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Vital Registration and Sustainable Urban Waste Management in Nigeria

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Abstract **Original Research Article**

Globally, rapid urbanization, population growth and industrial expansion in the cities have outpaced the capacity of the local authorities to manage waste effectively, resulting in widespread adoption of unsanitary disposal patterns. Many cities in Africa including Nigeria, are facing serious challenges in terms of urban waste management. Several policies and programmes with huge budgetary allocations have been experimented but with minimum success. The reason for the dismal performance of most waste management programmes resulted from the inability of the concerned agencies to bridge the missing link – the dynamic of waste generation in terms of the spatial variation and the changes in the direction of flow. Vital registration, the registration of births, deaths, marriages and migration has a long history, however, its application has not been fully utilized. If vital registration is reasonably accurate, it is possible to obtain a picture of the changes in the structure of the population which can provide a platform for forecasting of sources and potential volume of urban waste. This is achievable through data gathering and monitoring of urban population drift and household dynamics. This paper provides a broad insight into how data gathering through vital registration can improve urban waste management efforts in Africa especially in Nigeria where waste management is essentially handled by government agencies.

Keywords: Vital registration, Waste management, Urbanization, Sustainability, Nigeria.

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1. Introduction

Vital registration, the continuous, permanent, and compulsory, recording of the occurrence and characteristics of vital events such as births, deaths, marriages, migrations (moves) and other demographic phenomena has a long history (Uzobo and Ogbanga, 2017). However, progress on its documentation and applications of data generated has not been uniform and to the maximum. These events are referred to as "vital" because they have to do with the individual's entry into, and departure out of life, with the changes in the social status of the individual in his/her life-time. The laws of most countries in the world make the recording of vital events compulsory. In Nigeria, laws on the registration of these events exist, and the exercise is supposed to be compulsory. However, since these laws are not strictly enforced, there has been no proper co-ordination of the usefulness of the system, neither is the data generated put into effective usage.

A good vital registration system is a necessary and desirable goal required to assist in national planning. Although other methods of population data collection exist, these methods (censuses and sample surveys) have other uses but they also provide directly or indirectly vital statistics which in any case are not substitutes but complimentary (Pai, 2017). However, it is clear that the legal, medical and administrative functions of the vital registration system cannot be performed by any other mechanism adequately.

Population issues elicit much interest as there is an intrinsic tie between population change and development in one hand and the quality of life of people on the other (Aidenagbon, Mundi & Dakyes 2025). It is on this regard that it is generally agreed that the only way to make everyone count, is by counting everyone. Depending on the availability of resources and on the aim of collecting vital statistics, three forms of the system are available to choose from. These are: (i) the conventional full scale registration system, (ii) the sample registration executed to reduce the size of coverage, the amount of work and costs involved with the possibility indeed of obtaining better controlled quality of data; and (iii) the experimental registration system to test the applicability of registration techniques and procedures on a rather small scale. The geographical units for this are selected purposively and no national probability estimates can be obtained from the results (Okereka, 2015).

Globally, rapid urbanization, population growth, and industrial expansion especially in many African cities have outpaced the capacity of local authorities to manage waste effectively, resulting in widespread adoption of unsanitary disposal practices, particularly open dumping (Ike, 2018). Improper waste management has become one of the most pressing environmental challenges in many developing countries, including Nigeria. Developing countries experience a substantial increase in solid waste generation due to population growth, rapid urbanization, economic expansion, and rising standards of living. In contrast, developed countries tend to generate more solid waste per person annually, with estimates ranging from 521.95 to 759.2 kg/person/year (Afon, 2016; Adejobi and Olorunnimbe,2022). However, the management of solid waste poses significant challenges in developing nations. These challenges stem from inadequate infrastructure and lack of adequate data on the sources and trends of waste generation within the rapidly growing urban centres (Aderemi and Falade, 2012). In contrast, developed countries have implemented successful waste management strategies while developing nations continue to struggle with waste management due to continuous waste generation from unexpected sources (Nebegu, 2023).

In many Nigerian cities, open waste disposal remains the most prevalent method of managing household and municipal waste. The practice involves the indiscriminate dumping of waste in open spaces, road medians, drainages, and even near water bodies, often without any form of treatment or containment. This practice invariably contributes to the contamination of soil, surface water, and ground water resources; posing grave threats to environmental and public health (Medina, 2020). The challenge of municipal waste management remains one of the most pressing environmental concerns in developing nations, with significant implications for public health, environmental sustainability, and urban development (Alao, 2024).

Nigeria, the most populous nation in Africa, is experiencing rapid urbanization, which has severely strained its urban infrastructure, particularly in municipal solid waste management (MSWM). Concurrently, the country's Civil Registration and Vital Statistics (CRVS) system, managed by the National Population Commission (NPC), suffers from low coverage and incompleteness, hindering effective development planning. This article explores the critical nexus between a robust Vital Registration (VR) system and sustainable MSWM in Nigeria's urban centers. We argue that the real-time, granular demographic data inherent in vital registration—specifically on births, deaths, and migration—offers a powerful, yet underutilized, tool for improving waste generation forecasting, optimizing collection

logistics, and integrating public health responses. The current reliance on outdated census data and fragmented socio-economic surveys leads to systemic planning failures in the waste sector.

By conceptually analyzing the integration of vital registration data into MSWM planning frameworks, this paper proposes a model for data-driven urban waste management and governance. The authors conclude with actionable recommendations for policy reform, inter-agency collaboration, and technological integration to leverage VR data and transform Nigeria's urban waste landscape from a crisis into a manageable public service.

2.0. Literature Review

There are several, (and growing) body of independent literatures on the importance of vital registration and the menace of urban waste management as separate discourse, however, the nexus between the two concepts remain elusive. The dearth of demographic data in Nigeria is not new to all of us. Censuses and a few sample surveys had been the two major avenues through which data had been generated and occasionally published since our existence as a nation.

The importance of CRVS for development planning is well-established, providing essential data on fertility, mortality, and population dynamics (National Population Commission. 2018). However, the Nigerian system faces significant challenges, including low literacy rates, inaccessibility of registration centers, and socio-economic barriers (Atama, Igwe, Odii, Igbo, Ezumah, Okeke, & Ugwu, 2021). The resulting data is often incomplete and inaccurate, limiting its utility for planning purposes. The problem is compounded by the existence of parallel systems and a general lack of public awareness regarding the relevance of VR beyond personal documentation (Maduekwe, Banjo & Sangodapo, 2017). This systemic weakness means that a crucial source of dynamic population data is largely unavailable to urban planners, especially in the aspect of sustainable urban waste management.

2.1. National and International Support on Vital Registration in Nigeria.

Vital registration, is a fundamental component of Nigeria’s national development and social security framework. Recognizing the critical need for accurate data on births, deaths and other vital events, international organizations have provided intense financial, technical and material support to the National Population Commission (NPC). The United Nations activities directed at helping developing countries to improve their vital registration systems and vital statistics among others comprise: (a) provision of technical advisory services through country, regional and inter-regional experts. (b) the provision of training through fellowships and study tours, (c) the provision of funds for the purchase of equipment and (d) the provision of funds to cover selected items of local costs (United Nations, 2019; UNICEF, 2026).

The transformation of Nigeria's vital registration system is a collaborative effort involving several multilateral and bilateral organizations. These partners provide the necessary resources and expertise to transition from traditional paper-based methods to a modern, digital framework. The most significant recent development in Nigeria's vital registration is the shift toward a digital system, heavily supported by international expertise and funding (Table 1).

Table 1. Overview of Key International Partners

Partner Organization	Primary Area of Support	Key Contributions
UNICEF	Birth registration, digitization, advocacy.	Lead partner for e-CRVS, provided $300,000 grant in 2018, supported registration of 14 million birth (2024-2026)
World Bank	Funding, health system integration.	Financial support through the Global Financing Facility (GFF) for health-linked CRVS modernization.
WHO	Technical standards, mortality statistics.	Training on International Classification of Diseases (ICD) coding and death certification.
KOICA	Digital transformation, peer review	Knowledge sharing and exploration of digital infrastructure collaboration (2024)
UNECA	Strategic planning policy support	Co-developed the National Strategic Action Plan for CRVS (2018-2022).
USAID & EU	Technical assistance, vital statistics	Long term support for data collection, publication, and system assessments

Sources: United Nations, 2019; UNICEF Report on Sub-Saharan Africa, 2026

International support for vital registration in Nigeria is multi-dimensional, addressing financial, technical, and material needs. Organizations like UNICEF have provided substantial financial grants to cover operational costs and the procurement of registration materials. In 2018 alone, UNICEF provided over 600,000 booklets of birth certificates and millions of printed registration forms (UN, 2019). This material support is crucial for reaching underserved populations in rural areas where digital access may still be limited. The World Health Organization (WHO) and USAID have focused on enhancing the quality of vital statistics. This includes training health workers on the proper certification of causes of death and the use of standardized coding systems. Such technical assistance ensures that the data generated is not only comprehensive but also internationally comparable and useful for public health planning.3.3 Integration with Health and Identity Systems. The Global Financing Facility (GFF) and the World Bank advocate for the integration of CRVS with the broader health system (Aidenagbon, *et al*, 2025). By linking birth registration with maternal and child health services (e.g., during immunizations), the registration rate has seen significant improvement. Furthermore, international partners support the collaboration between the NPC and the National Identity Management Commission (NIMC) to ensure that vital registration serves as the foundation for the National Identification Number (NIN).

The Electronic Civil Registration and Vital Statistics (e-CRVS) System launched in November 2023 by the President of the Federal Republic of Nigeria, e-CRVS system represents a landmark shift in Nigeria's approach to is initiative was realized through a strategic partnership between the National Population Commission (NPC), UNICEF, and private sector partner- Barnksforte Technologies Limited. The system aims to ensure that every significant life event is captured digitally, providing a verifiable and secure identity for all Nigerians. At various times, the United Nations has provided support to regional and sub-regional centres (Pai, 2017). For example, the improvement of vital statistics has been actively promoted by the Regional Technical Bureau of the UDEAC Secretariat. With the support of the United Nations meetings were held on civil registration and vital statistics

to evaluate pilot projects on a system of permanent observation in the Congo, Gabon, Ghana, and Cameroon (Puopie and Owusu,2024).

Nationally generated resources are no doubt inadequate to meet the enormous costs in human and material terms for operating an effective and efficient vital registration system. So external assistance and support are highly needed. But as the National Bureau of Statistics once pointed out, technical cooperation activities should be seen by countries not as a permanent institution upon which they should become totally dependent but rather as a temporary expedience. At its 17th Session, the National Bureau of Statistics in discussing Technical Assistance in Statistics agreed that the right approach to technical assistance was to use experts and outside help only as long as was absolutely necessary and to establish sufficient expertise in the country itself as quickly as possible in order to make further assistance unnecessary (Naphtali, 2016).

International support has been the cornerstone of Nigeria's recent successes in vital registration. Through the combined efforts of UNICEF, the World Bank, WHO, and other partners, Nigeria is on a clear path toward achieving universal legal identity. The transition to the e-CRVS system not only modernizes data collection but also empowers every Nigerian citizen with a recognized legal identity, which is essential for national planning and individual rights.

2.2. The Usefulness of Vital Registration in Legal, Health and Administrative Matters

In addition to the general economic planning function of civil statistics, the economic commission for Africa identified four primary other uses to which vital statistics can be put. They are: legal planning, health planning, demographic analysis and administrative planning and related uses.

(i) Legal Utility

So far not all the legal rights are operational in Africa. However, the examples to be discussed deal with actual and potential legal uses in African countries. The particular vital events, date and place of occurrence, such as births, deaths, marriage and divorce have a legal implication for the person and the state (Uzobo & Ogbanga, 2017). Many states in their constitutions prescribe the rules for the acquisition of nationality of citizenship by birth or by any other means. To qualify by birth, a legal attestation of the event or fact, date or place of birth, information about parents must be obtained. So it is no surprise that passport authorities require information on nationality before issuing a passport to the applicant. The same rule applies to the issuance of driving licenses.

Also when a person dies intestate, claims on his or her estate can only be entertained in law if clear evidence of relationship of the benefactors can be demonstrated by documentary evidence provided in the birth certificates for children and marriage certificate for spouses. This is also true of insurance and dependency claims. It is true of proof of age when being considered for employment (Pai, 2017). Thus, the birth record is important to the individual as well as the state in helping to determine rightful citizenship; it also helps organizations and agencies in recruitment, and in honouring claims demanded by individuals.

In many countries, persons below the legally prescribed age cannot marry. In others there is the additional requirement that the right to marry without parental consent can only be granted if intending parties have attained a certain minimum age. In both cases, the parties concerned require to produce birth certificates or any other approved documentary evidence before they can be allowed to marry.

Persons below a certain age may not be allowed to enjoy some social rights such as access to drinking places, cinemas showing A-rated and X-rated films. The right to vote in national elections and the right to be tried in a juvenile court can be granted only to persons who have attained certain defined ages (Pai, 2017). In the case of doubts about the age of persons wishing to enjoy these rights, documentary evidence in the form of a birth certificate will be a useful

proof and the only means of seeking legal redress if any person so denied of the rights feels aggrieved.

Where a person dies intestate, there can arise problems about inheritance, especially if the dead left no widows, children, parents, brothers or sisters. Vital registration of the new occupants of the estate left behind are very vital to the effective updates and public administration. This in most cases has decisive effects on the changing patterns of lifestyle which invariably influence the rate and volume of waste generation (Samuel, Gemson, Ezebuiro,2023).

Registered marriages and certificates afford proofs which can be used by couples in any legal tussle involving rights to property and inheritance, and even children. The marriage certificate is also required before marriages can be annulled or before right to remarry can be granted.

(ii) Health Planning

Data obtained from registration of deaths in particular provides a good barometer of the health status of the population (Samuel, *et al*, 2023). Not only is the crude death rate a relevant measure but more importantly, the age-sex specific mortality rates provide information on the distribution of death by age and sex. For preventing or controlling many diseases and reducing death rates, age-sex differentials of mortality are important since some diseases or causes of death may be age and sex specific genetically or even socially. Accordingly, one will require age and sex specific death rates to put in place appropriate remedies. Equally true is the fact that infant and child mortality require special and different level and type of attention than adult mortality. It is necessary and many governments have been doing so, to pay particular attention to the level of infant and child mortality which because of their special etiology constitute a good index of development in societies. Spatial distribution of deaths and diseases can be abstracted from registered causes of death by locality. This if properly done should enable governments to design appropriate strategies for dealing with areas with marked concentration of particular disease and deaths arising therefrom. Special care can be provided, for example, to localities with pronounced concentration of infectious or communicable diseases (Opara, 2016).

Child survival in Africa is very much linked to pre- and post-natal care. The distribution of births the urban centres should for instance be a factor to consider in sharing services between communities. Birth records for various areas can provide indications of the localization of diseases and disabilities associated with environmental factors (Opara, Akuei & Sempewo, 2016).

(iii) Administrative Planning and Related Issues

Strictly speaking, it is not easy to differentiate legal uses of vital statistics from the administrative as both have some characteristics in common. However, the separate presentation has been followed for analytical convenience. Normally for admission into primary schools, children need to produce a birth certificate. On paper, child labour ideally is not welcomed in many societies, and there is minimum age for entry into the labour force. So applicants for employment are expected to produce proof of age which often involves presenting birth certificates or sworn affidavits. In cases where there are legal disagreements about the age of leaving service or retirement, the individual can also produce documentary proof of his age. Age has been a deciding factor for entry into the armed forces and for exclusion from military service (Oketuyi, 2025).

3. Applications of Vital Registration in Urban Waste Management

The integration of VR data into MSWM planning can yield substantial improvements across four key areas: forecasting, spatial planning, resource allocation, and public health integration (Table 1). These applications are further discussed for better understanding.

Table 2. Applications of VR in Urban Waste Management

Vital Registration Data Component	Urban Waste Management Application	Benefit to Urban Waste Managers
Birth/Death Registration	Real-time population size and growth rate	Accurate waste generation, forecasting and budget allocation
Migration Registration	Identification of new settlements and population influx.	Spatial planning, route optimization, and infrastructure siting.
Household Characteristics	Household size, age structure, and composition.	Tailoring collection services and targeted recycling programs.
Cause of Death Data	Mapping of waste-related disease outbreaks.	Public health intervention and targeted sanitation efforts.

Source: Authors compilation, 2025.

3.1. Forecasting Waste Generation

Waste generation is directly proportional to population size and density. While census data provides a baseline, it quickly becomes obsolete in rapidly growing urban centers. VR data, particularly birth and death registrations, provides a continuous, real-time measure of natural population change. Furthermore, if migration registration were effectively implemented, it would capture the significant influx of people into urban areas, which is a major driver of waste volume (Salami, Adegite & Bademosi, 2019). This dynamic population data allows for more accurate and timely waste generation forecasting, enabling authorities to adjust budgets, fleet sizes, and disposal capacity proactively.

3.2. Spatial Planning and Route Optimization

The spatial component of VR data, which records the location of vital events, is invaluable for geographical planning. When linked with Geographic Information Systems (GIS), VR data can identify areas with rapid population growth or decline, including the emergence of informal settlements that are often underserved by formal waste collection services (Omokaro,2025). This allows waste management authorities to:

1 Identify new waste hotspots for immediate intervention.

2 Optimize collection routes by factoring in real-time population density shifts, reducing fuel consumption and operational costs.

3 Plan future infrastructure (e.g., transfer stations, recycling centers) based on projected demographic trends.

3.3. Resource Allocation and Service Tailoring

Demographic characteristics such as age structure and household size, which are captured in VR, correlate with the composition and quantity of waste generated. For example, areas with a high proportion of young children may generate more disposable diaper waste, while areas with larger household sizes may generate more organic waste (Adeleke, Akinlabi & Jen, 2022) By analyzing VR data, authorities can tailor their collection services, public awareness campaigns, and recycling programs to the specific needs of different demographic clusters. This targeted approach is more efficient than a one-size-fits-all strategy.

3.4. Public Health Integration

The most direct link between VR and UWM is through public health. Death registration data, particularly when it includes the cause of death, can be cross-referenced with poor sanitation and waste management practices. Waste-related

diseases such as cholera, typhoid, and malaria are often concentrated in areas with poor waste disposal. By using VR data to map mortality and morbidity patterns, authorities can link specific public health crises to waste management failures, prompting targeted sanitation and clean-up efforts. This integration moves UWM from a purely logistical challenge to a critical public health intervention (Omokaro, 2025).

4. Challenges to Integration

Despite the clear benefits, the integration of VR data into UWM planning faces significant barriers in the Nigerian context. First, the incompleteness of VR data remains the most critical challenge. As long as a large proportion of vital events go unregistered, the data cannot be reliably used for planning purposes (Maduekwe, Banjo & Sangodapo,2017). Second, there is a profound lack of inter-agency collaboration between the NPC, which holds the VR data, and the various state and local waste management authorities (e.g., the Lagos State Waste Management Authority (LAWMA), Ogun State Waste management Authority (OGWAMA) e.t.c).. Data sharing protocols are often non-existent or cumbersome, preventing the flow of information necessary for integrated planning. Third, technological barriers exist, as many waste management authorities lack the necessary GIS and data analytics infrastructure to process and utilize granular demographic data effectively.

4.1. Case Study: Challenges in Urban Waste Management in Ogun State

Nigeria's UWM crisis is a complex issue rooted in both behavioral and structural factors. Studies highlight that the rapid population increase due to urbanization has consistently outpaced the capacity of waste management authorities to provide adequate services (Salami, *et al*, 2019). Ogun State Waste Management Authority (OGWAMA) was established to address the shortcomings of the Ogun State Environmental Protection Agency (OGEPA) and to more effectively manage waste in the state The Agency was created with the belief that it would do much better job than its predecessor. OGWAMA is the sole government agency accredited to collect all categories of waste including residential, industrial, and commercial.

The average daily solid waste generated by households in Abeokuta is approximately 0.60kg/person. This estimate is based on research conducted by Ojo (2024) in Abeokuta, Ogun state. To put this into perspective, studies by Edegbai (2019) and Ojo (2024) estimated that the Oke Saje dumpsite generates around 3,718,832.03kg (3718.83 tonnes) solid waste annually. The Ogun State Waste Management Authority (OGWAMA) however faces a number of significant challenges in its mission to keep the state clean. These challenges ranges from changing nature of residential demography, rapid development of new residential areas, variability in actions of residents towards waste disposal, industrial and systemic issues.

Like many governmental agencies in Nigeria, OGWAMA likely faces challenges related to funding and infrastructure. This include shortage of trucks and personnel which resulted into rationing of waste collection trucks among different centres within the city. There is also a heavy dependence on overstretched dumpsites. These issues hamper the agency's ability to collect and manage waste.

The rapid urbanization and population growth in Abeokuta, the state's capital, put increasing pressure on waste management services. As the population grows, so does the volume of waste generated, which can outpace the capacity of the existing infrastructure to handle it. Trucks allocation as well as periodicity of waste evacuation have however remained passive (Table 1.) for a period of ten years under study, without consideration for the dynamic and direction of population flows and its effects on waste generation within the city. As a result, the rapidly growing urban axis (Lafenwa/Adehun/Rounder) frequently suffers inadequate presence of OGWAMA trucks and personnel due to static allocation of infrastructure based on outdated population figures and overgeneralized equal annual growth rate within the city; without consideration for the

upsurge of population in the former sub-urban area (Ojo, 2024). This resulted into excessive pilling up of waste along the roads and indiscriminate dumping of refuse along the roads and waterways. Furthermore, the lack of accurate population data makes waste generation forecasting difficult, leading to inefficient collection routes and inadequate infrastructure investment (Imam, Mohammed, Wilson, & Cheeseman, 2018).

Table 3. Population Dynamics and UWM Service allocation in Abeokuta

	Lafenwa/Adehun/ Rounder Axix				Sapon/ Itoku/Ibara Axis			
Year	*Popn	Waste (kg/day)	No of Trucks allocate	Periodicity of evacuation/week	*Popn	Waste (kg/day)	No of Trucks allocate	Periodicity of evacuation /week
2015	26,581	15949	1	1	64,303	38582	2	3
2016	38,666	23199	1	1	65,148	39089	2	3
2017	45,362	27217	1	1	68,767	41260	2	3
2018	68,132	40879	1	1	69,202	41521	2	3
2019	77,645	46587	1	1	71,349	42809	2	3
2020	89,015	53409	1	1	72,304	43382	2	3
2021	96,156	57693	1	1	75,215	45129	2	3
2022	110,713	66428	1	1	68,222	40933	2	3
2023	135, 809	81485	1	1	69,547	41728	2	3
2024	156,984	94190	1	1	71,308	42785	2	3

Sources: **Population estimates from 1991 census figures with updates from INEC register & records of the Primary Health Care Centres, Abeokuta North Local Government.*

While OGWAMA is working to address the waste management challenges in Ogun state, the lack of cooperation among other agencies for data update makes it difficult to implement effective and sustainable waste management practices. For instance, Ogun state has a significant industrial presence, and some companies are accused of indiscriminate disposal of industrial waste and pollution. This includes the release of fumes and other dangerous gases, as well as the discharge of chemical waste and toxic emissions into the environment, which are hitherto residential areas (Ojo, 2024). Some industries have been found to be operating without proper environmental impact assessment or functioning effluent treatment plants.

The need for accurate demographic data is repeatedly emphasized in the literature as a prerequisite for developing effective waste management policies and infrastructure (Abel,2019). For instance, the Lagos State Waste Management Authority (LAWMA) has recognized the need for a structured approach to public awareness (Adejobi & Olrunnimbe, 2022), which requires understanding the distinct demographic groups within the city (Etim, Choedron, & Ajai, 2024).

Effective UWM requires a shift towards data-driven urban governance, where planning and resource allocation are based on timely, granular, and spatially referenced information. Current waste generation models often rely on socio-economic and demographic factors like household size and income (Adeleke, Akinlabi & Jen, 2022). VR data, by providing continuous updates on population size, composition (through births and deaths), and movement (through migration registration), offers a dynamic dataset that is superior to static census figures for modeling waste generation and consumption patterns.

6. Conclusion

The crisis in urban waste management in Nigeria is fundamentally a crisis of planning, exacerbated by a critical data deficit. The country's underperforming Vital Registration system holds the key to unlocking a more efficient, sustainable, and public health-conscious approach to urban waste management. By providing real-time, spatially referenced demographic data, Vital Registration can move urban waste management planning beyond static estimates and into a dynamic, responsive model of urban governance. While the challenges of incompleteness and inter-agency friction are significant, the potential benefits—including improved waste forecasting, optimized logistics, and targeted public health interventions—make the integration of vital registration data an imperative for Nigeria's urban future. A concerted effort by policymakers to prioritize civic records vital statistics completion and mandate data integration is the necessary first step towards transforming Nigeria's urban waste landscape.

This article explores the critical nexus between a robust Vital Registration system and sustainable urban waste management in Nigeria's urban centers. We argue that the real-time, granular demographic data inherent in vital registration—specifically on births, deaths, and migration—offers a powerful, yet underutilized, tool for improving waste generation forecasting, optimizing collection logistics, and integrating public health responses. The current reliance on outdated census data and fragmented socio-economic surveys leads to systemic planning failures in the waste sector. By conceptually analyzing the integration of vital registration data into urban waste management planning frameworks, this paper proposes a model for data-driven urban governance.

5. Recommendations

To realize the potential of vital registration data in transforming Nigeria's urban waste management, actionable recommendations are hereby made for policy reform, inter-agency collaboration, and technological integration to leverage Vital Registration data and transform Nigeria's urban waste landscape from a crisis into a manageable public service. The following recommendations are proposed:

1. Digitalization and Interoperability of civil records vital registers: The National Population Commission must accelerate the digitalization of the civil registration vital statistics system and ensure its data is geo-referenced. A national policy should mandate the creation of a secure, standardized data-sharing platform accessible to all relevant state and local government agencies, including urban waste management authorities.
2. Policy Reform for Data Sharing: The Federal Government should enact legislation that explicitly requires the sharing of anonymized, aggregated vital registration data for urban planning purposes. This would formalize the relationship between the National Population Commission and Urban Waste Management agencies, moving beyond ad-hoc cooperation.
3. Community-Based Registration Drives: To address the issue of incompleteness, targeted, community-based vital registration drives should be conducted, particularly in informal settlements and rapidly expanding urban peripheries. Linking registration to access to other

public services, such as waste collection, could increase compliance and coverage.

4. Capacity Building: urban waste management authorities must invest in staff training and technology to build internal capacity for data analysis, GIS mapping, and the use of demographic models for forecasting.

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