


HISTORY OF SANITATION IN BRAZIL: ACHIEVEMENTS AND CHALLENGES FOR PUBLIC HEALTH IN THE TWENTY-FIRST CENTURY

 <https://doi.org/10.56238/arev6n3-124>

Submitted on: 12/10/2024

Publication date: 12/11/2024

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ABSTRACT

The objective of this study is to examine the evolution of sanitation in Brazil, its achievements throughout the twentieth century and the challenges faced by public health in the twenty-first century. The research is justified by the relevance of sanitarianism in the development of public health policies and the need to understand how these advances influence the current scenario. The study uses a narrative literature review, with data collection carried out in databases such as SciELO and Google Scholar, covering recent publications on the subject. The results indicate that, although the SUS has promoted significant advances in equity of access to health, structural challenges such as underfunding and regional inequalities persist. The COVID-19 pandemic has highlighted both the importance of the SUS and its weaknesses, highlighting the need to reformulate and modernize the system. It is concluded that it is essential to strengthen the financing and management of the SUS, integrating technological innovations and sustainable strategies to face future health crises and the impacts of climate change. These findings contribute to the debate on the future of the SUS and public health in Brazil, offering subsidies for the formulation of more effective policies.

Keywords: Public Health, Unified Health System, Collective Health, Health Policies.

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INTRODUCTION

The history of sanitation in Brazil had its first manifestations at the end of the nineteenth century, in the midst of epidemics of diseases such as yellow fever, smallpox and cholera that devastated large cities, especially Rio de Janeiro. The country, at the time, was beginning to organize initiatives aimed at the control of communicable diseases, focusing on hygiene and basic sanitation measures. This period marked the beginning of public health policies in Brazil, which over the years have evolved in response to health crises and the emerging needs of the population (Borges; Baptista 2021).

At the beginning of the twentieth century, sanitarianism gained greater relevance with urban reforms and sanitary campaigns conducted by professionals such as Oswaldo Cruz, who led efforts to combat endemic diseases. These initiatives laid the foundations for the development of structured public health in the country. In addition, the creation of institutions such as the Special Public Health Service (SESP) during World War II boosted disease control in rural areas and peripheral regions. This expansion of sanitarianism reflected a growing commitment to the protection of public health, which was consolidated in the following decades (Borges; Müller 2020).

The creation of the Unified Health System (SUS) in 1988 represented a historic milestone for health prevention in Brazil, promoting the universalization of access to health and the decentralization of public health policies (Brasil 1988). The SUS has brought significant achievements, such as the expansion of vaccination campaigns, the improvement in basic care, and the creation of programs to control chronic and infectious diseases. This system has become a global example of inclusion and equity in health, although it continues to face challenges to ensure its financial sustainability and efficiency (Santos et al., 2020)

However, despite the achievements, the challenges for public health in Brazil remain complex. The country still faces marked regional disparities, where the population of the poorest areas, especially in the North and Northeast regions, has less access to quality health services. In addition, the pressure on the public health network is amplified by factors such as population aging, the increase in chronic non-communicable diseases, and the demands of an increasingly urban population. These issues require a new look at sanitarianism and more effective and integrated public health policies (Gomez et al., 2018).

In addition to inequalities in access to health services, another emerging challenge in the twenty-first century is global diseases, such as pandemics and the impacts of climate

change on public health. The COVID-19 pandemic, for example, highlighted weaknesses in the health system and the need to reformulate health strategies. In parallel, rising global temperatures and environmental disasters have generated new health challenges, such as the spread of tropical diseases to non-endemic areas and climate-related humanitarian crises (Arruda et al., 2018).

The question that guides this study is how the history of sanitarianism in Brazil influences the current and future challenges of public health. Through this analysis, we seek to understand how historical achievements can be used to face contemporary obstacles and to formulate fairer and more effective health policies. Based on this question, the research focuses on the main milestones of sanitarianism and its lessons for modern public health (Rocha et al., 2021). The objective of this study is to examine the evolution of sanitation in Brazil, its achievements throughout the twentieth century, and the challenges faced by public health in the twenty-first century.

THEORETICAL FRAMEWORK

The theoretical framework on the history of sanitation in Brazil and the challenges for public health in the twenty-first century is based on a comprehensive analysis of concepts, theories and models that have been developed over time in the field of public health. To fully understand the development of epidemiological control in Brazil, it is first necessary to explore the concept of sanitation, which emerged in the nineteenth century as a set of practices and policies aimed at promoting health through disease prevention, with a focus on hygiene, sanitation, and epidemiological control (Alves et al., 2017).

One of the fundamental theories that shaped sanitary prevention in Brazil was the miasmatic theory, which dominated sanitary thinking in the late nineteenth and early twentieth centuries. This theory, which attributed the spread of diseases to "miasma" or contaminated air, led to the implementation of several urban sanitation and vector control policies. influencing urban reforms and health campaigns led by figures such as Oswaldo Cruz. These campaigns were central to the initial development of sanitation in the country and marked the history of public health with the eradication of diseases such as yellow fever and smallpox in urban areas (Lima et al., 2020).

Another relevant theoretical framework is the "theory of the social determinants of health", which began to gain strength in the middle of the twentieth century, especially with the Lalonde report in 1974 and the Alma-Ata Conference in 1978, which highlighted health

as a result of social, economic and environmental factors, in addition to the health system itself. In the Brazilian context, this theory was important for the sanitation movement of the 1970s and 1980s, which culminated in the creation of the Unified Health System (SUS). This movement redefined the concept of sanitation, expanding the scope of public health to include not only the control of infectious diseases, but also the promotion of equity in access to health and the improvement of living conditions (Borghi et al., 2018).

With regard to the universal health service, the literature highlights several health care models that have been adopted over the years, including the "Primary Care Model" and the "Health Surveillance Model". Primary Health Care (PHC), based on the concept of comprehensive and continuous care, has been central to the implementation of the public health system, promoting health through preventive and community actions. The Health Surveillance Model, which articulates actions for health promotion, protection and recovery, focuses on the identification of risks and vulnerabilities, being an important tool for disease control in regions of high social vulnerability. However, the literature reveals that, despite the advances, there are significant gaps in the effective implementation of these models, with challenges related to regional inequality and health system financing (Prado et al., 2021).

Over the last few decades, research on sanitation and public health in Brazil has also identified consensus and controversies. A widely accepted consensus is the relevance of the SUS as a universal and equitable public health system, internationally recognized for its innovations in vaccination campaigns and family health programs. However, an emerging contradiction in the literature refers to the financial sustainability of the SUS. Several authors point to the chronic underfunding of the system and the lack of resources as obstacles to its full operationalization, which has generated debate about the future of the system in the context of the growing demands for health and the country's fiscal crisis (Pereira et al., 2021).

Another gap that the literature identifies is the impact of new global diseases and health crises, such as the COVID-19 pandemic, on the Brazilian health system. Although the SUS has demonstrated its importance during the pandemic, the crisis has revealed weaknesses in the system, especially in relation to the coordination of health policies between the federal, state, and municipal spheres. Recent studies indicate that there is an urgent need to strengthen the management and governance of the system, in addition to

promoting technological innovation and the integration of new health surveillance models (Paula et al., 2023).

The literature also highlights that, in the twenty-first century, issues related to environmental health and climate change have gained prominence in the field of public health. The concept of planetary health, which involves the interdependence between human health and the sustainability of the environment, has been explored by scholars investigating the impact of climate change on the spread of diseases and global health crises. In Brazil, the literature on the subject is still incipient, indicating a gap to be filled by future research that addresses the environmental impact on the health system and possible policy responses (Silva; Guimarães, 2018).

In summary, the theoretical framework that supports this study is based on a critical analysis of the theories and models that marked the evolution of sanitarianism in Brazil, as well as an examination of the gaps and contradictions present in the literature on public health in the current context. The study of Brazilian sanitarianism and the challenges faced by public health in the twenty-first century requires a deep understanding of the intersection between public policies, social determinants of health, and new emerging global factors, such as pandemics and environmental crises.

METHODOLOGY

The methodology adopted in this study is characterized by a narrative review of the literature, whose main objective is to integrate and synthesize the available knowledge about the history of sanitarianism in Brazil, its achievements and the challenges faced by public health in the twenty-first century. This type of study was chosen because it is suitable for the theoretical and critical exploration of complex themes, allowing the analysis of different perspectives and theories present in the scientific literature. The narrative review, unlike a systematic review, is not limited to an exhaustive search for evidence, but seeks to gather and interpret in an organized and coherent manner the main findings and discussions that already exist on the subject.

For the selection of the sample of articles and books used in this review, inclusion and exclusion criteria were defined. Publications were included that addressed the historical evolution of sanitation in Brazil, the creation of the Unified Health System (SUS), public health policies, and the contemporary challenges faced by public health. The sources consulted were selected from databases such as PubMed, Scielo, and Virtual Health

Library (VHL), prioritizing works published in the last 7 years, with the exception of classic or historical works that are fundamental to the theme. Publications that did not have direct relevance to the proposed analysis or that did not address specific aspects related to the Brazilian context were excluded.

Data collection was carried out through bibliographic research in the aforementioned databases, using descriptors such as "public health", "Unified Health System", "collective health" and "health policies". The collection process involved the reading of abstracts of articles and book chapters, followed by the full analysis of the works that met the inclusion criteria. The information extracted from the sources was organized into thematic categories, such as historical evolution, creation of the SUS, contemporary challenges, and emerging public policies.

Data analysis was carried out through a qualitative approach, focused on the critical interpretation of the information found in the literature. The analysis involved the identification of points of convergence and divergence among the authors, as well as the comparison of different theoretical and empirical perspectives on the development of sanitarianism in Brazil. In addition, emphasis was placed on gaps in the literature, such as the lack of studies on the intersection between collective health and climate change, and the new challenges posed by the COVID-19 pandemic.

Ethical considerations were taken into account during the conduct of the research, especially with regard to the proper use of sources and the faithful interpretation of the data. As this is a narrative review, there was no primary data collection involving human subjects, and therefore the approval of an ethics committee was not required. However, all care was taken to ensure accuracy and transparency in the presentation of the results, respecting the copyright and integrity of the sources consulted.

Finally, the limitations of this study should be acknowledged. As this is a narrative review, there is the possibility of bias in the selection of sources and in the interpretation of the data, since the review does not follow the same criteria of rigor and exhaustiveness as a systematic review. In addition, limitations related to access to some publications and the restriction of analysis to the Brazilian context may impact the generalization of the findings. However, it is believed that the present study offers a significant contribution to the understanding of the evolution of sanitation in Brazil and the challenges that public health faces in the twenty-first century, providing a solid basis for future research and public policies.

RESULTS AND DISCUSSIONS

During this study, 1,600 studies were initially identified in the PubMed, SciELO and Virtual Health Library (VHL) databases. After applying the inclusion and exclusion criteria, only 8 articles remained that met the criteria established to compose the final sample. Rigorous application of these criteria was essential to ensure the relevance and quality of the information obtained, providing a focused, solid evidence-based analysis to answer the research question. These 8 selected articles cover a variety of approaches and results on the topic at hand, allowing for a comprehensive and detailed analysis. From them, it was possible to identify trends, gaps and relevant aspects for the in-depth understanding of the subject, contributing to the construction of a solid knowledge base.

The results of this review reveal a complex path, marked by important achievements and persistent challenges in the field of public health. The analysis of the literature showed that Brazilian sanitarianism has its roots in the late nineteenth century, with the emergence of campaigns to control diseases such as yellow fever, smallpox and cholera. These efforts, led by figures such as Oswaldo Cruz, consolidated the beginning of public health policies in the country. With the creation of the SUS in 1988, Brazil made significant progress towards universalizing access to health, promoting greater equity and social inclusion (Barroso et al., 2018).

However, the results also point out that, despite the achievements, the SUS faces critical challenges. The analysis of the literature revealed a significant disparity in access to and quality of health services between the different regions of Brazil, with the North and Northeast areas presenting greater difficulties compared to the South and Southeast. In addition, insufficient funding of the SUS is a recurring issue in the publications analyzed, compromising its long-term sustainability. Authors such as Paim (2011) and Escorel (2015) highlight that, although the SUS is internationally recognized as a model of universal public health, its operationalization faces financial and management obstacles, which directly affects the quality of care (Grin et al., 2021).

Another important point highlighted in the results is the impact of global changes on Brazilian public health. The COVID-19 pandemic has brought to light weaknesses in the health system, exposing the difficulty of coordination between the spheres of government and the lack of adequate infrastructure in some regions. At the same time, the pandemic demonstrated the importance of the SUS in responding to health emergencies, highlighting

the fundamental role of the system in protecting the health of the Brazilian population. The literature points out that, although the SUS has faced difficulties, it has also been able to carry out mass vaccination campaigns, an aspect that reinforces its crucial role in times of health crisis (Paula et al., 2023).

In the discussion section, when comparing the results with the existing literature, it is observed that the achievements of sanitation in Brazil, such as the reduction of infant mortality rates and the increase in life expectancy, are closely linked to the strengthening of public health policies. However, the persistence of regional inequalities and the underfunding of the SUS indicate that health policies need to be reevaluated and reformulated to deal with contemporary demands. Authors such as Viana and Machado (2020) point out that technological innovations, such as telemedicine and artificial intelligence, can offer promising solutions to improve the efficiency of the SUS, especially in remote and hard-to-reach areas (Gadelha et al., 2022).

The discussions also point to the need for an integrated approach to address the new public health challenges in Brazil, such as chronic non-communicable diseases and the consequences of climate change. Studies suggest that the concept of planetary health is related to human health and environmental sustainability and should be incorporated into public health policies. The intersection between health and the environment, however, is still an underexplored area in Brazil, representing a gap in the literature that deserves greater attention (Giulio et al., 2021).

In terms of limitations, the study identified that most research on sanitation in Brazil focuses on historical aspects and the implementation of the SUS, while more recent themes, such as the impact of climate change and technological innovations in the health system, are less explored. In addition, the narrative review, by not following a rigid protocol such as systematic reviews, may have left out some relevant studies that were not included in the accessed databases. However, the scope of the studies analyzed offers a consistent view of the main milestones and challenges of sanitarianism in Brazil (Teixeira et al., 2020).

Finally, this study offers several directions for future research. It is necessary to explore more deeply the impact of climate change on public health in Brazil and to investigate how the SUS can adapt to these new demands. In addition, future studies may focus on developing strategies to improve the financing and management of the SUS, incorporating emerging technologies to increase efficiency and equity in access to health. In this way, the continuity of research on sanitation and public health in Brazil can contribute to

the strengthening of more effective and inclusive public policies in the twenty-first century (Alpino et al., 2022).

CONCLUSION

The research showed that, throughout its history, Brazil has achieved important advances, such as the eradication of infectious diseases in the early twentieth century and the creation of the Unified Health System (SUS), which consolidated universal access to health and equity as fundamental principles. However, the study also highlighted that despite these achievements, the public health system still faces significant challenges, including regional inequalities in access to health services and chronic underfunding of the SUS.

The analysis of the literature revealed the importance of rethinking and adapting health policies to contemporary demands, such as chronic non-communicable diseases, new pandemics, and the consequences of climate change. In addition, the crisis caused by COVID-19 has highlighted both the resilience and weaknesses of the SUS, reinforcing the need for greater integration and innovation in the Brazilian health system.

In terms of theoretical and practical contributions, this study provides a comprehensive overview of the development of sanitation in Brazil, identifying both the historical achievements and the current and future challenges. The survey offers insights that can be used to formulate more effective and inclusive public policies, especially with regard to promoting equity and strengthening the governance and financing of the SUS. Therefore, this work contributes significantly to the field of public health by emphasizing the need for sanitation adapted to the new social and environmental realities of the twenty-first century.

In summary, the study fulfilled its objectives by examining the historical evolution of sanitation in Brazil and by identifying the main challenges faced by public health. The findings underscore the need for an integrated approach, which includes technological innovation and environmental sustainability, so that the SUS continues to be a robust health system accessible to all Brazilians.

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