers valuable insights into the specific contexts where the active involvement of informal waste workers is crucial for promoting sustainable waste management practices.

2. Methods

The study purposively selected one underdeveloped country each from Africa and Asia. The Global Research Institute and Training Center (GRIT) was the common platform for all the researchers to come together for this study. The researchers belong to the countries which have been assessed in this study undertaking the secondary literature and case stories to complete the study. The literature was gathered from different sources including Google Scholar, Science Direct, Springer, Academia, ResearchGate, Sage, PubMed and online websites. All researchers used keywords like 'solid waste management', 'informal waste workers', 'waste management in Nepal', 'waste management in Nigeria', 'role of informal waste workers in Nigeria', 'challenges faced by informal waste workers in Nepal' and 'global waste management challenges' (Table 1).

Table 1. Number of Literature Reviewed under Different Topics

Topic	Journal Papers	Books	Reports
Solid Waste Management	24	4	2
Informal Waste Workers	10	1	1
Waste Management in Nepal	6	1	0
Waste Management in Nigeria	8	1	1
Role of Informal Waste Workers in Nigeria	4	0	1
Challenges Faced by Informal Waste Workers in Nepal	2	0	0
Global Waste Management Challenges	0	1	1

All the researchers undertook the roles to bring the cases of the country they reside in and prepared the first draft which was then revised further, and final paper was produced with in-

puts from all the researchers (Figure 1). The details of the countries involved in the study has been mentioned in Table 2.

2.1. Caste Study

Researchers have extensively studied the cases of Nigeria and Nepal to gain insights into the roles of informal waste workers in solid waste management. These two countries provide valuable case studies due to their unique contexts and challenges in solid waste management. By exploring the experiences of informal waste workers in these nations, researchers have been able to identify the significant contributions they make to waste collection, segregation, and recycling. Furthermore, these case studies present the obstacles faced by informal waste workers, such as health risks, social discrimination, and lack of recognition. Through a comprehensive analysis of the cases of Nigeria and Nepal, researchers have developed a deeper understanding of the importance of integrating informal waste workers into formal waste management systems and the potential benefits that can be achieved through inclusive and sustainable waste management practices.

Nigeria, an African country on the Gulf of Guinea is a multi-ethnic, multi-religious and culturally diverse federation of 36 autonomous states and the Federal Capital Territory. Nepal is a landlocked situated in South Asia with a total area of 147,516 square kilometers (Figure 2).

Nigeria, with an annual waste generation of 42 million tons, struggles to effectively manage its waste. The country's waste composition reveals that 57% of the waste is mainly food, while 29% is inorganic waste. Glass and metal makeup around 5% of the waste volume, with the remaining 4% comprising various other waste types (Ike et al., 2018).

In Nepal, solid waste management also faces various challenges, including poor waste collection services, inadequate segregation practices, and limited recycling facilities (Khanal et al., 2023). There is a lack of scientific and accurate studies predicting the output of municipal solid waste (MSW) specifically for least-developed countries like Nepal (Khana et al., 2023). Nepal generates approximately 1.8 million tons of municipal solid waste annually, with a per capita waste generation of 0.30 kg/person/day (World Bank, 2020). The majority of the household waste in Nepal consists of organic waste (56%), followed by glass (16%), plastic (13%), and paper (8%).

3. Results

The section is divided into four parts discussing the current solid waste management practices, roles of informal waste workers and associated government policies and actions for effective solid waste management in Nigeria and Nepal.

3.1. Current Solid Waste Management Practices

Sub-Sahara Africa generates an average of 62 million tonnes of waste annually while Nigeria alone generates 42 million tonnes of waste annually (Ike et al., 2018). Nigeria's annual waste shows that 57% of the waste is mainly food, while 29% is inorganic while volume of glass and metal stood at 5% (Figure 3). Other forms of waste constitute 4% of the total waste generated in the country (Ike et al., 2018). Although Nigeria has a capacity to recycle 70 ~ 80% of its solid waste, only less than 12% of plastic waste is being recycled, and the majority of this waste (approximately 80%) ends up in landfills and disposal facilities (Table 3).

Lagos which is one of the rapidest growing cities in Africa, generated about 9,071,847.4 kg of municipal waste daily in the city, owning to its population growth projected at 17.5 million. The formal sector of waste management is inadequate to deal with such an enormous of waste (Ogwueleka, 2009). As a result, the city has engaged the service of the private sector in its waste

Figure 1. Flowchart of the methodology used to conduct the study.

Figure 2. A Google map screenshot showing the countries considered for the study (source: https://www.surfertoday.com/).

management effort in order to achieve the desired goals of the waste policy and objectives, which has been replicated in most cities in Nigeria. However, efficient and effective waste management is still a serious challenge in most big cities in Nigeria (Ajadi and Tunde, 2010). Hence, there is a need for improvement in solid waste management service delivery in Nigeria, particularly in the area of waste collection.

Nepal generates around 1.8 million tons of MSW annually and it is expected to reach 2.2 million tonnes in 2030 (Kaza et al, 2018). The majority of household solid waste contains organic waste. The daily per capita waste generation of Nepal is 0.30 kg occupying 56% organic, 16% glass, 13% plastic, and 8% paper waste (World Bank, 2020) as shown in Figure 4. Nepal lacks proper source segregation, has poor waste collection service, less recovery of recyclables and most of the waste is dumped in open spaces (Khanal, 2022). Despite of higher potentiality of recovery, waste management companies fail in making waste segregation facilities due to financial burden and unavailability of land in city areas.

The household solid waste management in Nepal is handled by the government, private companies and local organizations. Apart from this, the informal sector also plays vital role in diverting the waste from the landfill site. Kathmandu, the capital city of Nepal generates the highest amount of solid waste in the country. Despite of topmost priority of every government, solid waste management issues of the capital have not been solved yet.

3.2. Roles of Informal Waste Workers in Effective Solid Waste Management

Waste management in Nigerian cities is predominantly handled by government agencies with limited capacity to address solid waste management challenges (Ike et al., 2018). While the government's efforts are commendable, it alone cannot solve the waste management problem in the country. The informal sector also plays a crucial role in waste management in Nigeria, consisting of unapproved, unrestricted, and unregistered individuals or groups, including scavengers, garbage collectors, mobile garbage buyers, and scrap traders (Nwaka, 2005). At most dumpsites in the country, informal workers engage in waste sorting. After recovering recyclable materials, they sell them to scrap buyers, who then sell them to recycling companies (Nwosu and Chukwueloka, 2020). These collectors separate and sort recyclables into different components and sell each component to different dealers. Waste buyers purchase recyclable materials such as bottles, glass, plastics, textiles, used cement bags, electronic waste, and furniture, which they later sell to scrap dealers. Scrap metal dealers assist in the conversion and processing of recovered materials into raw materials, which are sold to recycling companies (Ogwueleka and Naveen, 2021).

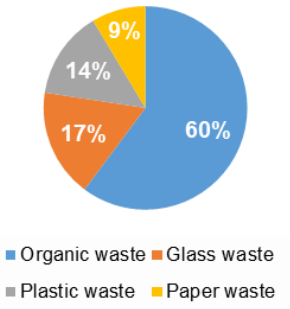

Figure 3. Composition of solid waste in Nigeria.

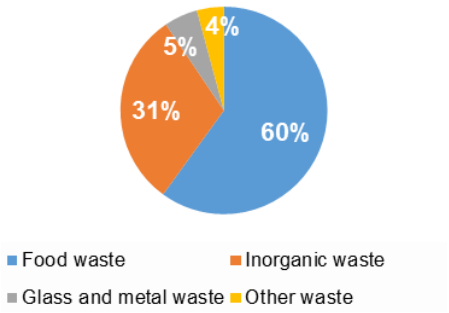

Figure 4. Composition of solid waste in Nepal.

Table 2. Details of the Countries Involved in this Study

Countries	Population (2021)	GDP (2021, Billion US $)	GDP Growth (2021)	Population Growth (2021)	Per Capita Waste Generation (kg/person/day)
Nigeria	211,400,704	440.78	3.6 %	2.5 %	0.44
Nepal	29,674,920	36.29	4.2 %	1.8 %	0.30

Note: Source: World bank, 2020.

Table 3. Waste Generation and Recycling Rate of Nigeria and Nepal

Countries	Total Waste Generation (tons/year)	Waste Collection Efficiency	Recycling Rate	Number of Informal Waste Workers
Nigeria	32 million	75% (in urban areas)	Less than 25%	1,117,000
Nepal	1.8 million	62%	4.1 %	Approx. 20,000

Note: Source: World Bank, 2020 and CBS, 2021.

Table 4. Performance Metrics by Evaluating the Findings of the Study

Parameters	Nigeria	Nepal
Total Waste Generation	42 million tonnes annually	1.8 million tonnes annually
Waste Composition	Food waste: 57%	Organic waste: 56%
	Inorganic waste: 29%	Glass waste: 16%
	Glass and metal waste: 5%	Plastic waste: 13%
	Other waste: 4%	Paper waste: 8%
Recycling Rate	Less than 12%	4.1%
Waste Collection Efficiency	75% (in urban areas)	62%
Number of Informal Waste Workers	Approximately 1,117,000	Approximately 20,000
Main Roles of Informal Waste Workers	Scavengers, garbage collectors, mobile waste buyers, and scrap traders	Rag pickers, itinerant waste buyers (IWBs), scrap center workers, and landfill waste workers
Education and Living Conditions of Informal Waste Workers	Majority are illiterate or have limited formal education, living in poor conditions	Majority have limited education and come from poor families
Challenges Faced by Informal Waste Workers	Discrimination, low self-esteem, lack of government support, inadequate storage facilities, and financial constraints	Occupational health risks, lack of personal protective equipment, fluctuating income, and poor living conditions
Government Policies	No specific policies for involving the informal waste sector	Lack of specific legislation for waste workers' involvement in waste management

Most informal waste workers in Nigeria's solid waste management sector are illiterate or have limited formal education. They face poverty and marginalization, receiving no support or funds from the government or organized sector (Ogwueleka and Naveen, 2021). Ogwueleka and Naveen (2021) discovered that informal waste workers in Nigeria work between 10 and 12 hours per day, searching for and trading solid waste recyclables. These workers face discrimination and harassment from government officials and the public, leading to low self-esteem and stigmatization (Scheinberg et al., 2011; Aparcana, 2016). Storage facilities are inadequate for the recovered materials, and there are challenges in accessing financial resources. The sector remains unregulated and unrecognized (Ogwueleka, 2013), which results in hazardous conditions. Moreover, the scavengers are often exploited by scrap dealers who offer low prices. Informal recycling activities in major Nigerian cities such as Lagos, Ibadan, Kano, Port Harcourt, Warri, Abuja, Calabar, and Sagamu provide employment and livelihoods for a significant number of people, while also contributing to environmental conservation, the provision of secondary raw materials to industries, and the prolongation of the lifespan of waste disposal sites.

In Nepal, there are approximately 20,000 informal waste workers, with 75% of them sustaining their livelihoods in the capital city of Kathmandu. These workers are involved in various roles, including rag pickers, itinerant waste buyers (IWBs), scrap center workers, and landfill waste workers (Khanal, et al., 2021). Due to their mobility, there is no mechanism to accurately record the exact number of these waste workers. In the case of scrap centers and landfill waste workers, there are more females than males. However, in the case of IWBs, males from the Terai region of Nepal and neighbouring India are involved in purchasing recyclables from households and institutions. Informal waste workers come from poor families, often have limited education, and rely on the daily collection of recyclables for their livelihoods. Although the majority of waste workers are aware of the occupational health risks, around 81% of landfill waste workers have never used the full set of personal protective equipment (PPE) during their work (Khanal et al., 2021). It is crucial to raise awareness about the potential risks from hazardous chemicals and blood-borne infections (Sapkota et al., 2020). There is a need to enhance the availability of high-quality PPE, deliver comprehensive training programs on the correct utilization of PPE, and increase awareness

among both waste workers and policymakers regarding the occupational health risks they may face (Giri et al., 2023).

The income of IWWs is dependent on the quantity and quality of recyclables collected and regarded as the survival strategy for a large number of poor people. The income of rag pickers, landfill waste workers and IWBs are not equal every day. The income largely depends on seasons and festivals. The income is lesser during winter and rainy season and spikes during the start of new sessions at school and during the major festivals like Dashain and Tihar.

3.3. Rules and Policies Related to Informal Waste Workers

Despite the state's crucial role in municipal solid waste management, the problem of municipal solid waste in Nigeria has remained unsolved. The informal economy has always been excluded from Municipal Solid Waste management system policy and reforms. Nigeria's national solid waste management policy doesn't include a strategy to involve the sizeable informal sector. An inclusive policy is one that acknowledges and involves informal waste workers in solid waste management while also improving their quality of life and waste management effectiveness (Mbah and Nzeadibe, 2016).

Nepal's first national policy on solid waste was formulated in 1996 (Khanal, 2022). The policy talks about the importance of minimizing the waste from its source with the role of the private sector in waste collection. At present, solid waste management act 2011 talks about reducing, reusing, and recycling solid waste. Though the act has focused on maximum recovery of waste before sending it to landfill site, it fails to mention the role of waste workers in diverting the waste from the landfills. Also, there is no separate legislation for industrial, electronic, and chemical waste in Nepal.

4. Discussion

Nigeria and Nepal face similar challenges in solid waste management, but Nigeria generates significantly more waste due to its larger population and higher GDP (Table 4). Both countries rely on the informal waste sector to fill the gaps in waste management services. Nigeria and Nepal differ in various aspects of solid waste management practices, informal waste workers, and related policies.

Both countries struggle with inadequate waste collection services and poor segregation practices, hindering effective waste management. The waste management systems adopted in Nigeria and Nepal were not satisfactory as there was little, or no reuse of the waste generated in the two study locations. Nigeria which generates close to 42 million tonnes of waste annually was able to recover less than 12% of the total waste generated. The same trend was found in Nepal which struggles to recover about 4% of 1.8 million tons of waste generated annually. There are heaps of other problems ranging from collection, transportation, sorting, processing, and disposal of waste that were found in both countries.

The role of informal waste workers is crucial in both Nigeria and Nepal. While informal waste workers could play significant contributions in waste management, government agencies of the two countries, which have limited capacity to tackle the problems of solid waste management, have monopolized waste management in both countries. As at the time of this study, enough attention has not been paid to the contributions of the informal sector to waste management. Our analyses of the terms related to the role of the informal sector in waste management show that the involvement of the informal sector contributes positively to waste management in both countries, especially in the area of collection, sorting, recovery, and recycling. However, it was observed that inconsistency in legislation in Nigeria and Nepal was a major problem discouraging the involvement of informal waste workers. It can be claimed that it was particularly challenging to create advancements in waste management in Nigeria and Nepal due to the lack of proper records on informal waste workers, application of out-of-date legislation, lack of documentation on waste management practices and a lack of enforcement of the rules in both countries.

In essence, the populace in the study locations lacks knowledge or advice regarding the procedures to follow and what they may and cannot do in the management of waste. In addition, inadequate funds and skilled manpower with proper technologies to manage solid waste effectively were also found in Nigeria and Nepal to be responsible for improper waste management. While many of the issues may be resolved without significant financial outlays. Simply, increasing system efficiency can address these issues (for example, modifying collection routes, changing collection times and others).

The effort of the informal sector needs to be recognized for effective waste management in both countries. Going forward, Governments should consider developing policies that will guide the waste sector, ensure the informal sectors are registered, raise awareness and invest in waste collection and recycling.

Public awareness and education play a crucial role in promoting proper waste management practices, but this aspect was not extensively covered in the study. The active involvement and cooperation of the general population are essential for the effectiveness of waste management efforts. Financial constraints and resource allocation were briefly mentioned in the study as contributing factors to improper waste management. However, a more comprehensive analysis of the financial challenges faced by governments, including the allocation of budgets for waste management, investment in infrastructure, and resource allocation for waste collection and recycling, is needed for a more holistic understanding of the issue.

As technological advancements, such as waste-to-energy conversion, efficient sorting and processing techniques, and smart waste collection systems, have the potential to significantly enhance waste management effectiveness, a detailed examination of these technological solutions is also required. Further analysis of the dynamics for stakeholder collaboration is needed to identify the challenges and opportunities associated

with fostering effective stakeholder collaboration. The study highlighted the need for inclusive waste management policies but did not elaborate on specific policy frameworks and regulations that could support the involvement of informal waste workers and address the challenges in waste management. A comprehensive analysis of the existing policies, potential policy reforms, and the legal frameworks governing waste management in Nigeria and Nepal is necessary to shed light on the regulatory aspects of waste management in these countries.

5. Conclusions and Recommendation

The current study explored the solid waste management practices, the role of informal waste workers, and related policies in Nigeria and Nepal. The findings several key issues, challenges and opportunities in the waste management system of Nigeria and Nepal.

Nigeria generates around 42 million tons annually, with food waste accounting for the majority. However, the recycling rate is less than 12%, and a significant portion of waste ends up in landfills and disposal facilities. The formal waste management sector in Nigeria is insufficient to handle the enormous waste volume, leading to the engagement of the informal sector, which plays a vital role in waste collection and recycling activities. The informal waste workers face various challenges, including discrimination, and low self-esteem, but their activities provide employment opportunities and contribute to environmental conservation.

In Nepal, approximately 1.8 million tons of MSW are generated annually, predominantly comprising organic waste. The recycling rate is only 4.1%, and the majority of waste is dumped in open spaces due to inadequate waste collection services, poor segregation practices, and limited recovery of recyclables. Informal waste workers, such as rag pickers and itinerant waste buyers, play a significant role in diverting waste from landfills. They face occupational health risks and seasonal fluctuations in income but contribute to the livelihoods of many poor individuals.

The study also shows that both Nigeria and Nepal face challenges with inadequate waste collection services, poor segregation practices, and low recycling rates. The involvement of informal waste workers is crucial in bridging the gaps in waste management services. However, the existing policies and legislation in both countries do not adequately recognize and support the role of informal waste workers. Inconsistency in legislation, lack of documentation, and limited enforcement have hindered the progress of effective solid waste management. Awareness-raising programs and investment in waste collection and recycling are essential. Additionally, addressing financial constraints, promoting system efficiency, and adopting appropriate technologies can contribute to effective waste management in both countries.

Based on the study findings, the following recommendations are proposed to enhance solid waste management practices and the role of informal waste workers in Nigeria and Nepal.

(a) Develop inclusive waste management policies that recognize and support the informal waste sector.

(b) Strengthen waste collection and segregation systems, promoting responsible waste disposal habits.

(c) Invest in recycling infrastructure and capacity to improve waste recovery and recycling rates.

(d) Foster collaboration and coordination among government agencies, waste management companies, and informal waste workers.

(e) Enforce existing legislation and develop new regulations to ensure proper waste disposal.

(f) Provide support and recognition for informal waste workers, improving their working conditions and access to social protection measures.

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Appendix A. Abbreviation

CBS	Central Bureau of Statistics
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GRIT	Global Research Institute and Training Center
ISWM	Integrated Solid Waste Management
IWBs	Itinerant Waste Buyers
LDCs	Least Developed Countries
MSW	Municipal Solid Waste
PPE	Personal Protective Equipment
SWM	Solid Waste Management
UNEP	United Nations Environmental Programme

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