Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

Funding Water and Sanitation Initiatives to Foster Economic Growth and Sustainable Development: A Case Study of Lagos State

Oluwadare Joshua OYEBODE
Lecturer, Civil and Environmental Engineering Department,
Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria
oyebodedare@yahoo.com

ABSTRACT

Sufficient funding, effective sanitation strategies, and the deployment of relevant technologies are essential for fostering economic growth, protecting public health, and promoting sustainable development. This study explores the crucial financing mechanisms needed to achieve sustainable water and sanitation goals, considering the diverse community needs, infrastructure complexities, and environmental responsibilities. It examines the challenges and opportunities in financing water and sanitation initiatives, emphasizing the importance of increased investments, improved governance, and innovative financing models. Additionally, it discusses the potential benefits of investing in water and sanitation infrastructure, including economic growth, environmental preservation, and public health improvements. By synthesizing current knowledge and providing insights into best practices, this study contributes significantly to the discourse on financing water and sanitation for sustainable development. It concludes that achieving prosperity in Lagos State depends on adequate financing for water projects, robust sanitation policies, improved wastewater management, and a commitment to economic growth and sustainability. Therefore, stakeholders in the water sector must collaborate on strategies to finance access to clean water and sanitation services to advance sustainable development goals.

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

Keywords: *Financing, Lagos State, Sustainable development. Sanitation policies, Improved wastewater management systems*

1. INTRODUCTION

Access to clean water and sanitation services is imperative for sustainable development, yet it remains a considerable challenge for numerous communities globally. Water and sanitation are essential for maintaining public health, fostering economic growth, and ensuring environmental sustainability .Access to clean water and sanitation prevents disease, boosts productivity, and protects ecosystems. Investing in these services is essential for long-term benefits. Clean water is indispensable for drinking, cooking, hygiene, and sanitation, while adequate sanitation facilities curb the spread of diseases and bolster public health. Safe drinking water, sanitation, and hygiene (WASH) are crucial for elevating the standard of living by promoting health, protecting the environment, enhancing educational outcomes, and fostering convenience, dignity, and gender equality. Underprivileged and marginalized populations face significant barriers to accessing improved WASH services and often exhibit poorer associated behaviors. These disparities highlight the necessity for targeted interventions to guarantee equitable access to WASH facilities, significantly influencing public health and social equity. Tackling these challenges is crucial for achieving broader development objectives and enhancing the quality of life for everyone. Enhanced WASH services are pivotal in alleviating poverty, fostering equality, and bolstering socioeconomic development. As a result, drinking water and sanitation were designated as key targets in the Millennium Development Goals (MDGs). Looking ahead, the Sustainable Development Goals (SDGs) for the post-2015 era aim to achieve universal access to water, sanitation, and hygiene (WASH) by 2030[1-5].

Additionally, in 2010, the United Nations (UN) passed a resolution endorsing the Human Right to Safe Drinking Water and Sanitation (HRTWS). This resolution advocates for drinking water and sanitation services that are safe, affordable, acceptable, available, and accessible for all individuals.

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

. Additionally, access to water and sanitation services intricately intertwines with other development outcomes, including education, gender equality, and economic growth. Communities equipped with reliable water and sanitation infrastructure are better positioned to break the poverty cycle and elevate overall well-being. However, financing the establishment and upkeep of water and sanitation infrastructure presents myriad challenges. The expenses linked with constructing and maintaining water supply systems, wastewater treatment plants, and sanitation facilities are often substantial, especially in low-income and marginalized communities where the demand is most pressing. Scarce financial resources, insufficient institutional capabilities, and competing development priorities further complicate endeavors to secure sustainable financing for water and sanitation projects[6].

Addressing these challenges necessitates innovative financing mechanisms and collaborative strategies that harness public and private sector resources, international aid, and community engagement. Public-private partnerships (PPPs) have emerged as a promising model for mobilizing private sector expertise and investment capital while ensuring public oversight and accountability. International aid and development assistance play a pivotal role in bolstering infrastructure projects in low-income countries and regions grappling with humanitarian crises or environmental adversities. Moreover, community-led initiatives empower local stakeholders to assume ownership of water and sanitation projects, nurturing sustainability and resilience at the grassroots level. By involving communities in the planning, execution, and management of infrastructure projects, these initiatives foster social inclusivity, reinforce accountability, and cultivate trust between citizens and governing bodies'[7].

In addition to conventional financing mechanisms, innovative financial instruments like impact investing, green bonds, and performance-based financing present novel avenues to attract capital for water and sanitation projects, concurrently aligning financial returns with social and environmental objectives. These instruments incentivize private sector investment in sustainable infrastructure projects, propelling innovation and efficiency in the provision of water and sanitation services. Furthermore, governmental policies, regulatory frameworks, and institutional capacities assume a pivotal role in establishing an enabling environment for the sustainable financing of water and sanitation projects. Clear regulatory directives, transparent procurement processes, and effective governance structures are indispensable for enticing investment,

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

mitigating risks, and ensuring the enduring viability of infrastructure investments.**2.0[8]**

LITERATURE REVIEW

Access to clean water and sanitation is crucial for ensuring public health, fostering economic development, and achieving environmental sustainability.Despite increased attention to the global water and sanitation crisis, significant challenges persist, particularly in marginalized communities. Financing water and sanitation infrastructure is crucial to achieving universal access and ensuring the sustainability of these vital services[9].

Public-Private Partnerships (PPPs) have become prominent in financing water and sanitation projects, especially where public resources are limited. While PPPs offer benefits such as leveraging private sector expertise and financing, concerns about affordability, accountability, and equity highlight the need for robust regulatory frameworks and stakeholder engagement[10].

International aid and development assistance are vital for financing water and sanitation projects, particularly in low-income countries experiencing crises. However, concerns about aid dependency and sustainability underscore the importance of transparency, accountability, and local ownership in aid-supported projects[11].

Community-based initiatives show promise in financing and managing water and sanitation projects, particularly in underserved areas. Community involvement, local governance, and social capital are critical for mobilizing resources and ensuring project sustainability. However, challenges such as resource constraints and social exclusion require careful attention[12].

Innovative financial instruments like impact investing and green bonds offer new opportunities for financing water and sanitation projects while aligning with social and environmental goals. Despite their potential, challenges such as market fragmentation and risk perception hinder their widespread adoption, necessitating supportive regulatory frameworks[13].

Government policies and institutional capacities are vital for creating an enabling environment for sustainable financing of water and sanitation projects. Clear policy objectives, regulatory guidelines, and effective governance structures are essential for attracting investment and ensuring project viability. However, governance challenges

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

such as corruption and regulatory capture pose significant barriers to effective implementation, highlighting the need for governance reforms[14].

In conclusion, investments in water security are crucial for achieving the Sustainable Development Goals (SDGs) and addressing global challenges like climate change. Challenges in water supply for megacities like Lagos emphasize the importance of public health and sustainable infrastructure development. However, the contributions of infrastructure to growth and development in Nigeria need improvement, underscoring the significance of good governance and environmental sustainability[15].

3.0 METHODOLOGY

By synthesizing insights from theoretical frameworks, empirical studies, and practical experiences, literature were reviewed to inform policymakers, practitioners, and stakeholders involved in water and sanitation projects worldwide, facilitating evidence-based decision-making and transformative change towards achieving universal access and sustainable management of water and sanitation resources[16].

3.1 WATER SECTOR AND LAGOS STATE EXPERIENCE

Lagos, the largest city in Africa, experienced a doubling of its population over the past 15 years to reach 20.19 million in 2012.
Lagos, functioning as both a city and a state, is Nigeria's main commercial center, hosting over 70% of the nation's industries and economic activities. *Its annual growth rate of 5% positions Lagos as the third largest mega-city globally, following Tokyo and Mumbai. With such rapid expansion, the demand for essential services like water is escalating swiftly.* Geographically, Lagos includes Lagos Island, the original city, the Mainland with its rapidly expanding settlements, and other islands such as Ikoyi, Eko Atlantic, Iddo, and Victoria Island, all connected by various bridges. *The state covers approximately 1,341 square miles (3,400 km2), half of which is water. The metropolitan area of Lagos spans 385.9 square miles (999.6 km2), with water bodies including wetlands constituting over 22% of its total landmass.* Despite occupying only a third of the state's land area, the metropolitan area is home to over 87% of Lagos' population.. *Despite its coastal location, providing potable water in Lagos is challenging due to the unsuitability of the surrounding lagoon and ocean waters for human consumption.*

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

3.2 The Present and Future Water Supply Issues

The rapid population growth in Lagos and the expansion of slums have challenged the government's ability to deliver essential services. Historically, the Lagos State Water Corporation was responsible for managing water supply. However, since the 1980s, the situation has worsened due to rapid population growth, inadequate planning, limited funding, deteriorating infrastructure, climate change, and corruption. Currently, the Lagos State Water Corporation faces a demand gap of 330 million gallons per day (MGD).

Development of Water Protection Plans and Initiatives

Most of Lagos's water supply comes from freshwater bodies that are vulnerable to pollution from agricultural runoff, illegal dumping, and human waste. Yet, the Lagos government lacks plans to protect its water resources. Protecting these sources necessitates collaboration among major water agencies, basin authorities, private suppliers, and the public.

Other Efforts of Lagos State Water Agencies for Water Supply and Quality

The Lagos State Regulatory Commission (LWRC) ensures fair returns for water service providers and resolves disputes. The Lagos State Drug Quality Assurance Laboratory (LSDQAL) monitors the quality of pipe-borne water.. The Lagos State Environmental Protection Agency (LASEPA) monitors water bodies and recommends pollution control measures. The Lagos State Water Corporation (LWC) provides potable water, prioritizing production increase and access improvement. The Lagos State Waste Management Office (LSWMO) oversees wastewater management, researches environmentally friendly technologies, and provides consultancy services fig 1-

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

5.

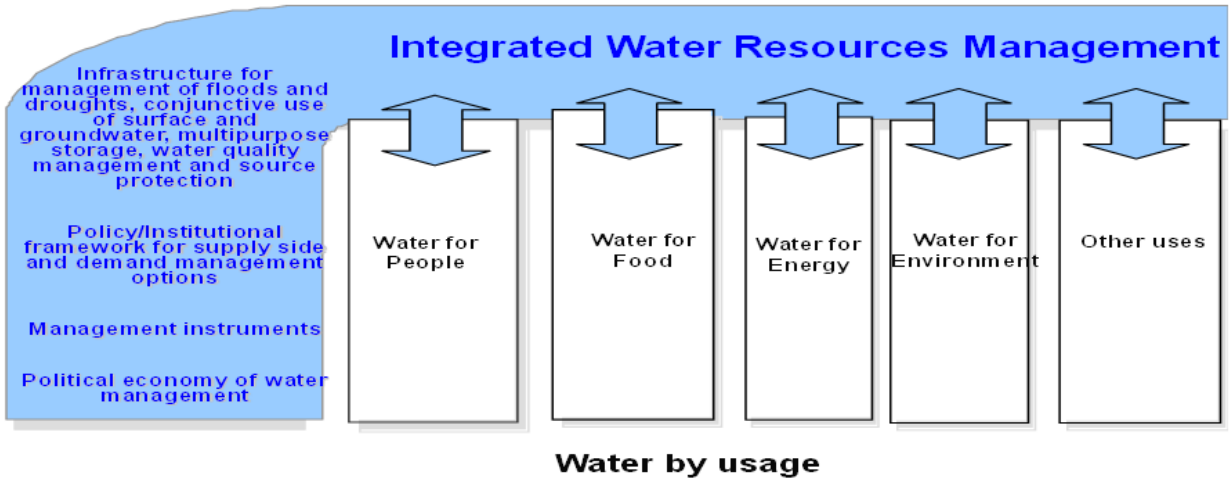


Figure 1: Conceptual Framework for Integrated Water Resources Management (adapted from the Global Water Partnership)

Figure 2: Typical Water Treatment Plant

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

Figure 3: Current Areas of focus for Water Resources Management

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

Figure 4: Sustainable Development Goals with special Focus on Water Resources

Figure 5: Major aspects of Water Governance

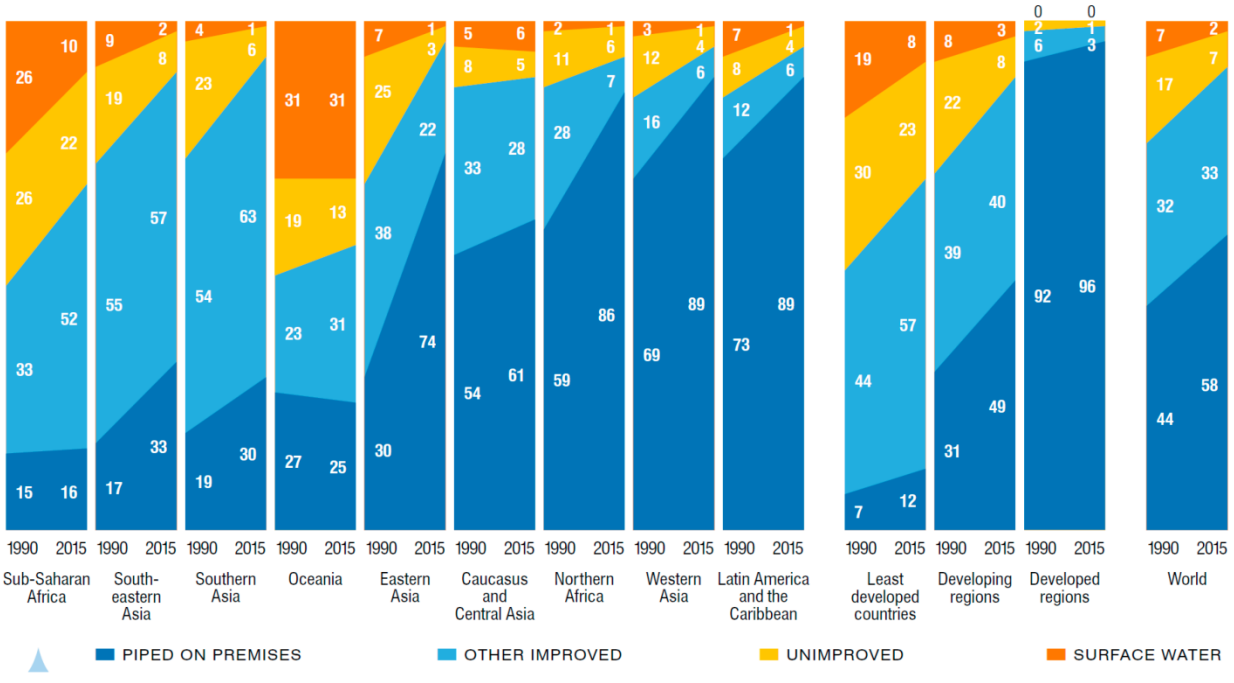
4.0 RESULTS AND DISCUSSION

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

The global percentage of individuals using improved sources of drinking water increased from 76% in 1990 to 91% in 2015, marking significant progress towards achieving the Millennium Development Goals (MDGs). Figure 6 illustrates regional progress breakdowns from 1990 to 2015.

While the Millennium Development Goal (MDG) target of halving the number of people without access to safe drinking water was met by 2010, regional disparities and inequities endure, particularly evident in the discrepancies between urban and rural populations.. While 2.6 billion more people have gained access to improved water sources since 1990, as of 2015, 663 million individuals still rely on unimproved water sources, down from 1.3 billion in 1990. Furthermore, 4% of urban residents and 16% of rural residents lack access to healthcare.

In Sub-Saharan Africa, 44% of rural residents continue to use outdated water sources, resulting in significant challenges, particularly for African women. They lose billions of hours of productivity annually due to water transportation dutiesAs an illustration, in 2008, over 25% of individuals in multiple Sub-Saharan African nations spent more than 30 minutes on a round trip for water collection.Notably, women (64%) and girls (8%) bear the brunt of this burden, compared to men (24%) and boys (4%), illustrating the gendered impact of water scarcity and access issues.



Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

Figure 6: Drinking-water coverage trends by developing regions and the world, using the JMP improved water definition, 1990–2015. Reproduced with permission from the World Health Organization and UNICEF
In urban regions, the use of piped water supplies often signifies better water service.

By extrapolating findings globally, the authors projected that in 2010, 1.8 billion people (28%) utilized contaminated water, more than twice the 783 million people (11%) who used an unimproved water source.

4.1 Sanitation Coverage

Although the global MDG target for improved sanitation has seen some progress, increasing from 54% in 1990 to 68% in 2015, it fell short by 9%.

In 2015, the number of people lacking access to improved sanitation facilities remained at 2.4 billion, the same as in 1990, due to population growth. However, since 1990, 2.1 billion people have gained access to improved sanitation. Regional statistics in Figure 7 show the progress made from 1990 to 2015.

Globally, the percentage of people practicing open defecation decreased from 24% in 1990 to 13% in 2015. However, disparities exist, with 23% of people in Sub-Saharan Africa and 34% in South Asia still practicing open defecation. Additionally, 9% of the global population, or 638 million people, share a sanitation facility with another family or multiple families. Access to improved sanitation differs between urban and rural areas, with 82% of urban residents compared to 51% of rural residents having accessA study conducted in 12 cities across low- and middle-income countries found that while 98% of households used toilets, only 29% of the fecal waste was managed safely.

This suggests that rates of "improved" sanitation may not accurately reflect the extent of safely isolated, transported, or treated fecal waste.

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

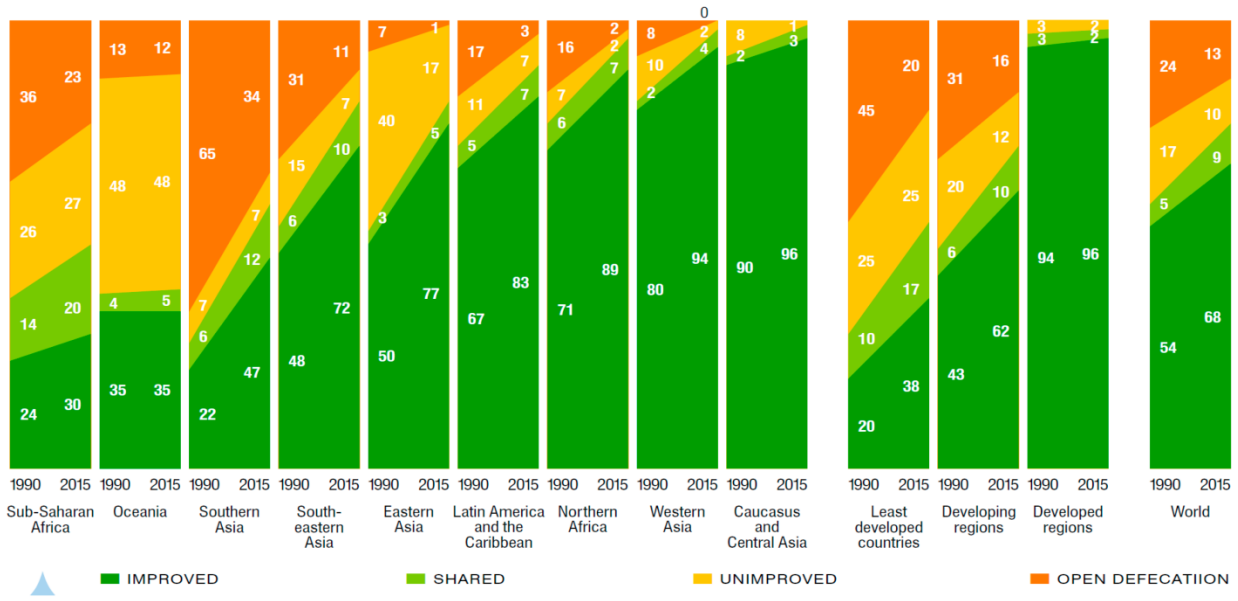


Figure 7. Sanitation coverage trends by developing regions and the world, using the JMP improved sanitation definition, 1990–2015. Reproduced with permission from World Health Organization and UNICEF

the Sustainable Development Goals (SDGs) aims to monitor handwashing facilities' availability with soap and water, a metric increasingly captured through nationally representative surveys. While MDG Target 7C lacked a global indicator for hygiene, research indicates that 19% of individuals worldwide wash their hands with soap after contact with excreta, with lower rates observed in Southeast Asia (17%) and Sub-Saharan Africa (14%). However, self-reported handwashing or the mere presence of handwashing stations, often used as proxy indicators for hand hygiene, may overestimate actual behaviors.

Global reporting on institutional Water, Sanitation, and Hygiene (WASH) lacks standardization, but efforts are underway to establish a comprehensive reporting system for schools and health facilities to monitor SDG progress. Various UN agencies collect data on WASH in schools (UNICEF), health facilities (WHO), and refugee camps (UNHCR).

The environmental consequences of poor WASH practices encompass excessive water extraction and pollution resulting from mismanaged human excreta.Increased water demand due to

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

socioeconomic growth and climate change could expose up to 5 billion people to moderate water stress by 2050. Groundwater over-extraction, exacerbated by agricultural subsidies, contributes to water scarcity. Moreover, poorly managed human excreta pollute settlements, groundwater, and surface water bodies, leading to ecosystem degradation and economic losses in sectors like fisheries and tourism.

Financial and economic studies translate health, social, and environmental impacts of inadequate WASH into monetary metrics, aiding policymakers and stakeholders in understanding the consequences and informing cost-benefit analyses. However, estimates vary widely, with the cost of poor sanitation exceeding 2% of GDP in East Asia and Sub-Saharan Africa and over 4% in South Asia. Despite highlighting the issue's scale, these estimates do not provide clear guidance on cost-effective solutions..

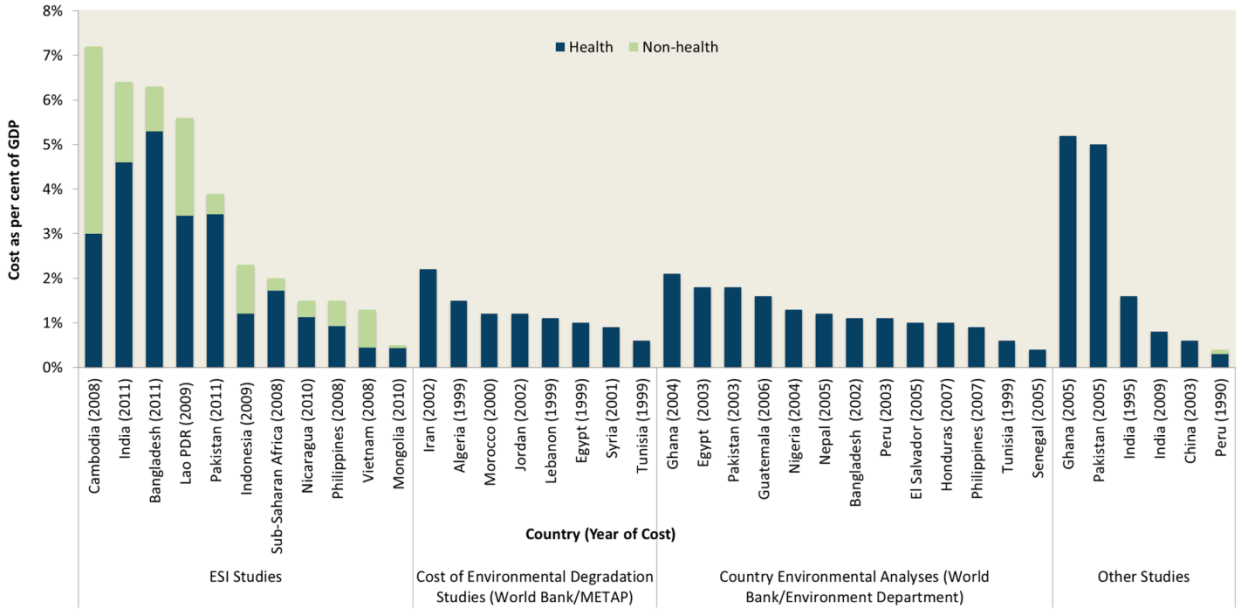


Figure 8. Economic costs of poor water and sanitation in selected countries, as a percent of gross domestic product, disaggregated by health and non-health damages.

5.0 CONCLUSION

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

Ensuring adequate financing for water and sanitation initiatives is essential for achieving sustainable development goals. Transparency, accountability, and fairness in fund allocation are critical aspects that need to be emphasized. Proper management of water resources is indispensable for national development, as water is integral to various economic and societal development indicators.

Access to clean water and proper sanitation is crucial for enhancing public health and hygiene. Additionally, it drives economic development, supports environmental sustainability, and fosters social equality. Mobilizing sufficient funding, both domestically and internationally, is imperative to address the existing gaps in water and sanitation infrastructure globally. Collaborative efforts involving governments, private sectors, NGOs, and international organizations are vital to establish sustainable financing mechanisms to tackle this urgent global challenge.

By prioritizing investments in water and sanitation, we can pave the way for a healthier, more prosperous, and sustainable future for all. Learning from and engaging with the initiatives and strategic actions of Lagos State can provide valuable insights for other states in addressing water-related issues.

Greater investments from both public and private sectors are vital to meet the increasing demand for water, influenced by factors such as population growth, urbanization, and climate change.

Governments are essential in regulating and developing infrastructure for water and sanitation services. However, shortcomings in funding allocation and policy implementation impede progress in many areas. Achieving Sustainable Development Goal 6, which centers on ensuring clean water and sanitation for all, requires a multifaceted approach involving enhanced sector-wide investment, promotion of innovation, and adoption of integrated water management strategies.

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

The interlinkage between water, sanitation, and sustainable development underscores their impact on health, poverty reduction, food security, and environmental sustainability. Collaboration among stakeholders, capacity-building, and a holistic approach to water management are essential to overcome challenges posed by water scarcity, pollution, and inadequate access to water and sanitation facilities.

The Lagos State Water Corporation acknowledges the necessity for additional resources, which may require support beyond what the state government alone can provide. Consequently, exploring alternative revenue streams, including partnerships with the private sector, is under consideration. However, challenges like flawed pricing systems, low metering rates, and poor service delivery hinder revenue generation. Ultimately, the availability of funds will determine whether the Lagos State Water Corporation can achieve its goal of meeting the demand gap.

In conclusion, achieving universal and equitable access to safe water and sanitation by 2030 requires concerted efforts involving increased investments, innovative solutions, and cross-sectoral cooperation. Understanding the condition of rivers, streams, and their relation to groundwater is crucial for effective mitigation of threats to water development. Strengthening environmental regulations and stepping up enforcement, along with education and awareness campaigns, are essential steps in protecting water resources.

Recommendations for addressing the challenges and accelerating progress toward universal access to safe water and sanitation include increasing public and private investments, improving policy implementation and governance, promoting innovation and technology adoption, strengthening capacity-building and education, fostering cross-sectoral collaboration, monitoring and evaluating progress, ensuring equity and inclusion, adapting to climate change, and raising awareness and advocating for water and sanitation issues.

REFERENCES

1. Acey C. The challenge to delivery of public goods in rapidly expanding cities in Africa: financing and implementing water and sanitation policies in Lagos, Nigeria. In: A paper prepared for the 4th European Conference on African Studies; 2011.
2. Adewole AT. Waste management towards sustainable development in Nigeria: A case study of Lagos state. International NGO Journal. 2009;4(4):173-179.
3. Aina TA, Etta FE, Obi CI. The search for sustainable urban development in Metropolitan Lagos, Nigeria: Prospects and problems. Third World Planning Review. 1994;16(2):201.

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

4. Akiyode OO. Urbanization Trend and Water Insecurity in Developing Economy Mega-city. A Case Study of Lagos, Nigeria. Journal for Sustainable Development in Africa. 2011;13(3):194-212.

5. Alaerts GJ. Financing for water—water for financing: a global review of policy and practice. Sustainability. 2019;11(3):821.

6. Daramola O, Olawuni P. Assessing the water supply and sanitation sector for post-2015 development agenda: a focus on Lagos Metropolis, Nigeria. Environment, development and sustainability. 2019;21:1127-1138.

7. Herrera V. Reconciling global aspirations and local realities: Challenges facing the Sustainable Development Goals for water and sanitation. World Development. 2019;118:106-117.

8. Lagoarde-Segot T. Financing the sustainable development goals. Sustainability. 2020;12(7):2775.

9. O'Riordan J, Boyle R, O'Leary F, Shannon L. Using the OECD water governance indicator framework to review the implementation of the river basin management plan for Ireland 2018–2021. Environmental Protection Agency: Wexford, Ireland; 2021.

10. Olaniyi TK, Nwankwo N, Idahose UE. Assessment of health, safety and environmental implications for water quality management in the Global South: a case study of Lagos, Federal Republic of Nigeria. International Journal of e-Healthcare Information Systems. 2023;9(1):239-249.

11. Oyebode OJ. Solid waste management for sustainable development and public health: A case study of Lagos State in Nigeria. Universal journal of public health. 2013.

12. Oyebode OJ. Strategy for tackling flood and water scarcity for adequate water supply and public health in Nigeria. European Journal of Advances in Engineering and Technology. 2018;5(8):656-664.

13. Oyebode OJ, Omoya OO. Treatment optimization and performance evaluation of water supply schemes: a case study on Akure and Environs. International journal of environmental science and technology. 2019;16(11):6873-6884.

14. Oyefara JL. Good governance and environmental sustainability in Lagos state, Nigeria: Can the state achieve goal seven of millennium development goals (MDGS)?

15. Oyegoke SO, Adeyemi AO, Sojobi AO. The challenges of water supply for a megacity: a case study of Lagos Metropolis. International Journal of Scientific & Engineering Research. 2012;3(2):1-10.

Journal of Water Resource Engineering and Management
Research paper
Vol 11, issue 1,2024
Receiving date:22-4-2024
Acceptance- 17-05-2024
Publication -20-05-2024

16. World Health Organization, United Nations Children's Fund. Progress on household drinking water, sanitation and hygiene 2000-2020: five years into the SDGs. World Health Organization; 2021.