Asian Journal of Research in Medical and Pharmaceutical Sciences

Volume 13, Issue 2, Page 13-20, 2024; Article no.AJRIMPS.116473
ISSN: 2457-0745

Roles and Barriers to Waste Management among Garbage Collectors in Port-Harcourt Metropolis, Rivers State, Nigeria

Olachi U Nkere [a*] and Ezinne C Iwunze [a*]

[a] Department of Preventive and Social Medicine, University of Port Harcourt, Port-Harcourt, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Author OUN conceptualized the study, manage the literature searches, and wrote the protocol. Author ECI managed the literature searches, did the analyses and wrote the first draft of the manuscript. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJRIMPS/2024/v13i2251

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/116473

Original Research Article

Received: 15/02/2024
Accepted: 25/04/2024
Published: 30/04/2024

ABSTRACT

Efficient waste management continues to be a significant public health challenge in Nigeria and other developing nations owing to a number of factors facing the personnel of waste management authorities, potentially leading to a disruption in the environment.
Aim: To investigate the waste management roles and barriers faced by municipal waste collectors in Port Harcourt metropolis, Rivers State.
Study Design: A descriptive, cross-sectional design was used.
Place and Duration of Study: Port Harcourt metropolis, River State, Nigeria over a six month period.
Methodology: The study was conducted among 302 municipal waste collectors through cluster random sampling, using pretested, structured, interviewer-administered questionnaires. Data entry

**Corresponding author: E-mail: olachinkere@gmail.com; iwunze.ezinne@uniport.edu.ng;*

and analysis were done using MS-Excel and analyzed using Statistical Package for Social Sciences version 20. Categorical variables were summarized using frequencies and proportions.
Results: All study participants were males aged 20 years and above. They collected and sorted waste from both approved and unapproved receptacles. However, poor waste segregation at households, collection and processing practices, disruptive activities of scavengers, use of old, frequently dysfunctional equipment, poor training and insufficient remuneration/welfare and lack of public support were identified as the existing challenges faced by the garbage collectors.
Conclusion: Unified efforts from relevant stakeholders such as households, organized private sector and the government are required to surmount the challenges faced by waste collectors. This will lead to the implementation of measures which could significantly promote sustainable development and environmental protection.

Keywords: Waste; garbage collectors; barriers; roles; Port Harcourt.

1. INTRODUCTION

Inefficient waste management is one of the major environmental challenges of this century [1]. Urban regions in many countries of the world are currently faced with the issue of waste management, a major public health concern. This is because major towns and cities across the world have seen a surge in population growth as a result of the industrial revolution, resulting in high rates of urbanization and development [2].

Waste management is the process of disposing of municipal solid waste generated by individuals in an urban area in a manner that is not harmful to the environment, or humans, with the best possible cost [3]. In addition, waste management deals with controlling the generation, storage, collection, transfer and transport, processing, and disposal of solid waste in a manner that follows the best principles of health, economics, engineering, conservation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes [4].

Numerous studies show that, among other sources, families (between 55% and 80%), market areas (10% and 30%), and institutions account for a large portion of the municipal solid waste produced in developing nations [5,6,7]. Particularly in developing nations, the amount of waste generated by growing cities is outpacing the capacity of national and municipal governments to manage [8,9]. The negative effects of waste management are evident in towns and cities all over the world [10,11,12]. Also the high organic content in municipal solid waste promotes the proliferation of microbial infections, potentially resulting in infectious and chronic diseases in waste workers, rag pickers, and people living nearby.[13] Other effects of poorly managed waste are pollution of the world's oceans, clogging of drains and flooding, transition of diseases via vector breeding, increase respiratory problems due to airborne particles from waste burning, harming animals that inadvertently consume waste, and affecting economic development through reduced tourism. Human health can be affected directly through disease outbreaks, mental health strain, and reduced productivity which subsequently results in poor quality of life of the people [14].

Obio/Akpor LGA and PHALGA are the major and the most advanced local government areas in Port Harcourt, Rivers State. According to Rivers State Waste Management Agency (RIWAMA) regulations, their high population density and ongoing development have led to an influx of solid waste and improper solid waste disposal throughout the local government [15]. The Rivers State Waste Management Authority collects and disposes of solid waste in the Port Harcourt metropolis through contractors who primarily use manual labour and garbage collectors to carry out their duties [16]. The authorities or their contractors are faced with challenges like; poor remuneration of workers, lack of training and retraining of workers, use of old vehicles/equipment, frequent breakdown of compactors on the road and lots more [12]. The most crucial phase in waste management is waste prevention, which is unavoidable but can be greatly minimized [17]. Waste management plays a crucial role in maintaining environmental sustainability by efficiently handling collecting, transportation, processing, recycling and disposal of waste materials [18]. When properly done, waste management helps prevent pollution, conserves resources and protect public health. Effective waste management also promotes circular economy principles by maximizing the reuse and recycling of materials, thereby minimizing the need for raw material extraction and reducing waste sent to landfills or

incineration. Therefore, this study aimed to ascertain the waste management roles and identify barriers encountered by municipal solid waste collectors in Port Harcourt metropolis.

2. METHODOLOGY

2.1 Study Area

This study was conducted in Obio/Akpor and PHALGA, the main LGAs of Port Harcourt metropolis. Obio/Akpor is the largest LGA of Rivers State, with its headquarters at Rumuodomaya [15]. While Port Harcourt Local Government Area (PHALGA) is the second largest urban LGA of Rivers state. The projected population of Rivers State in 2015 was 6,592,072 [19]. Majority of River people, over the years have migrated to this LGA making it another commercial, economic and industrial hub for the state [19].

The Port Harcourt Council Area shares boundaries with Emohua, Etche, Ikwerre, Oyigbo, Eleme, Okrika and Port Harcourt Local Government Areas of Rivers State. It mainly comprises of the Ikwerre tribe but due to its urban status, there is an influx of other nationalities to the Local Government Area. [20].

2.2 Research Design

A descriptive cross-sectional study was conducted.

2.3 Study Population

The study population comprised of municipal waste collectors in Port Harcourt metropolis, Rivers State.

2.4 Sampling Technique

A cluster random sampling was employed in this study. The study setting is divided into 85 zones (clusters): By the Rivers State Waste Management Agency. Obio/Akpor Local Government Area is divided into 49 clusters while Port Harcourt City Local Government Area has 36 clusters. Twenty-four (24) and 19 clusters were purposively selected from Obio/Akpor and Port Harcourt City Local Government Areas respectively. Thereafter, a list of these clusters served as a sampling frame from which through simple random technique by balloting, a minimum of 6-7 municipal waste collectors were selected from each of the clusters until the minimum sample size was reached.

2.5 Eligibility Criteria

All the contractors' personnel working for RIWAMAs' service providers were included in the study while those that were on annual leave or too sick to respond were excluded.

2.6 Sample Size Determination

The sample size appropriate for the study was calculated using the Cochran formula; $n = \frac{Z^2pq}{d^2}$ [21]**.** where; n = minimum sample size, z = 1.96; standard derivation; 95% CI p = Proportion of residents who managed their municipal solid waste from a previous study 77% = 0.77 [22]. q = (1 – p) =0.23. d^2 =level of precision 5% = 0.05
Putting the values in the formula above N =272. Applying a 10% non-response rate using the formula= $\frac{N}{1-0.1}$

Thus, sample size N = 302 municipal waste collectors.

2.7 Data Management

An interviewer-administered, structured questionnaire was adapted and developed from an existing tool that has been used in similar studies [23]. There were 3 subsections in the tool and these comprised of socio-demographic characteristics of the respondents, waste management roles by waste collectors and the possible barriers encountered by these solid waste collectors. Thirty questionnaires were pretested using a similar population aside the study population. The Data were analyzed using Kuder and Richardson Formula 20 (KR-20) test in Microsoft Excel and it gave a 0.82 result. This was to ensure test reliability and consistency of the tool.

3. RESULTS AND DISCUSSION

3.1 Results

The study participants were aged 20 years and above. The result reveals that the most of the respondents (47.3%) belonged to the 20-29 years' age category, while respondents who were 40 years or older had a proportion of 8.7% (28)**.** All the participants 100% (302) were male and slightly above half 54.6% (165) were married. Primary education had a prevalence of 20.2% (61), secondary school education was the highest with a prevalence of 77.2% (233), and only a few 2.6% (8) participants had attained tertiary education (see Table 1).

Table 1. Socio-demographic characteristics of waste collectors

Characteristics (n=302)	Frequency (n)	Percentage (%)
Age of Respondents		
20 – 29years	143	47.3
30 – 39years	131	43.4
≥40years	28	9.3
Sex		
Male	302	100.0
Female	0	0.0
Marital Status		
Married	165	54.6
Single	125	41.4
Widower	7	2.3
Separated	5	1.7
Educational Level		
Primary	61	20.2
Secondary	233	77.2
Tertiary	8	2.6
Religion		
Christianity	242	80.1
Muslim	18	5.9
Others	42	13.9

Table 2. Role of waste collectors in solid waste management (*n=302*)

Roles	Frequency (n)	Percentage (%)
How do you normally collect municipal solid waste? (n=461)*		
Collection from approved receptacles	308	66.8
Collection from unapproved receptacles	153	33.2
Waste was segregated/sorted before disposal		
Yes	0	0.0
No	302	100.0
Do you segregate or sort municipal solid waste before you collect them?		
Yes	149	49.3
No	153	50.7
Is there any form of sorting /segregation at the final disposal sites?		
Yes	114	37.7
No	188	62.3
What persons are involved in municipal solid waste sorting?		
RIWAMA service providers & scavengers	192	63.6
Scavengers only	110	36.4
Do you have any technical segregation facility at final disposal dumpsite?		
Yes	302	100.0
No	0	0.0
Is there are recycling/ treatment facility in any of the dump sites?		
Yes	0	0.0
No	302	100.0

**Multiple responses applicable*

Table 3. Barriers encountered by municipal solid waste collectors (*n=302*)

Characteristics	Frequency (n)	Percentage (%)
Use of old vehicles/ equipment		
Yes	243	80.5
No	59	19.5
Frequent breakdown of compactors on the road		
Yes	212	70.2
No	90	29.8
Lack of training and retraining of workers		
Yes	186	61.6
No	116	38.4
Poor remuneration of workers		
Yes	280	92.7
No	22	7.3
Activities of scavengers (emptying bagged waste on the floor to pick recyclables)		
Yes	272	90.1
No	30	9.9
Lack of health insurance		
Yes	235	77.8
No	67	22.2
Poor public cooperation		
Yes	155	51.3
No	147	48.7

Table 2 shows the role of waste collectors in solid waste management. More than half (66.8%) said that they collected waste from the approved receptacles while the rest (33.2%) did not. All the participants (100.0%) indicated that MSW waste was never segregated before disposal**.** Almost half of the respondents (49.3%) said that they sorted waste before collection. When asked if there was any form of sorting at the final disposal site, only (37.7%) answered in the affirmative. Similarly, more than half (63.6%) said both RIWAMA service providers and scavengers were involved in sorting. Lastly, all the participants stated that there were no technical segregation or recycling/ treatment facilities at the dump sites (See Table 2).

In this study, (80.5%) of the participants stated that vehicles/equipment used were old. Also, a good proportion (70.2%) of the respondents said the compactors broke down frequently on the roads. More than half (61.6%) of the respondents stated that non-regular training and retraining of workers were barriers to their roles as waste collectors.

Also, majority (92.7%) and (90.1%) of the respondents identified poor remuneration and activities of scavengers as major challenges they faced in waste management respectively. Majority (77.8%) and about half (51.3%) stated lack of health insurance and poor public cooperation respectively as some of the barriers waste collectors encountered (See Table 3).

3.2 Discussion

This study explored the waste management roles and barriers faced by waste collectors in Port Harcourt metropolis. It was observed that most of the municipal waste was not sorted at their source of generation before disposal. As part of waste management, recycling is a particularly vital process that can be made easier when waste generators endeavour to segregate their waste before disposal. Most of the waste seen at this designated sites in Port Harcourt metropolis are mainly household waste. Therefore, waste separation or sorting at the household level should be encouraged and not viewed as inconvenient as this contributes significantly to waste management, as reported by several studies [24,25].

However, about half of the garbage collectors stated that they sorted the waste at the designated dump sites within the city before transporting them to the final disposal site. Although majority of the respondents reported that little or no sorting subsequently took place at

the final disposal site. This implies that the volume and quantity of waste generated by households, industries and other public places would be increased and cumbersome for the waste collectors who transport these wastes from the various unauthorized and authorized sites across the metropolis to the final disposal sites. Also, the unsegregated wastes are likely to attract scavengers who rummage through these waste and are at risk of exposure to certain communicable diseases. Therefore, the importance of waste segregation and sorting cannot be over-emphasized and as such innovative ways of ensuring that this takes place at the points of waste generation should be explored [26,25]. These may include public sensitization by media engagements as constant reminders, provisions of incentives to households that exchange their segregated waste for money and enforcement of environmental protection laws.

The respondents affirmed that there was no technical segregation facility at final disposal dumpsite nor was there any recycling/treatment facility in any of the dump sites. This could pose some significant implications on the residents of Port Harcourt metropolis as huge volumes of untreated waste deposited in landfills creates the possibility of increased disease spread and the release of harmful toxins into the environment [27,28]. Also, valuable resources present in waste materials would be lost, opportunities for wealth creation from waste are forgone leading to resource depletion, increased demand for raw materials, and reduced economic productivity.

In the index study, more than three-quarters of the study population reported the use of old vehicles/equipment as a barrier. Majority also affirmed that the frequent breakdown of compactors on the road was a major challenge. A similar study by Ongia et al., cited these factors as barriers to proper solid waste disposal [29]. The frequent breakdown of these vehicles can be a likely cause of road accidents causing more harm to residents. Other challenges reported by the majority of the study participants included lack of training and retraining of workers, poor remuneration of workers, the activities of scavengers and the lack of health insurance. Improved welfare, good remuneration, and provision of life insurance are advocated as these personnel are low cadre workers, and also have families as observed in our study and are at increased risk of exposure to road traffic accidents and death. Keagaisa showed that these waste management barriers were not peculiar to the people in the PH metropolis Obio/Akpor community but rather cuts across different regions [30]. To address these barriers, public cooperation should be encouraged by engaging members of the community at all levels through all forms of media, enforcement of laws banning the activities of scavengers, training and retraining of waste management workers and other sustainable interventions.

4. CONCLUSION

The role of municipal waste collectors represents a significant yet understudied aspect of waste management practices. Concerted efforts from relevant stakeholders such as households, industries, organized private sector and the government are needed to surmount the challenges and barriers faced by the waste collectors. Also innovative interventions if instituted, have far-reaching implications for environmental protection and sustainable development.

ETHICAL APPROVAL AND CONSENT

Ethical approval was obtained from the University of Port Harcourt ethics research committee. Permission to conduct research was also obtained from the local government councils and written consent forms were signed and received from each study participant after thorough explanations of the purpose of the research and that their participation was voluntary without any form of coercion. They were assured of confidentiality and anonymity.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Zacho KO, Mosgaard MA. Understanding the role of waste prevention in local waste management; 2016.
Available:https://sci-hub.53yu.com/10.1177/0734242X16652958
2. Samson AO, Oluwatoyin OR. Challenges of waste management and climate change in Nigeria: Lagos State metropolis experience. African Journal of Scientific Research. 2012;7(1).

Available:https://www.academia.edu/download/101964217/ajsr_7_3.pdf
3. Joshi R, Ahmed S. Status and challenges of municipal solid waste management in India: A review. Cogent Environmental Science. 2016;2(1):1139434. Available:https://doi.org/10.1080/23311843.2016.1139434
4. Doda YB, Toma S. Assessment of Municipal Solid Waste Management The Case of Hawassa Town, Southern Nation, Nationalities and Peoples Regional State [PhD Thesis, Haramaya University]; 2014. Available:https://www.academia.edu/download/51336701/abiy.pdf
5. Abdel-Shafy HI, Mansour MSM. Solid waste issue: Sources, composition, disposal, recycling, and valorization. Egypt. J. Pet; 2018.
6. Nabegu A. An Analysis of Municipal Solid Waste in Kano Metropolis, Nigeria. J Hum Ecol. 2010;31:111–119. Available:https://doi.org/10.1080/09709274.2010.11906301
7. Okot-Okumu J. Solid waste management in African cities–East Africa. Waste Management–An Integrated Vision. 2012; 1–20.
8. Kumari T, Raghubanshi A. Waste management practices in the developing nations: Challenges and opportunities; 2022. Available:https://doi.org/10.1016/B978-0-323-90463-6.00017-8
9. Yousif DF, Scott S. Governing solid waste management in Mazatenango, Guatemala: Problems and prospects. International Development Planning Review. 2007; 29(4):433–450.
10. Anomanyo ED. Integration of municipal solid waste management in Accra (Ghana): Bioreactor treatment technology as an integral part of the management process. Lund University, Sweden; 2004. Available:https://www.lumes.lu.se/sites/lumes.lu.se/files/anomanyo_edward.pdf
11. Ferronato N, Torretta V. Waste mismanagement in developing countries: A review of global issues. International Journal of Environmental Research and Public Health. 2019;16(6):1060. Available:https://doi.org/10.3390/ijerph16061060
12. Ugwuanyi R, Isife T. Urbanization and solid waste management challenges in Nigeria. Technoscience Review. 2012;3:3–14.
13. Pujara Y, Pathak P, Sharma A, Govani J. Review on indian municipal solid waste management practices for reduction of environmental impacts to achieve sustainable development goals. Journal of Environmental Management. 2019;248: 109238.
14. Momoh JJ, Oladebeye DH. Assessment of awareness, attitude and willingness of people to participate in houshold solid waste recycling programme in Ado-Ekiti, Nigeria. Journal of Applied Sciences in Environmental Sanitation. 2010;5(1).
15. Eze P, Kaboufou, Douglas R. Suitability mapping of solid waste disposal sites in Obio/Akpor local government area: Rivers state of Nigeria. MOJ Ecology & Environmental Sciences. 2023;8(1). Available:https://doi.org/10.15406/mojes.2023.08.00266
16. Miwano EP, Ibidabo A, Kingsley D. Occupational hazards and safety practices of refuse collectors in Obio/Akpor Local Government Area of Rivers State. Asian Journal of Medicine and Health. 2018; 13(3).Article 3. Available:https://doi.org/10.9734/AJMAH/2018/45368
17. Pires A, Martinho G. Waste hierarchy index for circular economy in waste management. Waste Management. 2019; 95:298–305.
18. Rimi Abubakar I, Maniruzzaman K, Dano, Dr. UL, Alshihri F, Alshammari M, Mohammed S, Ahmed S, Ahmed W, Al-Gehlani W, Alrawaf T. Environmental sustainability impacts of solid waste management practices in the global south. International Journal of Environmental Research and Public Health. 2022;19:1–29. Available:https://doi.org/10.3390/ijerph191912717
19. Briggs DC, Eneh AU. Preparedness of primary health care workers and audit of primary health centres for newborn resuscitation in Port Harcourt, Rivers State, Southern Nigeria. The Pan African Medical Journal. 2020;36:68. Available:https://doi.org/10.11604/pamj.2020.36.68.22164
20. Onuoha H, Olaide A, Achema E. Geospatial techniques in risk mapping of oil pipelines in obio/akpor areas of Rivers State, Nigeria; 2013.
21. Cochran WG. Note on an approximate formula for the significance levels of z. The

Annals of Mathematical Statistics. 1940; 11(1):93–95.

22. Almasi A, Mohammadi M, Azizi A, Berizi Z, Shamsi K, Shahbazi A, Mosavi SA. Assessing the knowledge, attitude and practice of the kermanshahi women towards reducing, recycling and reusing of municipal solid waste. Resources, Conservation and Recycling. 2019;141: 329–338. Available:https://doi.org/10.1016/j.resconrec.2018.10.017
23. Roopa S, Menta Satya R. Questionnaire designing for a survey. The Journal of Indian Orthodontic Society. 2012;46:37–41. Available:https://doi.org/10.5005/jp-journals-10021-1104
24. Sabiini G, Rishmany J. Sorting and miniaturization of household waste. European Journal of Scientific Research. 2019;153(3):283–298.
25. Shirleen D, Kho K. Improvement on waste segregation knowledge by verbal and visual prompt in indonesia international institute for life sciences (i3L). Indonesian Journal of Life Sciences. 2023; 52–57. Available:https://doi.org/10.54250/ijls.v5i01.171
26. Mukundan H. Identifying barriers and promoters of household waste sorting among students [fi=AMK-opinnäytetyö| sv=YH-examensarbete| en=Bachelor's thesis|]; 2020. Available:http://www.theseus.fi/handle/10024/341278
27. Mekonnen B, Haddis A, Zeine W. Assessment of the effect of solid waste dump site on surrounding soil and river water quality in Tepi Town, Southwest Ethiopia. Journal of Environmental and Public Health. 2020;e5157046. Available:https://doi.org/10.1155/2020/5157046
28. Nta S, Ayotamuno J, Igoni A, Okparanma R, Claudia T, Alecsandri V. Emission from uyo main refuse dumpsite and potential impact on health. International Journal of Environment and Climate Change. 2020; 10:8–13. Available:https://doi.org/10.9734/IJECC/2020/v10i530196
29. Ongia J-O, Turyabanawe L, Barasa B, Mulabbi A, Akello G. Factors and constraints hindering effective municipal solid waste management systems in sub-saharan Africa: Case study of Northern Uganda. International Journal of Advanced Research. 2021;3(1). Available:https://doi.org/10.37284/ijar.3.1.431
30. Keagaisa AT. Institutional barriers to effective municipal solid waste management in ngaka modiri molema district municipality, South Africa—University of Johannesburg; 2023. Available:https://ujcontent.uj.ac.za/esploro/outputs/graduate/Institutional-Barriers-to-Effective-Municipal-Solid/9932707807691

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/116473