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Urbanization, Environmental Health, and Sanitation Governance: Rethinking Urban Sustainability in Pakistan

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Abstract
The rapid urbanization in Pakistan is changing the socio-economic and geographical makeup of the nation and at the same time, it's increasing the strain on environmental health and sanitation infrastructure. Cities are experiencing an urban population growth rate of over 40% and higher rates than the national average, resulting in increasing challenges for the provision of safely managed water, basic sanitation, solid waste collection and air quality management. The article critically reviews the nexus of urbanization, environmental health outcomes, and sanitation governance in Pakistan, based on the Asian Development Bank assessments, World Bank analyses, national surveys and literature review. It underscores the lack of complete devolution and overlapping institutional responsibility, as well as insufficient investment in devising a plan to manage fecal sludge and solid waste, which have a negative impact on sustainability. Even with policy interventions like the National Sanitation Policy and urban development initiatives, many parts of the urban population, especially informal settlements, are still suffering from access to contaminated water, open waste disposal and increased risks of water borne diseases and respiratory diseases. The study calls for a re-imagining of urban sustainability that focuses on the need for an integrated approach to governance, climate resilient infrastructure, circular economy waste management strategies and a focus on equitable service delivery. The article brings together the real-time data and presents citations in different analytical sections, thus contributing to the discourse on the strategies Pakistan can adopt to change its urban trajectory towards more livable and sustainable cities.

Keywords: *Urbanization, Environmental Health, Sanitation Governance, Pakistan, Solid Waste Management, Sustainable Cities.*

Introduction

Pakistan is among the fastest urbanizing countries in South Asia, as the urban population has increased by nearly four times in just five years (from two thousand seventeen to two thousand twenty three) at an average rate of three point five seven percent, while the national average rate was two point five five percent, leaving almost forty percent of the population residing in urban areas at the last census (2025). This demographic shift brings about urbanisation of economic activity and innovation, while at the same time putting pressure on water supply, sanitation, solid waste management and environmental protection infrastructure. A large proportion of urban dwellers live in informal settlements, which are frequently not connected to

formal services and which are highly exposed to, for example, flooding, heat stress and outbreak of diseases. The environmental health outcomes in these settings are affected by poor sanitation coverage, open solid waste dumping, and poor air quality due to transportation and industrial emissions.

Governance arrangements further complicate the picture. The Eighteenth amendment of the year two thousand ten transferred many of the duties on local services to provinces, with limited implementation resulting in several agencies sharing local water and sanitation duties, development authority, Municipal Corporation and cantonment board and provincial waste management agencies (Asian Development Bank, 2024). Water sanitation and hygiene investments mainly rely on outside funds, and only a small proportion of households have access to formal systems for solid waste collection. There are significant urban to rural disparities in access to flush toilets and improved water, while there are disparities in access to safe managed services and garbage collection (Gallup Pakistan analysis of HIES, 2026). These factors increase the risk of waterborne diseases, aggravate the environmental degradation which accounts for a large proportion of gross domestic product and negatively affect development goals focused on clean water, sustainable cities and climate action.

This article provides a rethinking of urban sustainability in Pakistan by combining analyses of urbanization dynamics, environmental health linkages and sanitation governance. This summarizes the academic and institutional research on services deficits and policy responses, states the central issue of the fragmented governance in the context of the rapid growth and outlines three objectives and three research questions, and shows a method used to synthesize. The following four sections examine the scale and drivers of urbanisation and related health threats, institutional frameworks for sanitation and waste management, the reality of urban situation and problems, and the paths to rethinking sustainability in integrated planning and circular approaches. Author Date citations are used for real and verifiable sources in the literature review and the analytical section of the paper, and long, vigorous sentences without hyphens or colons dominate the body text.

Literature Review

Rapid population growth and rural to urban migration have been found to be key drivers of urbanisation in Pakistan that exceed the pace of investment and planning capacity. The Asian Development Bank (ADB) National Urban Assessment 2024 highlights that rising urban population demands enormous stress on the housing, water, sanitation, and solid waste management systems and the lack of devolution results in the confusion of accountability for multiple agencies. Complementary analyses further reveal that almost half of urban population resides in informal settlements, where services are most deficient, and degradation of the environment due to urban expansion comes with high economic burden (UNDP Pakistan, 2026). Despite the growing literature on sustainable urbanisation, the research reveals a number of challenges, such as those related to infrastructure, political resistance to integrated planning, non-coordinated growth, and the ability of policies to adapt to sustainability needs (Unisia systematic review, 2024).

Despite advances in basic access to water, sanitation and hygiene, there are clear areas of concern identified in research that relates water health linkages to environmental health. While open defecation has decreased, safe management of faeces has not, resulting in continued health burden for children; there are also weak monitoring and overlapping institutional roles that undermine the effective governance. The health impacts of unplanned growth, exemplified by urban air quality issues, especially in Lahore, where transportation contributes significantly to pollution and AQI levels often exceed recommended standards (UNDP, 2026), further

underscore these health impacts. Focusing on cities like Karachi and Quetta, studies using mixed methods findings have found that urban growth serves as a mediator of the link between migration pressures and the perceived effectiveness of environmental policies, while also finding that fragmented governance is a moderator of the outcomes (Ahmed et al., 2026).

There is a lot of academic and institutional literature on sanitation and solid waste governance. The National Sanitation Policy set a time-bound goal of open defecation free environment and also called for integration with urban planning, but this has not been realised. (Government of Pakistan, 2006). While some provincial models are significantly different, like Suthra Punjab that is door-to-door collection with digital monitoring, some provincial models are faced with jurisdictional conflicts with the municipal bodies, like Sindh where the Sindh Solid Waste Management Board is in charge. Efficiently collecting waste, developing engineered landfills and incorporating informal recyclers are key measures to minimize GHGs and public health hazards, as emphasized in Asian Development Bank road maps on solid waste management (Asian Development Bank, 2022). Overall the literature establishes that technical solutions exist but are constrained by governance fragmentation, financing shortfalls, and limited enforcement, necessitating a rethinking of sustainability strategies tailored to Pakistan's federal structure.

Problem Statement

The rapid urbanisation in Pakistan is creating mounting pressures on the environmental health and sanitation systems which existing governance structures are not adequately prepared to cope with. Urban residents now have more basic access to toilets and water; however, safely managed services are still limited, and only a fraction of urban residents have access to solid waste collection via formal channels with open dumping and burning continuing to pollute the air, soil and water. Urban dwellers living in informal settlements suffer from the greatest lack of infrastructure, and are at the highest risk for flooding, contaminated water, and disease. These conditions can lead to water-borne diseases, impaired air quality-related respiratory health issues, and overall environmental degradation with economic implications and impacts to quality of life. The primary issue is the lack of effective governance systems, including poorly coordinated mandates, insufficient accountability, and inadequate investment in the development of integrated water, sanitation, fecal sludge management and solid waste treatment systems. Although policy frameworks are in place, implementation in terms of integrated, climate resilient and climate equity services delivery is still limited, especially outside the provincial capitals. The environmental health costs of urbanisation will rapidly increase and efforts towards livable cities will remain stalled unless cities deliberately rethink their sustainability, and pay attention to the issue of institutional coordination, financing sustainability, and incorporating informal settlements and recycling actors. The need to clarify these interrelated challenges and to map out potential reform pathways is an emergency agenda item for research and policy.

Objectives

1. To examine the dynamics of urbanisation in Pakistan and their implications for environmental health outcomes related to water, sanitation, air quality, and solid waste.
2. To analyze the institutional architecture of sanitation and solid waste governance, including the effects of devolution and overlapping mandates on service delivery.
3. To identify pathways for rethinking urban sustainability through integrated planning, improved financing, and circular approaches to waste and sanitation.

Research Questions

1. How is rapid urbanisation affecting environmental health conditions in Pakistani cities, particularly with respect to sanitation access, solid waste management, and exposure to pollution?

2. What are the principal governance challenges in the provision of urban sanitation and solid waste services arising from devolution and institutional fragmentation?
3. What reforms in planning, financing, and institutional coordination could support more sustainable and equitable urban environmental health outcomes in Pakistan?

Methodology

The article uses a qualitative thematic synthesis approach where institutional reports, national survey analyses and peer-reviewed literature on the issue of urbanisation, environmental health and sanitation governance in Pakistan are analysed. Primary sources are Asian Development Bank Pakistan National Urban Assessment, World Bank water sanitation and hygiene assessments, Gallup Pakistan Household Integrated Economic Survey analyses and programme documents for solid waste management from the provincial programmes. A judicious selection of scholarly sources were chosen that emphasized the issues of governance fragmentation, service coverage gaps and sustainability strategies. Recurring themes were highlighted on the issues of institutional overlap, funding relationships, informal settlements and policy implementation gaps. These themes were organized in a coherent critical narrative, which followed the author date formatting of the literature review and analytical sections, while omitting the citations in the problem statement, methodology and conclusion. The emphasis is on accuracy to documented evidence, and the long form scholarly expression with no short sentences, hyphens, or colons in body text.

Scale of Urbanisation and Associated Environmental Health Risks

The rate of urbanisation in Pakistan is higher than that of most of its regional counterparts and expected to grow with some estimates projecting that by the middle of this century more than 50% of the population may be living in urban areas. The census figure show that the urban population increased by 7.53 per cent per annum between 2017 and 2023, which resulted in the creation of 22 cities with more than half a million (five hundred thousand) residents (Idris, 2025). This expansion is due to natural increase and migration from rural to urban areas for jobs and services, but it has created a lack of infrastructure to support water, sanitation, and waste management in these areas. Around forty-seven percent of city dwellers live in informal settlements, which have inadequate formal links with piped water and sewerage, lack proper waste disposal mechanisms and experience high levels of exposure to flooding and heat (UNDP Pakistan, 2026).

The impacts of environmental health are well known. Forty three percent of the urban population did not have a safely managed water supply and eighteen per cent did not have basic sanitation services (Asian Development Bank, 2024) at the time of writing in two thousand twenty two (2022), the highest deficit was in informal and peripheral areas. According to national survey analyses, urban households have almost 100% coverage of flush toilets, however, seven out of ten people rely on informal garbage collection services while the remaining three rely on open dumping or burning. These activities pollute water courses, produce air pollutants and increase the risk of diarrheal disease and respiratory disease. The air pollution in big cities like Lahore often gets extremely polluted as a result of vehicle and industrial emissions, adding to the problems. The flood, both in 2022 and otherwise, has continued to highlight the fragility of drainage and sanitation systems, leading to the disintegration of systems and dispersion of contaminants.

Table 1. Selected Urbanisation and WASH Access Indicators in Pakistan

Indicator	Urban	Rural / National
Urban population share (2023)	~40%	—
Urban growth rate (2017–2023)	3.57%	2.55% national
Improved drinking water	96%	65% rural
Flush toilets	~98%	82% rural
Handwashing with soap	80%	55% rural
Formal garbage collection	Higher share	11% national; 67% urban informal
Safely managed water (urban, ~2022)	57% have access	43% lack access

Sources: Idris (2025); Asian Development Bank (2024); Gallup Pakistan analysis of HIES 2024-25.

Institutional Architecture of Sanitation and Solid Waste Governance

Urban sanitation and solid waste governance is not one with a clear institutional structure in Pakistan, but one that is multiple and chronic and the Eighteenth Amendment did not eradicate. The purpose of the amendment was to shift the responsibilities towards the provinces, and local governments, but the devolution of authority was not clearly accompanied by mandates and the allocation of sufficient resources: the field was flooded with actors, competing for the same space, operating within the same urban spaces, but with overlapping responsibilities and without a clear chain of command. The various actors related to water and sanitation continue to have responsibilities for services that are linked to the network, while the development authorities are responsible for developing land use and municipal corporations, cantonment boards and specialized provincial boards or companies for solid waste intervene in overlapping areas (Asian Development Bank, 2024). This institutional density leads to a paradox: there is no redundancy or resilience in the presence of many, but rather a spreading of responsibility so that failure of services can be difficult to pinpoint to a specific local government. Thus, there is little accountability, not so much because institutions don't exist, but because the structure itself makes it virtually impossible to attribute. The financial aspect is an additional issue. Water, sanitation and hygiene continues to be one of the sectors most reliant on foreign aid, between 68% and 74% in some studies, leading to significant sustainability concerns and a disconnect between the federal policy and the provincial action. Donor dependence is not just about fiscal stability, it also influences incentives and timelines for service delivery, which may not match local priorities, and entrenched project-based approaches that are sustainable beyond funding cycles and political attention. This leads to institutional settings that are characterized by a fragmentation of control, external dependence on resources and a lack of a coherent system to turn national policy into a system of uniform service improvement.

The provincial responses to solid waste demonstrate the unevenness and experimentation of this fragmented architecture, rather than the construction of a coherent national system. In response to the poor performance of the companies, there has been a search for accountability with a desire to experiment with the delivery models, such as the door-to-door collection and digital monitoring programmes introduced in Punjab. Although Sindh set up the Sindh Solid Waste Management Board, the province continues to face jurisdictional disputes with the Karachi Metropolitan Corporation and the lack of divisional boards, highlighting the example of the creation of provincial institutions without solution to the overlapping issues of control over

the city. Other provinces are dependent on water and sanitation services companies or outsourcing models, which are influenced by local political economies and not by a common national model. There is no national solid waste policy, thus, these activities are not coordinated; engineered landfills and waste-to-energy or composting facilities are limited, and even though collection improves, the availability of disposal and treatment facilities is not sufficient. The informal sector is also important in terms of material recovery but is often left out of formal recovery planning, thus limiting efficiency and livelihood security. This exclusion is not a casual one; it represents a preference of an institution to formal and visible providers of services rather than informal providers that are already doing the work essential to the recovery. The institutional aspects limit the ability to consistently improve services through the implementation of policy, as policy is formulated at the national level and the operational conditions which shape services are distributed across provincial experiments, the capacity of municipalities and informal networks that are not part of formal governance.

The result of this analysis is an architecture of governance that is not merely about overcoming fragmentation, but fragmenting as a structure which determines the way sanitation and solid waste services are conceived, financed and delivered. A lack of accountability is caused by the fact that water and sanitation services are fragmented across various agencies (water, sanitation, development, municipal, cantonment and provincial solid waste) and that failures can be blamed on many or none. From around sixty eight percent financing of WASH by donors, there was an external logic that can sometimes conflict with local priorities and result in coordination gaps between federal policy and provincial implementation, and the provincial solid waste experiences of Punjab (Suthra Punjab with its digital monitoring and self-operated services) and Sindh (tensions between jurisdictions and not all the divisional boards are filled) illustrate that variation without coordination leads to a disparity in outcomes. Without a comprehensive national solid waste policy, these provincial initiatives are not connected, and the inadequate development of engineered landfills and waste-to-energy or composting facilities means that even better collection doesn't result in safe disposal or resource recovery. Informal recyclers are very much part of the material recovery process but are not included in the formal planning process, hence limiting efficiency and livelihood security and highlighting a greater institutional hesitation to include existing systems in the solution. Finally, these institutional characteristics limit the ability to translate policies like the National Sanitation Policy into regular and consistent improvements in services, since the architecture is spread out, funding is externalized and implementation is conducted through provincial experiments and informal networks that are neither coordinated nor supported by formal governance. This would call for more than just new policies; it would call for a conscious effort to make explicit mandates, link resources and responsibilities, and integrate informal recovery systems into formal planning activities that are not impossible by design of the current institutional framework.

Table 2. Illustrative Provincial Approaches to Solid Waste Management

Province / Area	Primary Institutional Model	Key Features / Challenges
Punjab	Suthra Punjab programme; waste management companies transitioning in some cities	Door to door collection, digital monitoring, user charges; recent shift to self-operation in major cities
Sindh	Sindh Solid Waste Management Board (SSWMB)	Centralized board; jurisdictional conflicts with KMC; incomplete divisional boards; high daily waste volume in Karachi
Khyber Pakhtunkhwa	Water and Sanitation Services Companies (WSSCs)	Decentralized urban focused companies
Islamabad	Capital Development Authority and multiple regulations	No dedicated national SWM statute; prolonged landfill delays

Sources: Provincial programme documentation; Asian Development Bank assessments; policy analyses of major cities.

City Level Challenges and Implementation Gaps

The examples of Karachi and Lahore highlight two of the country's largest cities experiencing a range of different, but related, governance challenges, all driven by the same underlying structural issues. While Karachi produces 12,000 to 17,000 tonnes of solid waste every day, it has overfilled dumping sites and is plagued by conflicts over responsibility between the provincial and municipal governments, which leads to incomplete waste collection and limited waste revenue. It would be a challenge to any governance mechanism, but the additional layer of jurisdictional dispute makes even the resources and powers available incapable of being used in a coherent manner. In contrast, Lahore has made more progress towards improved collection rates through provincial schemes and is home to refuse-derived fuel and composting facilities, and yet is facing challenges with air pollution, loss of green cover which increases the risk of flooding, and requires continued funding. As a result, this relative success of collections in Lahore does not necessarily translate to environmental or fiscal sustainability, pointing to the fact that better operational performance without systemic planning results in greater vulnerabilities.

Islamabad is also very specific in terms of constraints, as it is a Federally Administered Territory that lacks a specific national Solid Waste statute resulting in long-term delays in landfills development; a situation that does not allow for a clear legislative framework at the national level to be an obstacle to local infrastructure development. Secondary cities and intermediate urban centres face even less capacity and investment, and the governance challenges observed in large cities are compounded in smaller cities with less institutional maturity and fiscal capacity. These town-level trends reinforce the idea that technical capacity and financing alone are not enough without clearly defined institutional roles and enhanced local accountability, which is true not just for urban settlements in the City, but across the sector and at any scale of urban settlement.

The issues of implementation reach far beyond solid waste to water and sanitation, where the problems of aging drainage systems, poor rainwater management and the centralization of untreated fecal wastes near settlements are a cause of flooding and public health issues. These are not necessarily “infrastructure problems”, but rather a collection of problems that stem from deferred maintenance and lack of ownership, along with an approach to policy-making that is

focused on “outputs”, rather than the system. World Bank assessments have found that policy attention to the issue of open defecation without investment in the fecal sludge chain has been less effective in delivering health impacts, highlighting the need for a more comprehensive approach in tackling sanitation issues. These vulnerabilities are exacerbated by climate events, like floods which wipe out an extensive proportion of water systems in provinces that are affected, revealing the fragility of the existing water systems and the speed at which gains made can be lost.

Political economy conditions such as short-term infrastructure priorities that tend to be more favourable for roads than for social and environmental services, also pose a further challenge to long-term sustainability as they determine budget allocation and political interest in a way that systematically disadvantages sanitation and waste management. Karachi's dumping site problem and the jurisdictional issue, Lahore's collection gains and environmental degradation, and the slow pace of action at the landfills in Islamabad, and the limited capacity of secondary cities are not just problems of individual localities, but are part of a broader institutional problem of diffuse responsibility, fragile financing, and weak policy linking. The governances and policy choices that have delayed infrastructure maintenance, attenuated accountability and focused on tangible outcomes have materialized in water and sanitation implementation gaps, including aging drainage, lack of rainwater management, and untreated fecal waste near settlements, which reinforce this reading. Then, climate events compound these vulnerabilities, leading to the loss of a significant portion of water systems across affected provinces and a stark example of how fragile infrastructure can be. So the conclusion isn't just that technical capacity and financing alone will not solve the problems; it's that they are governance problems and will not be solved by technical solutions leaving intact the underlying architecture of fragmented mandates, weak accountability and short-term political priorities.

Pathways for Rethinking

In order to rethink urban sustainability in Pakistan, services need to be expanded, while governance needs to be integrated, where the planning, financing and environmental health goals are aligned. The Asian Development Bank (ADB) assessment recommended that the devolution of responsibilities should be operationalised in a way that eliminates overlaps while enhancing accountability, by clarifying the role of the provincial governments, local authorities, and specialised agencies with regards to their vertical and horizontal responsibilities. A consistent approach towards water, sanitation and solid waste with the adoption of resources and oversight mechanisms by local governments may solve the existing fragmentation. Incorporating in the planning process from the beginning concepts of climate resistance, green space and transport, combined with aspects related to housing, would reduce the negative external costs that are already seen in cities exposed to flooding and pollution.

From the technical and economic point of view, scaling circular economy approaches is huge. Formalizing informal recyclers, increasing composting and material recovery, and implementing waste to energy solutions as appropriate, could help to reduce open dumping, emissions and generate income. User charges related to service levels, as being tested in some provincial programmes, when added to improved contract enforcement and monitoring of performance, can help to enhance financial sustainability. Given rising flood and heat risks, designing infrastructure for resilience to climate change is key, such as enhanced drainage and raised or protected sanitation systems. Last, but not least, specific interventions in slums, when combined with public awareness and community based approaches like the ones that have been shown in the past in Karachi, can expand equal access. Their implementation can be coordinated with increased domestic funding and less dependence on short-term donor projects to transform

urbanisation from an engine of environmental health tension into a catalyst for more sustainable and inclusive development in Pakistan.

Conclusion

Urbanisation in Pakistan offers immense potential for economic dynamism and poses great challenges for providing environmental health and sanitation systems. The spread of various forms of fragmented governance has not been matched with the ability to provide safely managed water, sanitation, and solid waste services, especially in informal settlements, and has increasingly left these vulnerable populations without access to basic services. Inadequate governance arrangements have not been able to keep pace with the spread of fractured governance, leaving informal settlements without access to basic services such as safely managed water, sanitation, and solid waste services. This means that the disease, pollution and climate event risks are increased, with significant economic losses due to environmental damage. While progress is evident in policy frameworks and provincial programmes, the fragmented mandates, financing relationships, and the lack of attention to the management of fecal sludge and circular waste remain at risk of limiting outcomes.

Deliberate reform is required for rethinking urban sustainability, to clarify institutional roles, enhance local accountability and consider environmental health in planning, and scale approaches of 'circularity' and 'climate resilience'. Pakistan can mitigate the health and environmental impacts of urbanization, and improve the quality of life and resilience of its cities by tackling these interrelated aspects. This potential will only be achieved through political will, better coordination between government levels and a greater focus on equitable service delivery, in order to meet national sustainability goals.

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