

# Sustainable cities through household waste management: an unexplored approach to challenges confronting private solid waste management

Private solid  
waste  
management

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## Abstract

**Purpose** – In less than a decade to sustainable development goals (SDGs) there is a threat of household waste emanating from sub-urban sprawl especially in developing countries. Private approaches with government-enabling environments have been proved a successful platform for urban services such as housing provision and telecommunication in developing cities. Still private solid waste management (PSWM) seems different in Nigeria. Therefore, this paper aims to investigate the possible perceived hindrances facing PSWM organisations and proffer feasible policies to enhance sustainable clean and healthy cities.

**Design/methodology/approach** – Seven communities within Benin City sub-urban environs were adopted as the study area to accomplish the research's objectives via a phenomenology type of qualitative research design. The study analysed the collated data from the knowledgeable participants via a thematic approach.

**Findings** – Lax legislative, absence of institutional framework, inadequate economic motivation, inadequate technical operations, among others, emerged as the encumbrances faced by PSWM firms. Wastes dumped along unethical locations such as streets, roads, uncompleted buildings, culverts and drainage channels, and undeveloped plots emerged as the encumbrance outcomes. Findings show that proffering feasible policy solutions to tackle identified hindrances can promote the achievement of SDGs across semi-urban locations in Nigeria.

**Research limitations/implications** – This research is restricted to urban household waste management by PSWM within Nigeria. Also, the study identified the challenges and proffer policy solutions to enhance improved clean environment within the sub-urban and urban cities.

**Practical implications** – As part of this study's implications, results from this research intend to guide government policymakers and PSWM firms to encourage collaboration in designing appropriate strategic and educational programmes for the householders (customers) in sub-cities. It will be achieved via feasible policies that are tailored towards achieving sustainable health and environment-friendly sub-urban locations.

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**Originality/value** – This paper intends to enhance proper PSWM and create sustainable cities via collaboration. Also, the paper engaged key stakeholders via a qualitative research design to proffer possible solutions to the menace of sub-urban and urban household waste management.

**Keywords** Developing cities, Environment, Management, Suburban housing, Urban sprawl, Waste

**Paper type** Research paper

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## 1. Introduction

The management of household waste is germane to the environmental management system. [Elsaid and Aghezzaf \(2015\)](#) described a waste management system as the coordination of all duties, practices and resources for creating a platform that manages waste and obeys the environmental rules. For this paper, the term “waste” includes unsolicited or unusable items that are deliberately discarded by their users ([Younes \*et al.\*, 2015](#)). Waste management in cities has remained a major environmental problem but worse in developing settings ([Adenaike and Omotosho, 2020](#)). One of the reasons is the inability to have an accurate waste generation record. The statistic provided by the United Nations Department of Economic and Social Affairs/Population Division (UNDESA/PD) claimed that the proportion of African population residents in city areas is anticipated to increase from 40% in 2010 to above 57% in 2050 ([UNDESA/PD, 2012](#)). It calls for concern because there is no sound mechanism to manage possible household waste from such urban population growth. [Cobbinah \*et al.\* \(2015\)](#) found that the unparalleled rise in the level of Africa’s urbanisation in the first half of the 21st century has triggered several debates, concerns and disquiet about what this may mean for the standard of life of the African population. The city squalors have overwhelmed the urban authorities in African cities ([Cobbinah \*et al.\*, 2017](#)). It is a crucial challenge for sustainable solid waste management ([Younes \*et al.\*, 2015](#)).

The dangers of household solid waste management regarding human well-being and the environment remain a concern to cities and semi-cities in developing and developed countries. Though policies and programmes to mitigate the threat through technology have been advanced, the task of offering sustainable cities and healthy environments, especially in developing settings like Nigeria, is still frightening. One of the approaches adopted in the past was the private sector participation in solid waste management. Private sector participation in urban solid waste management was embraced, especially in developing countries, because it enhances efficiency, improves the quality of waste management services, reduces service delivery costs and reduces scarce government resources. Also, it is a possible opportunity and mobilise private investment for urban investment ([Cointreau-Levine, 1994](#); [Phonchi-Tshekiso \*et al.\*, 2020](#)). The latter authors affirmed that the interplay of stakeholders in developing countries is critical to achieving sustainable solid waste management systems. For this paper, PSWM implies formal private sector involvement in providing efficient solid waste management services, focusing on Nigerian households. These benefits are not free from challenges. Thus, a solid waste management (SWM) system encompasses the formation of waste, gathering, transportation, processing, reprocessing and final disposal of the refuse and other waste items ([Agunwamba, 1998](#)). It entails a mechanism employed to mitigate waste accumulation in the first instance. The research focuses on household waste because of urban sprawl and the possible challenges facing private operators in managing these wastes. It includes solid wastes generated from homes, workplaces, learning centres, factories, etc. This waste category can be influenced by social, economic, cultural, emotional, academic and high-technology variables ([Guerrero \*et al.\*, 2013](#)). The World Bank report estimated that global solid waste would increase from 3.5 million tonnes per day in 2010 to more than 6 million tonnes per day in 2025 ([Hoornweg and](#)

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Bada-Tata, 2012). The World Bank projected a waste peak by 2050 in OECD nations, 2075 in Asia-Pacific nations and a steady increase in Africa till 2100. It may exceed 11 million tonnes per day (Nwachukwu *et al.*, 2017). Ebekozi (2020) found geometric growth of population and urbanisation, especially in semi-cities. Thus, this study needs to drive policies that will improve and enhance urban's SWM via private initiatives in Nigeria's context.

With the volume of research on SWM such as Cobbinah *et al.* (2017), Nwachukwu *et al.* (2017), Ike *et al.* (2018), Salami *et al.* (2018), among others, only a few such as Afon (2007), Longe *et al.* (2009) and Olukanni and Nwafor (2019) have worked in the direction of private SWM. Afon (2007) evaluated the role of the "Barro boys" in the informal sector in urban solid waste management in Mushin and Kosofe. These locations are sub-urban in Nigeria and found that the "Barro boys" activities are illegal but integrating them into the existing system to evolve an efficient urban SWM is more realistic. In this paper, "Barro boys" is a term used to describe people's activities in the informal waste collection in Nigerian sub-cities. Sometimes, the waste materials are collected without a charge if the content of the waste contains materials that can be sorted and resold. Some of the waste materials that the Barro boys can resell to the recycle buyers are plastic, steel, carton paper, etc. Longe *et al.* (2009) worked regarding issues being encountered by the private managers of waste generated from households and its environs, especially in semi-urban locations. The latter authors focused on the users' perception of SWM in Ojo Local Government Area, one of the sub-urban locations in Lagos, Nigeria. And their research engaged households only via a questionnaire survey. The study focuses on the perceived challenges private solid waste management (PSWM) faces in semi-cities with the daily increase in population in a developing setting such as Nigeria and major stakeholders engaged via unexplored dimension. If past studies have impacted SWM positively regarding urban sprawl, especially in developing countries, why are there debris and waste in semi-cities? The finding was part of the preliminary survey before the main study was conducted.

Nwachukwu *et al.* (2017) found more significant research impacts on SWM in advanced nations than in developing countries. In developing nations, the economy, society and technology variables are not robust. Rahji and Olorunfoba (2009) affirmed that because of the failure of the local governments to manage waste disposal and sanitation as inscribed in the Constitution, the private solid waste managers in Nigeria's cities emerged via stakeholders' system management. Private approaches with a government-enabling environment have been proved to be a successful platform for urban services such as housing provision (Ebekozi, 2020), transportation and telecommunication in developing cities but the case of the PSWM seems different in Nigeria. The absence of institutional framework as to who (state or local government) is responsible for the collection and management of urban solid waste management before private partnership took over the administration might have contributed. Igbinomwanhia and Ideho (2014) found conflicting roles between local government councils and the agency, Edo State Waste Management Board (ESWMB), under the supervision of the Ministry of Environment and Public Utilities (MEPU). This enhanced the challenges facing the PSWM and one of the motivations for the study. If no significant impact, especially on semi-urban locations, then identifying and addressing the perceived encumbrances facing SWM using an unexplored approach by engaging the key stakeholders directly from the field cannot be over-emphasised. This paper presents a new dimension of proffering solutions to underlying issues that have hindered the PSWM from being productive in service delivery. Thus, this study investigated the possible hindrances facing PSWM organisations and proffer policy solutions to enhance clean, healthy and sustainable cities via the following objectives:

- To investigate the perceived contributory factors to encumbrances facing PSWM in Nigerian cities.

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- To recommend feasible policy solutions to enhance sustainable clean cities and healthy environments and promote community collaboration with PSWM across Nigerian cities.

## 2. Overview of solid waste management in Nigeria

In Nigeria, [Sridhar \*et al.\* \(2017\)](#) affirmed that some of the regulations that were used to govern the protection of the environment include: Public Health Laws of 1957 (amended as Public Health Law Cap 164 of 1958), Nigerian Criminal Code Cap 42, LFN, 1958, Factories Act of 1955 (amended in 1958), among others. The national public outcry of the “Koko Saga” stirs up environmental regulations in Nigeria. In 1987, an Italian vessel illegally dumped toxic waste in Koko. As a follow-up, the Nigerian Federal Government swung to action and established the Federal Environmental Protection Agency (FEPA) in 1988. At the state level, the relevant ministries were encouraged to establish State Environmental Protection Agency (SEPA) ([Federal Environmental Protection Agency, 1988](#)). [Nabegu \*et al.\* \(2017\)](#) asserted that the Environmental Protection Agency (EPA) passed their laws at the state level. Between 1980 and the late 1990s, Nigeria witnessed a radical and orderly progression of environmental laws. One of the possible reasons is the subscription to many international conventions and treaties ([Agbazue \*et al.\*, 2017](#)). The country recorded improved legislation on environmental development during that period to curtail waste disposal and management. Among the Acts and legislations include Petroleum Act, 1969, Environmental Impact Assessment Act of 1992, and National Environmental Standards Regulatory and Enforcement Agency (NESREA) Act enacted in 2007 ([Salami \*et al.\*, 2018](#)). In Benin City and environs, the MEPU is the regulatory ministry obligated to manage the environment on behalf of the Edo State Government. The ESWMB is directly under the supervision of MEPU with the obligation of supervising waste from collection to disposal or recycling ([Igbinomwanhia and Ideho, 2014](#)). The authors observed that ESWMB has been ineffective in carrying out her responsibilities. One of the possible reasons is that the policy allows the local government council to appoint private waste managers in the cities like the ESWMB. The policy guidelines call for a review for the proper efficiency and productivity of the system.

Globally, several studies have been conducted regarding solid waste management. Some of the papers tackled issues within waste management and wastes generated. Others on modelling the waste management issue. It includes gathering, conveyance and discarding with consideration for the economic evaluation ([Bertazzi and Speranza, 2012](#)) and comparing different recycling mechanisms ([Melikoglu, 2013](#)). Some addressed the issue from a statistical perspective regarding waste size, value and utilisation ([Popovic \*et al.\*, 2013](#)). Regarding challenges being faced by private firms that manage solid wastes in neighbourhoods and environs, a few studies have been conducted in Nigeria’s context. Examples are [Imam \*et al.\* \(2008\)](#), [Longe \*et al.\* \(2009\)](#), [Ike \*et al.\* \(2018\)](#), [Ezeudu and Ezeudu \(2019\)](#) and [Adenaike and Omotosho \(2020\)](#). [Imam \*et al.\* \(2008\)](#) reviewed the state of the SWM system in Nigeria’s Federal Capital. They found that despite the noble intention of the Abuja Master Plan, there was no healthy landfill for waste dumping. It makes the transportation more tedious for the operators to a single dumpsite at Mpape. It has increased the illegal dumpsites by the informal collection workers. The authors identified lax planning and enforcement of relevant clauses in housing development guidelines as hindrances facing the private operators. Based on the relevance of the private sector in waste management and embraced by stakeholders, if these issues are not tackled, achieving sustainable clean cities may be threatened. In principle, the health environments of these cities will not be spared from these threats. [Longe \*et al.\* \(2009\)](#) engaged

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households only in their questionnaire survey. [Ike et al. \(2018\)](#) identified some of the variables that hinder the effective performance of Nigeria's SWM.

[Ezeudu and Ezeudu \(2019\)](#) focused on four sectors as a source of waste, emphasising circular economy and a reviewed approach was adopted. [Adenaike and Omotosho \(2020\)](#) evaluated the effort being put in by the Lagos State Government to recover resources from solid wastes via collaboration with private organisations. They found that the state government did not create an enabling environment for the private wastes managers to operate. For example, land, funding and proper legislation were missing. Also, the Epe and Mosimi Materials Recovery Stations were yet to be constructed, and the Ikorodu Composting Plant was evidence on media but absent in reality. Apart from not engaging key stakeholders, the studies adopted reviewed approach with the exemption of [Longe et al. \(2009\)](#) and [Adenaike and Omotosho \(2020\)](#) that adopted a questionnaire survey. This study intends to fill this methodological gap and other gaps.

In Cairo, [Elsaid and Aghezzaf \(2015\)](#) found that achieving a sustainable waste management system requires three key variables to be integrated and managed. It includes environmental, social and economic variables. They identified national, state, and local government sectors, urban corporations, NGOs, homes, private cleaning firms, ministries in charge of waste management and recycling organisations as the main stakeholders involved in waste management. [Oteng-Ababio et al. \(2013\)](#) affirmed that environmental health burden resulting from urban solid waste in many developing African cities, using Ghana as a case in point, calls for concern. They suggested that apart from policies that will drive the appropriate institutional and financial instruments, there is a need for African cities via their authorities to consider integrating proven informal innovations such as the "waste pickers" and legitimising them with the formal system. Also, [Cobbinah et al. \(2017\)](#) found that the non-involvement of Ghana's cities household in SWM has made household occupants apathetic to urban SWM problems. It is because the government agencies feel that urban SWM is the sole responsibility of the government.

[Salami et al. \(2018\)](#) found that the amount of waste generated across Nigeria's cities has increased, but the management strategies are inadequate. For example, many of the states agreed to create dumpsites as the best available option. [Oyebode \(2018\)](#) identified population growth, modernisation, urbanisation and industrial manufacturing as the causes of solid wastes. The author recommended Integrated Solid Waste Management (ISWM) as one of the best approaches to address SWM issues in urban areas. The ISWM mechanism prevents, recycles, and manages solid waste in patterns that protect the environment's well-being and human health. According to [Tobore's \(2009\)](#) findings and corroborated by [Oyebode \(2018\)](#), inadequate regulatory framework, lack of private sector investment, inept institutional functions, lax governmental will, weak capacity to discharge responsibilities, absence of data information for planning and wrong attitude of house users were found to be contributory factors to the encumbrance facing SWM. [Ezeudu and Ezeudu \(2019\)](#) suggested circular economy as a possible solution to sustainable SWM because many streams of waste items accumulated in the Nigerian business environment, including household waste, have an established saleable and recyclable ability that could offer profit for the waste creator and the user. [Ike et al. \(2018\)](#) found poor collection and disposal methods, inadequate funds, lax compliance to government policies, weak documentation/data, and improper management of dumpsites and fills, among others, the hindrances facing Nigeria's SWM. [Agunwamba \(1998\)](#) identified corruption, poor cities planning, inadequate infrastructure, lax record documentation of waste data, political aspects such as positioning of facilities influenced by the political class, inadequate experts in waste management, attitudes of the public and attitude of the waste workers because of low morale as the hindrances facing solid waste

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management. Others are the attitude of the government, inappropriate technology, maintenance of operational equipment and funding.

### 3. Research method

A phenomenology type of qualitative research design was employed. This research adopted an unexplored approach through face-to-face data gathering from knowledgeable participants who have had work experience (Creswell and Creswell, 2018; Ebekoziem, 2021) and can proffer solutions to achieving sustainable, clean and healthy cities without threat to the environment. Thus, the study preferred a phenomenology type of qualitative method. It can offer a better revealing device to explore the perceived contributory factors to the encumbrance facing PSWM. And proffer feasible policy solutions that will enhance sustainable clean cities through PSWM across Nigerian cities. This approach becomes better because no research has attempted to explore PSWM in the developing Sub-Saharan Africa Cities; a case in point is Benin City, to the best ability of this paper. Thus, this study was conducted in Benin City, Nigeria. One of the reasons is that Benin City is one of the fast-growing ancient cities and in line with Ogu (2000) that attempted to proffer solutions to the limitation of the private solid waste operators, using Benin City, Nigeria, as a case study. But Ogu's study recommendations and conclusion were based on secondary data (reviewed literature) only. This paper sourced data from primary sources with relevant stakeholders from seven communities. And newsprints, government documents and renowned journals were the secondary sources used to validate the study's findings. It is in line with Jaafar *et al.* (2021). Also, experts were selected and engaged in the interview sessions. Research ethics were observed in this paper, and approval was granted.

Seven semi-urban communities were selected and used in the study. This approach followed Ebekoziem (2020) that adopted five sub-urban communities in Benin City environs to evaluate community involvement in low-cost housing provision. A maximum of 12 km from the city's centre (Ring Road) and a minimum of 6 km were used as conditions in the preferred communities engaged. This intends to capture communities within Benin City with a high population of residents. Purposive and snowball sampling techniques were used to contact the participants. This was carried out consecutively. The purposeful sampling technique identified the interviewees, followed by snowball sampling to accomplish good saturation. Thematic analysis was utilised to analyse the collated data derived from the semi-structured interview questions. Appendix presents the semi-structured interview questions. Table 1 presented the interviewees' brief background information and communities coded "A to G". The participants were selected to represent the key PSWM stakeholders, which facilitated saturation for this research. The study saturation was established when there was no evidence of "new concept/information" or further theoretical insights from the ongoing in-depth interviews. The researchers used their contextual understandings in analysing and interpreting the data. Using this approach to establish the saturation has added to the body of knowledge in some meaningful manner (Thorne, 2020). The stakeholders are households, non-governmental organisations in environmental matters, local government councils (health and environment sections), private solid waste management companies, informal collectors, environment experts and housing experts.

A total of 35 interview meetings were carried out between May 2021 and August 2021, and saturation was achieved. The interviewees' full identities were concealed, but the interviewees' rank indicates that those interviewed by the researchers were considered as undoubted interviewees and have authentic knowledge about PSWM provision for the semi-cities in Benin City and across Nigeria. For example, interviewee P29 has over 25 years of work experience in household waste management in the council, participant 31 is an

| Participant/Rank   | Community/Code   |      |      |      |       |       |       | Total | Private solid waste management |
|--|------------------|------|------|------|-------|-------|-------|-------|--------------------------------|
|  | A                | B    | C    | D    | E     | F     | G     |       |                                |
| Distance from Kings Square (KM)                          | 6 km             | 7 km | 8 km | 9 km | 10 km | 11 km | 12 km |       |                                |
| Resident (Owner)   | P1               | P2   | P3   | P4   | P5    | P6    | P7    | 7     |                                |
| Resident (Tenant)  | P8               | P9   | P10  | P11  | P12   | P13   | P14   | 7     |                                |
| Informal collector                                       | P15              | P16  | P17  | P18  | P19   | P20   | P21   | 7     |                                |
| Community youth leader                                   | P22              | P23  | P24  | P25  | P26   | P27   | P28   | 7     |                                |
| Local government staff (health and environment sections) | P29 and P30      |      |      |      |       |       |       | 2     |                                |
| Private solid waste management company                   | P31, P32 and P33 |      |      |      |       |       |       | 3     |                                |
| Environment expert                                       | P34              |      |      |      |       |       |       | 1     |                                |
| Housing expert   | P35              |      |      |      |       |       |       | 1     |                                |
| <i>Total number of participants</i>                      |                  |      |      |      |       |       |       | 35    |                                |

**Table 1.** Summary of participants' description

**Note:** P: Participant

Environmental Consultant and operates an NGO that secured grants from the World Bank some years ago to create awareness on environmental issues. From the 76 accredited waste managers in Benin City as of 16<sup>th</sup> April 2019, only 12 captured the study area (Edo State, 2019). From the 12 waste managers, three (P31, P32 and P33) indicated an interest in participating and were interviewed. The participants were interviewed in their homes apart from Participants (29, 30, 31, 32, 33, 34, and 35). The latter participants were interviewed in their offices during working hours. Others were interviewed in their communities during the week and weekend.

In developing the codes, the research employed thematic analysis. The collated data were manually analysed, and results were presented. The 35 interview transcripts were read multiple times among the researchers of this study who double as the coders to capture the participants' opinions regarding the phenomenon. This is in line with Ebekozi *et al.* (2021) that utilised the same method to generate the initial coding scheme for their work. The first phase involves coding the transcripts and then grouping (categories). The latter phase engages the use of the categories from the first phase to re-read the transcript precisely and discover the concepts. The thematic method was adopted to study the common patterns at this stage. From the patterns, two themes emerged. The two research objectives played an important role in developing the themes based on the identified patterns (Jaafar *et al.*, 2021; Ebekozi *et al.*, 2021). The researchers used member checking, triangulation and researcher reflexivity as the validity approaches of the collected data (Creswell and Creswell, 2018). This study adopted narrative, in vivo, attribute and theming coding techniques (Corbin and Strauss, 2015). The researchers manually coded the 35 transcripts. Sixty-five codes were obtained and re-organised based on reference, occurrence and frequency. This includes government policy framework, constitutional formulation of private waste management policies, dumpsites for sewage or plant treatment, monitoring private solid waste managers, waste management state agency, local government council agency, supervision and monitoring and Edo State Sanitation and Pollution Law. Others are basic infrastructure, planned housing mapping, documentation of waste data, political issues, technical and skilled human capital, sewage treatment plant, license to private waste managers, waste managers' attitude, circular economy, Town Planning Officers, waste management

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equipment, among others. Ten categories were derived from the 65 codes. The categories include threat of household waste, household solid waste influence, sustainable clean cities, and community collaboration. Others are healthy environment, role of PSWM, government role in sustainable cities, role of household waste producer, among others. Two main themes emerged (perceived contributory factors and possible policy solutions) from the ten categories. The study's objectives guided the arrival of the main two themes.

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## 4. Results and discussion

Perceived contributory factors to the encumbrance facing PSWM in Nigerian cities is one area that has been under-studied in Nigeria. It may hinder achieving related SDGs and become a threat to the well-being of the households and the environment if not mitigated and feasible solutions proffered. Therefore, findings from this research are presented below.

### 4.1 Theme one: Perceived contributory factors

This section offers a platform for the participants to identify the perceived contributory factors to the encumbrance facing PSWM in Nigerian cities. One of the germane points that emerge is that lax government policy framework and existing constitutional formulation of private waste management policies. They are perceived as the major contributory factors to the encumbrance being faced by PSWM companies in Nigerian cities. First, apart from not following the best global practices, such as dumpsites provision by the state without provision for sewage or plant treatment (P30 and P34), there is lax monitoring of private solid waste managers by the agencies and conflicting role of the state agency (ESWMB) and the local government council agency (P29, P30, P32, P34 and P35). Lax supervision and monitoring may neglect performance and focus on profit-driven goals only. Findings agree with [Igbinomwanhia and Ideho \(2014\)](#), [Oyebode \(2018\)](#) and [Olukanni and Nwafor \(2019\)](#). The former authors found that Edo State Sanitation and Pollution Law mandates the state agency (ESWMB) to engage private waste managers in gathering and discarding waste from households and business properties in the cities. Also, the policies formulated at the national level direct the local government agency with similar responsibility. There is evidence of conflicts between the state and local government agencies, thus, affecting the private waste managers. [Oyebode \(2018\)](#) and [Olukanni and Nwafor \(2019\)](#) found inadequate regulatory framework, inept institutional functions, lax governmental will, among others, as contributory factors to the encumbrance facing solid waste management. Second, the absence of basic infrastructure to enhance the collection of household waste such as access road, lack of planned housing mapping (numbering system) (P35), unapproved residential on-going construction (P35), inadequate provision of 1,100-litre bins at strategic positions (P5, P12, P20 and P26), among others, contributed the challenges being faced by the solid waste managers. Findings agree with [Agunwamba \(1998\)](#), and it was found that poor cities planning, inadequate infrastructure, lax record documentation of waste data, political aspects such as the place to install the facilities are influenced by those in power, among others, are contributory encumbrance factors facing solid waste management.

The participants agree that the inability of the governments (federal, state and local) to create the enabling environment calls for concern. It includes inadequate technical support, lack of technological and skilled human capital and capital-intensive equipment such as the sewage treatment plant, recycling and separator plants at strategic locations. These features were missing across the communities covered, and Participant P34 opines that cities in Abuja, Lagos and Cross Rivers States have recorded success in this direction. Findings agree with [Olukanni and Nwafor \(2019\)](#), and it was discovered that many states public waste management agencies lacked capital-intensive equipment. The weakness and



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inefficiency of the recognised private solid waste managers led to the emergence of illegal solid waste managers. Majority of the tenants and house owners agree that the illegal solid waste collectors were patronised at one point in time because they are always available. P7 says, “[...] how to do expect me to patronise private waste managers when they come to my street once in two weeks and sometimes, once in a month [...] But mandated to make full payment for that month because nobody to report their inefficiencies to [...] This is the scenario [...]” One of the outcomes of the high patronage of illegal collectors is the illegal dumpsites across the seven communities covered.

P22 and P25 claim that two illegal collectors were caught in their areas dumping refuse in an undeveloped plot of land. P25 says, “[...] There is a piece of land very near a natural waterway and the illegal collectors have converted the place to the dumpsite. To ensure that the waterway is maintained, as one of the community youth leaders, we placed a signpost there that defaulters will be apprehended and handover to the necessary government agencies for possible prosecution. On this fateful day, I saw an illegal collector offloading his waste; immediately I tried to confront him, he ran away and left his wheelbarrows [...]” Many of our supposed clients patronise the illegal collectors than us. Moreover, for many to pay is a problem because the illegal collectors can collect the waste for free with a little piece of steel attached to the waste (Participants P31, P32 and P33). This claim by the waste managers validates the submission by some households that patronise the illegal collectors. It may not motivate the waste managers to invest in the business.

Also, P4, P12, P24, P29, P33, P34 and P35 affirm that public awareness and attitudes to waste regarding waste storage and separation, reprocessing, gathering occurrence, scattering and fly-tipping, readiness to pay for private waste management services and the level and type of disposal facilities may have contributed to the challenges facing the PSWM. Findings agree with [Oyebode \(2018\)](#), and it was discovered that urban solid waste management has become noticeable because of the pattern of waste disposal. This issue is more evident in developing country setting like Nigeria. Findings show that 76 waste managers were accredited in Benin City, and 12 covered the seven communities used for the study. The three waste managers (P31, P32 and P33) that were engaged require substantial technical backup, especially in the area of capacity building. P33 says, “[...] how many of the state government regulatory agencies can boost of supporting, enforcing, and sustaining written contracts with PSWM? This is the bitter truth [...] sometimes, we keep quiet and manage what we see because we want to remain in business. For example, we are assured in the agreement of dumpsites provision at a near distance but turns to be a fallacy for over five years of my operation. I have to source for dumpsites and maintain the sites [...]” Findings agree with [Oyebode \(2018\)](#) and it was found that enforcement and implementation of private solid waste management across the various state agencies is one of the challenges that should be tactically addressed.

#### *4.2 Theme two: Possible policy solutions*

This section offers feasible policy solutions to enhance sustainable clean cities and promote community collaboration with PSWM across Nigerian cities. Participants P2, P5, P7, P9, P13, P16 and P19 suggest the need to review the government policy framework on private solid waste management from the federal to the local government levels. This action will reverse the duplication of functions and clearly define each tier of government’s role regarding private solid waste management for efficiency and productivity. It is one of the germane feasible solutions that emerge from this study. Also, residents and community leaders should be involved in the proposed review and responsibility apart from the monthly payment assigned (P12, P22 and P30). Findings agree with [Igbinomwanhia and Ideho \(2014\)](#), and it was found that the state agency (ESWMB) and the local government

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agency conduct the same role regarding issuing a license to private waste managers in urban centres. P33 says, “[. . .] government’s role and policy in the articulation and implementation of private solid waste management in urban centres should be all-inclusive. The host communities and household users should have a voice in the reviewed policy [. . .]” The laxity in the supervising and monitoring roles of the supervising agencies and ministries is one area that calls for concern.

Majority of the tenants and house owners engaged flanked at the attitude of the waste managers regarding commitment to service. P3 says, “[. . .] we see the waste management people once in two weeks, but when it comes to the collection of money, they can afford to reach ten times a day to serve payment notices [. . .]” Viewpoints from P31, P34 and P35 suggest a circular economy (CE) approach to mitigate the hindrances and improve the performance of waste managers in semi-urban centres. P35 says, “[. . .] CE provides good prospects to SWM and has recorded success in advanced countries. It is because of the concept that what is waste from A may become raw materials to B if further processed [. . .].” Findings agree with [Ezeudu and Ezeudu \(2019\)](#). It was found that many streams of Nigeria’s solid waste household material generated have a proven saleable and recyclable ability that could offer monetary gain for the waste producer. It is a win-win concept for both parties. The unplanned attitude of some housing developers coupled with some corrupt Town Planning Officers that allow construction development without building plan approval calls for concern. P35 says, “[. . .] if you go round some of these new outlets, you will ask yourself questions such as ‘who approved this building plan?’ Is there no inspecting Town Planning Officer in this area? And many more because of the ‘eye-mess’ design and construction [. . .] In my area, XYZ Community, many of the natural waterway have been sold, filled and built [. . .]” Thus, legislation that will reawaken the slack in monitoring and supervising the activities of the private waste operators cannot be over-emphasised. It will include how the waste should be disposed of through enforcement and public sensitisation.

The private waste managers need the enabling environment through technical support, technological and skilled human capital and intensive equipment such as the sewage treatment plants, recycling, and separator plants. Some of the equipment are capital intensive and are beyond what many of the waste managers can afford. Findings from the Edo State Website enlisted the following: 3nos. Tippers, 2nos. Kuboata Tractors, 3nos. Roll on Roll off Trucks, 1nos 980 G CAT Payloaders, 2nos Compacting Trucks, 2nos Mechanical Sweepers, 350nos 1,100-litre bins, 10nos Lawn Mowers, 150nos Las Mon Bush Cutters and 5,000nos Wheel Barrows as the equipment and vehicles in ESWMB in the year 2020. Participants P25, P30, P31, P32 and P34 suggest that some of the equipment can be rented/ loaned to waste managers that have shown some commitment to cleaning up the cities. Findings agree with [Ike et al. \(2018\)](#), and it was found that majority of these private waste managers lack financial resources to manage the waste from collection to recycling. It is where creating the enabling environment by the government comes in, to drive efficiency and productivity. Regarding the illegal collectors, majority of the participants agree that the government should formally legalise them and develop a workable framework of operation for them. P34 says, “[. . .] the bitter truth is that the illegal waste collectors cannot be eliminated but can be checked if registered and incorporated to the formal system. It will mitigate illegal dumpsite along the road, street, uncompleted building, undeveloped plot, etc. [. . .].”

## 5. Conclusion and recommendations

This paper found out that private solid waste management in Nigeria is hindered by several perceived contributory factors, as revealed. Among the major factors are the absence of

enabling legislation, the absence of institutional framework and inadequate resources. Others are inadequate economic motivation, inappropriate/insufficient dumpsite locations and absence of basic infrastructure. The possible outcomes would be massive household waste across the cities. Also, the informal approach to managing household waste will increase. These approaches may be a threat to the environment because of the mechanism used. Thus, if not mitigated by stakeholders, these contributory factors are threats to sustainable clean cities and health environment. Based on the identified perceived encumbrances, the experts and stakeholders in solid household waste management proposed feasible policy solutions to enhance sustainable clean cities and promote community collaboration with PSWM across Nigerian cities.

First, formulation and development of integrated policies and institutional framework on household solid waste management regarding reduction, separation/sorting, reuse, recycling and disposal are long overdue. There should be enabling legislation that will drive the enforcement and implementation across cities and semi-cities in Nigeria, especially the low-income household cities such as Benin City and its environs. Other developing countries with similar attributes to Benin-City regarding household waste challenges and low-income earners can adopt these policies. The proposed reviewed framework and policies (waste management policies) encompasses monitoring and enforcement of regulations, advancing the open dumping system to semi-controlled landfills in designated locations, and providing suitable locations to be used as a dumpsite. The maintenance of these dumpsites should be a collaboration between the regulatory agencies and the private waste managers. The mechanism should be developed in a blueprint for a clearer understanding. The establishment of a households waste database in each locality and regular updates are long overdue to improve present and future planning. Planning to engage new waste managers or constructing solid waste management facilities such as recycling plants can be more effective if data are available. Thus, generating these data is germane to promoting sustainable clean cities and healthy environments in semi-cities. Also, the paper suggests policies and programmes that will integrate and register the illegal collectors with the formal waste managers to achieve effective collaboration. This collaboration intends to mitigate wastes dumped along streets/roads, underneath open drains, in culverts, uncompleted buildings, undeveloped plots of land, etc. Second, the government should have a mechanism to assist the private waste managers in recovering their money from their clients (debtors) who refused to pay for the genuine service rendered. It will serve as a moral and boost the waste managers' economic value. A special emergency court can be constituted with the legal backing to handle this aspect of the hindrance. Many households are "professional debtors" because of lax sanctions for defaulters. It will bring more commitment to their duties and responsibilities by ensuring the cities are clean. All the above suggestions deserve consideration if cities and semi-cities solid waste services are better in quality and coverage in Benin City environs and other cities in Nigeria with attributes of low-income earners.

This research can guide private waste managers, household users, policymakers, environmentalists, NGOs on environmental matters and scholars in Nigeria. Two potential limitations of this research demand further elucidation. First, this paper covers only the perceived contributory factors to the encumbrance facing PSWM in Nigerian cities and proffer feasible policy solutions. Future studies should explore the underlying issues regarding managing storage, collection, transport, treatment and waste disposal via the unexplored dimension. Second, the qualitative method employed to investigate the perceived contributory factors offers robust and rational evidence on PSWM in a developing setting with quantitative data support like a questionnaire survey for a deeper explanation and possibly validating the qualitative findings. Thus, this paper suggests a mixed-methods

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research design for forthcoming research. Creswell and Creswell (2018) adopted the suggested approach in their studies to achieve generalisability. The authors affirmed that the exploratory sequential mixed methods assist scholars to validate the face-to-face results. It is one of the gaps (methodological gap). The need for more research on other developing nations with similar qualities concerning low-income households, hindrances in private household waste management and lax policies cannot be over-emphasised.

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## Appendix

Dear Participant,

Request for Interview

In less than a decade to sustainable development goals (SDGs), there is a threat of household waste emanating from sub-urban sprawl, especially in developing nations. Private approaches with government-enabling environments have been proved a successful platform for urban services such as housing provision, transportation, and telecommunication in developing cities. Still, private solid waste management (PSWM) seems different in Nigeria. Therefore, this research is titled: Sustainable Cities Through Household Waste Management: An Unexplored Approach to Challenges Confronting Private Solid Waste Management. Specifically, the researchers will achieve the objectives via the following:

- (1) To investigate the perceived contributory factors to encumbrances facing private solid waste management (PSWM) in Nigerian cities.
- (2) To suggest possible policy solutions to enhance sustainable clean cities and healthy environments and promote community collaboration with PSWM across Nigerian cities.

Kindly note, the interview questions are going to be within the stated objectives. Responses provided by you will be collated and analysed together with that of other interviewees. It will make up the value and contribution to achieving the success of this work. Information provided will be treated with the greatest secrecy.

Hence, your valuable time and other inputs in answering the questions will be highly cherished.

With regards.

Yours faithfully,

(Researchers)

## Basic questions for the participants

- (1) From your perception, how can you describe household waste from suburban locations as a threat to sustainable Benin City and, by extension, Nigerian cities?
- (2) Do you think the government has created the enabling environment for the private waste managers to be involved in solid waste management in your locality?
- (3) If yes, can you explain?
- (4) If no, is there likely reason(s)?

- (5) What do you think are the likely perceived contributory factors to the encumbrance being faced by the private solid waste management (PSWM) in Nigerian cities?
- (6) What role do you think the government can enhance sustainable clean cities and a healthy environment?
- (7) What role do you think the private solid waste managers can promote community collaboration with PSWM across Nigerian cities?
- (8) What is your take on the role of other stakeholders in enhancing sustainable clean cities and a healthy environment?
- (9) What are the possible policy solutions to enhance all-inclusive sustainable clean cities and healthy environments?
- (10) Do you think sustainable development goals regarding clean cities and a healthy environment are achievable before the year 2030?
- (11) If yes, please explain?
- (12) If no, is there likely reason(s)?

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