

Sustainable Public Health Financing dalam Perspektif Green Economy

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Abstract: Sustainable public health financing has become an increasingly important issue in the context of global health system resilience and sustainable development. Many countries continue to face chronic underinvestment in primary health care and increasing financial pressures due to demographic changes, environmental risks, and emerging health crises. At the same time, the concept of the green economy has gained attention as an integrated framework that connects economic development, environmental sustainability, and social well-being. This study aims to analyze sustainable public health financing from a green economy perspective by examining how green financial instruments and sustainability-oriented policies can support resilient health systems. The study employed a qualitative approach using a systematic literature review of peer-reviewed articles published between 2020 and 2025 related to public health financing, green finance, and sustainable development. The findings indicate that integrating green finance instruments, such as green bonds, climate funds, and environmental taxation, can contribute to improving environmental quality, strengthening health infrastructure, and supporting long-term public health outcomes. However, the implementation of green finance in health systems remains constrained by regulatory limitations, institutional capacity gaps, and fragmented financing structures. Therefore, integrating green economy principles into public health financing frameworks can provide strategic pathways for developing resilient, equitable, and environmentally sustainable health systems.

Keywords : Green Economy, Green Finance, Public Health Financing, Sustainable Development, Health System Resilience

INTRODUCTION

The sustainability of public health systems has become an increasingly critical concern in many countries due to rising healthcare costs, demographic changes, and the growing burden of disease. Governments are required to ensure that health systems remain accessible, equitable, and resilient while managing limited fiscal resources. However, many countries continue to experience chronic underinvestment in public health services, particularly in primary health care (PHC), which serves as the foundation of universal health coverage (UHC). Insufficient public funding for PHC has resulted in unreliable health services, uneven quality of care, and heavy reliance on out-of-pocket payments by households. Such financing patterns are considered unsustainable because they expose vulnerable populations to financial hardship and limit the capacity of health systems to provide preventive and community-based care. Consequently, strengthening sustainable public health financing has become a central issue in global health policy discussions (Hanson et al., 2022).

The challenge of inadequate and unstable health financing became particularly evident during the COVID-19 pandemic. The pandemic exposed significant weaknesses in the financial resilience of health systems across the world, including insufficient funding for emergency preparedness, limited flexibility in public financial management, and inadequate investment in essential health services. Many countries struggled to mobilize rapid financial resources to respond to the crisis, highlighting the need for more flexible and resilient health financing mechanisms. The experience of the pandemic demonstrates that sustainable health financing must not only ensure adequate funding for routine health services but also provide sufficient flexibility to support emergency response, protect vulnerable populations, and maintain essential services during public health crises. Therefore, building resilient health systems requires financing strategies that are stable, adaptable, and capable of supporting long-term public health objectives (Kwon & Kim, 2021).

In response to these challenges, international health policy frameworks increasingly emphasize the importance of strengthening financing mechanisms for primary health care. The Lancet Commission on PHC financing argues that achieving universal health coverage requires not only increased health expenditure but also improvements in the efficiency and equity of resource allocation. Effective health financing systems should rely on strong public funding sources, risk pooling mechanisms, and allocation models that prioritize population health needs rather than service volume. Furthermore, payment mechanisms such as capitation and performance-based incentives can encourage health providers to focus on preventive care and community health outcomes. Such reforms aim to shift health systems toward population-oriented care models that prioritize long-term health improvement rather than short-term clinical interventions (Kadarpeta et al., 2024).

Another important dimension of sustainable health financing relates to transparency and accountability in the management of health resources. Effective financial governance requires reliable health expenditure data, standardized reporting systems, and robust monitoring frameworks that allow policymakers to evaluate how resources are allocated and used. Modern health financial information systems enable governments to track expenditures, assess efficiency, and identify gaps in resource allocation. Without accurate and transparent financial data, it becomes difficult to design effective financing policies or evaluate the impact of health investments on population health outcomes. Strengthening financial governance is therefore essential for ensuring that health financing systems are both sustainable and accountable (Orr et al., 2023).

Alongside these financial governance challenges, there is growing recognition that sustainable health systems must also address environmental sustainability. The concept of the green economy has emerged as an important framework for integrating economic development, environmental protection, and social well-being. A green economy promotes economic activities that reduce environmental risks and ecological scarcity while improving human well-being and social equity. In recent years, this concept has expanded beyond environmental sectors to include public policy areas such as energy, transportation, agriculture, and healthcare. Within the health sector, adopting green economy principles can contribute to healthier living environments, reduced environmental health risks, and more sustainable health infrastructure. Thus, integrating green economy principles into health policy offers opportunities to address both environmental and public health challenges simultaneously (Souad, 2023).

Green economy policies are increasingly linked with financial strategies aimed at supporting sustainable development. One example is the emergence of green finance policies that encourage investments in environmentally sustainable industries, infrastructure, and technologies. These policies include financial instruments such as green bonds, environmental taxes, and sustainability-linked investment funds. Research suggests that green finance initiatives can have significant positive impacts on public health by promoting environmentally responsible industries, improving environmental quality, and

supporting the development of sustainable health infrastructure. For example, investments in renewable energy, pollution reduction, and sustainable urban development can reduce environmental health risks such as air pollution and water contamination. By improving environmental conditions, green finance policies indirectly contribute to better health outcomes for populations (Feng & Zhou, 2024).

Empirical studies also demonstrate the potential benefits of green finance in improving public health indicators. Research conducted in China found that the development of green finance significantly improved population health outcomes, particularly in regions experiencing high levels of environmental pollution and limited access to healthcare services. The study suggests that green financial investments support environmental governance, promote sustainable industrial development, and encourage the expansion of environmentally friendly infrastructure, all of which contribute to improved public health conditions. These findings highlight the potential of integrating green finance strategies into broader development policies that aim to improve both environmental sustainability and population health outcomes (Fan et al., 2023).

Within healthcare systems themselves, the adoption of green economy principles also presents opportunities to reduce environmental impacts and improve operational efficiency. Hospitals and health facilities are significant consumers of energy and producers of waste, making them important targets for sustainability initiatives. Studies examining circular economy practices in healthcare systems have identified several opportunities to reduce carbon emissions and environmental footprints. These include improving waste management systems, adopting renewable energy technologies, redesigning hospital infrastructure for energy efficiency, promoting sustainable transportation systems, and implementing environmentally responsible procurement practices. Such initiatives not only reduce environmental impacts but can also lower operational costs and improve the long-term sustainability of healthcare systems (Soares et al., 2023).

Despite the growing recognition of the relationship between environmental sustainability and health outcomes, the integration of green economy principles into public health financing remains relatively limited. Much of the existing research on green finance focuses on environmental policy or industrial development rather than specifically addressing the financing mechanisms of health systems. Similarly, research on health financing has traditionally focused on issues such as insurance coverage, risk pooling, and provider payment systems without considering the environmental implications of health sector investments. As a result, there is still limited understanding of how green economic policies can be incorporated into the design of sustainable health financing systems. This gap suggests the need for interdisciplinary research that connects health economics, environmental policy, and sustainable development frameworks (Feng & Zhou, 2024).

Another limitation identified in the literature concerns the geographical scope of empirical evidence related to green finance and public health. Many quantitative studies examining the relationship between green finance and health outcomes are concentrated in specific countries, particularly China, where large-scale environmental and financial reforms have been implemented. While these studies provide valuable insights, their findings may not necessarily be generalizable to other national contexts with different economic structures, governance systems, and health financing models. Expanding research beyond a limited number of national case studies is therefore important for developing a broader understanding of how green economy policies can influence health financing and population health outcomes globally (Fan et al., 2023).

Furthermore, existing literature reviews on green finance and sustainable development often highlight the lack of long-term impact assessments and the limited attention given to vulnerable or marginalized populations. Many studies focus primarily on macroeconomic indicators or environmental performance metrics rather than examining how green finance initiatives influence equity in health access or health outcomes for disadvantaged communities. This limitation suggests that future research should

incorporate social equity considerations when evaluating the impacts of green economy policies on health systems and public health outcomes (Lestari, 2025).

Another research gap relates to the limited integration of environmental sustainability goals into the design of health financing mechanisms themselves. While studies on PHC financing emphasize the importance of public funding, risk pooling, and needs-based allocation, they rarely consider how these financial mechanisms could support environmental sustainability within health systems. For example, provider payment models rarely include incentives for environmentally sustainable practices such as energy-efficient hospital operations or waste reduction initiatives. Integrating environmental objectives into health financing mechanisms could encourage healthcare providers to adopt more sustainable practices while maintaining high-quality patient care (Hanson et al., 2022).

In addition to these limitations, integrated economic frameworks such as the green economy, circular economy, and bioeconomy have rarely been applied directly to health sector financing systems. Although these frameworks are widely discussed in sustainability literature, their application within healthcare financing remains limited. Research exploring circular economy practices in hospitals has primarily focused on operational efficiency and environmental impact reduction rather than examining how financing mechanisms can support these sustainability initiatives. Consequently, there is a need for conceptual frameworks that integrate environmental sustainability principles with health financing policies to support the development of greener and more resilient health systems (D'Amato & Korhonen, 2021).

Given these research gaps, the integration of green economy principles into sustainable public health financing represents an important area for further investigation. Developing financing frameworks that simultaneously support health system resilience and environmental sustainability may contribute to more holistic approaches to public policy. By aligning financial incentives with environmental and health objectives, governments can encourage investments in sustainable health infrastructure, environmentally responsible healthcare delivery, and preventive health strategies that reduce environmental health risks. Such approaches may ultimately contribute to improved population health outcomes while supporting broader sustainable development goals (Rafinda et al., 2025).

Based on the challenges and research gaps identified in the existing literature, this study aims to analyze sustainable public health financing from a green economy perspective. Specifically, the study seeks to explore how green economy principles can be integrated into public health financing frameworks in order to support environmentally sustainable, financially resilient, and socially equitable health systems. Through this analysis, the study contributes to the development of conceptual insights that connect health financing policy with broader sustainability objectives in the context of green economic development.

METODOLOGI

This study employed a qualitative research approach using a systematic literature review design to analyze sustainable public health financing from a green economy perspective. The research focused on examining how green economy principles can be integrated into public health financing frameworks to support resilient and environmentally sustainable health systems. The data used in this study consisted of secondary data obtained from peer-reviewed academic journal articles, international health policy reports, and scientific publications related to public health financing, green economy policies, and sustainable development in the health sector. The data collection technique involved a structured literature search conducted through major academic databases such as Scopus, Web of Science, PubMed, and Google Scholar. Keywords used in the search process included “sustainable health financing,” “green economy,” “green finance,” “public health systems,” and “primary health care financing.” Articles published between 2020 and 2025 were prioritized to ensure the relevance and timeliness of the analysis. The selected literature was screened based on inclusion criteria such as relevance to public health financing, discussion of sustainability or green economy concepts, and publication in reputable peer-reviewed journals.

The data analysis in this study followed a qualitative thematic analysis procedure to identify key themes and conceptual relationships between green economy principles and sustainable public health financing. After the relevant literature was collected, each article was systematically reviewed to extract key information related to financing mechanisms, policy frameworks, environmental sustainability strategies, and health system outcomes. The extracted data were then categorized into thematic clusters including sustainable health financing models, green finance policy mechanisms, environmental sustainability in healthcare infrastructure, and governance of health financial systems. Comparative analysis was subsequently conducted to synthesize findings across different studies and identify patterns, research gaps, and emerging policy directions. This analytical approach enabled the study to develop an integrated conceptual understanding of how green economy strategies can contribute to strengthening sustainable public health financing systems and improving long-term health system resilience.

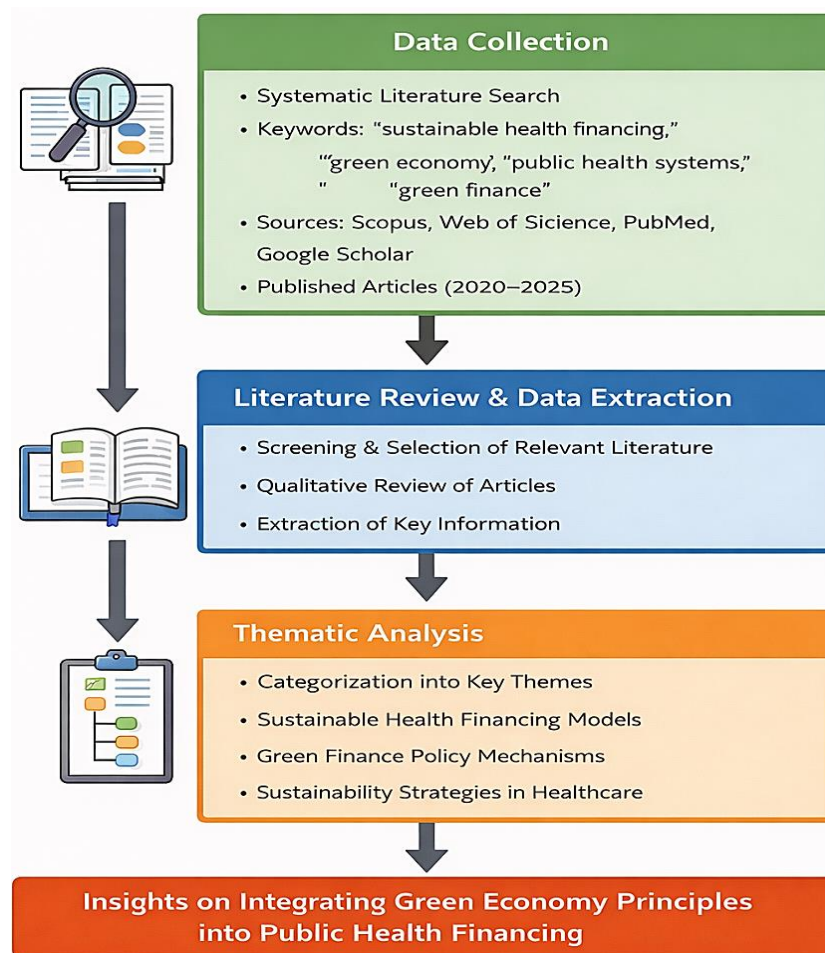


Figure 1. Diagram Conceptual Research

RESULTS AND DISCUSSION

To identify key themes and patterns related to sustainable public health financing from a green economy perspective, the selected literature was systematically reviewed and categorized based on major

policy dimensions discussed across the studies. The analysis focused on three primary domains: sustainable health financing mechanisms, green economy policy integration, and governance strategies for strengthening health system resilience. The synthesis of findings from the reviewed studies is presented in Table 1.

Table 1. Key Dimensions of Sustainable Public Health Financing in the Green Economy Perspective

Dimension	Key Findings	Policy Implications	Sources
Sustainable Health Financing	Strengthening public funding for primary health care, reducing out-of-pocket expenditure, and improving resource pooling mechanisms are essential for achieving universal health coverage and equitable access to health services.	Governments should prioritize public financing for PHC, adopt needs-based allocation systems, and implement provider payment models that encourage preventive and population-based care.	Hanson et al. (2022); Tshering (2021); Kadarpetta et al. (2024)
Health System Resilience and Pandemic Preparedness	Health systems require stable and flexible financing to respond effectively to public health emergencies while maintaining essential services.	Public financial management systems should allow flexible funding allocation and rapid mobilization of resources during health crises.	Kwon & Kim (2021); Orr et al. (2023)
Green Economy and Public Health	Green finance policies contribute to improved public health outcomes through environmental protection, sustainable infrastructure, and cleaner industrial development.	Integrating green finance instruments such as green bonds and sustainability-linked investments can support environmentally responsible health infrastructure and reduce environmental health risks.	Feng & Zhou (2024); Fan et al. (2023)
Environmental Sustainability in Healthcare Systems	Healthcare facilities contribute significantly to energy consumption and waste generation, creating opportunities for sustainability improvements through circular economy practices.	Hospitals can adopt sustainable waste management, energy-efficient infrastructure, and green procurement policies to reduce environmental impacts.	Soares et al. (2023); Rafinda et al. (2025)
Governance and Accountability	Transparent financial reporting systems and modern health expenditure monitoring frameworks are critical for sustainable health financing governance.	Governments should strengthen health financial data systems and reporting standards to improve transparency and accountability in health spending.	Orr et al. (2023)

The findings presented in Table 1 indicate that sustainable public health financing cannot be addressed solely through traditional financial mechanisms but must also incorporate broader sustainability considerations. The literature suggests that strengthening public financing for primary health care remains the core foundation for achieving equitable and resilient health systems. At the same time, integrating green economy principles into health policy can contribute to improved environmental conditions, sustainable

infrastructure, and better population health outcomes. The combination of sustainable financing mechanisms, green investment strategies, and strong financial governance frameworks can create a more resilient and environmentally responsible health system. These findings highlight the importance of interdisciplinary policy approaches that link public health financing with environmental sustainability strategies in order to support long-term health system resilience and sustainable development.

Discussion

The findings of this study highlight that sustainable public health financing cannot be understood solely as the provision of sufficient financial resources for health services, but rather as a broader governance and economic strategy that connects health financing mechanisms with environmental sustainability and green economic transformation. The synthesis of literature presented in the previous section indicates that sustainable financing systems must simultaneously address fiscal sustainability, environmental sustainability, and population health outcomes. In recent years, scholars and policymakers have increasingly recognized that the integration of green economy principles into public health financing can strengthen the resilience of health systems while addressing environmental determinants of health. This perspective aligns with the broader concept of sustainable development, which emphasizes the interconnectedness of economic growth, environmental protection, and social well-being. Consequently, sustainable public health financing must incorporate policy instruments that promote both financial stability and environmental responsibility in order to support long-term public health outcomes.

One of the most significant findings in the literature is the growing role of green finance as a mechanism for improving environmental quality and indirectly enhancing public health outcomes. Green finance instruments, including green bonds, climate finance funds, and environmentally targeted investments, have been increasingly adopted by governments and financial institutions to support environmentally sustainable development projects. Research shows that green finance initiatives contribute to the reduction of environmental pollution, the expansion of renewable energy infrastructure, and the development of environmentally sustainable industries. These environmental improvements have direct implications for public health because environmental pollution is a major determinant of health outcomes in many countries. Studies examining the relationship between green finance and public health indicate that investments in environmentally sustainable sectors can reduce exposure to air pollution, improve environmental quality, and ultimately contribute to better health outcomes for populations (Feng & Zhou, 2024).

Empirical evidence from several countries also supports the relationship between green financial policies and improved environmental governance. Studies examining the impact of green finance and environmental governance policies in China have demonstrated that green financial instruments can significantly reduce carbon emissions and environmental pollution levels. These policies encourage industries to adopt cleaner production technologies and support investments in renewable energy infrastructure. As environmental quality improves, the incidence of pollution-related diseases such as respiratory illnesses and cardiovascular disorders can decline, contributing to improved public health outcomes. Therefore, the integration of green finance policies into national development strategies not only supports environmental sustainability but also contributes to the protection of population health (Xu & Zhu, 2022).

Similar findings have been observed in other regional contexts, where green finance initiatives have been linked to broader sustainable development outcomes. Research focusing on emerging economies, including countries involved in the Belt and Road Initiative, indicates that green financial investments are associated with improved environmental governance and economic sustainability. These investments often target sectors such as renewable energy, sustainable infrastructure, and environmentally friendly industrial development. By reducing environmental degradation and promoting sustainable economic growth, green

finance initiatives contribute indirectly to improving health conditions in communities exposed to environmental risks. This evidence highlights the potential of green financial mechanisms to support both environmental sustainability and public health goals within integrated development frameworks (Khan et al., 2022).

In addition to environmental benefits, green finance also plays a role in strengthening the economic foundations of sustainable development. Studies examining the relationship between green financial development and economic performance indicate that green financial policies can stimulate innovation, support research and development in environmentally sustainable technologies, and promote the development of green industries. These economic transformations create opportunities for improving public health infrastructure and supporting sustainable health systems. For example, investments in environmentally sustainable healthcare facilities, renewable energy systems for hospitals, and climate-resilient health infrastructure can improve the long-term sustainability of health systems while reducing operational costs. Consequently, green finance policies can contribute to the development of environmentally sustainable healthcare systems that are better equipped to respond to future environmental and public health challenges (Kwiliński et al., 2023).

The relationship between green finance and health outcomes has also been observed in developing economies where public investment in health and innovation plays an important role in supporting sustainable development. Studies examining the relationship between green finance, public health expenditure, and research and development investments suggest that increased public spending on health and innovation can strengthen the impact of green financial initiatives on sustainable development. In countries such as India and other emerging economies, government spending on healthcare and technological innovation supports the development of environmentally sustainable health infrastructure and promotes the adoption of green technologies in healthcare delivery systems. These investments contribute to improved environmental conditions and enhanced health service capacity, thereby supporting both environmental sustainability and population health (Wu & Song, 2022).

Another important dimension of sustainable public health financing concerns the role of international climate funds and global environmental financing mechanisms. Institutions such as the Green Climate Fund and other climate financing initiatives have been established to support climate adaptation and mitigation projects in developing countries. These financial mechanisms are increasingly recognized as important tools for strengthening health system resilience in the face of climate change. Climate change poses significant threats to public health, including increased risks of heat-related illnesses, infectious disease outbreaks, and food and water insecurity. By supporting investments in climate-resilient infrastructure, disaster preparedness, and sustainable environmental management, climate finance mechanisms can help protect populations from the health impacts of climate change while strengthening national health systems (Alawode et al., 2025).

In addition to climate financing instruments, fiscal policies such as environmental taxes and health-related taxes also play an important role in sustainable public health financing strategies. Environmental taxes and health-related excise taxes on products such as tobacco, alcohol, and sugar-sweetened beverages can generate additional fiscal resources for public health systems while simultaneously reducing consumption of harmful products. These policy instruments create a dual benefit by increasing government revenue for health financing and promoting healthier population behaviors. Research suggests that integrating environmental and health taxation policies into broader health financing frameworks can strengthen fiscal space for health while supporting preventive public health strategies (Karamagi et al., 2023).

Despite the growing range of financial instruments available for supporting sustainable health systems, there remains a strong consensus in the literature that public financing should remain the primary foundation of health system financing. Sustainable health systems require reliable domestic funding sources

that ensure equitable access to health services and protect populations from catastrophic health expenditures. Studies examining health financing reforms in low- and middle-income countries indicate that reliance on out-of-pocket payments and external donor funding often leads to financial instability and inequitable access to healthcare. Strengthening domestic tax revenues, improving financial pooling mechanisms, and allocating resources based on population health needs are therefore essential strategies for achieving sustainable health financing systems (Hanson et al., 2022).

Evidence from African and Asian health systems further illustrates the challenges associated with unsustainable health financing structures. In many countries, high levels of out-of-pocket spending continue to limit access to essential health services and create financial barriers for vulnerable populations. Additionally, reliance on external donor funding can create volatility in health financing systems because external resources may fluctuate due to changing global priorities or economic conditions. Strengthening domestic resource mobilization, improving public financial management systems, and increasing the efficiency of health expenditures are therefore critical priorities for building sustainable health financing systems that support universal health coverage (Ifeagwu et al., 2021).

Public financial management reforms also play an important role in ensuring the effectiveness and sustainability of health financing systems. Transparent budgeting processes, reliable financial reporting systems, and effective expenditure tracking mechanisms enable governments to allocate resources more efficiently and improve accountability in health spending. Modern health financial information systems allow policymakers to monitor the allocation and utilization of health resources, identify inefficiencies, and evaluate the impact of health investments on population health outcomes. Strengthening financial governance systems is therefore essential for ensuring that health financing mechanisms contribute effectively to sustainable health system development (Orr et al., 2023).

In addition to strengthening traditional public financing mechanisms, innovative financial strategies have emerged as potential solutions for addressing funding gaps in health systems. These strategies include blended finance models, impact investment initiatives, diaspora bonds, fintech-enabled health financing platforms, and public-private partnerships. Blended finance mechanisms combine public and private financial resources to support large-scale investments in health infrastructure and environmental sustainability projects. Similarly, impact investment funds provide capital for projects that generate both financial returns and positive social or environmental outcomes. These innovative financial instruments offer new opportunities for mobilizing resources for sustainable health systems while reducing reliance on traditional donor funding (Mweha, 2025).

However, despite the potential benefits of these innovative financing approaches, their implementation in many developing countries remains limited. Several barriers hinder the widespread adoption of green finance and sustainable health financing mechanisms, including weak regulatory frameworks, limited institutional capacity, and the absence of standardized definitions for green financial instruments. Without clear policy guidelines and regulatory standards, financial institutions may face difficulties in identifying eligible green investments or assessing the environmental impact of financed projects. Additionally, fragmented financing structures and inconsistent policy coordination can lead to inefficiencies and misalignment between environmental and health policy objectives (Lestari, 2025).

Another important challenge concerns the risk of fragmented funding structures within health systems. When multiple financing mechanisms operate independently without effective coordination, health financing systems may experience inefficiencies, duplication of efforts, and inconsistent policy implementation. Fragmented financing can also lead to misallocation of resources and undermine the effectiveness of health investments. Ensuring policy coherence and alignment between health financing strategies, environmental sustainability policies, and economic development plans is therefore essential for maximizing the impact of sustainable public health financing initiatives (Frolov, 2025).

Overall, the findings of this study demonstrate that sustainable public health financing from a green economy perspective requires an integrated policy approach that connects health financing reforms with environmental sustainability strategies and green financial instruments. While green finance initiatives offer significant opportunities for supporting environmentally sustainable development and improving population health outcomes, their successful implementation depends on strong public financing systems, effective governance frameworks, and coordinated policy strategies. By aligning financial incentives with environmental and health objectives, governments can create resilient health systems that contribute to both sustainable development and improved public health outcomes.

CONCLUSIONS

The findings of this study indicate that sustainable public health financing from a green economy perspective requires an integrated approach that connects health financing mechanisms with environmental sustainability and green financial policies. The analysis shows that green finance instruments such as green bonds, climate funds, environmental taxes, and innovative financing mechanisms can contribute to strengthening public health systems by supporting environmentally sustainable infrastructure, reducing pollution-related health risks, and improving long-term health outcomes. At the same time, sustainable public health financing must remain grounded in strong domestic public funding, effective resource pooling, and equitable allocation mechanisms to ensure universal access to health services. Although green finance offers significant opportunities to support sustainable health systems, its implementation still faces challenges related to regulatory frameworks, institutional capacity, and policy coordination, particularly in developing countries. Therefore, integrating green economy principles into public health financing frameworks can provide a strategic pathway for building resilient, equitable, and environmentally sustainable health systems that are better prepared to address future public health and environmental challenges.

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