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Waste, Sanitation and Public Health in Jos Metropolis: An Environmental History of Urban Development, 1976-2023

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Abstract

This study examines the historical relationship between urban development, waste management, sanitation, and public health in Jos Metropolis between 1976 and 2023. This is against the growing concerns of climate change, rapid urban development and population growth and the growing public health, in conjunction with inadequate literature on environmental history of Jos metropolis. The study adopts a historical approach, where sources are drawn from both primary and secondary sources, this include the city master plan, published books and journals environmental regulations, institutional reports, healthcare and waste in Jos. The analysis is organised into four broad phases: the post-1976 period of planned expansion; the institutional and economic crises of the 1980s and 1990s; the establishment and consolidation of the Plateau Environmental Protection and Sanitation Agency (PEPSA) after 2000; and the fragmented, increasingly participatory but still precarious sanitation regime of 2011–2023. Findings shows that the 1976 Greater Jos Master Plan provided an important planning opportunity, but urban growth subsequently outpaced the infrastructure and institutional arrangements designed to manage it. Public drains, culverts, vacant land, streams, and road margins became informal extensions of the municipal waste system. At the same time, households, informal recyclers, private operators, health institutions, markets, religious organisations, and civil-society groups developed practical responses that official policy often overlooked. The study concludes that a robust public-health strategy for Jos requires historical accountability, integrated metropolitan governance, investment in collection and final disposal, recognition of informal environmental labour, and sanitation policies designed with communities rather than imposed upon them.

Keywords: Environmental History, Waste Management, Public Health, Urban Development, Sanitation Governance, Jos Metropolis

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Introduction

A city is judged by more than the buildings it constructs. It is also judged by how it moves water, goods, people, and waste.[1] Every settlement produces waste; the important questions are who collects it, where it goes, whose labour makes it disappear, and who bears the cost when the system breaks down. Waste is therefore not an external nuisance. It is a revealing measure of urban governance. Onibokun's *Managing the Monster* captures this dilemma in the African context: waste becomes difficult to contain when the institutions responsible for it are weaker than the urban processes that produce it. Jos Metropolis provides a particularly useful setting in which to examine this relationship. Jos grew first as a mining and administrative centre and later as a metropolitan region shaped by commerce, government, education, transport, migration, and expanding residential districts. The 1976 Greater Jos Master Plan was an important attempt to direct this growth through planned land use and infrastructure. Its later history, however, points to a familiar problem in African urban development: plans can be ambitious while the institutions, revenues, land controls, and services needed to sustain them remain fragile. By the early twenty-first century, formally planned neighbourhoods stood alongside expanding districts where roads, drains, water, toilets, and refuse collection were incomplete or unreliable.

The consequences have been environmental as well as social. Waste in drainage channels can obstruct storm-water movement and increase flood risk; organic matter in open spaces can attract vectors; burning exposes residents to smoke; and poorly segregated healthcare waste creates risks for patients, workers, handlers, and nearby communities. These pathways connect public health to inequality, public authority, land values, gendered household labour, and the informal economy.[2] Existing studies have made valuable contributions to knowledge of waste management in Jos. Peter, Hull, Jowitt, and Adeloye identify economic, institutional, political, legislative, technical, operational, and socio-cultural constraints in Greater Jos. Their work is especially important because it combines document review with interviews, observation, and residential surveys.[3] Ngwuluka and colleagues examine waste management in healthcare establishments within Jos Metropolis and draw attention to the distinctive dangers of medical waste. Akintunde's study of the spatial and temporal pattern of urban growth demonstrates the scale of built-up expansion and its implications for the urban environment.[4] Other studies and reports have examined PEPSA, private operators, environmental NGOs, and household practices. What remains less developed, however, is a sustained historical interpretation that brings these strands together across the period from 1976 to 2023.

Jos city has gone through an exponential urban expansion and increasing population growth, but the ability of the city's public institutions to run and manage adequate sanitation services has been at variant with these rapid changes, given rise to the continuous difficulties involving waste disposal, drainage, environmental cleanliness and public health. The situation has been compounded by the inadequate recognition and feeble institutional support for the sanitation efforts of homes, individuals, private operators and community organisations, notwithstanding their importance of the contributions to sustaining the urban environment. As a result, the disparity between urban growth and sanitation capacity raises critical concerns about public health, citizenship, socio-economic inequality and the effectiveness of urban planning in addressing sanitation needs in Jos Metropolis.

[1]UN-Habitat. *Solid Waste Management in the World's Citieswater and Sanitation in the World's Cities*. London, Gutenberg Press. 2010
[2]V. Gidwani. The work of waste: inside India's infra-economy. Transactions of the Institute of British Geographers, 40(4). 2015. 575–595. http://www.jstor.org/stable/24583010
[3]P. Gwom, A. Hull, P. Jowitt and A. Adeloye, Municipal Solid Waste Management in Greater Jos, Nigeria. (iafor). The International Academic Forum. (ND) www.iafor.org
[4]J.A. Akintunde, E.A. Adzandeh and O.O. Fabiy. Spatio-temporal pattern of urban growth in Jos Metropolis, Nigeria. Remote Sensing Applications: Society and Environment. Vol. 4, 2016, 44-54

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Conceptual Clarification

Sanitation

Sanitation refers to the management of human excreta, solid waste, and wastewater to prevent contamination and ensure hygiene, thereby reducing the risk of disease transmission in a community. It encompasses proper disposal methods, drainage systems, and the provision of sanitation facilities in accordance with cultural and physical considerations.[5] It means-measures of promoting health through prevention of human contact with the hazardous wastes as well as the treatment and proper disposal of waste-water.

Waste

Waste is the useless byproduct of human activities which physically contains the same substance that are available in the useful product. Wastes have also been defined as any product or material which is useless to the producer. Dijkema et al, pointed out that, wastes are materials that people would want to dispose of even when payments are required for their disposal.[6] Although, waste is an essential product of human activities, it is also the result of inefficient production processes whose continuous generation is a loss of vital resources.

Public Health

The science and art of preventing disease, prolonging life, and promoting health through the organized efforts and informed choices of society, organizations, public and private , communities, and individuals.[7] It is the science and art of preventing diseases, prolonging life, promoting health and efficiencies through organized community effort. It is concerned with the health of the whole population and the prevention of disease from which it suffers.

Jos Metropolis and the Historical Production of Urban Waste

Environmental history is concerned with the changing relationship between human societies and the wider material world. It asks how political economy, technology, culture, and everyday practice alter landscapes, but also how soils, watercourses, climate, disease vectors, and ecological limits shape human life. Applied to Jos, this approach makes it difficult to separate the city from its environment. Streets, drains, waste grounds, water systems, dumpsites, hospitals, and markets are all socio-environmental spaces. The analysis also draws on urban political ecology, which directs attention to power. Unequal access to water, drains, collection, and safe disposal is not explained by scarcity alone. Investment decisions, land-use controls, enforcement practices, contracts, and official recognition help determine which neighbourhoods receive services and which are left to cope. In such circumstances, environmental inequality is easily described as the result of residents' "bad habits," even when people are responding to services that are absent, irregular, or too expensive.[8]

Waste studies provide a complementary perspective. Mary Douglas famously observed that dirt is "matter out of place," a formulation that directs attention to classification and social order. What is considered waste depends on where it is, who owns it, and whether it can be recovered. A plastic container in a household compound may be rubbish; in the hands of a recycler it may be a commodity. A market's

[5]M. A. Onyango, M. Uwase. Humanitarian Response to Complex Emergencies and Natural Disasters. in S. R. Quah, (Ed) *International Encyclopedia of Public Health* (Second Edition). Academic Press. 2017. 106-116

[6]G. P. J. Dijkema, M. A. Reuter and E. V. Verhoef. A new paradigm for waste management. WasteManagement, 20(8). 2000. 633-638. https://doi.org/10.1016/S0956-053X(00)00052-0

[7]Phin, N. (). The Historical Development of Public Health. In F. Wilson, M. Mabhala (Eds.) *The Historical Development of Public Health*. SAGE Publications Ltd. 2009. 5-10. https://doi.org/10.4135/9781446216736.n2

[8]B. T Abur, G. A. Duvuna and A. A. Wara. Assessment of Municipal Solid Waste Generation, ManagementPractices and Waste-To-Energy Potential in Nigeria: A Review. *International Journal of Research Publication and Reviews.* 5(6). 2024. 5763-5773

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organic waste may be a public nuisance when scattered in a drain but a resource for composting when collected. Newell and Green's work on the cultural politics of dirt in Africa is useful here because it shows that cleanliness is never only a technical condition; it is also connected to morality, respectability, authority, and social distinction. Public health scholarship adds a further dimension. Ziraba, Haregu, and Mberu review the multiple pathways through which poor solid-waste management can harm health in developing countries, including contact with contaminated materials, vectors, air pollution from burning, water contamination, occupational exposure, and risks to waste pickers. These pathways should not be converted into unsupported claims about particular diseases in Jos. They do, however, provide a framework for understanding why collection, segregation, drainage, final disposal, and occupational protection matter.[9]

Methodologically, the article uses periodisation rather than treating 1976–2023 as a single undifferentiated interval. The periods are analytical, not rigid chronological boxes. They identify dominant tendencies while acknowledging overlap and unevenness. The evidence includes the 1976 Greater Jos planning context; federal environmental legislation and regulations; published research on urban growth and municipal waste; studies of healthcare establishments; institutional accounts of PEPSA; and comparative scholarship on African cities. The paper reads these sources against one another. Planning documents reveal official intentions; empirical studies reveal institutional and material outcomes; environmental-history analysis examines the gap between the two.

Analytical period	Dominant urban process	Sanitation implication	Institutional tendency
1976–1989	Planned expansion, administrative growth, and economic restructuring	Increasing demand for coordinated collection, drainage, and public-space management	Strong planning ambition but uneven implementation
1990–1999	Accelerated growth, fiscal pressure, and planning mismatch	Expansion of informal disposal and service inequalities	Regulatory ambition without sufficient local capacity
2000–2010	PEPSA era and metropolitan intensification	Formal collection coexisting with open dumping, informal recovery, and inadequate final disposal	Centralised agency responsibility with resource constraints
2011–2023	Fragmented, networked, and participatory urban governance	Persistent service gaps alongside private, informal, NGO, and community responses	Mixed governance, public awareness, contracting, and weak integration

The 1976 Planning Moment

[9]M. A. Okikiola and A. A. Alo. Spatio-Temporal Dynamics of Urban Green Space andTemperature in Ado-Ekiti Metropolis, Nigeria. *Forests and Forest Products Journal.* 20. 2020. 40-53©

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The year 1976 is a useful point of departure because it marks the planning framework through which Greater Jos was expected to accommodate future growth. The master-planning idea reflected a modernist confidence that land could be zoned, infrastructure sequenced, and urban expansion guided. Such planning was not inherently misguided. The provision of space for residential districts, roads, public institutions, commercial activities, open areas, and ancillary services could have created the basis for a healthier metropolitan environment. Waste management, however, was often treated as a service to be added to urban development rather than as a central component of urban form.[10] The important question is not simply whether Jos had a plan. It is whether the assumptions behind that plan could be maintained as the city changed. Planning remains meaningful only when population figures are updated, land controls are enforced, revenue is available, and infrastructure is delivered in step with growth. Peter and colleagues report that the Greater Jos Master Plan was designed to guide growth but that subsequent expansion exceeded what had been anticipated. Plateau State government establishments moved into Greater Jos during the 1980s, accompanied by federal and state ministries, parastatals, businesses, newspapers, schools, and other institutions. These activities increased employment, migration, traffic, commercial consumption, and the volume and diversity of waste.[11]

The relationship between urban planning and waste is therefore reciprocal. Land-use change creates new waste streams, while the absence of waste infrastructure reshapes land use. When collection is reliable, waste remains relatively invisible in the public realm. When it is unreliable, residents use the nearest available space: an unbuilt plot, roadside, stream edge, culvert, or drainage channel. The city's waste geography then becomes a record of its planning geography. Areas with incomplete roads and drainage are not merely poorly served; they also become more likely to function as unofficial disposal spaces.[12]

Urban Growth and the Limits of Capacity

There have been indications of exponential expansion of the metropolitan population and built-up area. Peter and colleagues report that the population of Greater Jos rose from less than one million in 1991 to 1,315,301 in 2006, with later projections indicating further growth. Akintunde documents substantial spatial expansion and reports that Jos's built-up area increased markedly over the period examined, reaching approximately 62 square kilometres by 2014. These figures should be read as indicators of pressure rather than as a simple causal explanation. Population growth does not automatically produce poor sanitation. It becomes environmentally damaging when infrastructure, governance, finance, and land-use control fail to expand with it. The difference is crucial. A growing city can produce more waste and still remain healthy if it has adequate collection, transfer, treatment, recycling, drainage, toilets, and safe final disposal. Conversely, a smaller city can experience serious environmental harm when services are absent or badly managed. In Jos, the historical problem was that urban growth was accompanied by a widening gap between the material requirements of the metropolis and the institutional resources available to meet them.[13]

This gap was visible in the absence of a fully sanitary disposal system. The Greater Jos study reports that there were no sanitary landfills and that waste from the formal collection system was disposed of in ways that generated environmental concerns. A collection system without secure final disposal merely moves the problem from one location to another. It may clean a market or street temporarily while transferring risk to a peripheral community, a low-lying area, or a watercourse. Environmental history makes this

[10]Abur, Duvuna and Wara. Assessment of Municipal Solid Waste Generation …, 5763-5773
[11]Abur, Duvuna and Wara. Assessment of Municipal Solid Waste Generation …, 5763-5773
[12]K. J. Miner, I. T. Rampedi, A. P. Ifegbesan and F. Machete. Survey on Household Awareness and Willingness to Participate in E-Waste Management in Jos, Plateau State, Nigeria. *Sustainability* 12(3). 2020. 1047
[13]J. Y. Dung-Gwom. The Nature of Peri-Urban Developments in Jos, Nigeria. World Congress on Housing. 2008

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displacement visible: the apparent cleanliness of one district may depend on the increased exposure of another.[14]

Changing Consumption and the Material Character of Waste

The content of urban waste changed alongside the economy of Jos. Food residues remained important, reflecting household and market activity, but plastics, paper, glass, metals, packaging, and other manufactured materials became increasingly significant. The Greater Jos study identifies food residues, plastics, paper, and glass among the principal components of municipal waste. This composition has implications for storage, collection, recovery, decomposition, and public health.[15] Organic waste decomposes rapidly and can attract vectors; plastics obstruct drains and persist in the environment; broken glass and metal create injury risks; and mixed waste makes recovery and safe handling more difficult.[16] Consumption should not be moralised as though residents alone created the problem. Packaging is produced upstream by manufacturers and distributors, while disposal responsibility is often assigned downstream to households and local authorities. When a city has no dependable collection point or affordable service, the environmental cost of packaging is externalised onto streets, drains, and neighbourhoods. This is one reason why waste policy must connect municipal management to producer responsibility, markets for recovered materials, and the design of products and packaging.

From Environmental Regulation to Institutional Fragmentation, 1980s–1999

The 1980s and 1990s were marked by important changes in Nigeria's environmental governance. Federal Decree No. 58 of 1988 established the Federal Environmental Protection Agency (FEPA), giving national environmental protection a more explicit institutional framework. The 1991 regulations concerning solid and hazardous wastes, industrial pollution abatement, and related standards further developed the regulatory architecture. These measures reflected growing recognition that waste threatened water, land, air, and public health. Yet legal recognition and practical capacity are not the same. Environmental regulation is effective only when responsibilities are clear, standards are locally appropriate, monitoring is regular, and public agencies have the resources to enforce requirements.[17] In a large and expanding metropolitan region, federal rules require translation into local collection routes, disposal sites, equipment maintenance, staff training, public communication, and mechanisms for community participation. The history of Jos suggests that the national framework did not by itself resolve the local problems of finance, land, logistics, and coordination.

The difficulty was partly institutional. Waste management could involve state agencies, local government councils, health authorities, planning departments, markets, private contractors, traditional and community institutions, and households. When responsibilities overlap without coordination, each actor may claim a limited mandate while the waste remains uncollected. When responsibilities are transferred without funding, decentralisation can become a shifting of blame. When enforcement is emphasised without service provision, sanitation becomes punitive rather than preventive.[18] The public-health importance of this period lies partly in how exposure became ordinary. Where drains are used as disposal channels, residents may come to regard blockage and overflow as ordinary features of the rainy season. Where burning is the most accessible method of reducing household refuse, smoke becomes an everyday environmental condition. Where public toilets are inadequate, people adapt through unsafe practices.

[14]E. A. Adzandeh, J. A. Akintunde and E. A. Akintunde. Analysis of Urban Growth Agents in Jos Metropolis, Nigeria. *International Journal of Remote Sensing and GIS*, Vol. 4, Iss. 2, 2015, 41-50
[15]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50
[16]P. Gwom and I. G. U. Ayuba. Municipal Solid Waste Management in Greater Jos, Nigeria. *International Journal of Education, Humanities and Multidisciplinary Research*. 6(3). 2014
[17]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50
[18]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50

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Historical normalisation does not make exposure harmless; it makes it less visible to authorities and more difficult to contest. Environmental sanitation campaigns often presented the clean city as a moral achievement and dirty surroundings as evidence of irresponsible citizenship. Such campaigns could mobilise residents while obscuring unequal material conditions. In my view, citizenship in a healthy Jos should include both the obligation to avoid indiscriminate dumping and the right to dependable, affordable sanitation services.[19]

PEPSA and the Search for a Metropolitan Waste System, 2000–2010

The establishment of the Plateau Environmental Protection and Sanitation Agency around 2000 marked an important institutional response to the limitations of earlier arrangements. PEPSA was assigned responsibilities that included the removal, transport, and disposal of domestic, commercial, and industrial waste; the maintenance of public drainage facilities; street cleaning; registration of private waste-collection companies; preparation and updating of waste-collection and disposal plans; monitoring of disposal systems; public education; and mobilisation for clean-up exercises. The mandate is revealing: waste, drainage, public space, and sanitation were understood as parts of one urban problem. PEPSA's creation also represented an attempt to create institutional memory and technical focus. A dedicated agency could, in principle, maintain vehicles, map collection routes, monitor disposal sites, register operators, advise on recycling, and coordinate public education more effectively than a dispersed system. It could also provide a focal point for accountability. However, a broad mandate can become a burden when it is not matched by a stable budget, adequate equipment, trained staff, reliable data, and clear relationships with local governments.[20]

Evidence from the Greater Jos study indicates that PEPSA and environmental task forces produced some operational improvements, but that refuse continued to be dumped along roads, in culverts, drainage channels, under bridges, and in open spaces. This contrast deserves a more careful reading than a simple verdict of institutional failure. It shows that official action could produce visible, temporary improvement without changing the system that generated the waste. Clean-up exercises remove visible waste, but they do not necessarily provide daily collection, safe storage, transfer infrastructure, recycling markets, or sanitary landfills. This is the difference between an occasional display of cleanliness and a sanitation system that actually lasts. The agency's work also took place within a difficult political economy. Collection vehicles require purchase, fuel, repair, and replacement. Workers require salaries, protective equipment, supervision, and training.[21] Disposal sites require land, access roads, engineering controls, environmental monitoring, and community consent. If any component fails, the system becomes unreliable. The Greater Jos study links inadequate service to funding limitations and equipment constraints, and it notes that a substantial share of vehicles may be unavailable or unsuitable for the task. These are not minor administrative details. They are the physical conditions of public health.

Private operators formed another part of the emerging system. Contracting can extend service, encourage innovation, and reduce pressure on public agencies. It can also produce uneven coverage when operators concentrate on areas able to pay. The challenge is not whether private actors should exist, but how they are regulated, integrated, and held accountable. A metropolitan waste system requires route coordination,

[19]M. D. Chaudhary, et al. "Waste Management in Disease Prevention: A Public Health Overview." *Bioinformation* Vol. 21,12 4363-4367. 15 Dec. 2025, Doi:10.6026/973206300214363

[20]K. U. Donuma. Environmental and human health risks of indiscriminate disposal of plastic waste and sachet water bags in Maiduguri, Borno State Nigeria. Waste Management Bulletin. 2024

[21]M. E. Ntekpe, E. O. Mbong, E. N. Edem and S. Hussain. Disposable Diapers: Impact of Disposal Methods on PublicHealth and the Environment. *American Journal of Medicine and Public Health*. 1(2). 2020. 1 - 7

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service standards, transparent contracts, complaint mechanisms, and arrangements for neighbourhoods where user fees alone cannot sustain collection.[22]

The informal sector deserves equal attention. Informal waste pickers and traders recover valuable materials and reduce the volume sent to disposal sites. Wilson, Velis, and Cheeseman argue that informal recycling is a significant component of waste management in developing cities and should be understood as a resource rather than simply as a problem. In Jos, informal recovery operates at household, market, roadside, and disposal levels. Its workers possess detailed knowledge of material value, seasonal flows, and local demand. Yet they often work without protective equipment, legal recognition, stable income, or protection from harassment. An environmental-history perspective reveals that the city's sanitation system has long depended upon labour that official narratives tend to render invisible.[23]

Healthcare Waste and the Public-Health Boundary

Healthcare establishments occupy a distinctive position in the history of sanitation. They are places where waste can contain sharps, blood-contaminated materials, pharmaceuticals, chemicals, pathological materials, and ordinary domestic refuse. The mixing of these categories increases risk and complicates treatment. Ngwuluka and colleagues' study of healthcare establishments within Jos Metropolis is important because it shifts attention from household and municipal refuse to the institutional spaces where public-health protection can be undermined by inadequate waste practices. Healthcare waste also illustrates the difficulty of separating "environmental" and "public-health" history. A hospital may treat infectious illness while producing waste that exposes cleaners, waste handlers, scavengers, patients, and neighbours. Waste management is therefore part of clinical safety, occupational safety, environmental protection, and community health simultaneously. Training, segregation at source, secure storage, transport, treatment, and final disposal are not optional additions to healthcare; they are part of the quality of care.[24]

The issue is especially significant where municipal and healthcare systems intersect. General municipal collection must not mix hazardous hospital materials with ordinary waste, while independent facility management requires technical capacity and oversight. Where water, storage, treatment equipment, or funds are inadequate, staff may improvise. This reflects the broader conditions under which Nigerian urban institutions have delivered essential services during economic pressure. Public-health analysis must also avoid exaggerated or unsupported claims. Poor waste management creates plausible pathways of exposure, but the presence of a pathway does not prove a specific disease outbreak.[25] A stronger scholarly approach distinguishes between documented conditions, established mechanisms, and claims requiring epidemiological confirmation. For Jos, this means combining environmental observation and waste studies with hospital records, laboratory surveillance, household health surveys, and spatial analysis in future research. The absence of such integrated data should not be used to dismiss environmental risk; it should be treated as an argument for improving the evidence base.

Governance and Everyday Environmental Labour: 2011–2023

The period after 2010 saw the coexistence of formal government action, private service provision, informal recovery, NGO activity, community campaigns, environmental education, and household adaptation. This was not a transition from a state system to a market system. It was a layered and fragmented regime in

[22]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50
[23]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50
[24]M. Ibrahim, Muna et al. "Healthcare Waste Segregation Practice and Associated Factors among Healthcare Professionals Working in Public and Private Hospitals, Dire Dawa, Eastern Ethiopia." *Journal of environmental and public health* vol. 2023 8015856. 28 Jan. 2023, doi:10.1155/2023/8015856
[25]O. I. Ogidi, et al. Healthcare Waste Management Practices in Hospitals. A Review. *Environmental and Human Health* Vol. 01. Iss. 01. 2025

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which different actors performed different parts of the work. The resulting system could be innovative, but it was also difficult to coordinate and evaluate. Studies of Greater Jos during this period emphasise the need for cooperation among formal and informal sectors, communities, and other stakeholders. This recommendation is more profound than it may first appear. It challenges the assumption that expertise belongs only to agencies and consultants. Residents know which collection points overflow, which roads become impassable in the rains, which streams carry waste, and which operators are reliable. Informal workers know which materials have value and how they move through the city. Health workers know where hazardous waste is generated and where handling breaks down. Effective policy should institutionalise these forms of knowledge.[26]

Environmental NGOs also became more visible. Their work may include public awareness, clean-up campaigns, recycling, advocacy, research, and collaboration with state agencies. NGOs can help bridge the gap between official policy and community practice, but they cannot substitute for public infrastructure. A clean-up campaign may attract attention and change behaviour for a time, yet the waste will return if collection remains absent. The history of Jos therefore calls for a distinction between civic mobilisation and service delivery. Both are necessary, but they are not interchangeable. Households perform a large share of sanitation labour. Women and children frequently participate in sweeping, sorting, storing, carrying, and managing household waste, although the distribution of this labour varies by class, neighbourhood, and household structure. When municipal services are weak, household labour expands. This transfer is often invisible in budgets and policy documents. It also has gendered implications: time spent on waste and water management is time unavailable for education, paid employment, rest, or community participation. A public-health history that counts only trucks and tonnes misses these embodied costs.[27]

The same period also exposed the limits of enforcement-based sanitation. Monthly environmental sanitation exercises and public campaigns can create visible order, but compulsory clean-ups may place disproportionate burdens on traders, transport workers, tenants, and low-income residents. Enforcement may be necessary against deliberate illegal dumping and unsafe commercial practices, yet it must be accompanied by accessible services and transparent rules. Otherwise, environmental regulation risks becoming a performance of authority rather than a mechanism for reducing exposure.[28] Climate variability and intense rainfall sharpened these problems. Waste in drains and low-lying spaces can reduce drainage capacity, while poor road access can interrupt collection. It would be methodologically careless to attribute every flood or health event to waste alone. Nevertheless, the interaction among land-cover change, drainage, rainfall, waste accumulation, and settlement patterns is historically important. Environmental risks are often compound: several moderate weaknesses combine to produce a severe local outcome.

Waste, Inequality, and the Public Health of the Metropolis

The geography of waste also reflects inequality. Better-served districts are more likely to have good roads, secure housing, private collection, and political influence, while rapidly expanding and lower-income areas may depend on communal points, irregular collection, or informal disposal. This does not mean that affluent neighbourhoods are free from risk. It means that the ability to avoid or shift risk is unevenly distributed. Disposal sites make this especially clear: when a site is selected without safeguards, monitoring, compensation, or local consent, nearby communities bear the odour, smoke, traffic, litter, and anxiety associated with the city's waste. The burden is also occupational. [29]Waste workers, informal

[26]O. R. Okwa, and P.O. Odungweru, Designation of Environmental Impact Assessment (EIA) and Socio-Economic Development in Rivers State. *Journal of Contemporary Issues*. VOL. 6, 2026 81-92
[27]Okwa, and P.O. Odungweru, Designation of Environmental Impact Assessment (EIA) …, 81-92
[28]Okwa, and P.O. Odungweru, Designation of Environmental Impact Assessment (EIA) …, 81-92
[29]Okwa, and P.O. Odungweru, Designation of Environmental Impact Assessment (EIA) …, 81-92

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recyclers, street sweepers, market cleaners, children near dumps, and residents beside drains may face greater exposure. Gloves, boots, masks, safe tools, training, and emergency procedures are therefore public-health infrastructure, not luxuries. At the same time, "public attitude" must be discussed carefully. Behaviour matters, but it is shaped by the service environment. Where bins are absent, collection irregular, or fees unaffordable, education alone cannot solve illegal disposal.[30]

Jos's sanitation order is co-produced but unequally valued. Agencies, contractors, households, informal workers, and community groups all keep the city functioning, yet responsibility is often pushed downward while authority and resources remain fragmented. The appropriate response is not state withdrawal but a stronger social contract: public agencies provide dependable services, communities help design and monitor them, and environmental labour is recognised and protected.[31]

Discussion: from "Waste Problem" to Historical Governance Problem

Taken together, the evidence points to three broad conclusions. First, growth became a sanitation crisis because infrastructure and governance did not keep pace with it. Second, waste crosses administrative boundaries, so a drain, market, dumpsite, household, and hospital cannot be managed as isolated units. Third, formal and informal systems are interdependent. The formal sector provides authority, planning, finance, equipment, and standards; the informal sector supplies flexible labour, material recovery, local knowledge, and livelihoods. Treating them as opposites is both inaccurate and impractical. Sanitation should consequently be measured as a public-health service, not only as an aesthetic exercise. Useful indicators include collection reliability, neighbourhood coverage, safe final disposal, healthcare-waste segregation, worker injuries, blocked drains, complaint resolution, and community satisfaction. These measures would tell Jos more than the number of periodic clean-up campaigns alone.[32]

Problems and Evidence-Based Solutions

The evidence points to a chain of connected sanitation problems in Jos. The table separates what the sources document from the practical responses that follow. A solution should answer a demonstrated problem, not merely repeat an aspiration about keeping the city clean.

PROBLEM DOCUMENTED IN JOS	FACTUAL EVIDENCE	PRACTICAL SOLUTION GROUNDED IN THE EVIDENCE
Waste is dumped in roads, culverts, drains, under bridges, and open spaces.	Peter et al. record these disposal practices in Greater Jos, even after environmental sanitation task-force activity.	Provide regular primary collection and accessible communal containers, protect drains from dumping, and enforce anti-dumping rules only alongside a service residents can actually use.
Collection is irregular and household storage containers are scarce.	The Greater Jos study reports irregular kerbside collection and containers available to very few households.	Publish dependable collection schedules, increase the number of suitable storage points, and monitor coverage by neighbourhood rather than

[30]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50
[31]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50
[32]Adzandeh, Akintunde and Akintunde. Analysis of Urban Growth Agents in Jos Metropolis …, 41-50

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		measuring success only through occasional clean-ups.
Final disposal is unsafe and concentrated.	Peter et al. report no sanitary landfill in Greater Jos and identify Dong as the single dumpsite receiving formally collected waste at the time of their study.	Develop an engineered disposal or treatment facility, monitor smoke, odour, leachate, and groundwater risks, and involve host communities in site selection and oversight.
Vehicles and maintenance capacity are inadequate.	The study reports shortages of collection vehicles and states that only 30% of compactor vehicles were operational in the 2013 inventory.	Ring-fence sanitation funds for vehicle maintenance, spare parts, fuel, and replacement; publish an annual inventory of functional equipment; and select vehicles according to Jos's road, traffic, and haulage conditions.
Waste is mixed instead of being separated for recovery or treatment.	The Greater Jos study reports heterogeneous waste collected without sorting and identifies food residues, plastics, paper, glass, and metals.	Introduce gradual source separation, beginning with organics and high-value recyclables, supported by separate collection, composting trials, and markets for recovered materials.
Informal collectors and recyclers are useful but marginalised.	Informal collectors provide house-to-house services and recover materials, while some are banned or have carts impounded; Wilson et al. show the wider importance of informal recycling.	Register and train willing operators, provide protective equipment and designated recovery spaces, and integrate them into contracts without destroying their livelihoods.
Healthcare waste is not safely managed.	The Jos hospital study surveyed six major hospitals and found inadequate segregation and disposal, as well as weak worker awareness of relevant regulations and hospital waste policy.	Require segregation at source, secure temporary storage, staff training, protected handling, documented treatment, and regular inspection of public and private facilities.
Urban growth has outpaced planned infrastructure.	Akintunde et al. record growth in built-up area from	Make waste, drainage, toilets, and disposal capacity

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	15 km² in 1984 to 62 km² in 2014; Peter et al. report that expansion exceeded the assumptions of the 1976 plan.	conditions of new development approval, and update metropolitan plans and population data regularly.
Responsibilities are spread across agencies without adequate coordination or funding.	Peter et al. identify multiple agencies and weak funding as central constraints; PEPSA's mandate covers collection, drainage, private operators, planning, education, and mobilisation.	Establish a metropolitan coordination mechanism with clearly assigned duties, shared standards, public reporting, and a complaint system that identifies which agency must respond.
Public education is separated from service delivery.	The Greater Jos study reports public-awareness efforts alongside continuing poor disposal practices.	Link education to reliable collection information, affordable services, community monitoring, and realistic enforcement. Residents should not be asked to perform a service that government has not made feasible.

Way forward

The first priority is a metropolitan baseline. Jos needs current information on population, waste generation, collection routes, disposal sites, drains, healthcare facilities, operators, informal recovery, and neighbourhood complaints. Peter et al. identify accurate population data and funding as necessary for planning. Without such information, it is difficult to tell whether a programme has improved coverage or merely moved waste elsewhere.

The second priority is institutional clarity. PEPSA's broad mandate is useful, but collection, drainage, disposal, education, and hazardous-waste monitoring require coordination and funding. A metropolitan framework should assign duties among state agencies, local governments, health authorities, private operators, and communities, while publishing service standards and complaint channels. Collection and final disposal should be planned together, with engineered treatment or disposal, transfer facilities, and carefully managed composting and recovery where markets exist.

Healthcare waste requires separate attention. Hospitals and clinics should segregate waste at source, train staff, provide secure storage and protective equipment, and document treatment and disposal. Sanitation education should provide information about collection days, approved points, fees, and complaints. In my view, cooperation will improve when residents can see that authorities are also keeping their side of the bargain. Further research should combine oral and archival history with public-health surveillance and spatial analysis.

Conclusion

Between 1976 and 2023, Jos Metropolis changed from a city whose expansion was expected to be guided by a master plan into a complex metropolitan region whose environmental systems were frequently assembled through improvisation. The 1976 planning moment contained an opportunity to align urban growth with infrastructure. Subsequent administrative expansion, population increase, changing

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consumption, fiscal pressure, institutional fragmentation, and uneven enforcement widened the gap between planned development and lived urban conditions. The history of waste in Jos is therefore a history of public authority and public labour. Agencies regulated and removed waste; private operators filled selected gaps; informal workers recovered materials; households managed refuse; health institutions confronted specialised risks; and communities endured or contested unequal exposure. These actors did not possess equal power, but all shaped the city's sanitation order.

The central lesson is clear. Jos's waste problem should not be treated as a cultural defect of its residents or as an inevitable price of urbanisation. It is a problem of historical governance. Waste accumulates when the material flows of a growing metropolis exceed the capacity, coordination, and accountability of the institutions charged with managing them. Public health is endangered when that risk is shifted onto people least able to escape it. A healthier Jos will require more than periodic clean-up campaigns. It requires metropolitan coordination, dependable collection, safe disposal, healthcare-waste controls, support for recovery and recycling, worker protection, transparent data, and community participation. Above all, it will require a renewed understanding of sanitation as a shared urban right and responsibility. The environmental history of Jos shows that public health is secured not at the end of the waste chain but throughout the life of the city from planning and production to consumption, collection, recovery, treatment, and final disposal.

References

Abur, B. T Duvuna G. A. and Wara, A. A. Assessment of Municipal Solid Waste Generation, ManagementPractices and Waste-To-Energy Potential in Nigeria: A Review. *International Journal of Research Publication and Reviews.* 5(6). 2024. 5763-5773

Adzandeh, E. A. Akintunde, J. A. and Akintunde, E. A. Analysis of Urban Growth Agents in Jos Metropolis, Nigeria. *International Journal of Remote Sensing and GIS*, Vol. 4, Iss. 2, 2015.

Akintunde, J. A. Adzandeh E. A. and Fabiy, O. O. Spatio-Temporal Pattern of Urban Growth in Jos Metropolis, Nigeria. Remote Sensing Applications: Society and Environment. Vol. 4, 2016.

Dijkema, G. P. J. Reuter, M. A. and Verhoef, E. V. A new paradigm for waste management. WasteManagement, 20(8). 2000.

Donuma, K. U. Environmental and human health risks of indiscriminate disposal of plastic waste and sachet water bags in Maiduguri, Borno State Nigeria. Waste Management Bulletin. 2024

Dung-Gwom, J. Y. The Nature of Peri-Urban Developments in Jos, Nigeria. World Congress on Housing. 2008

Gidwani. V. The work of waste: inside India's infra-economy. Transactions of the Institute of British Geographers, 40(4). 2015

Gwom, P. and Ayuba, I. G. U. Municipal Solid Waste Management in Greater Jos, Nigeria. *International Journal of Education, Humanities and Multidisciplinary Research*. 6(3). 2014

Gwom, P. Hull, A. Jowitt P. and Adeloye, A. Municipal Solid Waste Management in Greater Jos, Nigeria. (iafor). The International Academic Forum. (ND) www.iafor.org

Ibrahim, M. Muna et al. "Healthcare Waste Segregation Practice and Associated Factors among Healthcare Professionals Working in Public and Private Hospitals, Dire Dawa, Eastern Ethiopia." *Journal of environmental and public health* vol. 2023 8015856.

© 2026 The Authors. Published by Bexford Publishing Ltd

M. D. Chaudhary, et al. "Waste Management in Disease Prevention: A Public Health Overview." *Bioinformation* Vol. 21, 12. 2025.

Miner, K. J. Rampedi, I. T. Ifegbesan A. P. and Machete, F. Survey on Household Awareness and Willingness to Participate in E-Waste Management in Jos, Plateau State, Nigeria. *Sustainability* 12(3). 2020.

Ntekpe, M. E. Mbong, E. O. Edem E. N. and Hussain, S. Disposable Diapers: Impact of Disposal Methods on PublicHealth and the Environment. *American Journal of Medicine and Public Health*. 1(2). 2020.

Ogidi, O. I. et al. Healthcare Waste Management Practices in Hospitals. A Review. *Environmental and Human Health* Vol. 01. Iss. 01. 2025

Okikiola, M. A. and Alo, A. A. Spatio-Temporal Dynamics of Urban Green Space andTemperature in Ado-Ekiti Metropolis, Nigeria. *Forests and Forest Products Journal.* 20. 2020.

Okwa, O. R. and Odungweru, P.O. Designation of Environmental Impact Assessment (EIA) and Socio-Economic Development in Rivers State. *Journal of Contemporary Issues*. VOL. 6, 2026

Onyango, M. A. Uwase, M. Humanitarian Response to Complex Emergencies and Natural Disasters. in S. R. Quah, (Ed) *International Encyclopedia of Public Health* (Second Edition). Academic Press. 2017.

Phin, N. The Historical Development of Public Health. In F. Wilson, M. Mabhala (Eds.) *The Historical Development of Public Health*. SAGE Publications Ltd. 2009.

UN-Habitat. *Solid Waste Management in the World's Citieswater and Sanitation in the World's Cities*. London, Gutenberg Press. 2010

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