



THE ROLE OF SANITATION IN IMPROVING PUBLIC HEALTH: A LITERATURE REVIEW

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ABSTRACT

Sanitation has a central role in improving public health because it prevents the spread of infectious diseases and strengthens social welfare. This study is a systematic literature review conducted according to PRISMA guidelines, by reviewing international and national literature published in 2020- 2025 from Scopus, PubMed, Google Scholar, SINTA, and Garuda databases. The review identified six main themes: (1) improved sanitation reduces the risk of infectious diseases such as diarrhea by 26% and child mortality by 13%; (2) access to improved sanitation at the community level contributes to improved maternal and infant health; (3) sanitation improves the quality of life, sense of security, and economic well-being of communities; (4) active community participation is a key factor in the sustainability of sanitation programs; (5) access to safe sanitation plays a role in empowering women and strengthening gender equality; and (6) sanitation policies contribute to the achievement of Sustainable Development Goals (SDGs), especially goals 3 and 6. The findings show that the success of sanitation development is not only determined by the availability of infrastructure, but also by education, community participation, and a social equality-based approach. Thus, investment in the sanitation sector is an effective preventive, social, and economic strategy in realizing healthy, productive, and sustainable communities.

Keywords: Sanitation; Public health; Quality of life; Community participation

1. INTRODUCTION

Public health is a key measure in assessing the success of a country's development. Based on the theory of health determinants proposed by Bloom (1974), the degree of individual and community health is influenced by four factors, namely the environment, behavior, health services, and heredity. Of these four factors, environmental and behavioral aspects are considered the easiest to modify through public policy and social change. One component of the environment that greatly influences public health status is sanitation, which includes the provision of waste disposal facilities, clean water management, and individual hygiene behavior. Deficiencies in sanitation have long been identified as a major cause of increased incidence of environmentally-based infectious diseases such as diarrhea, cholera, typhoid, and helminthiasis (Wolf et al., 2022).

Globally, sanitation conditions are still a major problem. According to the *Joint Monitoring Programme* report by the World Health Organization (WHO) and UNICEF (2023), around 3.5 billion people in the world do not have access to safe sanitation services, while 419 million people still practice open defecation. The disparity is greatest in South Asia and Sub-Saharan Africa, where poverty, high population growth and limited infrastructure policies are the main barriers. As a result, around 1.4 million deaths each year are caused by diseases that can be prevented through the provision of clean water and proper sanitation facilities (Wolf et al., 2022; Waddington et al., 2023).

The situation in Indonesia is not much different. According to the Basic Health Research (Riskesdas, 2023), around 17% of households in Indonesia do not have access to healthy latrines, while 24% of rural communities still practice open defecation. Data from the Central Bureau of Statistics (BPS, 2024) shows that the national achievement of access to proper sanitation has only reached 83.9%, with significant disparities between urban (91.2%) and rural areas (74.6%). These conditions correlate with high rates of environmentally-based diseases such as diarrhea, stunting, and intestinal parasitic infections, which ultimately reduce people's productivity and quality of life.

Poor sanitation not only impacts physical health, but also social and economic well-being. Research conducted by Ross et al. (2021) revealed that ownership of personal sanitation facilities improves quality of life, sense of security, and self-esteem, especially for women.

Similar results were found by Sorcher et al. (2023) which showed that community-based sanitation programs in the Philippines were able to improve the social and economic welfare of rural communities. Therefore, sanitation needs to be viewed not only as technical infrastructure, but also as an instrument of social and economic empowerment.

The Indonesian government has implemented various strategic programs, such as Community-Based Total Sanitation (STBM) and the Stop Open Defecation Movement, which aim to change people's behavior towards clean and healthy living habits. However, there are still many challenges faced, including budget limitations, lack of facility maintenance, and low community participation in maintaining program sustainability (Sofiyah & Dheta, 2025). Research by Clarke et al. (2021) also confirms that the success of sanitation programs depends more on the level of community involvement than on top-down approaches that only rely on infrastructure.

Globally, sanitation issues are prioritized in the Sustainable Development Goals (SDGs), particularly goal 6 which targets the availability of clean water and proper sanitation for all by 2030. Sanitation also contributes to the achievement of SDG 3 (healthy life and well-being) and SDG 5 (gender equality), as it is proven to improve health status and reduce social inequality, especially for vulnerable groups (Bhan & Caruso, 2025). Thus, sanitation development has a strategic role in realizing a healthy, productive and sustainable society.

Various studies have reinforced the link between sanitation and improved public health. A systematic review by Wolf et al. (2022) in *The Lancet Global Health* found that improving access to clean water and sanitation can reduce the risk of diarrhea by 26% and reduce child mortality by 13%. The results of the study by Kmush et al. (2021) also showed that sanitation coverage at the community level has a positive effect on maternal and infant health. These facts confirm that sanitation is not only a basic need, but also an effective long-term investment to improve the quality of human life.

Therefore, this study was prepared to comprehensively review the role of sanitation in improving public health, by reviewing the latest research results from various national and international scientific sources during the period 2020-2025. The results of this review are expected to provide an in-depth understanding of the contribution of sanitation to physical, social

and economic health, and provide policy input for efforts to improve sustainable sanitation in Indonesia.

2. METHODS

This study used a systematic literature review approach to examine the relationship between sanitation and improving public health. This approach was chosen in order to collect, analyze and synthesize empirical research results that have been published during the 2020- 2025 period, both from reputable international journals and accredited national publications.

This review method is based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines as described by Page et al. (2021). The review process was conducted through four main stages, namely: (1) article identification; (2) initial screening; (3) eligibility determination; and (4) final inclusion. This approach ensured that the literature selection process was transparent, systematic and replicable.

Article searches were conducted through several databases, namely Scopus, PubMed, Google Scholar, as well as the national portals SINTA and Garuda to capture Indonesian literature. Keywords used included: sanitation, public health, community health, sanitation intervention, health outcomes, and quality of life. The search was limited to English or Indonesian articles with a publication date of 2020-2025, and only included peer-reviewed studies. Inclusion criteria included articles that: (1) examined the relationship between sanitation and public health; (2) were conducted in developing countries including Indonesia; (3) contained quantitative or qualitative empirical data; and (4) were published in indexed journals.

The analysis process was conducted using a thematic synthesis approach as described by Thomas and Harden (2008). Each article was reviewed to identify patterns of findings and key themes, including: (1) the impact of sanitation on infectious diseases; (2) the influence of sanitation on quality of life and community well-being; and (3) socio-cultural factors that influence the sustainability of sanitation programs (Nelson et al., 2021; Wolf et al., 2022). Data from various studies were grouped to find commonalities, differences, and relevant global and national trends.

The validity of the review results was strengthened by comparing the literature findings with official data from WHO and UNICEF (2023), the Indonesian Ministry of Health (2023), and Statistics Indonesia (2024). This triangulation approach ensures that the synthesis of the review results is not only academic, but also relevant to the real conditions in Indonesia. All sources were cited using APA 7th edition citation style, and all references used had an active DOI to ensure authenticity and avoid plagiarism.

3. RESULTS AND DISCUSSION

This literature review produced six main themes that illustrate the role of sanitation in improving health outcomes

a. Impact of Sanitation on Communicable Diseases and Child Mortality

Most of the literature shows that improved access to proper sanitation significantly reduces the incidence of infectious diseases, especially diarrhea and intestinal parasitic infections. Wolf et al. (2022) through a meta-analysis in *The Lancet Global Health* found that clean water and

sanitation interventions can reduce the risk of diarrheal disease by 26% and reduce child mortality by 13% in low-income countries.

Similar results were reinforced by Waddington et al. (2023) in *PLOS Medicine*, who reported that improved sanitation directly contributed to a 15% reduction in under-five mortality over the medium term. In Africa and South Asia, research by Bekele et al. (2020) revealed that integrated sanitation programs have a major effect on reducing water-based diseases, especially in areas that previously had high open defecation rates. Meanwhile, Kanda et al. (2021) through a review of controlled trials showed that the success of interventions relies heavily on household behavior in using and maintaining sanitation facilities, not just on their provision.

The Indonesian context also shows the same pattern. Data from the Indonesian Ministry of Health (2023) notes that an increase in access to healthy latrines from 70% to 83% in the last five years contributed to a 24% reduction in diarrhea incidence in several STBM priority provinces. Overall, this evidence confirms that sanitation is a key determinant in preventing infectious diseases and improving child health.

b. Sanitation and Maternal and Infant Health

Several studies highlight the link between adequate sanitation and maternal and neonatal health. Kmush et al. (2021) using data from 40 low- and middle-income countries found that high sanitation coverage at the community level reduced the risk of preterm birth and neonatal infections.

The study also indicated that women living in neighborhoods with limited access to sanitation were more prone to pregnancy complications due to exposure to environmental pathogens and psychological stress. Other findings by Nair et al. (2023) showed that public policy interventions such as the Swachh Bharat Mission in India were successful in reducing the incidence of anemia and diarrhea in pregnant women. The program not only builds infrastructure, but also educates people about hygiene behavior. The link between sanitation and maternal-child health is also found in the Indonesian context. According to a report by BPS (2024), areas with higher coverage of healthy latrines have 1.5 times lower infant mortality rates than areas with low access.

This evidence confirms that improved sanitation not only impacts common diseases, but also plays an important role in reproductive health and family well-being.

c. Sanitation on Quality of Life and Social Wellbeing

Adequate sanitation is also closely related to the social and psychological aspects of society. In their systematic review, Ross et al. (2021) found that ownership of private sanitation facilities has a significant effect on quality of life because it provides a sense of security, privacy, and comfort, especially for vulnerable groups such as women and the elderly. Good sanitation also increases social participation, reduces shame, and strengthens individual dignity in the community.

Research by Sorcher et al. (2023) in the Philippines showed that community-based sanitation programs succeeded in increasing the economic productivity of poor families by 12% due to reduced sick time due to environmental infections. In addition, proper sanitation also strengthens social cohesion as healthy communities are more active in social and economic activities. Overall, sanitation has been shown to act as a social equalizer that strengthens welfare and reduces social disparities between regions.

d. The Role of Community Participation in Sanitation Sustainability

One of the main factors in the success of a sanitation program is the level of community participation. According to Clarke et al. (2021), sanitation programs in Timor-Leste that prioritize participatory approaches have proven to be more sustainable than programs that only focus on physical development. The study emphasized that the community's sense of ownership of the facilities built determines long-term success.

Research in Indonesia by Sofiyah and Dheta (2025) showed that community involvement in every stage of the STBM program—from planning to evaluation—increased the success of clean and healthy living behavior by 35%. In addition, active community participation creates a strong social network in maintaining environmental hygiene and reducing open defecation practices. This finding shows that community-based interventions are more effective and sustainable than top-down programs.

e. Sanitation and Gender Equality

Gender is an important dimension in discussions about sanitation. According to Caruso et al. (2021), access to safe sanitation is a key factor in improving women's sense of security and dignity, especially in rural areas. Women often face the risk of harassment and violence when having to relieve themselves in the open. Bhan and Caruso (2025) emphasized that the provision of safe sanitation facilities acts as a form of empowerment, as it increases women's school attendance and their participation in economic activities.

MacArthur et al. (2024) in Africa showed that sanitation programs that integrate a gender perspective can strengthen social cohesion and family welfare. Women's involvement in sanitation management has also been shown to increase program effectiveness, as they have a central role in maintaining household hygiene. Thus, sanitation not only impacts physical health, but also becomes an instrument of social empowerment and gender equality.

f. Global and National Policy Context in Achieving the SDGs

Sanitation is a major component of the Sustainable Development Goals (SDGs), especially goal 6, which is to ensure the availability of clean water and proper sanitation for all by 2030. According to WHO & UNICEF (2023), by 2022 around 3.5 billion people in the world still live without access to safely managed sanitation. The largest gaps are in developing countries, indicating the need for cross-sector policy support between health, infrastructure and education.

In Indonesia, national policies related to sanitation are regulated through the National Medium-Term Development Plan (RPJMN) as well as various programs such as STBM, PAMSIMAS, and Gerakan Stop BABS. According to the Indonesian Ministry of Health (2023), the national target of 90% access to improved sanitation by 2025 is expected to accelerate the achievement of SDGs 6 and SDGs 3. However, BPS (2024) notes that there are still disparities between regions: provinces in eastern Indonesia such as NTT and Papua have achievements below 70%, far behind urban areas in Java and Bali. This suggests that successful sanitation policy requires a holistic approach that not only builds infrastructure, but also strengthens education, community participation, and cross-sector governance.

DISCUSSION

The results of the literature review show that sanitation has a very significant role in improving public health. This relationship is not only medical through the prevention of infectious diseases, but also has social, economic and psychological impacts. This section discusses the main

findings by relating them to Bloom's (1974) determinants of health theory and the Indonesian policy context that supports the achievement of the Sustainable Development Goals (SDGs).

a. Sanitation as a Key Determinant of Public Health

Theoretically, sanitation is an important component in Bloom's (1974) environmental determinants of health. A clean environment and a good sanitation system serve as the main barrier in preventing the transmission of water and feces-based diseases. The results of research by Wolf et al. (2022) and Waddington et al. (2023) confirmed that access to proper sanitation facilities can reduce the risk of diarrheal disease by 26% and child mortality by 13%.

Biologically, good sanitation systems prevent pathogen contamination from feces to water and food, thereby reducing the chain of disease transmission. This is in line with the environmental health continuum concept, where environmental interventions have a direct impact on people's health status (Nelson et al., 2021). In the Indonesian context, the Indonesian Ministry of Health (2023) also reported a correlation between increased ownership of healthy latrines and decreased cases of diarrhea in 21 priority provinces.

Thus, improved sanitation can be considered a public health investment that provides a large preventive impact at a relatively low cost. This strengthens the argument that sanitation development should be a core part of public health policy at both national and local levels.

b. Sanitation, Maternal and Child Health, and Family Productivity

The impact of sanitation is not only limited to infectious diseases, but also relates to maternal and child health. Kmush et al. (2021) showed that access to good sanitation at the community level reduces the risk of pregnancy complications and neonatal infections. Poor sanitation conditions increase exposure to harmful microorganisms, which can trigger reproductive tract infections in mothers and impaired fetal development.

In addition, research by Nair et al. (2023) highlighted that public policy interventions such as the Swachh Bharat Mission in India not only build physical facilities, but also successfully change people's behavior through health education. Similarly, Indonesia's

Community-Based Total Sanitation (STBM) program emphasizes behavior change as a key element of program success.

Good sanitation also has an impact on family productivity. With less sick time due to water-based diseases, the family's economic burden is reduced, and work productivity increases. Reduced infectious disease rates indirectly reduce medical expenditure, which in turn improves social welfare. Therefore, investments in sanitation not only improve health, but also contribute to household microeconomic development (Ross et al., 2021).

c. Social and Psychological Dimensions of Sanitation: Quality of Life and Dignity

Sanitation has far-reaching impacts on people's social and psychological well-being. Access to safe sanitation facilities creates a sense of comfort, privacy and security, especially for women and girls. Ross et al. (2021) asserted that private latrine ownership significantly improves quality of life, while Sorcher et al. (2023) added that a community-based sanitation program in the Philippines was able to improve social and economic well-being by 12%.

The link between sanitation and psychological well-being is also evident in the reduction of stress and shame among people who previously did not have private sanitation facilities. In many cases, improved sanitation was followed by increased self-esteem and social participation (Bhan & Caruso, 2025). This phenomenon shows that sanitation is not only a technical issue, but

also closely related to human rights and individual dignity. Thus, sanitation policy should not only target infrastructure development, but also pay attention to the social and psychological aspects of the beneficiary community, so that the changes that occur are sustainable.

d. Community Participation and Sustainability of Sanitation Programs

One of the success factors of sanitation programs that is often overlooked is the level of community participation. According to Clarke et al. (2021), programs that involve the community from the planning stage to maintenance show higher sustainability than top-down programs. Active community participation creates a sense of ownership, increases responsibility, and strengthens social solidarity in maintaining existing facilities.

Research in Indonesia by Sofiyah and Dheta (2025) reinforces these findings, where community involvement in the process of identifying sanitation problems and local training succeeded in reducing open defecation practices by 35%. STBM programs in several districts show that collective behavior change is more effective when the community is the subject, not the object of intervention.

Community involvement is also important to ensure long-term sustainability. Many sanitation programs stop functioning due to lack of social ownership. Therefore, government policies need to place communities as key partners, not just recipients of aid.

e. Sanitation and Gender Equality: An Empowerment Perspective

The gender dimension is one of the most important findings in the sanitation literature. Caruso et al. (2021) and Bhan & Caruso (2025) found that access to safe sanitation plays a direct role in increasing women's participation in education and the economy. In many rural areas, women face the risk of violence and harassment when defecating in the open. With safe facilities in place, this fear and risk is dramatically reduced, giving women more opportunities to engage in activities outside the home. MacArthur et al. (2024) also showed that sanitation programs oriented towards gender equality resulted in greater social impact. When women are involved as managers and decision-makers in sanitation projects, program success rates increase due to sensitivity to user needs. Thus, sanitation is not just a technical matter, but also part of the women's empowerment agenda. A gender transformative sanitation approach that combines physical, social and institutional aspects is an important strategy to ensure equitable access to public services.

f. Implications for National Policy and SDGs Achievement

In the context of global policy, sanitation issues are prioritized in SDGs Goal 6, which is to ensure access to clean water and proper sanitation for all. Data from WHO and UNICEF (2023) shows that despite significant progress, around 3.5 billion people in the world still do not have access to safe sanitation.

In Indonesia, achieving sanitation targets is part of the National Medium-Term Development Plan (RPJMN) and is integrated with the STBM and PAMSIMAS Programs. However, BPS data (2024) shows that there is still a wide regional gap between urban and rural areas. Successfully achieving the SDGs targets depends not only on physical development, but also on cross-sector coordination between health, education and environment. The government needs to strengthen monitoring mechanisms and regional funding so that sanitation programs can run sustainably. In addition, data integration across agencies is important to ensure that sanitation achievements are truly in line with improving public health. Policy programs that combine education, infrastructure and community empowerment have been shown to be more effective

than approaches that focus solely on facility provision (Clarke et al., 2021). Therefore, national sanitation development strategies need to adopt a holistic and evidence-based approach.

g. Future Research and Policy Directions

Although scientific evidence has overwhelmingly demonstrated the strong link between sanitation and public health, there are still gaps in policy implementation, especially at the local level. Some regions in Indonesia face geographical and socio-cultural constraints that make conventional approaches difficult to implement. Therefore, technological innovations and community-based policies that are adaptive to local conditions are needed. In addition, future research needs to integrate climate change and environmental resilience dimensions in the sanitation discourse. Environmental degradation and natural disasters have the potential to damage sanitation infrastructure, which in turn increases the risk of disease. The climate-resilient sanitation approach as proposed by WHO can be a new model in sustainable sanitation development.

From the policy side, the government needs to expand partnerships with the private sector and civil society organizations to strengthen financing and innovation. Solid cross-sector collaboration will accelerate the achievement of universal sanitation targets and ensure an overall improvement in public health.

4. CONCLUSION

This literature review confirms that sanitation has a very important role in improving public health. The results showed that sanitation not only serves as a means of preventing infectious diseases, but also as a foundation for improving the social, economic and quality of life of the community. Proper sanitation is able to create a clean, safe and healthy environment, thereby reducing the burden of environment-based diseases that have been a major challenge in developing countries, including Indonesia.

Improved sanitation is proven to support maternal and child health, increase women's sense of security and dignity, and strengthen community social participation. The success of sanitation programs relies heavily on active community engagement, not solely on the provision of physical infrastructure. A participatory approach that integrates education, empowerment, and institutional strengthening is key to program sustainability.

In addition, sanitation has a strategic dimension in supporting the achievement of the Sustainable Development Goals (SDGs), particularly goal 3 on good health and well-being and goal 6 on access to clean water and proper sanitation. Therefore, sanitation development needs to be positioned as a long-term investment in public health policy and sustainable development. Increased cross-sector collaboration, technological innovation, and community participation will be key in realizing universal sanitation access and improving the quality of life of the Indonesian people.

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