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Examining Clean Water and Health Infrastructure for Sustainable Global Well-being under SDG 3 and SDG 6

[1]Puteri Nawal, Researcher, Molecular Science, Universiti Putra Malaysia, Malaysia. E-mail: p.nawal@upm.edu.my

Abstract: In the paper, the author addresses the overlap of the concepts of public health and sustainability by examining the connection between SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation) in ensuring global well-being. The research seeks to learn the impact of access to clean water and healthcare facilities on the health of the people, as well as lead to the realization of sustainability objectives. They employ a mixed-method approach that comprises qualitative data from an extensive literature analysis, interviews with stakeholders, case studies, and quantitative analysis of health and sanitation indicators across the regions. Significant results refer to the positive correlation between the sub-factors of clean water, healthcare infrastructure, and better life expectancy, as it has been found that the higher the water and sanitation systems are, the higher the health outcomes. Nonetheless, the study also reports a number of obstacles, such as funding shortages, inconsistency of policies, as well as the unavailability of infrastructure, as the factors that do not support the advancement of SDG 3 and SDG 6, especially in low- and middle-income states. The paper also ends by highlighting the need to have integrated policies that synchronize not only the public health but also the long-term environmental sustainability, and give practical suggestions to policymakers to focus on the development of water and healthcare infrastructure. The implications of these findings are enormous in regard to the well-being of the global population, especially in vulnerable regions where SDG 3 and SDG 6 should be met in order to achieve long-term health and development.

Keywords: Public Health; Sustainability; SDGs; Global Well-being; Clean Water; Health Outcomes; Sustainable Development.

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I. Introduction

The intersection of public health and sustainability is a critical area of focus for global well-being, The nexus between sustainability and public health is a vital point of concern to the overall human well-being because it tackles some of the most urgent challenges human beings are currently facing. Among the issues facing the health and sustainability of populations in the world are climate change, health disparities, and unequal access to clean water and sanitation. These problems not only impact the health outcomes of individuals, but they also add to the overall social and economic inequalities (Macassa, 2021; Cernev & Fenner, 2020). The connection between environmental sustainability and the general population's health has become more vivid due to the fact that the environmental issues of air quality, water, and climate change directly affect the health of people in a direct manner. These relate to each other, and it is essential to address these issues in order to enhance the quality of life and gain sustainable development for all. The key in this discussion is SDGs 3 and 6 (Fei et al., 2021). SDG 3 strives to guarantee healthy lives and well-being of all, regardless of age, and it contains a broad spectrum of different health-related goals, such as the reduction of child mortality, curbing infectious diseases, and enhancing mental well-being (Smith et al., 2023; Graham & White, 2016). SDG 6, which aims to make clean water and sanitation available to everyone, is directly related to the field of public health because access to clean water and proper sanitation is the key to avoiding water-borne diseases and maintaining a healthy way of life.

The present paper aims to discuss the ways in which SDG 3 and SDG 6 intersect and can be utilized in improving the welfare of the world. The research questions will be as follows:

- How does sustainability define the outcomes of the public health, especially sanitation and access to healthcare?
- What benefits will the realization of these SDGs have on global well-being, especially in the developing areas?

- What are the obstacles to having health and sustainability objectives that are at policy level?

The major contribution of the paper is that it will thoroughly analyze how SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation) intersect and support the well-being of the world. It assesses the opportunities of access to clean water and health infrastructure to enhance health outcomes and sustainability agenda by employing a mixed-methods approach. The paper presents those challenges as the lack of funds and ineffective policies and underlines the necessity of combined policies which will harmonize long-term environmental sustainability and public health. It provides viable advice to policy makers with respect to bettering water and health infrastructures to attain SDGs through appropriate measures.

The paper follows the following structure: in the first section, I am introducing the intersection of public health and sustainability, with the SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation). Section 2 gives a literature review of the correlation between these SDGs and their effects on health outcomes and sustainability. In Section 3, the methodology with the mixed approach in which, literature review, surveys, interviews, and case studies were used have been discussed. Section 4 reports on the findings and the fact that there is a correlation between access to clean water, healthcare infrastructure and health outcomes. Section 5 ends with the policy implications and practical recommendations of using the approach of integrating public health and sustainability in order to achieve SDGs effectively.

II. Literature Survey

The interaction between sustainability and overall public health, especially as it is related to SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation) has been the focus of numerous publications in recent years, with the key relationships between the health outcomes and the environmental sustainability becoming more apparent. (Sweileh, 2020) looked into the issue of SDG 3 using a bibliometric analysis on how much the health and well-being have been covered in scientific literature (Sweileh, 2020; Onyeaka et al., 2024). This paper highlighted the increasing interest in the area of public health pointing out that sustainability and health are inseparable especially in access to clean water, disease prevention, and health care infrastructure. (Howden-Chapman et al., 2017) also emphasize the synergies between SDG 3 and other SDGs, noting that the health problems associated with climate, including diseases caused by vectors, require a comprehensive approach in both health and environmental areas of work (Howden-Chapman et al., 2017; Alfehaid et al., 2025; Venkatesh, 2022) also discussed the trade-offs between SDG 3 and other objectives, and it was found that health outcomes can either drive or restrain development in other sustainability sectors, such as sustainable consumption (Venkatesh, 2022; Sahilu, 2022).

Furthermore, some studies such as (Sompolska-Rzechuła & Kurdyś-Kujawska, 2021) have been done on the role of the climate and environmental health relationships, in which the authors argue about how the alterations in environmental conditions impact the human health situation, especially in Europe (Sompolska-Rzechuła & Kurdyś-Kujawska, 2021; Shehu & Nazim, 2022). (Onabola et al., 2022) developed the framework combining health equity with the land-water-energy nexus and provided information on how the distribution of resources across sectors affect the outcomes in the field of public health, which is crucial in the SDG 6 (Mohamad Taghvaee et al., 2023; Onabola et al., 2022; Talukder et al., 2024).

Nevertheless, even with the accumulation of literature, there are still a number of gaps. As an example, although the connection between water access and health is thoroughly developed, (Alkaim & Hassan, 2024) emphasize the fact that there is no focus on the institutional management of sustainable practices and direct effect on health outcomes (Alkaim & Hassan, 2024; Ly et al., 2022). Further, (Raman et al., 2023) note that there is a missing link in the literature on SDG 3 interaction with larger SDGs, and therefore, more integrated frameworks should investigate the connection between these two in practice (Raman et al., 2023; Iriarte & Musikanski, 2019). The current literature also fails to represent the importance of the local contexts and the obstacles to adoption of health and sustainability policies at the community level.

The study of these relationships has been done using several theoretical frameworks. A case example is a framework like the Health in All Policies (HiAP) which has been used in literature on the attitudes between public health and sustainable development to advance policies that address both the health and environmental determinants. The systems theory has also been used to appreciate the interdependence of health and environment sustainability and how there should be holistic solutions to address issues, taking into consideration the social, economic, and environmental aspects at the same time.

The literature review identifies the increased overlap between sustainability and public health, specifically, the correspondence of SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation). The multiple studies prove that availability of clean water, sanitation and healthcare facilities makes a large difference in promoting health-related outcomes, including life expectancy and prevention of illness. Nevertheless, there are still some obstacles, such as a lack of funding, uneven policies, and a lack of proper infrastructure, particularly in low- and middle-income countries. The literature also highlights the importance of incorporating joint frameworks that can solve these obstacles towards the realization of SDG 3 and SDG 6. With all the achievements, there still exist gaps in the comprehension of the effective execution of these SDGs, namely, in the area of governance at the community level and the contribution of the local contexts.

III. Methodology

The study is a mixed-method study, a combination of qualitative and quantitative research to investigate how the issue of public health and sustainability intersect, in the form of SDGs 3 and 6. This design will enable conducting a thorough analysis of the theoretical grounds and practical implementations of integrating health and sustainability by providing a strong framework of comprehending the relationships between them.

Data Collection Methods

- **Literature Review:** The primary source of data in this study will be an in-depth literature review of the available literature, publications, and reports regarding SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation). This will involve peer-reviewed journal articles, government and non-governmental organization reports, and publications of the international organizations to determine the gaps, trends as well as insight engaged in health and sustainability interactions.
- **Surveys and Interviews:** The literature review will be complemented by surveys and semi-structured interviews with the key stakeholders, such as policymakers, experts in the area of public health and sustainability practitioners. These data collection techniques will assist in collecting qualitative data about the issues and opportunities in pursuing SDG 3 and SDG 6 specifically through the lens of local and international stakeholders who engage in health and sustainability initiatives.
- **Case Studies:** The list of case studies will be provided to give a practical example of how integrated methods of public health and sustainability have been used in different regions in a successful manner. The case studies will provide the information on the best practice and lessons learned in the real-world interventions.

Data Analysis

- **Thematic Analysis:** The thematic analysis will be used in analyzing the qualitative data collected in the literature review, interviews and case studies. This entails the identification, analysis, and reporting of patterns (themes) in the data which will reflect more on the relationship between the concept of public health and sustainability in relation to SDG 3 and SDG 6.
- **Statistical Analysis:** The quantitative data collected from surveys will be analyzed using statistical analysis techniques, such as descriptive statistics and correlation analysis, to identify trends and

relationships between the implementation of public health and sustainability measures and their impact on health outcomes and sustainable development.

This mixed-methods design will take care of in-depth exploration of both theoretical and practical dimensions of the intersection of public health and sustainability.

Figure 1 below describes the approach that was used to conduct research on SDGs 3 and 6. It starts with three essential elements, including literature review of the existing studies about the SDGs, surveys and interviews with the stakeholders and case studies that investigate the real-life examples. The data analysis involving qualitative analysis (thematic analysis) and quantitative analysis (statistical analysis) is a part of these inputs. This is the stage that leads to the final synthesis where the research findings and conclusions are incorporated to come up with a holistic perspective when it comes to research topic.

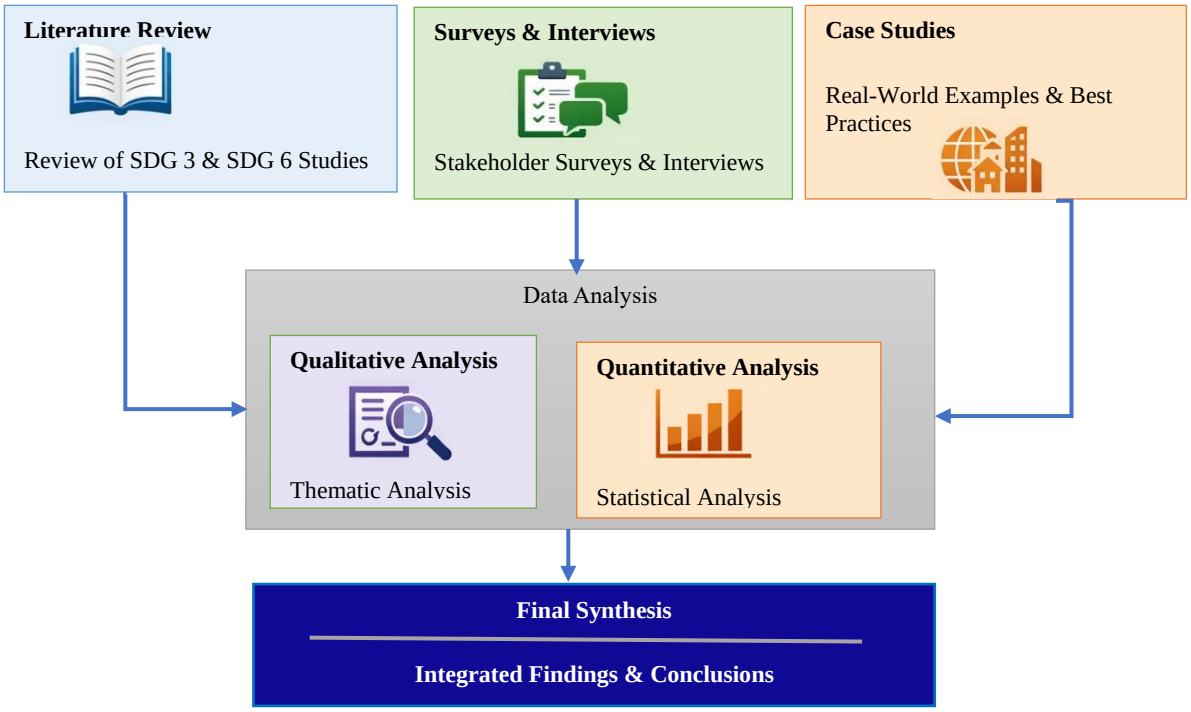

Figure 1: Research Methodology Flowchart

IV. Results and Discussion

The results of this research point out that there is a significant overlap between sustainability objectives, especially SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation), with the challenges facing the health of the population (Sanitation, nutrition, and healthcare infrastructure). The availability of clean water and sanitation has a direct effect on the health outcomes as it lowers waterborne illnesses and enhances general hygiene. In addition, healthcare infrastructure is critical in facilitating long-term sustainability because it is necessary in the reduction of health crisis as well as in the provision of the population with preventative and primary healthcare services. This study discovered that the nations and regions with a superior access to clean water, sanitation, and healthcare facilities have stronger health outcomes, which consequently helps in sustainable development by having healthier and productive population.

This Table 1 would provide a comparison of leading indicators of SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation) in various regions or countries. It might demonstrate information like healthcare facilities, access to sanitation, and health results of the population (e.g., expectancy of life,

infant mortality, access to clean water), which would enable a more accurate comparison to understand how these two variables affect one another.

Table 1: Comparison of Health and Sustainability Indicators Across Regions

Region/Country	Access to Clean Water (%)	Sanitation Coverage (%)	Healthcare Infrastructure (Hospitals per 100,000 people)	Infant Mortality (per 1,000 live births)	Life Expectancy (Years)
Region A (Developed)	98%	95%	150	3	82
Region B (Developing)	75%	70%	45	35	67
Region C (Least Developed)	45%	40%	10	70	55

Moreover, nutrition is one of the determinants in the public health and sustainability. This paper concluded that health discrepancies are worsened by poor nutrition as a result of low access to clean water and sanitation, particularly among low income and rural populations. These interconnected problems are essential to address in order to realize the aspirations of SDG 3 and SDG 6. Sustainable solutions to the enhancement of water quality, sanitation systems, and healthcare infrastructure should be incorporated to enhance the health results of the population and add to the overall sustainability outcomes.

This Figure 2 shows that there is a positive relationship between life expectancy and access to clean water. With access to clean water, life expectancy tends to rise, with the water infrastructure playing an essential role in the health of people. Areas with low access to water have worse life expectancy and worse health outcomes, whereas regions with almost universal access match the Universal Access Goals, having improved health outcomes. This supports the significance of access to clean water to SDG 3 (Good Health and Well-being).

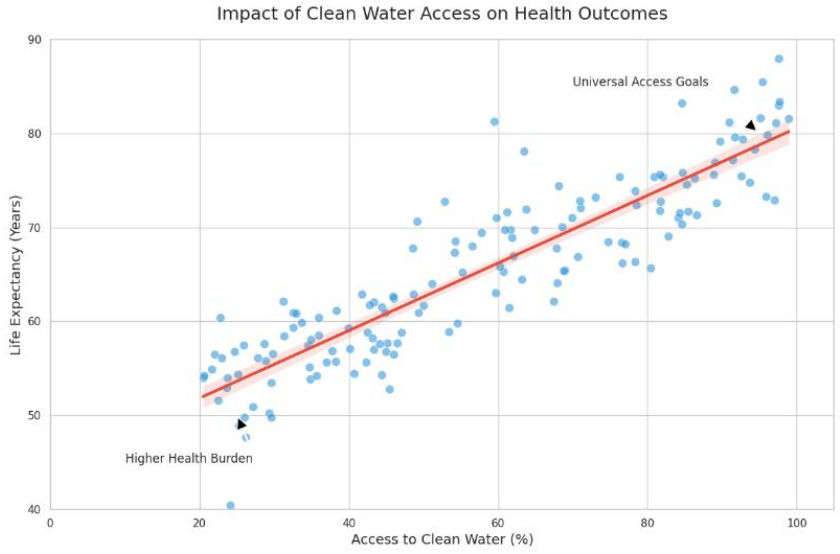

Figure 2: Impact of Clean Water Access on Life Expectancy

The study also determined that there are some critical obstacles and challenges to development to attain SDG 3 and SDG 6. Funding is one of the most significant challenges especially in the low and middle-income countries where health and sanitation resources are usually underfunded. The scarcity of finances does not allow the expansion of health and sanitation efforts to cover the infrastructure, water sources, and health sectors gaps. Also, the unequal implementation of the sustainable development programs due to the

inconsistency of policies in various levels of government as well as conflicting priorities present obstacle to the implementation of sustainable development programs. The absence of infrastructure especially in rural regions worsen such complications since inaccessibility to services is not achieved due to poor roads, medical amenities and sanitation systems.

These findings have far-reaching consequences on the well-being of the rest of the world. By focusing on the overlap between sustainability and public health, the situation in which people in vulnerable areas lack access to clean water and basic medical care can be addressed to a considerable degree, resulting in better health results. The integrated and sustainable measures to improve SDG 3 and SDG 6 will decrease the health disparity, prevent the disease, and facilitate the economic development. In the end, the increase in productivity and overall health in the developing areas will be a result of the overall stability and prosperity due to the better infrastructure of the population and the ability to have access to clean water in the long run.

These results are consistent with the literature available but also present the novel knowledge of the interdependence of SDG 3 and SDG 6. As an example, (Howden-Chapman et al., 2017) emphasize that health policies should be associated with the sustainability goals, which reflect this result that an increase in the level of sanitation and healthcare infrastructure correlates with reduced health outcomes. Nevertheless, the study contributes to the existing literature because the nutritional aspect is frequently neglected in the context of a more general discussion of SDG 3 and SDG 6. Also, (Venkatesh, 2022) addresses SDG 3 trade-offs with the rest of SDGs, especially where resource allocation is concerned. This study is helpful in giving a more detailed suggestion on how to alleviate these trade-offs through integration and offer viable solutions to address the challenges facing health and sustainability projects.

The comparison of the results with the existing literature reveals that despite the significant progress in the field of understanding the connection between the concepts of public health and sustainability, interdisciplinary studies and interventions are still required to reach the full potential of SDG 3 and SDG 6.

V. Conclusion

This paper examined the intersection of imperative areas of public health and sustainability, and the particular SDGs in focus in SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation). The results indicate the high importance of the access of clean water, sanitation and healthcare infrastructures on enhancing the health results of the people and on the achievement of sustainable development. The study showed that nations that have a strong healthcare system and sustainable practices of sanitation and management of water have a better health outcome, which, consequently, goes into a broader development agenda. In addition, nutrition has been found to be a critical determinant in health as well as sustainability especially in low-income areas where water and sanitation shortages worsen malnutrition.

In theoretical terms, the study enhances the comprehension of the nature of mutual interconnectedness between public health and sustainability. It supports the necessity of a combined approach that can take care of the health and environmental aspects simultaneously, which leads to the opinion that the SDGs need to be followed as a whole, not separately. In practice, the study makes recommendations to the policy makers to address such barriers as inadequate funding, infrastructure and inconsistency of policy. This work can inform policy makers and other organizations that strive to implement SDG 3 and SDG 6 and particularly in the vulnerable and resource-restrained areas through the promotion of concerted efforts to interconnect public health and sustainability.

Further studies on the influence of specific environmental conditions, including climate change, on the nexus of public health and sustainability are possible in the future. Although this paper concentrated on water and sanitation, there is a lack of exploration on the overall consequences of health-related problems caused by climate conditions, including quality of air and transmission of diseases caused by vectors. Moreover, exploring how technological innovations, including AI and big data, can help improve the health

and sustainability integration may offer new avenues of SDGs. Lastly, a study exploring how local governance and community-based solutions can help to address the challenge of infrastructure and resource deficiencies would provide more context-specific solutions to achieve SDG 3 and SDG 6.

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