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SIMAPES: INNOVATION FOR THE MANAGEMENT SYSTEM IN PUBLIC POLICIES IN THE AREA OF HEALTH EDUCATION IN BRAZIL

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Abstract: The article aims to present and discuss the Health Education Mapping System (SIMAPES) as an innovative technological instrument for public management, which integrates data from the education and health sectors in Brazil, with the aim of improving public policies in these areas. The data were obtained from official ordinances of the Brazilian Ministry of Health and through consultation on the "SIMAPES" platform. For the literature review and discussion, we carried out an integrative search in the SciELO database with keywords, using works available in full that covered the use of information technologies, public policies and the intersection of public sectors. SIMAPES carries out mapping, monitoring and evaluation of the health education situation, integrating and intersecting data sources from the Higher Education Census, Brazilian Institute of Geography and Statistics (IBGE) and the Unified Health System (SUS). Among the indicators generated by the system are the number of places in health courses, available infrastructure and regional human resources training needs. The innovative integration of data that this tool performs can contribute to decision-making in public policies regarding the opening of vacancies and courses in the health area, according to local needs and directly benefiting the Brazilian population, thus representing an advance technology in public management. However, this is a system that is still being improved and requires further investigation, especially in relation to possible biases.

Keywords: Public Policy, Health Education, Information Technology, Information Management.

INTRODUCTION

Given the exponential increase in the creation and availability of data and information in various public and private repositories, the integration of data between different sectors of public administration represents a challenge for the implementation of integrated and efficient public policies. In particular, interoperability between health and education information systems is fundamental for policies that involve the interface between these fields, such as the training of human resources for health (Pagotto et al., 2022).

Several studies point to the potential of information systems to promote this integration. Silva et al. (2020) evaluated information technologies for integrating health information systems, highlighting the benefits for health planning. In turn, the study by Souza et al. (2019) emphasized the gains from using information technology in the integration between education, health surveillance and primary care.

The scenario of public policies in the health sector in Brazil is no different, technologies are tools that support interventions aimed at promoting, protecting, preventing and recovering the health of the population in the country, being important in all stages of transition of care for those who they need the single (and public) health system in Brazil - the SUS (Unified Health System), (Vasconcelos et al., 2021). From this perspective, in 2012, the member states of the Pan American Health Organization (PAHO) adopted resolution CSP28.R9, definitively providing for the evaluation and incorporation of information technologies in health systems, substantiating the importance of guiding new policies public policies in this area and the evaluation and maintenance of policies already established by member countries, including Brazil (OPAS, 2012).

In the meantime, Brazil reinforced and

incorporated centralized information systems on health status in the sanitary field, on diseases and injuries, costs and expenses of the sectors. However, with the increasing decentralization of policies between managers in the education area and managers in the health sector, information regarding the performance of the intersection of the education sector and the health sector began to be managed in an indecomposable way, creating difficulties in evaluating these two convergent areas, as well as in decision-making aimed at health education (Zarpelon and Batista, 2022).

For Zarpelon and Batista (2022), the primary elements of integration processes in these areas involve management tools suited to the complexity of integrated systems and that can provide good communication mechanisms, as well as promoting joint planning of actions, providing a support structure and being able to deal with existing antinomies.

Seeking to increase the insertion and use of these new technologies for decision-making, Brazil developed the Health Education Mapping System (SIMAPES), aiming precisely to overcome the fragmentation of data between health and education. SIMAPES is responsible for mapping, monitoring and evaluating the situation of health education in the country. This tool, the subject of this article, can bring great benefits to the improvement of integrated public policies between health and education.

Faced with this impasse and considering the SUS (Unified Health System) competence to promote the articulation of the sectors of educational bodies, professional supervision and training of human resources in the health area, it is essential to discuss the implementation of the SIMAPES system as a public policy tool that articulates intersectoral technology of education with health in Brazil.

OBJECTIVES

This manuscript's main objective is to: 1) Present SIMAPES: Health Education Mapping System in Brazil, as a tool implemented to remedy the deficit in the intersection between information from the health and education sectors in Brazil and qualify the planning and implementation of public policies relevant to health education.

Secondary objectives: 1) Discuss how SIMAPES can strengthen and support decision-making in public policies in the area of education. 2) Discuss how SIMAPES, as a mapping and evaluation system, can benefit the population by making political decisions based on intersectoral data made easily and quickly available to managers. 3) Promote the need to create unifying, technological, practical and intelligence systems in the adaptation, formulation and strengthening of public policies in all sectors.

MATERIALS AND METHODS

This is a qualitative study, with an exploratory and descriptive approach within the field of human, political, administrative and social sciences. This approach aims to identify the object of study through documentary evidence contextualized with bibliographic research (Stake, 2010), providing an in-depth and detailed analysis for readers.

The study first proceeded with the elaboration of the following research questions: "How can information and intelligence tools contribute to managers' decision-making, using the intersection of data and information between two distinct and independent areas?"; 2) How can SIMAPES, as a management tool incorporated by the Brazilian Ministry of Health, contribute to improving the intersectorality of teaching-service in health?

We carried out an integrative and non-systematic search of the literature, using the SciELO database with a search *string*

containing the keywords: "Education", "Health", "Information Technologies", "Intersection" joined by the Boolean operator "and". The resulting articles were filtered and selected based on complete reading, composing the literature review and discussion of the present manuscript.

The qualitative data obtained to achieve the objectives proposed by this article presenting and discussing the SIMAPES tool were collected through official sources from the Brazilian Government, considering that the object of study is an officially implemented system. Therefore, the research is based on Ordinance No. 4529/2022, which establishes the system, as well as the SIMAPES online platform, where all the data proposed by the tool is available.

RESULTS AND DISCUSSION

SIMAPES - Health Education Mapping System, in a general overview, enables the collection and analysis, as well as the availability of information pertinent to health education in Brazil. Furthermore, its mission is to promote transparency and research in health education, through the systematization of data of public interest relating to technical and undergraduate courses in the health area and the various structural interfaces of adjacent health services.

Among the main objectives of the SIMAPES tool is the investigation of the relationship between the provision of undergraduate courses in the health area, technical courses and the structure of health services, especially regarding the provision of sufficient and quality practice scenarios. Furthermore, the tool is responsible for presenting information about the installed capacity of the SUS (Unified Health System) in relation to the training of health professionals, with the aim of enabling the establishment of national and international parameters of best educational practices in health, as well as investigating training needs and qualification of managers, professionals and workers within the SUS (Unified Health System). Such objectives lead to continuous improvement in relation to the *expertise* of the national management of the Unified Health System (SUS), with the aim of guiding public health education policies in accordance with the duties provided for in section III of art. 6 and in item IX of art. 16, both of Law No. 8,080, of September 19, 1990.

The tool is also responsible for the continuous and permanent mapping, monitoring and evaluation of the situation in health education in Brazil. Mapping is understood as the process by which it is possible to collect, organize, systematize and gain in-depth knowledge of data from a given area of public administration or public policy, bringing together data from a single source or multiple sources to portray and describe a given set of data. Monitoring aims at the systematic and continuous monitoring of public policies, carried out through observation and measurement, aiming to obtain data, information and alerts, in a timely manner, to support decision-making regarding corrections in the management process. The evaluation is responsible for measuring the value or merit of an action in order to verify the relevance, efficiency, effectiveness, effectiveness, result, impact and sustainability of a policy or management process (BRAZIL, 2022).

SIMAPES data is presented from several dashboards, thus expanding the analytical scope of decision makers, as well as helping to improve communication between actors involved in the implementation of public policies that intersect education and health (Sousa et al., 2019; Bali et al., 2021).

SIMAPES is responsible for generating and managing the "Simapes Platform" - an

intelligence system (*Business Intellingence*) - which enables and makes available the results of data collection, the crossing of data from different indicators, sources and information banks on the subject. "Dynamic Panels" are available on the platform, an illustrative, dynamic, understandable and accessible panel, which contains an overview of health education, offering unified and non-unified data on the subject, such as, for example, absolute and relative numerical data on the census of higher education in Brazil; You can filter by year, location and health course. (Figure 1).

It is also possible to check tabs with intersectional data on the health situation of the places where these courses are being made available, such as the number of regional primary care teams, number of beds available per vacancy in each course, number of graduated professionals at the over the years, professional demand per SUS user and the history-evolution of these indicators over the years (Figure 2).

In addition to the dynamic panels on the SIMAPES platform, it is also possible to generate geographic thematic maps with existing data, such as, for example, the number of professionals trained per year over the years and the saturation index of fields of professional practice, by course, in each region of Brazil, enabling a broad view of the territory and also regionally - according to the public and/or manager's interest in health and/or education (Figure 3 and 4).

The databases responsible for continuously feeding this permanent system come from various population databases such as those provided by the "Brazilian Institute of Geography and Statistics" (IBGE), higher education censuses in historical series carried out by the Ministry of Education (MEC) in partnership with Universities and other institutions and Health Infrastructure data provided by various platforms that feed the databases of the "Sistema Único de Saúde no Brasil" (BRASIL, 2023).

The crossing of these indicators allows for better analysis of specific situations, reformulations of public policies in the health and education sectors and also provides better management of financial resources, materials and services in the areas that intersect higher education and work fields in the SUS (Unified Health System).

The data made available by the SIMAPES platform, such as the number of doctors graduating and graduated in a historical series, in each region, as well as the state and municipal differences that compare the location of the Higher Education Institution with the concentration of doctors/inhabitants in Brazil, are valid and guiding of important national public policies such as the creation of new medical schools in areas with a low saturation rate, the creation of new opportunities for residency and medical specialization and the need or not to hire foreign doctors to cover demand in Brazil, an example of the "Program Mais Médicos" and "Médicos para o Brasil" as well as the "Diploma Revalidation Process for Foreigners" (REVALIDA).

Furthermore, SIMAPES as a tool is an instrument of transparency in government public actions. That is, it enhances the relevance of policy implementation for society and all social actors involved (Cotta et. al., 2009). This way, this type of technology can also be used to measure the performance of public policies in the area of health education and evaluate their impact on society over a historical series (Kleba et al., 2015; Santos et al., 2020).

SIMAPES therefore denotes ideal technology in the context of Brazilian society, featuring a computerized system that brings together large databases, related to two important areas: health and education,
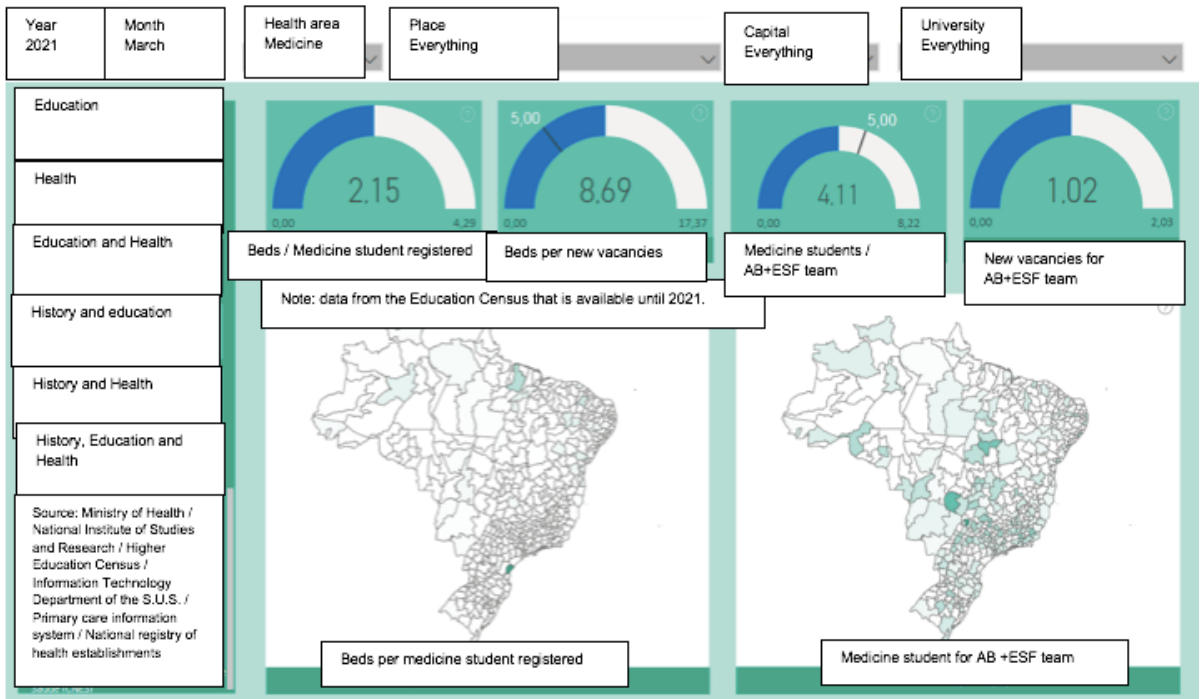
Figure 1. General view of the SIMAPES dynamic panel on the "Education and health" indicators, filtered by the medical course in March 2021.

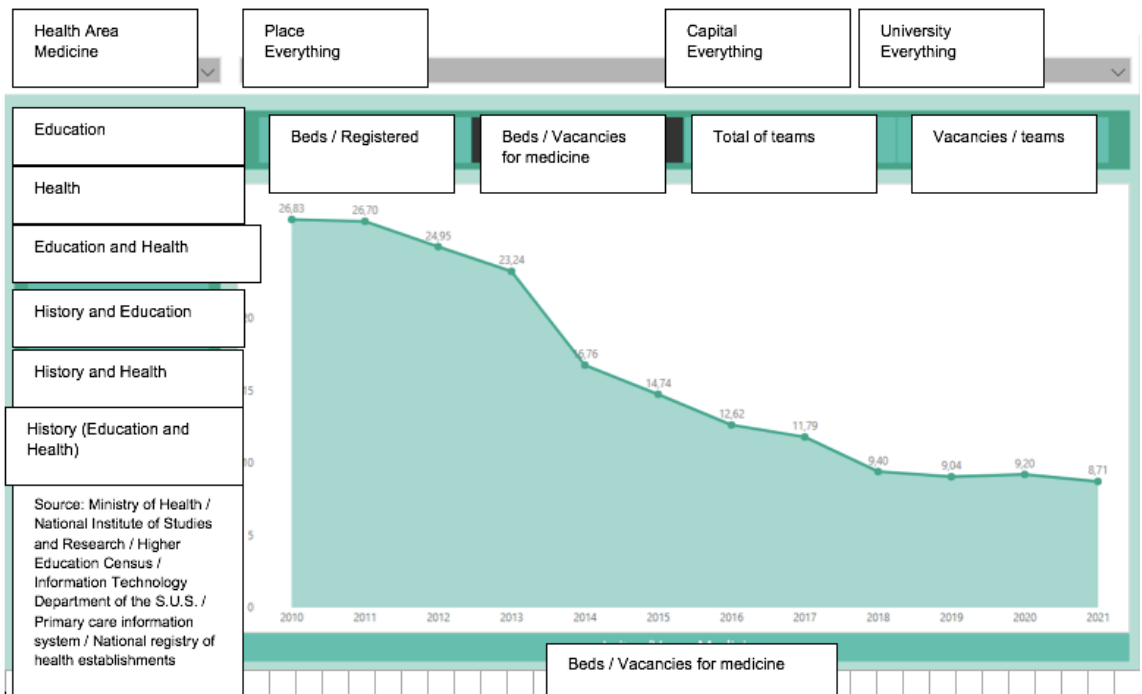Source: Ministry of Health, 2023

Figure 2. View of the Dynamic Panel with the history - Education and Health, relating the number of beds available for practices by undergraduate medical students and the number of students, over the last 10 years.
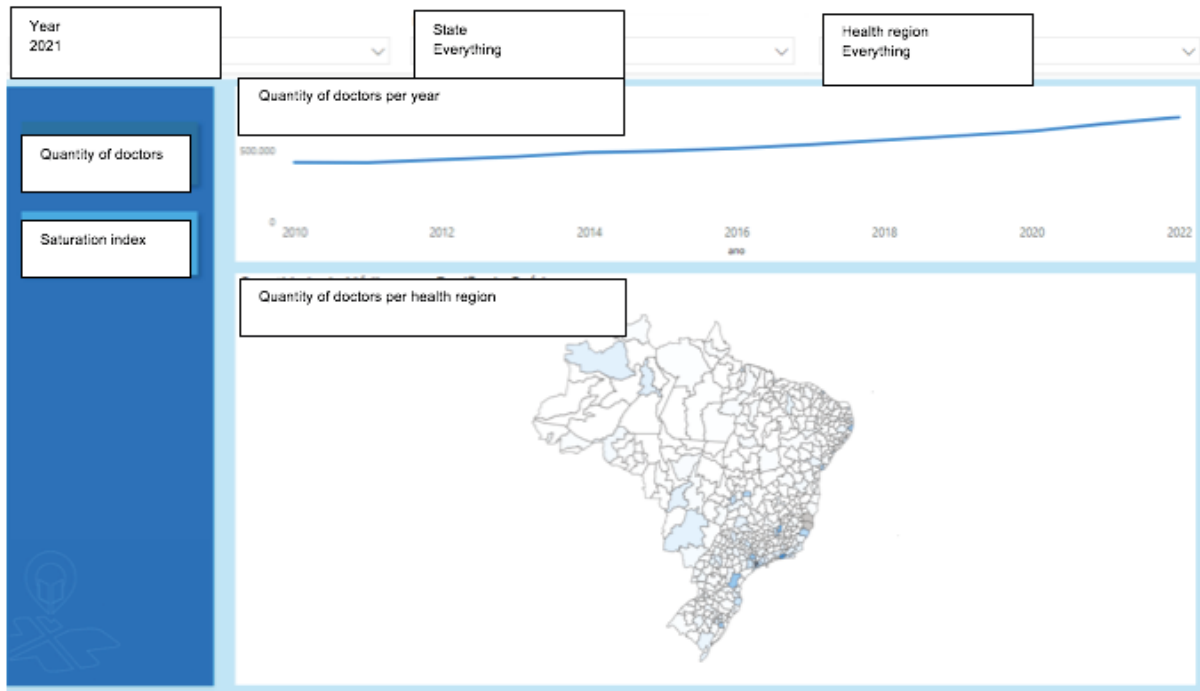
Source: Ministry of Health, 2023.

Figure 3. Geographic map and historical evolutionary line of the number of doctors trained per year in Brazil and in each region.

Source: Ministry of Health, 2023.

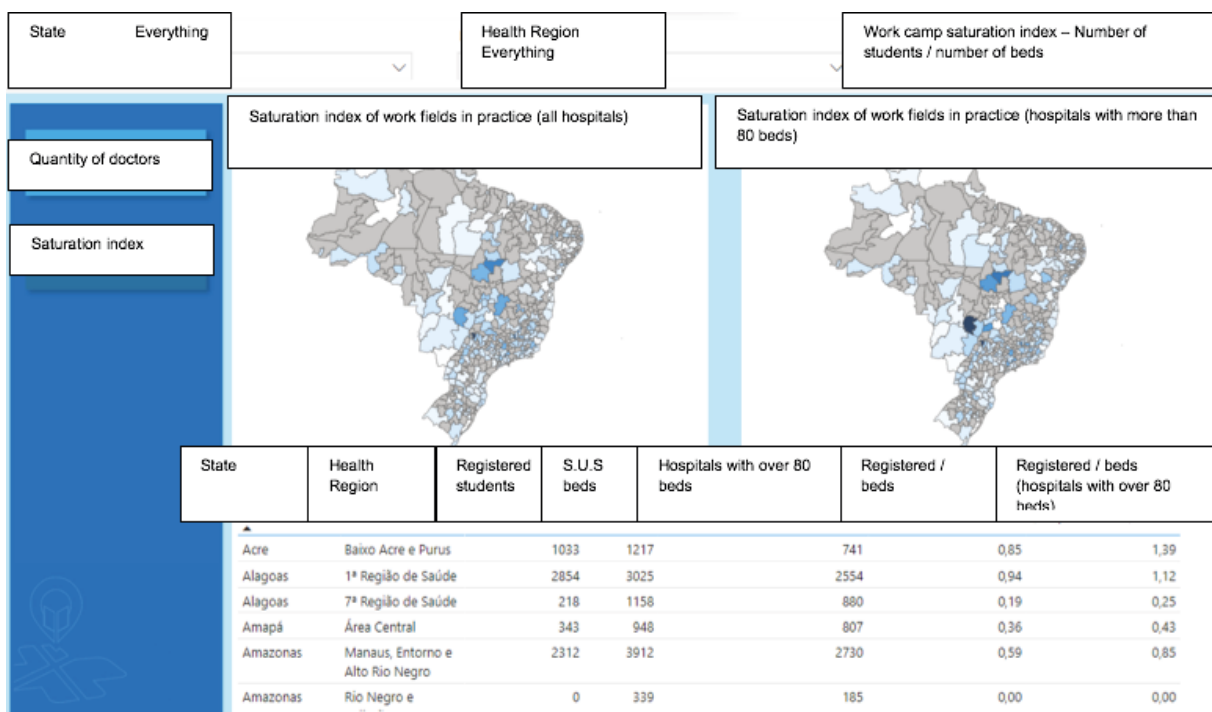| State	Health Region	Registered students	S.U.S beds	Hospitals with over 80 beds	Registered / beds	Registered / beds (hospitals with over 80 beds)
Acre	Baixo Acre e Purus	1033	1217	741	0,85	1,39
Alagoas	1ª Região de Saúde	2854	3025	2554	0,94	1,12
Alagoas	7ª Região de Saúde	218	1158	880	0,19	0,25
Amapá	Área Central	343	948	807	0,36	0,43
Amazonas	Manaus, Entorno e Alto Rio Negro	2312	3912	2730	0,59	0,85
Amazonas	Rio Negro e	0	339	185	0,00	0,00

Figure 4. Dynamic geographic map on the current Saturation index of fields of practice for medical courses in Brazil.

Source: Ministry of Health, 2023.

consisting of a set of heterogeneous data and integrated through an appropriate protocol and functional. This is considered one of the natural and essential requirements of an intelligent technological solution, considering the territorial extension of Brazil, with its inherent difficulties in communication and cooperation, and the egalitarian and homogeneous organization of the public machine (Nourani, 2010). Furthermore, it represents a solution for saving material and human resources, as little integration requires the same data to be filled in on different interfaces, generating rework and increased costs, as it becomes necessary to maintain several technological solutions with redundant functions (Neto, Andreazza and Chioro, 2020).

However, as a system under development, SIMAPES still presents some vulnerabilities. It is necessary to continually develop new information management strategies, as well as decision-making about the relevance of one piece of data over another. This is a challenge that faces the logic of selection bias, as in any operational technology aimed at the field of science.

Therefore, new studies are necessary with continued discussions and evaluations on the implementation of public policies and the maintenance of existing ones in the areas of health education, before and after SIMAPES. Discussions are also needed about the effectiveness of the system in terms of its functioning as a transparency tool for the general population.

CONCLUSION

This article aimed to analyze the potential of the Health Education Mapping System (SIMAPES) as an instrument to integrate data from the education and health sectors, seeking to improve public policies.

It was found that SIMAPES aims to map,

monitor and evaluate the situation of health education in Brazil. To do this, it integrates different data sources, generating useful indicators for planning actions that involve the interface between health and education. SIMAPES has proven to be an effective, transparent and simple tool, providing data and information to make more assertive decisions that are more congruent with reality at the intersection of education and health.

These characteristics of SIMAPES align it with previous studies that defended the use of information systems to promote interoperability between data from the health and education sectors. The system has the potential to bring relevant benefits in this context, supporting integrated public policies.

This way, intelligent management tools play a fundamental role in the success of public policies and guarantee uniformity of information and easy access for managers and the public, in order to guarantee the improvement of the quality of public affairs services. However, further studies are needed to evaluate the results of SIMAPES implementation in practice. Challenges such as data bias and continuous improvement need to be investigated.

In any case, SIMAPES represents a promising initiative for integrating data via information systems to improve the planning and implementation of public policies in the areas of education and health. Its potential is highlighted both by the scope of the system and by its convergence with the literature on the topic.

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