The Urban Health Paradox: Mitigating Environmental Degradation and Inequity for Sustainable Well-being

Executive Summary

The escalating global trend of urbanization, with the urban population projected to reach 68% by 2050, positions cities as the nexus of both unprecedented opportunity and profound health challenges.[1] This rapid, and often unplanned, urban growth has created a "triple threat" to public health, characterized by a rising burden of noncommunicable diseases (NCDs), the persistent threat of infectious disease outbreaks, and an increased risk of violence and injuries.[1] This crisis is not distributed equitably; it disproportionately impacts the most vulnerable populations, including low-income communities, ethnic minorities, and migrants, and is rooted in deep-seated issues of social and environmental justice.[1]

A central driver of this crisis is the historical and ongoing disconnect between the professions of urban planning and public health.[4] This fragmentation has led to a lack of shared language and the development of policies that often prioritize economic growth and infrastructure over human well-being and environmental health. The consequence is a normalization of unhealthy urban designs and a failure to address systemic inequities, such as those created by policies like redlining, which have left an enduring legacy of environmental degradation and health disparities in communities of color.[2]

The economic costs of inaction are staggering. The estimated global cost of the health impacts of air pollution alone was 8.1 trillion in 2019, accounting for approximately 6% of the global GDP.[8] This figure provides a compelling financial rationale for a strategic shift towards integrated policies. Frameworks such as the

Health in All Policies (HiAP) and the New Urban Agenda [9] offer a blueprint for integrated governance, while a variety of funding streams from regional bodies and national governments can be leveraged to support a more holistic approach.[11] While existing initiatives like the EU's Urban Agenda and the WHO's Urban Health Initiative have made progress, a

persistent gap remains in the absence of standardized methods to quantitatively assign value to the health benefits of nature and green infrastructure.[13] There is also a need for further research on the nuanced impacts of climate change on specific vulnerable subgroups.[14]

1. Defining the Issue: The Urban Environmental Health Crisis

The urban environmental health crisis is a complex, multi-faceted challenge where the interaction of the built, social, and natural environments of a city creates and exacerbates a wide range of adverse health outcomes.[1] It is a confluence of biophysical stressors—such as air, water, and soil pollution, the urban heat island effect, and noise—and socio-structural factors—including social exclusion, lack of access to well-designed public spaces, and sedentary lifestyles.[16] The scale of this issue is immense, given that over 55% of the world's population currently lives in urban areas, a proportion expected to increase to 68% by 2050.[1]

Statistics and Trends

The data highlights a pressing need for action. An estimated 91% of people living in urban areas breathe polluted air, and nearly 40% of urban dwellers lack access to safely managed sanitation services.[1] Poorly designed urban transport systems, characterized by a lack of walking and cycling infrastructure, contribute to road traffic injuries, noise, and air pollution, which in turn lead to higher rates of noncommunicable diseases (NCDs).[1] The negative health impacts extend to mental health, with urbanization linked to elevated rates of depression and anxiety.[1] This phenomenon is especially stark when considering that infectious diseases like tuberculosis, dengue, and COVID-19 thrive in the poor, overcrowded environments created by unplanned urbanization.[1]

Drivers

The drivers of this crisis are both biophysical and psychological. The **Urban Heat Island (UHI) effect** is a significant biophysical contributor, causing cities to experience temperatures

3–5°C higher than surrounding rural areas.[1] This phenomenon is driven by a series of biophysical mechanisms: the absorption and storage of solar energy by man-made materials, reduced convection and evaporation, and the release of anthropogenic heat.[21] The UHI effect intensifies heat stress and exacerbates air pollution episodes.[20] The burning of fossil fuels and industrial waste directly increases outdoor pollutants, while in less developed areas, the use of solid fuels for cooking contributes to dangerous levels of indoor air pollution, with 24-hour PM10 levels reaching up to 3,000 µg/m3, far exceeding the WHO guideline of 50 µg/m3.[19]

Psychological stressors are equally important. The high population density, relentless noise, and air pollution of urban environments are linked to high rates of mental illnesses, including depression and anxiety.[1] Chronic noise exposure, even at low levels, activates the hypothalamic-adrenal-pituitary (HPA) axis, inducing a stress response that can lead to hypertension and heart disease.[23] The absence of public spaces and green areas reduces opportunities for physical activity, social interaction, and community engagement, contributing to sedentary lifestyles and social isolation.[17] Furthermore, the lack of greenery and maintenance in these spaces is a significant source of dissatisfaction for urban residents, diminishing their perceived quality of life and sense of place.[24]

The environmental degradation and social deficits of urban areas are not separate issues but are intrinsically linked in a complex system. For instance, biophysical stressors like air and noise pollution directly harm physical health while simultaneously inducing psychological stress.[1] This stress, combined with social factors like overcrowding and social isolation, further erodes mental health.[1] The resulting poor physical and mental health can diminish an individual's capacity to engage with their environment, which in turn perpetuates a cycle of inactivity and social withdrawal.[19] This feedback loop underscores the need for a holistic approach to urban design and policy. The "triple threat" of NCDs, infectious diseases, and injuries serves as a powerful organizing principle for such a policy framework, providing a comprehensive view of urban health rather than a piecemeal focus on individual issues.[1] Policies addressing one threat often provide co-benefits for the others; for example, creating urban green spaces can mitigate the UHI effect, reduce the burden of NCDs, and provide a venue for social interaction that may reduce interpersonal violence.

Table 1: The Triple Threat of Urban Health Risks
Category of Threat
Noncommunicable Diseases (NCDs)

Infectious Diseases
Injuries & Violence

2. Who is Affected: Systemic Vulnerabilities and Health Inequity

The adverse health impacts of urban environmental degradation are not experienced uniformly across populations; they are a profound matter of social and environmental justice.[1] The consequences are disproportionately borne by socially vulnerable groups, including low-income communities, communities of color, certain immigrant populations, children, the elderly, and those with pre-existing chronic conditions.[1] These populations frequently reside in the most environmentally degraded neighborhoods, characterized by older infrastructure, limited access to resources, and higher exposure to environmental hazards.[2]

Systemic and Cultural Influences

The vulnerability of these populations is not coincidental but is a direct outcome of historical and ongoing systemic and cultural factors. In the United States, the history of urban planning is deeply intertwined with environmental racism, perpetuated through discriminatory policies like redlining.[7] Redlining, a practice banned in 1968, systematically denied housing loans to communities of color, leading to concentrated poverty, a lack of investment in infrastructure, and the clustering of environmental hazards in these areas.[5]

The enduring impact of these policies is evident in the physical landscape and the health outcomes of these communities today. Formerly redlined neighborhoods are now correlated with higher average temperatures and heat-related emergency department visits due to lower tree density and less green space.[5] This historical disinvestment directly contributes to the modern-day urban heat island effect, demonstrating a clear causal chain from past policy to present-day biophysical degradation.[2]

Studies have linked redlined areas to increased exposure to harmful emissions, worse asthma-related outcomes, and a life expectancy that is, on average, 3.6 years lower than in non-redlined communities.[5] These health disparities persist even when controlling for income, education, and other socioeconomic factors, underscoring that the issue is not one of individual behavior but of systemic discrimination.[6] The burden extends to mental health, with individuals from formerly redlined neighborhoods reporting significantly higher rates of anxiety and depression.[6]

The analysis of these systemic factors reveals that health inequities are not random but are "unfair, unjust, and avoidable" and "caused by the decision-making processes, policies, social norms and structures which exist at all levels in society".[29] This reframes the issue from a medical problem to one of governance, where health is viewed as a political and institutional outcome, not merely a function of individual choice. The systematic blockage of opportunities for historically marginalized groups, particularly Black communities, to build wealth through homeownership and access to services, has created a legacy of vulnerability that continues to affect their health and well-being today.[5]

Table 2: The Enduring Legacy of Redlining on Urban Health
Historical Policy/Factor
Redlining & Discriminatory Zoning
Concentration of Poverty & Disinvestment
Systemic Oppression

3. Root Causes: The Foundational Gaps

The urban health crisis is fundamentally a problem of disconnect—a failure of institutional collaboration and a misalignment of priorities. This can be attributed to foundational gaps in professional practices, structural governance, and knowledge.

Practice Gaps

Historically, the professions of urban planning and public health have operated in distinct and often isolated spheres.[4] Urban planners traditionally focused on the physical landscape, aiming to create order and economic prosperity, while public health professionals concentrated on containing contagions and providing sanitary living conditions.[4] This separation was formalized through distinct educational programs and professional associations, creating a lack of shared vocabulary and preventing them from reaching a consensus on what constitutes a "healthy community".[4] While there has been a recent push for reintegration, a gap persists in their fundamental approaches: planners are often trained as visionaries, whereas public health professionals require evidence-based practices and benchmarked data to document progress.[4]

Structural Limits

A fragmented governance structure compounds the issue. Urban health is recognized as a complex, interlinked system.[20] However, cities frequently operate in "silos," with separate, non-communicating departments for urban planning, mobility, parks, environment, and public health.[15] As a result, when urban spaces are redeveloped, health impacts are often only a marginal consideration, with political and economic interests receiving more attention.[15] This fragmented approach is a fundamental structural limit that prevents the application of a holistic, multi-sectoral strategy. Compounding this problem is the systemic underfunding of municipal public health services, a reality that was starkly revealed during the COVID-19

pandemic and leaves cities without the financial resources to fulfill their assigned tasks.[15]

Skills and Knowledge Gaps

A significant knowledge gap exists in the valuation of natural systems. Urban planners and practitioners often lack standardized methods to assign monetary or quantitative values to the co-benefits of green infrastructure and ecosystem services.[13] This absence makes it difficult to justify projects that prioritize human and environmental health over traditional economic development, as the business case for a new park or green roof is less tangible than the revenue from a new commercial development. This explains why economic interests so often take precedence.[13] Furthermore, there is a general lack of robust, localized data collection and monitoring systems, which hinders the ability of cities to assess and track progress.[30] While tools like Health Impact Assessments (HIAs) exist and are effective in measuring the potential effects of a project [4], their widespread adoption is limited, and they require a skilled, interdisciplinary workforce to implement.[15]

The core issue is not a lack of knowledge about what is wrong but a failure of institutional and professional collaboration. The separate educational pathways create a professional and linguistic divide, which manifests in fragmented municipal governance. This institutional "tragedy of the silos" means that departments with complementary goals fail to work together, leading to suboptimal outcomes for the city and its residents. A related problem is that while the economic cost of inaction is well-documented (e.g., the $8.1 trillion global cost of air pollution), the economic benefit of integrated planning and green infrastructure remains under-quantified.[8] This makes it difficult for policymakers to justify the upfront costs of these projects, perpetuating a status quo where political and economic considerations often supersede public health.

Table 3: The Urban Governance and Policy Gap
Area of Concern
Professional Focus
Governing Structure

Resource Allocation
Knowledge & Tools

4. Impact: The Human, Economic, and Social Costs

The decline in urban health due to environmental degradation has wide-ranging and substantial impacts on individuals, organizations, and society as a whole. These are not isolated consequences but are interconnected in a cyclical feedback loop that diminishes human well-being and a city's overall productivity and competitiveness.

Effects on People

The direct effects on human health are severe. Exposure to urban environmental factors is linked to a broad spectrum of health risks, including cardiovascular and pulmonary diseases, cancers, diabetes, reproductive problems, and heat-related strokes.[17] Outdoor air pollution alone is responsible for millions of deaths annually, primarily from NCDs.[17] A growing body of evidence also shows a strong association between exposure to air pollution and mental illnesses, with long-term exposure correlated with depression, anxiety, and a progressive decline in cognitive function, which can increase the risk of dementia in the elderly.[26] Children's developing brains are particularly sensitive to these effects, with exposure to traffic-related air pollution linked to higher rates of generalized anxiety in teenagers.[26] Noise pollution contributes to sleep disturbance, hypertension, and psychological stress, activating the brain's fear and anxiety responses.[23] Unhealthy housing, poor sanitation, overcrowding, and inadequate waste management create environments ripe for infectious disease transmission, including tuberculosis, dengue, and COVID-19.[1]

Effects on Organizations and Policy Goals

The economic costs are monumental and represent a direct feedback loop from the human health impacts. Air pollution actively "chokes economies" by causing widespread sickness, lost workdays, and reduced worker productivity and cognitive performance.[8] For example, in Sofia, Bulgaria, poor air quality was linked to an economic loss of 13.4% of local GDP in 2019 due to reduced labor productivity and absenteeism.[8] The global cost of the health impacts of air pollution was estimated at $8.1 trillion in 2019, underscoring the massive strain placed on healthcare systems.[8]

A further consequence is the "brain drain" of talent. Cities with severe air pollution are increasingly viewed as undesirable places to live and work, leading highly skilled workers to seek out cleaner cities.[32] Research shows that a 10-unit increase in PM2.5 concentration can raise a college graduate's probability to leave a city by 10 percentage points.[33] This loss of human capital and the stifling of social interaction—which is a key driver of new ideas and economic growth—can severely damage a city's long-term competitiveness.[32] The reduced economic output limits a city's tax base and financial resources, thereby restricting its capacity to invest in the very infrastructure and services needed to solve these problems.[15] This creates a self-perpetuating negative cycle, where poor health leads to economic decline, which in turn hinders a city's ability to improve the environment and the health of its citizens.

Table 4: The Economic and Social Costs of Urban Environmental Degradation
Area of Impact
Economic Productivity
Healthcare System
Human Capital & Talent
Quality of Life & Social Fabric

Agriculture & Food Security

5. Policy Context: Strategies and Gaps

A shift in policy and governance is necessary to address the urban health crisis effectively. While frameworks exist to guide this transition, significant gaps in implementation and equity remain.

Relevant Strategies and Initiatives

Effective urban policy recognizes that health is not a standalone issue but is woven into the fabric of urban life. The **New Urban Agenda** [10] and the

Health in All Policies (HiAP) framework [9] provide a blueprint for a cross-sectoral approach. The EU has also launched a new urban initiative as part of its Urban Agenda and European Green Deal, which supports cities with capacity building and innovative solutions.[12]

Green infrastructure is at the forefront of these strategies. Policies promoting the integration of green spaces, parks, and green roofs are seen as a key solution for mitigating the urban heat island effect, improving air and water quality, and enhancing biodiversity.[10] The EPA's 2035 Green Infrastructure Strategic Agenda provides a roadmap to equitably scale up these solutions, emphasizing their role in stormwater management, heat reduction, and restoring healthy watersheds.[35]

Active transportation is another cornerstone. Strategies such as **Complete Streets**, which promote safe and accessible areas for walking, cycling, and public transit, are being implemented to reduce air pollution and traffic injuries while simultaneously encouraging physical activity.[11] The US Department of Transportation, for instance, has programs that fund pedestrian and bicycle projects, recognizing their role in creating vibrant, healthy communities and reducing congestion.[11]

Gaps and Opportunities

Despite the existence of these robust frameworks and initiatives, their implementation remains fragmented. Municipalities often lack the financial resources, technical capacity, and regulatory authority to effectively transform their cities.[15] Furthermore, a critical gap exists in ensuring these policies are equitable. While addressing inequalities is a central tenet of the

New Urban Agenda and other frameworks, many initiatives lack a focus on how policies and interventions affect specific vulnerable subgroups, such as children, LGBTQIA+ people, and First Nations peoples.[14]

A significant challenge arises from the potential for well-intentioned policies to have unintended consequences. The implementation of new green infrastructure, for example, can improve a community's environment but may also drive up property values, leading to gentrification and the displacement of the very residents who would benefit most from the improvements.[7] The EPA's agenda acknowledges this risk, emphasizing that "authentic engagement" and equitable distribution of benefits are crucial to mitigating displacement.[35] This highlights a critical nuance: effective policy must not only propose solutions but also embed safeguards to ensure equitable outcomes, preventing a new form of marginalization. This requires policymakers to be deeply aware of the social and economic context in which their decisions are made and to ensure that solutions do not inadvertently compound existing inequities.

6. Solutions: Proven Models and Capacity-Building

Addressing the urban health paradox requires a combination of proven models, practical tools, and strategic capacity-building approaches.

Proven Models

A growing body of evidence from around the world demonstrates the feasibility and benefits of integrated urban interventions.

- **Green Infrastructure**: The **Atlanta BeltLine** is a compelling case study of large-scale green infrastructure. This project transformed a disused railroad corridor into a multi-use trail connecting 45 neighborhoods, offering space for recreation and community events.[39] In Chicago,

Millennium Park was built on derelict industrial land and features a massive green roof and gardens, which contribute to both community well-being and environmental health.[39] Similarly,
Klyde Warren Park in Dallas, built as a deck over an eight-lane highway, reconnected downtown to the uptown area and helped to transform the surrounding cityscape.[39] In Manchester, UK, initiatives such as floating plant islands and the
Moston Fairway Forest School demonstrate a holistic approach to green and blue infrastructure that improves water quality and engages the community.[40]

- **Active Transportation**: **Bogotá's Ciclovía** is an internationally recognized model of active transportation planning. It started as a grassroots movement and was later formalized into a municipal policy, closing major streets to motorized traffic on Sundays to promote physical activity and public health campaigns.[25] This demonstrates how a bottom-up, community-led initiative can be scaled up to a city-wide policy with significant health benefits.

Practical Tools

- **Health Impact Assessments (HIAs)**: An HIA is a critical tool used to estimate how a planned change in the built environment, such as a new transportation corridor or housing project, will affect a community's health.[4] These assessments are most effective when they are integrated into the earliest stages of the planning process and involve collaboration between health departments and urban planners.[4]
- **Shared Frameworks**: The WHO and UN-Habitat have developed the **Integrating Health in Urban and Territorial Planning Sourcebook**.[9] This resource provides guidance and tools for policymakers and professionals to embed health considerations into planning processes from the outset, moving away from a siloed approach to one that captures the multiple co-benefits of building for health.[9]

Capacity-Building Approaches

- **Multi-Sectoral Collaboration**: Building on the Health in All Policies framework, a key solution is fostering partnerships across disciplines.[9] This involves bringing together professionals from urban planning, public health, academia, and civil society to address complex urban problems collectively.
- **Community-Led Planning**: Empowering local residents to actively participate in shaping their communities' future is essential for creating equitable and sustainable change.[7] This

can be achieved through mechanisms like participatory budgeting, where community members have a direct say in how municipal funds are allocated.[7] Case studies show that bottom-up approaches, such as Ron Finlay's urban gardening initiative in Los Angeles, can lead to broader policy changes, demonstrating that local action can have city-wide impact.[39]

7. Best Practice: International Cases and Lessons

The successful implementation of solutions in various cities around the world offers valuable lessons for policymakers and practitioners. These examples highlight that transformative change is achievable through a combination of strategic planning, community engagement, and cross-sectoral collaboration.

- **Bogotá, Colombia**: The Ciclovía program stands as a powerful testament to the potential of leveraging public space for public health. Its success stems from a clear-sighted strategy to formalize a grassroots movement into an official urban policy.[25] By institutionalizing the closure of streets, the city created a predictable and safe environment for physical activity, social interaction, and the dissemination of public health information. The lesson here is that effective urban health policy can emerge from the needs and actions of citizens and be sustained through formal municipal governance.
- **Manchester, UK**: The Green and Blue Infrastructure initiatives in Manchester illustrate a comprehensive, city-wide approach to creating a "liveable city".[40] The projects, which range from large-scale regeneration efforts to smaller community-based projects like the **Moston Fairway Forest School**, demonstrate that a successful strategy integrates multiple objectives: improving water quality, enhancing biodiversity, and fostering community engagement. This case highlights the importance of a holistic, multi-benefit approach that moves beyond single-purpose projects to create a more resilient and attractive urban environment.
- **U.S. Cities (Atlanta, Chicago, Dallas)**: The success of large-scale green infrastructure projects in these cities proves that repurposing existing infrastructure is a viable and transformative strategy. The Atlanta BeltLine's conversion of a disused railroad and Klyde Warren Park's construction over a highway demonstrate how legacy infrastructure can be reimagined for public good.[39] These projects not only provide new green spaces and recreational opportunities but also reconnect fragmented neighborhoods, fostering community cohesion and economic vitality. The lesson is that creative, imaginative planning can turn a city's historical liabilities into its greatest assets.

These examples collectively demonstrate that best practice is not about a single solution but about an integrated, context-specific approach. It involves a commitment to multi-sectoral

collaboration, a willingness to formalize grassroots efforts, and a recognition that the repurposing and redesign of existing urban landscapes can yield significant and lasting benefits for human and environmental health.

8. Measurement: Indicators and Evaluation Methods

Effective policy and practice require a robust system for measurement and evaluation. This involves not only tracking a wide range of indicators but also employing a variety of methods to capture a complete picture of urban health.

Key Indicators

Measurement of urban health requires a multi-domain approach that goes beyond traditional public health metrics. Key indicators include:

- **Environmental Indicators**: Urban air quality, specifically in terms of fine particulate matter (PM2.5) and nitrogen dioxide (NO2) levels relative to WHO guidelines.[43] Other metrics include noise levels, green space density, access to clean water and sanitation, and waste management efficacy.[43]
- **Health Outcome Indicators**: The prevalence of noncommunicable diseases, mental health issues, infectious diseases, and road traffic injuries. Metrics such as life expectancy and healthy life expectancy are crucial for assessing progress on health equity.[1]
- **Social Indicators**: Walkability, social cohesion, perceived safety, access to services, and community engagement.[16]
- **Economic Indicators**: Productivity, healthcare costs, and the economic value of ecosystem services.[8]

Evaluation Methods

A comprehensive evaluation strategy employs both quantitative and qualitative methods.

- **Impact Assessments**: Tools like **Health Impact Assessments (HIA)** and **Environmental Impact Assessments (EIA)** are ex-ante instruments used to assess the

potential health and environmental effects of a project or policy before it is implemented.[31]

- **Data and Technology**: The use of Geographic Information Systems (GIS), satellite imagery (e.g., **Normalized Difference Vegetation Index** or NDVI), and GPS tracking allows for the quantification of environmental exposures and the evaluation of intervention impacts at a granular level.[45]
- **Qualitative and Participatory Methods**: In addition to objective data, qualitative methods such as stakeholder workshops, intercept surveys, and community consultations are essential for capturing residents' perceptions of well-being, safety, and community attachment.[31] These methods provide a critical understanding of the social and emotional costs and benefits of urban change, which quantitative data alone cannot capture.[24]

Effective evaluation requires integrating both objective and subjective data. For example, an objective metric like NDVI can measure an increase in green space.[45] However, if residents do not feel safe using that space, a subjective measure of "perceived insecurity" will not show a corresponding improvement in health outcomes or satisfaction.[16] A truly successful intervention must improve both the biophysical environment and the human experience within it. This dual approach paints a more complete picture, ensuring that interventions are not only physically sound but also socially and psychologically beneficial.

Table 5: Urban Health Indicators and Metrics
Domain
Environmental
Health
Social

Economic

9. Recommendations and Research Agenda

Based on this comprehensive analysis, a strategic and coordinated effort is required to transform urban environments and promote public well-being. Recommendations are outlined for key stakeholders: practitioners, policymakers, and researchers.

For Practitioners (Urban Planners and Public Health Professionals)

- **Adopt a Shared Language and Mandate Cross-Disciplinary Training**: Actively bridge the historical divide by creating a common vocabulary and integrated training programs. This includes adjusting academic curricula and providing continuous professional development that fosters a mutual understanding of each other's strengths and goals.[4]
- **Integrate Health Impact Assessments (HIAs) into All Major Projects**: Make HIAs a mandatory component of all urban development, transport, and land-use planning from the earliest stages. This provides a formal mechanism to ensure health impacts are considered alongside economic and environmental factors, facilitating collaboration between health departments and planners.[4]
- **Prioritize Authentic Community Engagement**: Shift from a model of simple consultation to one of co-production, where community members are empowered to participate in all stages of planning and implementation.[7] The goal is to tap into local knowledge and build trust, ensuring that interventions are tailored to the specific needs and desires of a community.[42]

For Policymakers

- **Implement a Health in All Policies (HiAP) Framework**: Legislate a framework that requires all government sectors—including transportation, housing, and environment—to formally consider and report on the health impacts of their policies.[9] This structural change can dismantle the "silo" mentality and foster a more integrated approach to governance.
- **Increase Municipal Authority and Dedicated Funding**: Ensure that federal and state legislation provides the necessary authority and dedicated funding streams for local governments to invest in healthy urban infrastructure.[15] This includes upgrading aging water and sanitation systems and increasing investments in green and active transportation infrastructure.[48]
- **Incentivize Equitable Development**: Create policy tools and funding mechanisms that prioritize projects in historically disadvantaged and underinvested communities. It is critical to include robust safeguards against gentrification and displacement to ensure that the benefits of environmental improvements are distributed equitably and do not further marginalize vulnerable populations.[35]

For Researchers

- **Develop Standardized Methods for Valuing Ecosystem Services**: A critical research gap exists in the quantitative and qualitative valuation of the health and economic benefits of green infrastructure.[13] Developing standardized tools to make the business case for nature-based solutions is essential to inform and prioritize future investment.
- **Conduct Subgroup-Specific Research**: A deeper understanding is needed of how environmental and social changes affect specific vulnerable populations, including women, children and adolescents, older persons, and LGBTQIA+ people.[14] Future research should investigate the relationship between physical and social urban environmental changes and health outcomes for these particular subgroups.[14]
- **Systematically Study Intervention Efficacy**: More evidence is required to understand the long-term health, social, and economic impacts of integrated urban planning interventions.[14] Future research should focus on a variety of small-scale interventions to promote variation and identify the most effective and adaptable solutions for complex urban systems.

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