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EFFICIENCY IN PUBLIC HEALTH MANAGEMENT: A SYSTEMATIC REVIEW OF METHODOLOGIES AND SOCIOECONOMIC IMPACTS

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ABSTRACT

This study conducts a systematic review on efficiency in public health management, analyzing studies published between 2005 and 2024. The objective was to identify the main methodologies employed, the variables investigated, and the impacts on socioeconomic development and health indicators. The research followed the PRISMA guidelines and used search strategies in national and international academic databases, resulting in a total of 959 articles identified. After applying the eligibility and exclusion criteria, 171 articles were selected for detailed screening, culminating in 80 studies included in the in-depth analysis. The results show that Data Envelopment Analysis (DEA) was the most used methodology, being used in 40% of the studies to evaluate the technical efficiency of health services. Tobit and multiple regressions have also been widely used to explore the relationship between efficiency and socioeconomic factors such as GDP per capita and HDI. In addition, longitudinal approaches based on panel data allowed the identification of trends and impacts of the policies implemented over time. Despite the predominance of quantitative methodologies, the review revealed the need for greater integration between quantitative and qualitative analyses, considering the Brazilian socioeconomic specificities. Efficiency in health management is essential to optimize the allocation of resources and ensure equitable and sustainable services. The findings reinforce the relevance of health economics and the use of robust analytical tools to support decisions and improve public policies.

Keywords: Health economics. Efficiency in health. Public health management. Socioeconomic development.

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INTRODUCTION

Access to health care is widely recognized as one of the fundamental determinants of quality of life and socioeconomic development. The World Bank highlights health as an essential dimension in the measurement of multidimensional poverty, considering its direct influence on demographic dynamics, mortality, and life expectancy (Araújo and Mendes, 2023). This perspective reinforces the importance of organized and efficient health systems to ensure equity in access and continuous improvement in social indicators.

In Brazil, regional disparities represent a persistent challenge in the field of public health. The country faces a complex inequality that impacts both socioeconomic development and access to health services, generating significant differences in health indicators between regions. As a response to this scenario, the Unified Health System (SUS) implemented regionalization as a central strategy to organize and integrate health services, promoting greater equity and efficiency in access.

Efficiency in public health management has been one of the main challenges faced by health systems worldwide (González-de-Julián *et al.,* 2024; Rezapour *et al.,* 2023). The optimization of available resources to ensure equitable and quality care is essential for the sustainability of health services, especially in countries with universal systems, such as Brazil (Kirigia and Kirigia, 2011). In this context, the analysis of efficiency in public health management becomes a fundamental tool to support strategic decisions and improve public policies (Marseille and Kahn, 2019).

In view of this scenario, this study aims to systematically analyze the scientific literature on efficiency in public health management, focusing on the methodologies employed, the variables evaluated, and the socioeconomic impacts. By understanding the different approaches used to measure efficiency, it is expected to provide subsidies for the improvement of public policies and the implementation of more effective strategies in the allocation of resources.

Different approaches have been used to measure the efficiency of health services, with Data Envelopment Analysis (DEA) being one of the most used methodologies, allowing comparing production units and identifying opportunities for optimization (Farewar *et al.,* 2022). In addition, statistical models such as Tobit and multiple regressions have been applied to assess the relationship between efficiency and socioeconomic factors, such as GDP per capita and HDI (Mohammadpour *et al.,* 2020). Such studies demonstrate that the efficiency of the health system can be directly associated with social determinants

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of health and the degree of financing and governance of the sector (Sabioni Lopes and Toyoshima, 2023).

The importance of efficiency in public health management is also linked to the ability to reduce waste and improve resource allocation. Studies indicate that the implementation of efficiency models can contribute to cost reduction without compromising the quality of the services provided (Mahmood *et al*., 2024). However, one of the challenges faced by managers is the need to adapt international models to local realities, considering structural, economic, and social differences in developing countries (Tashobya *et al.,* 2018).

Despite the advances in measurement methodologies, there are still gaps in the literature regarding the integration of qualitative and quantitative analyses, considering the specificities of regional and organizational contexts. In this sense, there is a growing interest in evaluating innovative strategies to improve public health management, including the use of digital technologies, artificial intelligence, and predictive models for optimizing health services (Standaert *et al.,* 2024).

Thus, this systematic review seeks to consolidate the main findings of the recent literature on efficiency in public health management, identifying trends and challenges in the implementation of effective resource allocation strategies. By critically analyzing the methods employed and their impacts on health systems, the study aims to contribute to the improvement of public policies and the construction of more efficient models for health management.

The structure of this article is organized as follows: in section 2, the materials and methods used in the systematic review are presented; in section 3, the main results obtained are discussed; and in section 4, the implications of the findings and recommendations for future research are addressed.

METHODOLOGY

The systematic review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, ensuring transparency and methodological rigor in the selection and analysis of studies. The search strategy was carried out in national and international academic databases, including SciELO, BVS ECOS, CAPES Journals, Web of Science, PubMed and Springer Nature.

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Descriptors related to efficiency in health management were used, combined by Boolean operators to increase the sensitivity of the search. The selection of studies followed predefined inclusion and exclusion criteria:

INCLUSION CRITERIA:

- Studies published between 2005 and 2024.
- Research that analyzes the efficiency in public health management through quantitative and/or qualitative approaches.
- Studies that use Data Envelopment Analysis (DEA), Tobit regressions, panel data models, or other statistical methodologies applied to health management.
- Eligibility and thematic scope

EXCLUSION CRITERIA:

- Studies that do not address the thematic scope of this study objective
- Duplicate articles or articles without access to full text.
- Theoretical works without methodological or empirical application.
- Studies that exclusively analyze hospital efficiency, without considerations about the health system as a whole.

The following selection criteria were used, following the PICO strategy: P (Population): Studies on efficiency in public health management published between 2005 and 2024. I (Intervention): Methodologies applied to evaluate efficiency in public health management. C (Comparison): Comparison between different methodologies and variables analyzed. O (Outcome/Result): Identification of impacts on socioeconomic development and health indicators, following this methodology, the studies available in full text were considered. Final PICO question: "Which methodologies used in studies on efficiency in public health management, published between 2005 and 2024, have the greatest impact on socioeconomic development and health indicators, and how do the variables analyzed correlate with these results?"

The analysis of the selected articles was carried out through a structured protocol, including the identification of objectives, methods, main findings, and limitations. Data extraction followed a standardized script to ensure comparability between studies and the identification of trends and gaps in the literature.

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The results of the review are presented in the next section, highlighting the main methodologies used, their applications in public health management, and the implications for the formulation of public policies.

SEARCH STRATEGY

The search was carried out in 2 phases, in the first phase the initial search was carried out with descriptors in Portuguese, including, Efficiency, Health Management, Health Economics and Organizations, Public Administration, Socioeconomic Development, DEA (Data Envelopment Analysis), Panel Data and Primary Health Care, in the following databases: SciELO, BVS ECOS, CAPES, Web of Science and SPEL Journals. This search was performed through structured combinations of descriptors, using Boolean operators. " " (quotation marks) to search for exact expressions, ensuring that descriptors were searched exactly as they were defined and AND to combine the different descriptors, allowing the search for articles that address multiple topics simultaneously.

This approach ensured that the search was comprehensive, but focused on the essential areas of the study, including the analysis of efficiency in public health management and its impact on health and socioeconomic development indicators, with searches being carried out in 33 combinations of descriptors, considering the following criteria:

1. "Health Management" AND "Health Economics and Organizations" AND Efficiency
2. "Health Management" AND "Health Economics and Organizations" AND "Public Administration"
3. "Health Management" AND "Health Economics and Organizations" AND "Socioeconomic Development"
4. "Health Management" AND Efficiency AND "Public Administration"
5. Efficiency AND "Primary Health Care" AND DEA
6. "Health Management" AND Efficiency AND "Socioeconomic Development"
7. "Health Management" AND "Public Administration" AND "Socioeconomic Development"
8. "Economics and Health Organizations" AND Efficiency AND "Public Administration"
9. "Economics and Health Organizations" AND Efficiency AND "Socioeconomic Development"

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10. "Economics and Health Organizations" AND "Public Administration" AND "Socioeconomic Development"
11. Efficiency AND "Public Administration" AND "Socioeconomic Development"
12. "Health Management" AND Efficiency AND "Public Administration" AND "DEA"
13. "Health Management" AND "Health Economics and Organizations" AND "DEA"
14. "Health Management" AND "Socioeconomic Development" AND DEA
15. Efficiency AND "Public Administration" AND DEA
16. "Economics and Health Organizations" AND Efficiency AND "DEA"
17. "Public Administration" AND Efficiency AND "Panel Data"
18. "Health Economics and Organizations" AND "Health Management" AND DEA
19. "Socioeconomic Development" AND "Health Management" AND DEA
20. "Public Administration" AND "Socioeconomic Development" AND DEA
21. "Public Administration" AND "Socioeconomic Development" AND "Panel Data"
22. "Health Management" AND Efficiency AND AED
23. "Health Management" AND Efficiency AND "Panel Data"
24. "Health Management" AND "Health Economics and Organizations" AND DEA
25. "Health Management" AND "Health Economics and Organizations" AND "Panel Data"
26. "Socioeconomic Development" AND "Economics and Health Organizations"
27. Efficiency AND "Data on Dashboard" AND DEA
28. "Public Administration" AND "Socioeconomic Development" AND Efficiency
29. "Health Management" AND "Panel Data" AND DEA
30. Efficiency AND "Data on Dashboard" AND DEA
31. Efficiency AND "Primary Health Care" AND "Panel Data"
32. "Primary Health Care" OR "Primary Care" AND "Socioeconomic Development"
33. Efficiency AND "Primary Health Care" OR "Primary Care" AND "Socioeconomic Development"

After searching the databases in Portuguese, the results were screened according to the selection criteria with 2 screenings. The first screening excluded publications prior to 2005 and restricted access, the second screening considered the thematic scope, incomplete or limited data. This stage aimed to define the articles, excluding those that do not directly meet the research objectives and ensuring that the selected studies contain

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complete data and appropriate methodologies. In this phase, the main descriptors used in the studies were identified and after that the second phase took place, using descriptors in English, this step, the search was expanded to other relevant databases, such as PubMed, CAPES Journals; Springer Nature link. The objective of this second search was to capture articles in English, ensure that international studies were incorporated into the review and thus provide a broader comparative analysis. The selection of descriptors was based on criteria that balanced scope and focus, in line with the objectives of the study. The terms chosen in English were: **"**Efficiency", "Health Management", "Health Economics", (Unified Health System): and "Socioeconomic Development". Below:

The selection of these terms is based on the relevance and intersection of these concepts within the context of public health, especially within the scope of the Unified Health System (SUS). The five terms chosen were:

1. Efficiency: Efficiency is a central indicator for evaluating the performance of any system, including the healthcare industry. This term is fundamental to investigate the capacity of the health system to use resources optimally, avoiding waste and maximizing health outcomes for the population. Efficiency is a crucial metric for understanding how public health policies can be improved.
2. Health Management: This term was prioritized over others, such as "Health" alone, because of its more specific focus on health management, which is the main focus of the research. Although "Health" emerged as a relevant descriptor, its generic scope was considered less appropriate to capture studies related to management practices and strategies.
3. Health Economics: The inclusion of this descriptor reflects the need to explore the intersection between health and economics, given the critical role of financing and resource allocation in the efficiency of health systems. This term broadens the perspective by including economic analysis as part of the evaluation of health management.
4. Unified Health System: The SUS is the Brazilian health system model, based on the principle of universality, integrality and equity. Understanding the efficiency and challenges of the SUS is crucial to evaluate the performance of the Brazilian health system and to propose public policies aimed at improving this model.
5. Socioeconomic Development: This was chosen due to its relevance to the central theme of the study, which investigates the relationship between efficiency in health

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management and socioeconomic development. It allows capturing studies that relate health management practices with indicators of economic growth and social well-being.

And finally, the screening and final selection, during this screening, the studies were evaluated for their relevance to the theme, methodological quality, and their contribution to the understanding of efficiency in public health management.

RESULTS

During the process of screening articles using DECS in Portuguese, 216 articles were initially found in the SciELO (19), ECOS VHL (43) and CAPES (154) databases. In the first screening, 28 articles were excluded due to criteria such as restricted access, year of publication prior to 2005, and duplicity, resulting in 188 remaining articles. Then, in the second screening, 102 articles were discarded because they did not meet the thematic criteria of the research, leaving 86 articles selected for final analysis. These 86 articles were submitted to the reading of the abstracts to assess their adherence to the inclusion criteria of the research, ensuring that only the most relevant and high-quality articles were considered in the systematic review.

Table 01: Distribution of Articles by Database and Screening Process

Database	Result	Exclusion at 1st Screening (Limited access, year of publication, repeated)	Result for 2nd Screening (Theme)	Exclusion at 2nd Screening	Selected Articles for Final Analysis
SciELO	19	7	12	6	6
VHL ECOS	43	6	37	20	17
CAPES	154	15	139	76	63
Total	216 Results	-28 excluded	188 result	-102 excluded	86 selected

Source: Author's Database, 2024.

EXTRACTION OF DESCRIPTORS

Descriptors are keywords or terms that are used to represent the main topics of a study. Pompei, (p. 01. 2010) defines descriptors by Nobre and Bernardo "The descriptor is, in the words of Nobre and Bernardo, "a term or keyword that the database uses to index the article." The descriptor confers greater specificity to the search performed.

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If the selected descriptors are not aligned with the standardized nomenclature of the databases, such as DeCS (Health Sciences Descriptors) or MeSH (Medical Subject Headings), the article may not be found in academic research, compromising its visibility and citation. This results in the loss of important information, undermining the scientific impact of the study (Brandau, Monteiro & Braile, 2005).

It is important to highlight, as pointed out by Brandau, Monteiro and Braile (2005), the difference between keywords and descriptors. While keywords are free and unstructured terms, descriptors follow a hierarchical organization, with strict control of synonyms, meanings, and relevance within a thematic tree. This hierarchical structure facilitates both the search and retrieval of articles, reinforcing the need for authors to consult tools such as DeCS and MeSH to select descriptors that accurately represent the content of their work. Source of the descriptors used in this research: The descriptors were selected from the "DeCS" column (Health Sciences Descriptors), with the exception of the term "Socioeconomic Development", which was included as an additional keyword.

Consolidated frequency

After counting the descriptors separately for each base, the frequencies were summed for an overview. Thus, the final table contains the total frequency of each descriptor in all databases combined.

Organization and Consolidation of Data

The data on the frequency of descriptors were organized in a table, where each column represented a database (VHL, SciELO, CAPES), and a final column showed the sum of the frequencies of all the databases, that is, the total count for each descriptor.

Table 2 presents the descriptors related to health and management, highlighting their frequencies in the SciELO, VHL and CAPES databases. The most frequent terms are Efficiency (23 mentions), Health Management and Health (14 each), with a higher incidence in the CAPES database. Topics such as the Unified Health System**,** Socioeconomic Development and DEA (Data Envelopment Analysis) have moderate relevance, with 5 to 6 mentions. The CAPES database concentrates descriptors focused on public management and efficiency, while the VHL has a more diversified approach, with unique mentions in areas such as Maternal Health **and** Information Systems**.** SciELO, in turn, has a smaller overall volume. The data reflect the importance of efficiency and

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management in the public health sector, with an academic emphasis on strategic and specific themes.

Table 02: Consolidated Descriptors by Database and Frequency of Use

Word	SciELO Count	VHL Count	CAPES Count	Total
Efficiency	4	6	13	23
Health Management	2	1	11	14
Health	1	3	10	14
Unified Health System	1	2	3	6
Socioeconomic Development	2	1	2	5
DEA (Data Envelopment Analysis)	1	2	2	5
Primary Health Care	0	3	0	3
Public Efficiency	2	0	4	6
Tax Management	2	0	1	3
Development	1	1	1	3
Health System	0	2	0	2
Public Management	0	1	9	10
Health Financing	0	1	0	1
Investments in Health	1	0	0	1
Maternal Health	0	1	0	1
Information Systems	0	1	0	1
Social Indicators	1	0	0	1
Public spending	1	0	0	1
SUS financing	0	1	0	1
SUS reforms	0	1	0	1
Mexico	0	1	0	1
Bibliometrics	0	1	0	1
Research	0	1	0	1
Health Care Sector	0	1	0	1
Health Level	0	1	0	1
Health Economics	0	1	0	1
SUS financing	0	1	0	1
Health Systems	0	2	0	2
Public administration	0	1	9	10
Health Management	0	1	0	1

Source: Author's Database, 2024.

The five descriptors chosen were combined in the search strategies using Boolean operators ("AND") to explore the intersections between the concepts. Combinations include:

1. "Efficiency" AND "Health Management" AND "Health Economics"
2. "Efficiency" AND "Unified Health System" AND "Socioeconomic Development"
3. "Health Management" AND "Health Economics" AND "Socioeconomic Development"
4. "Unified Health System" AND "Health Economics" AND "Efficiency"
5. "Health Economics" AND "Socioeconomic Development" AND "Efficiency"
6. "Health Management" AND "Unified Health System" AND "Efficiency"

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7. "Unified Health System" AND "Socioeconomic Development" AND "Health Management"
8. "Health Management" AND "Socioeconomic Development" AND "Efficiency"

Table 3 presents the results of the search for articles in the PUBMED database. Initially, 88 studies were identified, of which 22 were excluded at the first screening due to criteria such as limited access, year of publication, or duplicity. In the second screening, based on thematic relevance, 43 more studies were eliminated, resulting in 23 articles selected for final analysis.

The most productive combination was **"**Efficiency" AND "Health Management" AND "Health Economics", which generated 86 results, culminating in the selection of 21 articles. Other combinations, such as "Health Management" AND "Health Economics" AND "Socioeconomic Development" and "Health Management" AND "Unified Health System" AND "Efficiency", resulted in only one article each. In contrast, combinations involving the Unified Health System and socioeconomic development did not produce relevant results.

The process revealed a greater concentration of studies at the intersection between efficiency, health management, and health economics, but highlighted gaps in the scientific literature on topics that connect these topics to the Unified Health System and socioeconomic development.

Table 03: PUBMED Result with English Descriptors and Screening Process

Combination of Search Terms	Results	Exclusion at 1st Screening (Limited access, year of publication, repeated)	Result for 2nd Screening (Theme)	Exclusion at 2nd Screening	Selected Articles for Final Analysis
"Efficiency" AND "Health Management" AND "Health Economics"	86 results	22	64	43	21
"Efficiency" AND "Unified Health System" AND "Socioeconomic Development"	0 results	0	0	0	0
"Health Management" AND "Health Economics" AND "Socioeconomic Development"	1 result	0	1	0	1

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"Unified Health System" AND "Health Economics" AND "Efficiency"	0 results	0	0	0	0
"Health Economics" AND "Socioeconomic Development" AND "Efficiency"	0 results	0	0	0	0
"Health Management" AND "Unified Health System" AND "Efficiency"	1 result	0	1	0	1
"Unified Health System" AND "Socioeconomic Development" AND "Health Management"	0 results	0	0	0	0
"Health Management" AND "Socioeconomic Development" AND "Efficiency"	0 results	0	0	0	0
TOTAL	88 results	-22 excluded	66 results	-43 excluded	23 selected

Source: Author's Database, 2024.

Table 4 presents the results of a search in the Springer Nature database, using descriptors such as efficiency, health management, health economics, and socioeconomic development. In total, 567 articles were initially found. After the 1st screening, which excluded 281 studies due to criteria such as limited access, year of publication or duplicity, and a 2nd screening focused on thematic relevance, an additional 244 articles were eliminated, resulting in 42 studies selected for final analysis.

More productive combinations:

i. The search "Efficiency" AND "Health Management" AND "Health Economics" was the most expressive, with 343 initial results, culminating in 24 final articles, demonstrating the strong academic interest in this intersection.

ii. The combination of "Health Management" AND "Socioeconomic Development" AND "Efficiency" also stood out, with 85 initial results and 7 final articles.

1. Low productivity in specific descriptors:

i. Combinations involving the Unified Health System showed low representativeness. For example, "Unified Health System" AND "Socioeconomic Development" AND "Health Management" did not generate any final papers, despite the initial 4 results.

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ii. Other combinations, such as "Efficiency" AND "Unified Health System" AND "Socioeconomic Development", resulted in only 1 final article.

2. Trends and gaps:

a. The Springer Nature database revealed a concentration of studies related to health efficiency, management, and economics, topics that have been widely explored and relevant in the global context.

b. On the other hand, topics that connect the Unified Health System to socioeconomic development have scarce scientific production, evidencing a gap in the literature and potential for future research.

The results highlight the predominance of research focused on health efficiency and management with a focus on health economics, while issues related to the Unified Health System and socioeconomic development remain underexplored. The screening process, which significantly refined the volume of studies, ensured the selection of articles that were highly aligned with the objectives of the analysis. This thematic discrepancy suggests the need to broaden the academic debate in specific areas, especially on the integration of the SUS in contexts of development and efficiency.

Table 04: Springer Nature Outcome with English Descriptors and Screening Process

Combination of Search Terms	Results	Exclusion at 1st Screening (Limited access, year of publication, repeated)	Result for 2nd Screening (Theme)	Exclusion at 2nd Screening	Selected Articles for Final Analysis
"Efficiency" AND "Health Management" AND "Health Economics"	343 results	113	230	206	24
"Efficiency" AND "Unified Health System" AND "Socioeconomic Development"	19 results	11	8	7	1
"Health Management" AND "Health Economics" AND "Socioeconomic Development"	16 results	9	7	6	1
"Unified Health System" AND "Health Economics" AND "Efficiency"	21 results	15	6	5	1

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"Health Economics" AND "Socioeconomic Development" AND "Efficiency"	41 results	31	10	6	4
"Health Management" AND "Unified Health System" AND "Efficiency"	38 results	30	8	4	4
"Unified Health System" AND "Socioeconomic Development" AND "Health Management"	4 results	4	0	0	0
"Health Management" AND "Socioeconomic Development" AND "Efficiency"	85 results	68	17	10	7
Total	567 results	-281 excluded	286 results	-244 Deleted	42 selected

Source: Author's Database, 2024.

Table 5 presents the results of the search in CAPES Journals, focusing on descriptors related to efficiency, health management, health economics, and socioeconomic development. Initially, 88 articles were found, and 36 were excluded in the 1st screening, due to criteria such as limited access, year of publication, or duplicity. In the 2nd screening, based on thematic relevance, 32 more articles were eliminated, resulting in 20 articles selected for final reading.

The combination "Efficiency" AND "Health Management" AND "Health Economics" was the most productive, with 73 initial results, of which 15 articles were selected for analysis, reflecting the academic attention on efficiency and health economics. Another relevant combination was "Unified Health System" AND "Health Economics" AND "Efficiency", with 12 results, resulting in 4 final articles. On the other hand, combinations such as "Efficiency" AND "Unified Health System" AND "Socioeconomic Development" and "Health Management" AND "Unified Health System" AND "Efficiency" did not generate final articles, evidencing a low representativeness of these themes.

The results highlight a strong concentration of studies related to health efficiency and economics, while topics that connect the Unified Health System to socioeconomic development and efficiency have gaps in the literature. This panorama reinforces the need to expand research in these areas, especially in the Brazilian context. The screening

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process was essential to ensure the selection of articles aligned with the objectives of the analysis, resulting in a set of relevant studies for in-depth investigation.

Table 05: CAPES Journals Result with English Descriptors and Screening Process

Combination of Search Terms	Results	Exclusion at 1st Screening	Result for 2nd Screening	Exclusion at 2nd Screening	Selected Articles for Final Analysis
"Efficiency" AND "Health Management" AND "Health Economics"	73 results	30	43	28	15 Articles for Reading
"Efficiency" AND "Unified Health System" AND "Socioeconomic Development"	0 results	0	0	0	0
"Health Management" AND "Health Economics" AND "Socioeconomic Development"	0 results	0	0	0	0
"Unified Health System" AND "Health Economics" AND "Efficiency"	2 results	4	8	4	4 for Reading
"Health Economics" AND "Socioeconomic Development" AND "Efficiency"	3 results	2	1	0	1 for reading
"Health Management" AND "Unified Health System" AND "Efficiency"	0 results	0	0	0	0
"Unified Health System" AND "Socioeconomic Development" AND "Health Management"	0 results	0	0	0	0
"Health Management" AND "Socioeconomic Development" AND "Efficiency"	0 results	0	0	0	0
Total	88 results	-36 excluded	52 results	-32 excluded	20 selected

Source: Author's Database, 2024.

Table 6 presents the consolidation of the results obtained in several academic databases, detailing the total number of articles found, the articles excluded during the screening process and the articles selected for final analysis:

1. SciELO: Initial results: 19 articles. Exclusions: 13 articles, Final articles: 6 selected.
2. VHL ECOS: Initial results: 43 articles. Exclusions: 26 articles. Final articles: 17 selected.

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3. CAPES (DECS in Portuguese): Initial results: 154 articles. Exclusions: 91 articles. Final articles: 63 selected.
4. PUBMED: Initial results: 88 articles. Exclusions: 65 articles. Final papers: 23 selected.
5. Springer Nature: Initial results: 567 papers. Exclusions: 525 articles. Final papers: 42 selected.
6. CAPES Journals (DECS in English): Initial results: 88 articles. Exclusions: 68 articles. Final papers: 20 selected.

Table 06: Consolidation of Search Results and Article Selection Process

Database	Results	Exclusion	Selected Articles for Final Analysis
SCIELLO	19	13	6
VHL ECOS	43	26	17
CAPES (DECS in Portuguese)	154	91	63
PUBMED	88	65	23
Springer Nature	567	525	42
CAPES journals with DECS in English	88	68	20
Total	959 results	788 excluded	171 selected

Source: Author's Database, 2024.

In all, 959 works from different origins and countries were identified. After applying the inclusion and exclusion criteria, the number was reduced to 171 studies. Then, in the third and last screening, according to relevance criteria with detailed analysis, focused on the objective of the study and on the methodology used for the final result, 80 articles were selected for complete reading. This stage also aimed to identify the main references cited in the analyzed studies.

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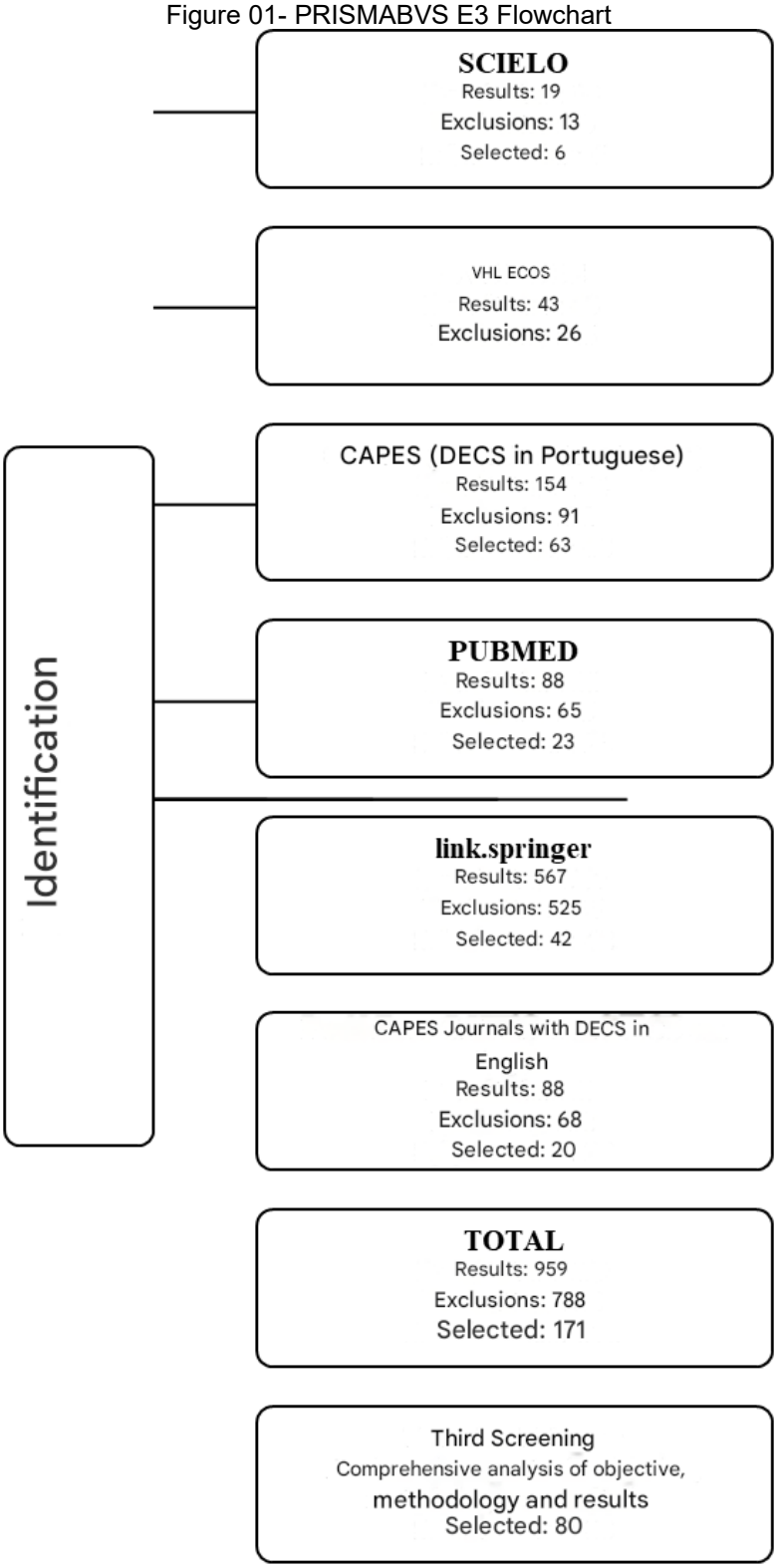
Figure 01- PRISMABVS E3 Flowchart



Source: Author, 2025.

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Table 07: Selected articles with DECS in Portuguese

No.	Title	Authors	Year/ Magazine	Methodology
1	Research and scientific production in health economics in Brazil	Eli Iôla Gurgel Andrade, Francisco de Assis Acúrcio, Mariângela Leal Cherchiglia, Soraya Almeida Belisário, Augusto Afonso Guerra, Daniele Araújo Campos Szuster, Daniel Resende Faleiros, Hugo Vocurca Teixeira, Grazzielle Dias da Silva, Thiago Santos Taveira	2007 Rev. Public Administration	Bibliographic Mapping
2	Management models and the SUS	Nelson Ibañez, Gonzalo Vecina Neto	2007 Ciênc. Collective Health	Desk Research
3	A model for evaluating the efficiency of public administration through the data envelopment analysis (DEA) method	Carlos Rosano Peña	2008 Rev. adm., Contemp.	DEA
4	Efficiency of municipal spending on health and education: An investigation through envelopment analysis in the state of Rio de Janeiro	Flávia Peixoto Faria, Paulo de Martino Jannuzzi, Silvano José da Silva	2008 Journal of Public Administration	DEA
5	The model for defining priorities of the SUS Cuiabá: Divergences that make it impossible to implement priorities	Nilva Maria Fernandes de Campos, Wildce G. Araújo Costa	2011 UNIVAG e-magazine	Semi-Structured Interviews and Document Analysis,
6	Managerial roles of the directors of public hospitals in Belo Horizonte	Wânia Candida da Silva, Nina Rosa da Silveira Cunha, Flávio Diniz Capanema, Afonso Augusto Teixeira de Freitas de Carvalho Lima	2012 RAHIS – Journal of Hospital Administration and Innovation in Health	Semi-structured interview based on the Quinn Model
7	Electronic governance practices and efficiency in the use of revenues: An analysis in Brazilian states	Ilse Maria Beuren, Geovanne Dias de Moura, Nilton Roberto Kloeppel	2013 Rev. Public Administration	DEA-Solver.
8	Innovation in health services in Brazil: Analysis of the cases awarded in the innovation contest in the federal public administration	Ferreira, Vicente da Rocha Soares; Najberg, Estela; Ferreira, Cintia Bragheto; Barbosa, Nelson Bezerra	2014 Rev. Public Administration	Qualitative-descriptive. Documentary
9	Does corporate governance influence the efficiency of Brazilian companies?	Igor Bernardi Sonza, Gilberto de Oliveira Kloeckner	2014 Accounting & Finance Journal - USP	DEA and Dashboard Data

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10	The efficiency of care in health units linked to the SUS in the southwest of Mato Grosso do Sul	Itzhak David Simão Kaveski, Larissa Degenhart, Mara Vogt, Nelson Hein	2015 Public Administration, Public Accounting and Social Management	DEA
11	Efficiency of public health spending: a challenge for municipalities in Santa Catarina, Brazil	Luciana Maria Mazon, Luis Paulo Gomes Mascarenhas, Valdir Roque Dallabrida	2015 Health soc.	DEA-CCR
12	The efficiency of Primary Health Care in the municipalities of Pernambuco from the perspective of data envelopment analysis	Maria Rosa Fragoso de Melo Dias	2016 Master's Thesis PPGGES	DEA-BCC
13	Control in the allocation of resources in public health: An analysis of the micro-regions of southeastern Brazil	Lucas Maia dos Santos, José Roberto de Souza Francisco, Márcio Augusto Gonçalves	2016 Public Administration and Social Management	DEA
14	Reflections on the role of health economics units within national health systems	Fabiola Sulpino Vieira	2016 Health soc.	Review Study
15	Global governance indicators and their relationship with the socioeconomic indicators of the BRICS countries	Pedro de Barros Leal Pinheiro Marino, Rômulo Alves Soares, Márcia Martins Mendes De Luca, Alessandra Carvalho de Vasconcelos	2016 Rev. Public Administration	DEA
16	Quality and evaluation in federal public services in Brazil: Historical and normative overview	Sadraque Oliveira Rios, Vera Lúcia Peixoto Santos Mendes	2016 Bahia Journal of Public Health	Literature Review
17	Innovation in the drug purchasing process: A case study of the Ministry of Health	Dayse Karenine de Oliveira Carneiro, Pedro Carlos Resende	2017 Rev. Serv. Public Brasilia	Focus Groups with Content Analysis
18	Analysis of the impact of alternative sources of financing on the efficiency and productivity of subnational federative entities in Brazil after the Fiscal Responsibility Law	Paulo Rogério Faustino Matos	2017 Journal of Public Administration	DEA
19	Evaluation of the efficiency of care in the SUS through data envelopment analysis: A study in the micro-regions of the state of Paraná	Herivélton Antônio Schuster, Suzana Habitzreuter Muller, Moacir Manoel Rodrigues	2018 Public Administration and Social Management	DEA

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20	A longitudinal assessment of technical efficiency in the outpatient production of maternal health services in Mexico	Serván-Mori, Edson; Chivardi, Carlos; Mendoza, Miguel Ángel; Nigenda, Gustav	2018 Health Policy and Planning	DEA
21	IPEA's health production: Contribution to the promotion of Brazilian socioeconomic development	Fabiola Sulpino Vieira	2019 IPEA	Descriptive and Relational Bibliometric Study
22	Granger's causality of the socioeconomic development index in the fiscal management of Brazilian municipalities	João Paulo de Oliveira Louzano; Luiz Antonio Abrantes; Marco Aurélio Marques Ferreira; Robson Zuccolotto	2019 Rev. Public Administration,	Regression Model with Panel Data and application of Granger's causality.
23	The efficiency of public spending in education: An evaluation of the Serido Potiguar region (2008-2015)	Andréa Cristina Santos de Jesus, Alinne Louise Feliciano Dantas, Márcio Vieira da Silva	2019 Res., Soc. Dev.	DEA
24	Efficiency or inefficiency of the social health organization in the management of primary health care	Cintia de Andrade Fonseca, Lúcia Dias da Silva Guerra	2019 JMPHC	Integrative Literature Review
25	Fulfillment of the goals of the health care management and quality contracts	Mariana Vieira de Melo, Leonardo Carnut	2020 JMPHC	Systematic Review Integrative of Literature.
26	Relationship between efficiency of public management and socioeconomic development: A study in the municipalities of Ceará	Vicente Lima Crisóstomo, Clayton Robson Moreira da Silva	2020 Development in Question	DEA and Firjan Municipal Development Index
27	Efficiency of state hospitals in Santa Catarina: A comparison between management models	Antonio Felipe Oliveira Rodrigues, Silvio Bhering Sallum, Fabiano Maury Raupp	2020 Advances in Scientific and Applied Accounting	DEA and Dashboard Data
28	Expenditures of previous years: An analysis of the relationship with the execution of the public budget and the efficiency in the management of resources	Saulo Silva Lima Filho, Blênio Cezar Severo Peixe	2020 Advances in Scientific and Applied Accounting	DEA and Dashboard Data
29	Financing, Composition of Expenditures and Efficiency in Health in the Municipalities of Pernambuco	Kleber Morais de Sousa, Monica de Maria Santos Fornitani Pinhanez, Paulo Aguiar do Monte, Paulo Roberto Nóbrega Cavalcante	2020 Public Administration and Social Management,	Multiple regression with Panel data
30	Document Management in the Brazilian Public Health Administration: An analysis from the point of view of Primary Care managers	Beatriz Rosa Pinheiro dos Santos, Ieda Pelógia Martins Damian	2020 IBERSID.	Descriptive and exploratory

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31	The Statement of Economic Result as an Indicator of Efficiency in the Management of Public Spending	Fabiano Rosa Lamoglia, Pierre Ohayon, José Augusto Veiga da Costa Marques	2020 Society, Accounting and Management	This is a descriptive qualitative study with literature analysis.
32	Quality of service provided x job satisfaction: A survey of employees of a Municipal Health Department in the Midwest region of Rio Grande do Sul	Claudio Raimundo de Bastos Brasil, Guilherme Aquino Delevati	2020 Brazilian Journal of Development	Descriptive research with interview
33	Relationship between management performance and the variables that influenced the efficiency and effectiveness of the Bolsa Família program	Iessa de Jesus Alves, Simone Alemandro Leite Filho, Geraldo Eduardo Bezerra George	2020 Public Administration and Social Management,	Multivariate regression Panel data
34	Comparative Analysis of the Allocative Efficiency of Municipal Public Expenditures using Data Mining	Paula Guelman Davis, Antônio Artur de Souza	2021 Public Administration and Social Management,	DEA and Data Mining
35	Information for the State management of SUS 2023 – 2026	Cipriano Maia de Vasconcelos	2021 CONASS	Book
36	Efficiency and sustainability of public health spending in Brazil	Edson Araújo, Maria Stella de Castro Lobo, André C. Medici	2022 Brazilian Journal of Health Economics	DEA
37	Fiscal Management and the Efficiency of Public Spending on Education and Health in Brazilian States	Raumaxciene Parente Lima, Francisco Antonio Bezerra	2022 Public Service Journal	AED and Tobit Regression Technique
38	Efficiency and Productivity of Health Expenditures, Actions and Services in the Most Populous Municipalities of Ceará in the Context of EC 95/2016	Antonio Rafael Valério de Oliveira, Samuel Cavalcante Mota, Alessandra Carvalho de Vasconcelos	2022 Public Administration and Social Management	DEA- BCC and Malmquist Productivity Index (MPI)
39	The Brazilian State in the context of the crises of dependent capitalism: commodification of public health via social organizations	Daniele Correia, Kleiton Wagner Alves da Silva Nogueira	2023 JMPHC	Literature Review
40	Performance Evaluation Model to Measure the Effectiveness of State Public Spending	Gilberto Crispm, Luiz Alberton, Ernani Ott	2023 Online challenge	DEA

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41	Technical efficiency of Primary Health Care (PHC) in the municipalities of Minas Gerais (2015-2019)	Thiago Costa Soares, Letícia Barreto da Cunha	2023 Institute of Economics and International Relations – UFU	DEA
42	Evidence of the impact of corruption on the efficiency of health and education policies in Brazilian states	Luckas Sabioni Lopes, Silvia Harumi Toyoshima	2023 Technical Efficiency; Corruption; Health and Education	DEA- BBC
43	Efficiency in public health: The trajectory of a concept from engineering	Janiele Cristine Peres Borges, Ronaldo Bordin	2023 Health Debate	Theoretical Essay
44	Determinants of the Relative Efficiency of Public Health Management	Érica Suélen do Nascimento, Franscisval de Melo Carvalho, Gideon Carvalho de Benedicto, José Willer do Prado	2023 Public Administration and Management	Tobit Regression Technique DEA
45	Outsourcing of public health and the dismantling of primary care in the city of São Paulo	Andrey Oliveira da Cruz, Maria Cristina da Costa Marques	2023 JMPHC	Systematic review
46	Knowledge of family health unit managers about Previne Brasil indicators	Heitor José Negri Dariva, Suzana Liotto Hirsch, Matheus Leandro Antes, Marcos Renck de Seixas, Analía Samanta López	2024 Cuadernos de Educación y Desarrollo	Anonymous Quiz in Google Forms
47	Public Management and Socioeconomic Performance: A Municipal Analysis	K. S. Silva, Renata Braga Berenguer de Vasconcelos	2024 Public Administration and Social Management,	Document Data Analysis

Source: Author's Database, 2025.

Table 08: Selected articles with DECS in English

No.	Title	Authors	Year/Journal	Methodology
48	Investigating health system performance: An application of data envelopment analysis to Zambian hospitals	Felix Masiye	2006 "BMC Health Services Research" magazine.	DEA
49	Pharmaceutical cost control in primary care: opinion and contributions by healthcare professionals	Alexandra Prados-Torres1, Amaia Calderón-Larrañaga, Antoni SicrasMainar, Sebastià March-Llull, Bárbara Oliván-Blázquez.	2009 BMC Health Services Research	Focus Groups
50	The essence of governance in health development	Joses Muthuri Kirigia, Doris Gatwiri Kirigia	2011 Revista International Archives of Medicine.	Document Review
51	Development of Public Health Education in Bulgaria	Stoyanka Popova, MD, PhD, Lora Georgieva, MD, PhD, Yordanka Koleva, MA, MPH	2011 Public Health Reviews	Descriptive Historical Review

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52	The state of the research for health environment in the ministries of health of the Economic Community of the West African States (ECOWAS)	Issiaka Sombié, Jude Aidam, Blahima Konaté, Télesphore D Somé, Stanislas Sansan Kambou	2013 Health Research Policy and Systems Journal.	Questionnaire
53	Equity in Distribution of Health Care Resources; Assessment of Need and Access, Using Three Practical Indicators	Habib Omrani-Khoo , Farhad Lotfi , Hossein Safari, Sanaz Zargar Balaye Jame, Javad Moghri and Milad Shafii	2013 Iran J Public Health	Lorenz curves; Gini Coefficient, Concentration and Robin Hood Indices.
54	Health systems performance assessment in low-income countries: learning from international experiences	Christine Kirunga Tashobya, Valéria Campos da Silveira, Freddie Ssengooba, Julieta Nabyonga-Orem, Jean Macq and Bart Criel	2014 Globalization and Health	Literature Review
55	Do economic evaluation studies inform effective healthcare resource allocation in Iran? A critical review of the literature	Hassan Haghparast-Bidgoli, Aliasghar Ahmad Kiadaliri, Jolene Skordis-Worrall	2014 Cost Effectiveness and Resource Allocation	Systematic Review
56	Technical efficiency and resources allocation in university hospitals in Tehran, 2009-2012	Aziz Rezapour, Farbod Ebadifard Azar, Negar Yousef Zadeh, YarAllah Roumiani, Saeed Bagheri Faradonbeh	2015 Med J Islam Repub Iran	DEA
57	Determinants of maternal mortality in Eastern Mediterranean region: A panel data analysis	Mohsen Bayati, Sajad Vahedi, Firooz Esmaeilzadeh, Zahra Kavosi, Zahra Jamali, Abdolhalim Rajabi, Yousef Alimohamadi	2016 Med J Islam Repub Iran	Dashboard Data
58	The Systemic Changes to Improve Efficiency in Polish Primary Health Care	Tomasz Holecki, Piotr Romaniuk, Joanna Woźniak-Holecka	2016 Pharmacol frontal	Systematic Review
59	A study on satisfaction with publicly financed health services in China	Shaoguo Zhai; Pei Wang; Anli Wang; Quanfang Dong; Jiaoli Cai and Peter C. Coyte	2017 Globalization and Health	Interview
60	A critique of the Uganda district league table using a normative health system performance assessment framework	Christine Kirunga Tashobya; Freddie Ssengooba; Juliet Nabyonga-Orem; Juliet Bataringaya; Jean Macq; Bruno Marchal; Timothy Musila, Bart Criel	2018 BMC Health Services Research	Key Informant Interview (KII).
61	Utilitarianism and the ethical foundations of cost-effectiveness analysis in resource allocation for global health	Elliot Marseille, James G. Kahn	2019 Philosophy, Ethics, and Humanities in Medicine	Review Study
62	Factors affecting the technical efficiency of rural primary health care centers in Hamadan, Iran: data envelopment analysis and Tobit regression	Saeed Mohammadpour, Javad Javan-Noughabi , Ali Vafaee Najar, Moharram Zangeneh , Shaghayegh Yousefi, Mojtaba Nouhi, Reza Jahangiri	2020 Cost Effectiveness Resource Allocation	DEA Tobit Panel Review

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63	Nonparametric estimation of a primary care production function in urban Brazil	Bruno Wichmann, Roberta Wichmann	2020 Health Economics Review	Cobb-Douglas (CD)
64	Political economy analysis of the performance-based financing programme in Afghanistan	Ahmad Shah Salehi, Carlos Blanchet, Ana Vassall and Josefina Borghi	2021 Global Health Research and Policy	Semi-structured interviews and Document Review
65	Health capabilities and the determinants of infant mortality in Brazil, 2004–2015: in the innovative methodological framework	Alexandre Bugelli, Roxane Borgès Da Silva, Ladislau Dowbor, Claude Sicotte	2021 BMC Public Health	(MVA) Multivariate Data Analysis -
66	Bridging the impactibility gap in population health management: a systematic review	Andi Orlowski, Sally Neve, Heather Humphreys, Wayne Smith, Rebecca Siân Jones, Rachel Ashton, Jackie Buck, Alex Bottle	2021 BMJ Open	Systematic Review
67	PRIMASYS: a health policy and systems Research approach for the assessment of country primary health care systems	Kabir Sheikh and Abdul Ghaffar	2021 Health Research Policy and Systems Journal.	Document Review
68	How Efficient are Basic Public Health Services Between Urban and Rural in Shandong Province, China? A Data Envelopment Analysis and Panel Tobit Regression Approach	Fankun Cao , Yan Xi, Chao Zheng, Tongyu Bai, Qiang Sun	2022 Risk Management Healthc Policy	Data Envelopment Analysis and Tobit Panel Regression Approach
69	Efficiency analysis of primary healthcare facilities in Afghanistan	Farhad Farewar, Khwaja Mir Ahad Saeed, Abo Ismael Foshanji, Said Mohammad Karim Alawi, Mohammad Yonus Zawoli, Sinai Irit, Wu Zeng	2022 Cost Effectiveness and Resource Allocation	DEA
70	Challenges of Implementing an Effective Primary Health Care Accreditation Program: a qualitative study in Iran	Farid Gharibi, Esmaeil Moshiri, Masoumeh Ebrahimi Tavani, Koustuv Dalal	2023 Health Research Policy and Systems Journal.	Interview
71	Developing Iranian sub-national primary Health Care Measurement Framework: A Mixed-Method Study	Ramin Rezapour, Ardeshir Khosravi, Mostafa Farahbakhsh, Elham Ahmadnezhad, Saber Azami-Aghdash, Jafar Sadegh Tabrizi	2023 Archives of Public Health	Revision
72	Cost efficiency of primary health care facilities in Ghana: stochastic frontier analysis	Kwadwo Arhin Eric Fosu Oteng-Abayie, Jacob Novignon	2023 Discover Health Systems	Stochastic Frontier Analysis (SFA)
73	Does patient and public involvement impact public health decision-making? A 10 year retrospective analysis of public consultation in Brazil	Ana Carolina de Freitas Lopes, Hillegonda Maria Dutilh Novaes, Patrícia Coelho De Soárez	2023 Health Research Policy and Systems Journal.	Cross-Sectional Study with Report Analysis Technical

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74	Decentralization of the health system – experiences from Pakistan, Portugal and Brazil	Shafaq Mahmood, Rita Sequeira, Muhammad Muneeb Ullah Siddiqui, Marcos Batista Araujo Herkenhoff, Patrícia Pita Ferreira, Adalberto Campos Fernandes, Paulo Sousa	2024 Health Research Policy and Systems Journal.	Literature and Documentary Review
75	Investigating the citing communities around three leading health-system frameworks	George Weisz and Jonathan Harper	2024 Health Research Policy and Systems Journal	Review Study
76	Patient-centered lean healthcare management from a humanistic perspective	Min Chen, Qing Guan, Jianmin Zhuang	2024 Health Research Policy and Systems Journal.	Literature review
77	Primary health care as a tool to promote equity and sustainability; a review of Latin American and Caribbean literature	Daniel Maceira, Rolando Enrique Peñaloza Quintero, Patricia Suarez, Laura Vanessa Peña Peña.	2024 International Journal for Equity in Health	Review Study
78	Proceedings of the 16th Annual Conference on the Science of Dissemination and Implementation in Health	Gila Neta, David A. Chambers, Lisa Simpson	2024 Implementation Science	Stochastic Frontier Analysis (SFA)
79	Modelling efficiency in primary healthcare using the DEA methodology: an empirical analysis in a healthcare district.	Silvia González-de-Julián , David Vivas-Consuelo, Isabel Barrachina-Martínez	2024 BMC Health Serv Res	DEA
80	The Knowledge and Application of Economics in Healthcare in a High-Income Country Today: The Case of Belgium	Balduíno Standaert, Désirée Vandenberghe, Marca P Connolly, João Hellings	2024 J Mark Access Health Policy	Literature review

Source: Author's Database, 2025.

DISCUSSION

The studies analyzed demonstrate that efficiency in public health cannot be evaluated exclusively from the perspective of cost rationalization, but must consider aspects such as equity, access, and quality of the services provided. Authors such as Mazon *et al. (2015) and Borges & Bordin (2023) highlight the need to incorporate metrics that reflect not only technical efficiency, but also the impact of health policies on reducing regional inequalities. This approach is essential to align the principles of health economics with the guidelines of the Unified Health System (SUS), which advocate universality, comprehensiveness, and equity.*

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However, there is a relative scarcity of studies that directly correlate investments in public health with indicators of impact on economic development, such as the Gross Domestic Product (GDP) and the Human Development Index (HDI). This gap points to the need for research that deepens the understanding of the relationship between the efficient management of health resources and the improvement of socioeconomic indicators.

The results of this systematic review show that efficiency in public health management has been widely analyzed through quantitative methods, especially Data Envelopment Analysis (DEA) and Tobit regression models. These methods are used to assess the technical efficiency of health units, as well as to identify determinant factors of health system performance in different regional and institutional contexts (Soares and Cunha, 2023; Cao *et al.,* 2022). However, the findings also highlight gaps in the integration of multidimensional approaches that can address socioeconomic and organizational aspects of mixed-method health services in stages (Rezapour *et al.,* 2023). The author highlights that the desired health outcomes are more attainable through strong Primary Health Care (PHC). Using comprehensive, science-based tools, decision-makers are guided to formulate better PHC reforms and policies (Rezapour *et al.,* 2023).

AED was identified as the predominant methodology, used to measure operational efficiency at different levels of the health system (González-de-Julián *et al.,* 2024; Farewar *et al.,* 2022). Studies indicate that its application makes it possible to compare production units, identifying those that operate with greater relative efficiency and enabling the improvement of evidence-based management practices in the adoption of technologies that occurred in Brazil between 2012 and 2021 (Lopes *et al.,* 2023). In particular, studies on Primary Health Care (PHC) point out that the technical efficiency of the units can be impacted by factors such as financing, distribution of resources, and incentive policies (Bugelli *et al.,* 2021), the authors conducted a study between 2004 and 2015, and found that there was a significant reduction in infant mortality rates in Brazil, highlighting the impact of public policies such as the Family Health Strategy and Bolsa Família (Bugelli *et al.,* 2021). This reinforces the importance of strategic allocation of investments, especially in regions where health indicators have greater inequalities (Tashobya *et al.,* 2018).

Another relevant finding concerns the use of panel data, which allows a longitudinal analysis of the efficiency of health services. This approach is essential to assess the impact of changes in public policies over time (Sabioni Lopes and Toyoshima, 2023). The application of Tobit regression, in particular, allows us to explore how macroeconomic

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variables, such as GDP per capita and public health spending, influence the efficiency of health systems (Mohammadpour *et al.,* 2020). However, there is a lack of studies that combine these techniques with qualitative approaches to capture the complexity of health management, a point highlighted by Mahmood *et al.* (2024) when analyzing the decentralization of health systems in different countries.

The review also pointed out that health management has been impacted by global trends in efficiency and sustainability. Stochastic frontier models (SFA) have been employed to analyze the performance of public health services and suggest that factors such as governance and transparency play a crucial role in the efficiency of spending (Standaert *et al.,* 2024). In addition, the literature emphasizes the importance of financing and regulation mechanisms, highlighting that the quality of governance directly influences the allocation of resources and equity in the provision of services (Kirigia and Kirigia, 2011), The Cost-Effectiveness Analysis in the context of global health, implies where and how resources should be allocated in a manner consistent with maximizing the overall benefit, such as deaths averted or quality-adjusted life years gained. Such allocation decisions are consistent with the findings of cost-effectiveness analyses, all lives have equal value, (Marseille and Kahn, 2019).

The study by Pinheiro Marino *et al.* (2016) that investigated the relationship between the World Bank's governance indicators and the socioeconomic development indicators in the BRICS countries indicated the explanatory capacity of the dimensions of governance indicators in relation to the HDI is greater when compared to that of the dimensions of governance indicators related to GDP, which can be understood by the fact that the second indicator deals only with the economic dimension, while the HDI encompasses other factors. Still in international studies, from a comparative perspective, Mahmood *et al*. (2024) discussed international experiences of decentralization of health systems, emphasizing that countries such as Portugal and Brazil still face significant challenges in optimizing the service network.

The review reveals that few studies discuss the relationship between governance and efficiency in public health management. Kirigia and Kirigia (2011) suggest that countries with better governance practices and transparency in the management of health resources tend to have higher levels of efficiency. In the Brazilian context, this relationship is still little explored, which highlights the importance of studies that integrate governance and fiscal responsibility metrics into efficiency evaluations.

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Another relevant point identified in the systematic review concerns the evaluation of Primary Health Care (PHC) as a strategy to optimize the allocation of resources and reduce inequalities. Studies such as those by Soares and Cunha (2023) show that municipalities with higher PHC coverage tend to perform better in efficiency indicators, reinforcing their role in the sustainability of health systems. However, there is a gap in the literature on the longitudinal evaluation of PHC and its long-term impact on regional development.

In view of this, the results obtained reinforce the need to improve the methodologies for evaluating efficiency in public health**,** with the inclusion of contextual variables that take into account socioeconomic, regional and structural aspects. In addition, the systematization of efficient practices and the dissemination of management models can be successful, contributing to the construction of more effective public policies aligned with the needs of the population.

Finally, there is a growing need for interdisciplinary approaches in the evaluation of health efficiency, including elements of management, economics, and public policy. Studies also indicate that value-based health strategies and innovation in public management can contribute significantly to improving the quality of services and optimizing the use of resources Mahmood *et al*. (2024) and Ferreira *et al.,* (2014).

CONCLUSION

The analysis of the reviewed studies shows the growing concern with the efficiency in the management of public health resources, reflecting an evolution in the methodologies applied and in the indicators used over time. The findings of this review reinforce the relevance of Data Envelopment Analysis (DEA) and Panel Data modeling as predominant approaches in measuring efficiency in the health sector. However, it is observed that the application of these methodologies still has limitations, especially with regard to the integration of variables that capture the socioeconomic impact of investments in health.

Despite the advances in research on the subject, there are still challenges to be overcome, such as the standardization of methodologies, the integration of indicators and the overcoming of regional social inequalities in the same place. The review highlights the need to advance in the construction of efficiency evaluation models that are applicable in different regional contexts, allowing comparisons between municipalities and states. The development of a model that incorporates both technical efficiency and socioeconomic

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impacts can contribute significantly to the formulation of evidence-based public policies, assisting managers in decision-making and in the more effective allocation of public resources, the findings of this study contribute to the advancement of knowledge in the area of efficiency in public health by providing a comprehensive view of the methodologies used and the gaps in the literature. The results reinforce the importance of approaches that integrate health economics, public administration, and socioeconomic development, promoting a more equitable and sustainable health system.

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