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Perception of health managers regarding health information systems and the usefulness of epidemiological data

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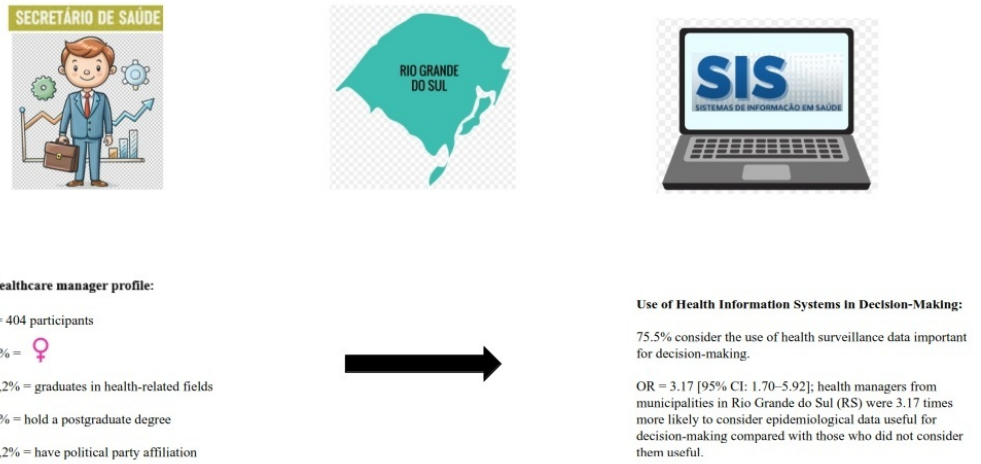
Graphical Abstract



Highlights

- *Few studies have explored managers' motivations for using data.*
- *75.5% of managers consider health information systems useful.*
- *The implementation of such systems increases the perceived usefulness by up to 3.17 times.*
- *Sociodemographic variables do not explain managers' perceptions.*
- *External factors may influence the use and perception of health information systems.*

Abstract

This study aimed to describe health managers' perceptions regarding the usefulness of epidemiological data. It employed a cross-sectional design including all municipal health managers in the state of Rio Grande do Sul between 2017 and 2019. Individual data were collected through a questionnaire, while municipal data were obtained from health information systems. The outcome of interest was the perceived usefulness of data from Health Information Systems (HIS). Multiple logistic regression analysis was conducted, and variables with a p-value <0.15 were retained in the final model. Among the 404 participants (81% response rate), 50% were women, 63.8% held a higher education degree, 78.7% had management experience, 77.2% were affiliated with political parties, 46.8% were previously employed by the SUS, and 59.2% presented a technical-scientific profile (postgraduate education, use of evidence-based guidelines, participation in scientific events). Overall, 75.5% perceived surveillance data as always useful for decision-making. Municipalities with implemented HISs were 3.17 times more likely (OR = 3.17; 95% CI: 1.70–5.92) to consider epidemiological data highly useful in the decision-making process. We conclude that differences exist in the importance attributed to epidemiological data in municipalities where HISs are implemented, influencing managers' decision-making processes.

Keywords: Management. Surveillance. Evidence. Decision-Making. Information Systems.

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INTRODUCTION

Health services must be organized based on territorial boundaries and assigned populations to enhance the accuracy of public health surveillance actions. This principle is established in Brazilian legislation, which mandates the use of epidemiological data to define priorities, allocate resources, and guide health programs (Law No. 8080). The law also establishes political and administrative decentralization of services, with municipalities serving as the smallest territorial unit — each under a single governance authority within its respective governmental sphere. Territorial decentralization occurs through the Health Care Network (Rede de Atenção à Saúde), which encompasses Health Surveillance activities[1,2]. However, evidence suggests that the epidemiological profile of service demand has little influence on spending allocation in Primary Health Care (PHC)[3], raising questions about the effective use of such data.

The complexity of managing a health system requires that managers seek valid information on local population health to plan and monitor public health policies[4]. Health statistics should enable managers at all system levels to identify progress, challenges, and needs[3,4]. For these purposes, a combination of major Health Information Systems (HIS) may be used; however, the mere availability of data does not guarantee their use in health management and decision-making[4].

Analyses of managers' profiles have revealed diverse academic backgrounds and underscored the need to define a set of competencies and skills essential for effective management[5,6]. Managers with training in public health are better equipped to coordinate Health Care Networks using surveillance systems for situational diagnosis and monitoring of planned actions[6,7]. This requires adequate knowledge to understand the functioning and importance of HIS and health surveillance, enabling decisions that align with population needs[8,9].

In organizing health actions, both education and managerial experience are crucial[10]. Managers with prior experience or education in health tend to prioritize PHC[6] and place greater value on HIS and evidence-based care protocols. Moreover, personal and professional experiences strengthen decision-making confidence, enhancing the ability to identify, evaluate, and contextualize key local health issues. Training professionals to work within Brazil's Unified Health System (SUS) has always been a challenge, as technological advancements whether soft, light-hard, or hard technologies[11,12] demand continuous updating[12]. Therefore, the knowledge required of public health managers must go beyond technical-scientific expertise, incorporating structural aspects derived from experience within local health systems[10].

The use of HIS enhances decision-making by providing locally contextualized information. Additionally, external scientific evidence supports the selection of optimal clinical care strategies within the Health Care Network, which can be incorporated into protocols. Thus, the use of HIS represents a coherent, reliable, and systematic approach to improving care quality, optimizing resources, monitoring protocol implementation, and achieving both efficacy and cost-effectiveness. In 1991, DATASUS was established to organize SUS information systems, integrating health data and supporting management across all levels of care[13]. This initiative also enabled international comparability of health data[14]. For example, in the Metropolitan Macroregion of Rio Grande do Sul, 43.3% of municipalities use the free PHC information systems provided by the Ministry of Health, while the remainder employ private or proprietary systems[15]. Despite the mandatory implementation of HIS in all municipalities as established by the 1996 Basic Operational Norm (Ordinance No. 2,203), many municipalities only collect data, while data entry is performed by regional or state health offices. Consequently, managers acknowledge underutilizing the potential of HIS in decision-making[16].

Academic and technical-scientific training among managers can facilitate the daily use of HIS. Conversely, lack of practical skills, limited time, insufficient resources for data retrieval and assessment, inadequate technical or administrative support, and resistance to change may hinder their adoption in public health management[17,18]. Decision-making should be informed not only by clinical aspects — such as therapeutic inputs — but primarily by data on the local population's health status[3,10]. Despite their importance, little is known about how managers value epidemiological data and which factors influence their use, justifying an exploratory analysis. Such information may be useful to remove barriers to HIS adoption and to promote macro-level policies encouraging routine use by local managers. The objectives of this study are to describe health managers' perceptions of the usefulness of epidemiological data from Health Information Systems and to explore their associations with individual and contextual factors.

METHODS

This was a cross-sectional study involving municipal health managers in office across municipalities of the state of Rio Grande do Sul, Brazil. Data collection took place from August 2017 to May 2019 through a structured questionnaire containing closed and semi-open questions, sent to the institutional email addresses of city halls and municipal health secretariats. In addition to the questionnaire, municipality-level variables were incorporated using data from health information systems.

For municipalities whose managers did not initially respond to the online questionnaire, up to six follow-up contact attempts (via landline or mobile phone) were made directly by the researchers with the respective secretaries or advisors to maximize response rates[6]. This study complied with the Brazilian Guidelines and Regulatory Norms for Research Involving Human Beings (Resolution 466/2012), CAAE 68968317.0.0000.534, approval no. 2.153.577 of June 22, 2017.

The outcome of interest was the perceived usefulness of epidemiological data, assessed by the guiding question: "In your opinion/view, how useful is the use of epidemiological data on the health situation for decision-making?" with the response options: (1) Always, (2) Almost always, (3) Sometimes, (4) Rarely, (5) Never, and (6) Don't remember/Don't know. For analytical purposes, this variable was dichotomized (options 1+2+3 vs. 4+5+6), and sensitivity analysis indicated that the associations remained stable when category 6 was treated as missing data.

A set of potential explanatory variables was analyzed. The questionnaire included 44 questions, of which some were selected for the present study. Concerning the sociodemographic profile of managers, the following variables were used: age, sex, race/skin color, parental educational level, equivalent household income, and religion. Regarding the technical profile, variables included: educational attainment, specific undergraduate degree, postgraduate training, years of management experience, and years serving as municipal health secretary. This block also included whether the manager considered epidemiological data useful for decision-making: "In your opinion/view, how useful is the use of epidemiological data on the health situation for decision-making?"

One of the indicators for integration and qualification of the health care network was "use of health information systems and monitoring," with the following response options: (1) Yes, full implementation (n=120); (2) Yes, partial implementation (n=148); (3) Yes, but not implemented (n=57); (4) No decision made (n=56); and (5) Don't know/ Don't remember (n=23). For analytical purposes, this variable was dichotomized (options 1+2 vs. 3+4+5).

Beyond these direct variables, two composite variables were constructed. The first, "SUS/Management linkage and adherence," was based on responses to: 1."Are you affiliated with any political party?" (Yes/No); and 2."How many weekly working hours are contracted for your current management position/function?" (20, 30, 40, >40 hours and/or Full-time dedication).

This composite variable was categorized as: (1) No linkage: no political affiliation and no full-time dedication; (2) Political-party linkage: political affiliation but no full-time dedication; (3) Mixed linkage: political affiliation and full-time dedication; (4) SUS-only linkage: no political affiliation but full-time dedication.

The second composite variable, "Academic/ technical-scientific profile," was constructed from the following indicators: (1) holds a postgraduate degree; (2) read scientific articles in the past three years; (3) attended a scientific conference in the past three years; and (4) supports evidence-based guidelines.

Municipal-level (contextual) explanatory variables were extracted from health information systems for the period 2015–2017, as these years were immediately prior to data collection, providing contextual averages for the preceding three years. These variables tend to be relatively stable over time and included: Rate of Family Health Teams per 100,000 inhabitants (from the National Registry of Health Establishments – CNES); Municipal population size (Brazilian Institute of Geography and Statistics – IBGE); Per capita health expenditure (indicator "Own Health Resources per Inhabitant" from the Public Health Budget Information System – SIOPS); Type of health management (as classified by the State Health Secretariat of Rio Grande do Sul).

The type of management classification followed the criteria of the Ministry of Health and the National Council of Municipal Health Secretariats (CONASEMS), based on the Financial Limit Con-

trol System for Medium and High Complexity Care (SISMAC), which defines whether a municipality has: (1) Full management (primary, medium, and high complexity); (2) Partial management of medium and high complexity (responsible for some medium and high-complexity services); or (3) Management limited to primary care.

Additionally, the following socioeconomic indicators were obtained from DATASUS for the most recent available year: municipal Gross Domestic Product (GDP) per capita, municipal Gini index, and municipal Human Development Index (HDI).

DATA ANALYSIS

Descriptive and bivariate analyses were performed. Associations between the outcome and covariates representing both manager and municipal profiles were assessed using the Chi-square test. Multiple logistic regression analysis was conducted to determine the role of variables included in the full (initial) model while controlling for potential confounders. Variables with $p<0.25$ in the bivariate analyses were included in the initial model to reduce multicollinearity. Variables with $p<0.15$ were retained in the final model using a stepwise backward selection approach. The variables "sex" and "age" of the manager, as well as "municipality size," were retained regardless of statistical significance. All analyses were performed using Stata software version 16.1.

RESULTS

Among the 497 municipalities in the state of Rio Grande do Sul, 404 health managers participated in the study (response rate: 81.3%). As shown in Table 1, most participants self-identified as White (94.5%), approximately 67% were aged up to 49 years, 50% were women, and 72% had an average monthly household income below BRL 5,000.

Of the 404 participants, 75.5% reported that the use of epidemiological data is always useful as a management tool. A total of 63.8% of managers had higher education degrees, of whom 30% held postgraduate qualifications, 28.2% held undergraduate degrees in health-related fields, and 6.2% had postgraduate training in public health (Table 1). Variables related to the managers' profiles (age, sex, race/skin color, parents' educational level, and household income) showed no statistically significant differences in the bivariate analyses (Table 1) regarding their perception of epidemiological data usefulness as a management tool.

Regarding the managers' educational background and professional experience (Table 2), the bivariate analyses revealed statistically significant variables. It was observed that 78.4% of managers with a SUS linkage considered the use of epidemiological data as always useful in their municipalities, whereas 71.9% of managers with only political-party linkage perceived the usefulness of such data. Most respondents also reported having some form of political affiliation (77.2%) and holding or being appointed to a trust-based position (76.2%). Municipalities managed by individuals with more than two favorable characteristics in the technical-scientific profile (e.g., postgraduate education, reading scientific articles, attending conferences, supporting evidence-based guidelines) had an 81.9% probability of recognizing the usefulness of epidemiological data.

In Table 3, which presents municipal (contextual) variables, it can be observed that only network integration and qualification (i.e., having an implemented Health Information System – HIS) show statistical significance regarding the perceived usefulness of epidemiological data. Municipalities with integrated and qualified networks have an 85.8% probability of perceiving epidemiological data as useful. For the remaining variables — such as Gross Domestic Product (GDP) per capita, per capita health expenditure, Human Development Index (HDI), or type of health management — there is an increasing trend in the likelihood of considering epidemiological data useful as GDP, per capita health spending, and HDI increase, as well as in municipalities with partial management of medium and high complexity care. Conversely, the Gini index shows an inverse relationship: the lower the Gini coefficient, the greater the probability that municipalities consider the use of epidemiological data useful.

Table 4 presents the results of the full model (including all variables) and the final model (excluding variables with $p > 0.15$). The goodness-of-fit indicators show a lower Bayesian Information Criterion (538.2 vs. 476.6) and higher accuracy (74.3% vs. 75.5%) in favor of the final model. The findings indicate that municipalities with an integrated and qualified network (i.e., those with fully implemented Health Information Systems – HIS) were three times more likely to value epidemiological data as a management tool (Odds Ratio, OR = 3.17; 95% Confidence Interval, CI: 1.70–5.92). Even when HIS were only partially implemented, the likelihood was nearly twice as high (OR = 1.71; 95% CI: 1.02–2.87). After adjustment, no other variables remained in the model.

Table 1 - Percentage distribution of municipalities with managers who reported that the use of Health Information Systems (HIS) is always useful as a management tool, according to the sociodemographic profile of municipal health secretaries, Rio Grande do Sul, 201–2019.

		Total		HIS always useful (%)	
		%	N	%	P-value
Total		100	404	75.5	
Age	≤39 years	36.4	147	75.5	0.98
	40–49 years	30.5	123	74.8	
	50–59 years	26.2	106	75.5	
	≥60 years	6.9	28	78.6	
Sex	Female	50.0	202	77.2	0.42
	Male	50.0	202	73.7	
Race/Skin color	White	94.5	381	75.3	0.84
	Non-white	5.5	22	77.3	
Equivalent Household Income	Elementary (complete or incomplete)	4,2	17	82.3	0.10
	High school (complete)	31,9	129	68.2	
	Higher education (complete)	33,9	137	76.6	
	Postgraduate	30,0	121	80.9	
Parental education level	<BRL 2,500	20.3	82	79.3	0.07
	BRL 2,500–5,000	51.7	209	71.3	
	BRL 5,000–7,500	17.6	71	85.9	
	>BRL 7,500	9.4	38	71.1	

Table 2 - Percentage distribution of municipalities with managers who reported that the use of Health Information Systems (HIS) is always useful as a management tool, according to the technical profile of municipal health secretaries, Rio Grande do Sul, 201–2019.

		Total		HIS always useful (%)	
		%	N	%	P-value
Total		**100**	**404**	**75.5**	
Undergraduate degree	Nursing/Medicine/Dentistry	16.3	66	78.8	0.17
	Other health-related fields	11.9	48	72.9	
	Non–health-related fields	35.6	144	80.6	
	None	36.1	146	69.9	
Postgraduate specialization	Public Health	6.2	25	88.0	0.16
	Other areas	23.8	96	79.2	
	None	70.0	283	73.1	
Management experience	0–1 year	21.0	85	77.6	0.59
	≥2 years	78.7	318	74.8	
Experience as Municipal Health Secretary	0–1 year	42.3	171	73.1	0.58
	2 years	39.6	160	76.2	
	>2 years	17.8	72	79.2	
Employment linkage profile	No linkage	13.6	55	78.2	0.60
	Political-party linkage	39.6	160	71.9	
	Mixed linkage (party and SUS)	37.6	152	77.6	
	SUS-only linkage	9.2	37	78.4	
Technical–scientific profile*	No characteristic	14.9	60	75.0	0.19
	1–2 characteristics	59.2	239	72.8	
	3–4 characteristics	26.0	105	81.9	

*Characteristics: (1) postgraduate education; (2) reading scientific articles; (3) attending scientific conferences; (4) supporting evidence-based guidelines; and (5) participating in training courses within the past three years.

Table 3 - Percentage distribution of municipalities with managers who reported that the use of Health Information Systems (HIS) is always useful as a management tool, according to *municipal characteristics*, Rio Grande do Sul, 201–2019.

		Total		HIS always useful (%)	
		%	N	%	
Total		100	404	75.5	
Rate of Family Health Teams per 100,000 inhabitants	<20 FHTs*	24.5	99	73.7	0.16
	21–30 FHTs	21.5	87	75.9	
	31–40 FHTs	22.8	92	83.7	
	>40 FHTs	31.2	126	70.6	
Population size	<5,000 inhabitants	44.1	178	76.3	0.80
	5,000–30,000 inhabitants	40.6	164	76.4	
	30,000–50,000 inhabitants	6.2	25	68.0	
	>50,000 inhabitants	9.2	37	73.0	
***Per capita* health expenditure**	<BRL 500	38.6	156	73.1	0.67
	BRL 500–999	43.8	177	76.8	
	≥BRL 1,000	17.6	71	77.5	
Type of health system management	Primary Care only (Full APS**)	29.9	121	75.2	0.98
	Partial system management***	57.4	232	75.9	
	Full system management	12.6	51	74.5	
Gross Domestic Product (GDP) *per capita*	<BRL 15,000	13.1	53	69.8	0.46
	BRL 15,000–20,000	25.7	104	76.0	
	BRL 20,000–30,000	31.4	127	73.2	
	≥BRL 30,000	29.7	120	80.0	
Municipal Gini Index	<0.50	31.7	128	80.5	0.09
	0.50–0.60	50.0	202	70.8	
	>0.60	18.3	74	79.7	
Municipal Human Development Index (HDI)	<0.40	18.8	76	76.3	0.79
	0.40–0.50	46.5	188	73.9	
	>0.50	34.7	140	77.1	
Network integration instruments: Health Information Systems	Not implemented/Don't know	33.7	136	65.4	<0.01
	Partially implemented	36.6	148	76.6	
	Fully implemented	29.7	120	85.8	

*FHT = Family Health Teams. **APS = Primary Health Care (Atenção Primária em Saúde). ***Partial management = management of medium and high complexity care, with full responsibility for primary health care.

Table 4 - *Odds ratios* (OR) and 95% confidence intervals (95% CI) for predictors of municipalities whose managers reported that the use of Health Information Systems (HIS) is always very useful as a management tool, according to multiple logistic regression, Rio Grande do Sul, 2017–2019.

		Full Model		Final Model	
		OR	(95% CI)	OR	(95% CI)
Age	≤39 years	1	—	1	—
	40–49 years	1.16	(0.63–2.12)	1.02	(0.58–1.79)
	50–59 years	1.02	(0.54–1.91)	0.98	(0.54–1.78)
	≥60 years	1.01	(0.34–3.01)	1.17	(0.43–3.16)
Sex	Female	1	—	1	—
	Male	0.87	(0.52–1.45)	0.86	(0.54–1.37)
Network integration/qualification instruments: Health Information Systems	Not implemented/Don't know	1	—	1	—
	Partially implemented	1.82	(1.04–3.19)	1.71	(1.02–2.87)
	Fully implemented	3.50	(1.79–6.84)	3.17	(1.70–5.92)

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		Full Model		Final Model	
		OR	(IC 95%)	OR	(IC 95%)
Equivalent household income	<BRL 2,500	1	—	1	—
	BRL 2,500–5,000	0.56	(0.29–1.08)	1.02	(0.58–1.79)
	BRL 5,000–7,500	1.49	(0.60–3.71)	0.98	(0.54–1.78)
	>BRL 7,500	0.43	(0.15–1.18)	1.17	(0.43–3.16)
Postgraduate specialization	None	1	—	1	—
	Other areas	1.22	(0.56–2.66)	0.86	(0.54–1.37)
	Public Health	2.44	(0.58–10.2)	1	—
Linkage profile	No linkage	1	—	1.71	(1.02–2.87)
	Political-party linkage	0.91	(0.41–2.01)	3.17	(1.70–5.92)
	Mixed linkage (Party + SUS)	1.15	(0.51–2.61)	—	—
	SUS-only linkage	0.88	(0.29–2.60)	—	—
Technical–scientific profile**	None	1	—	—	—
	1–2 characteristics	0.77	(0.38–1.58)	—	—
	3–4 characteristics	0.88	(0.31–2.51)	—	—
Rate of Family Health Teams per 100,000 inhabitants	<20 FHTs*	1	—	—	—
	21–30 FHTs	0.86	(0.42–1.77)	—	—
	31–40 FHTs	1.57	(0.73–3.40)	—	—
	>40 FHTs	0.66	(0.34–1.28)	—	—
Municipal Gini Index	<0.50	1	—	—	—
	0.50–0.60	0.63	(0.36–1.12)	—	—
	>0.60	1.22	(0.57–2.62)	—	—

*FHT = Family Health Teams.
*Technical–scientific profile characteristics: (1) postgraduate education; (2) reading scientific articles; (3) attending scientific conferences; (4) supporting evidence-based guidelines; (5) attending training courses within the last three years.

DISCUSSION

The findings of this study indicate an association between the degree of implementation of Health Information Systems (HIS) and the perceived usefulness of epidemiological data, even after adjustment for potential confounding factors. Furthermore, the majority (75.5%) of managers recognized the usefulness of HIS data. Managers from municipalities with implemented HIS were three times more likely to consider epidemiological data as very useful in the decision-making process. The educational background of managers[6,19,20] such as holding a degree in a health-related field, postgraduate education (especially in public health), reading scientific articles, attending health conferences, and supporting evidence-based guidelines appears to influence the operationalization of public health policies[21], as does having prior experience within the SUS and managing beyond the primary health care level. From a public health management perspective, epidemiological data are essential for producing locally relevant information and supporting decision-making, thereby enabling municipalities to develop strategies that reduce disease burden[22].

This study showed that 46.8% of managers were SUS employees, meaning that fewer than half of the municipal health secretaries held permanent positions through civil service exams. It can be inferred that many needed to become familiar with system details and technical concepts specific to the field. Nevertheless, more than half of them had a technical-scientific profile, likely favoring the use of local health surveillance data as evidence for management[23] and relying on information sources such as HIS data available in primary health care[24]. This contrasts with other studies, where the main sources of information were non-scientific articles and Ministry of Health guidelines[25]. Hence, it would be desirable for public health managers to be selected based on a specific profile aligned with the "training quadrilateral" concept for health ed-

ucation[12]. The training of health managers should not be underestimated, as it directly impacts the organization of the health system as a network. Training institutions must continuously offer programs in public health, as they make a tangible difference in health outcomes. Such training encompasses the development of subjectivity, technical and cognitive skills, and a comprehensive understanding of SUS[12]. Managerial training should also include the use of data and health information systems[25].

Another important finding concerns the linkage with the SUS. Most managers with a SUS linkage considered the use of epidemiological data always useful in their municipalities, whereas those with only political-party affiliation did so at a lower rate. Previous studies have reported that managers employed through public service exams, with over one year of experience, formal training, and initiative to train others in using software systems, were successful in implementing HIS in their municipalities[26]. It is important to emphasize that one of the main purposes of epidemiological data at the municipal level is to support decision-makers in assessing health conditions and identifying problems that require multidisciplinary approaches[22]. Equally significant is the use of data as a tool to identify and monitor health inequalities, thereby enabling targeted interventions for population groups according to their specific epidemiological profiles, expressed through socioeconomic and morbidity–mortality characteristics[26,27].

A higher proportion of managers from municipalities with partial management of medium and high complexity care considered epidemiological data useful. Under partial management, the municipal health secretary bears increased responsibility[28], as they become one of the key actors in allocating funds from federal, state, and municipal sources. Consequently, data become essential for evidence-based decision-making and for justifying health expenditures before social control mechanisms, audit courts, the Public Prosecutor's Office, and the Judiciary. This finding is consistent with the observation that the most frequently used HIS were those related to budgetary data entry, which directly influenced financial transfers[29].

The findings suggest that the perceived usefulness of Health Information Systems (HIS) for management is strongly conditioned by their effective implementation an aspect consistent with the national literature. This relevance is reinforced by studies conducted in various Brazilian states. A cross-sectional study in Minas Gerais, for instance, found that managers actively use data and information to organize local health management, underscoring the facilitating role of computerized systems in this process[30]. Similarly, research conducted in Rio Grande do Sul, focusing on municipalities with fewer than 10,000 inhabitants, showed that the implementation and effective use of HIS are fundamental to efficient municipal health management[31]. Such evidence — spanning both large and small municipalities — highlights the critical importance of public policies that promote and ensure the full adoption and utilization of health information systems.

The results of this study should be interpreted in light of both its limitations and strengths. It is important to note that, as a cross-sectional study, it does not allow for the establishment of temporal or causal relationships — particularly because the perceived value of epidemiological data is a subjective assessment influenced by situational and historical factors at the municipal level. The current manager's perception may reflect the municipality's institutional history, given the well-documented path dependency of public policies[32]. Furthermore, this study concerns the opinions of political agents regarding the usefulness of epidemiological data for decision-making, which are inevitably shaped by the political context at the time of data collection. As in all perception and opinion surveys, the possibility of distortion due to social desirability bias[33] should be considered. Therefore, the reported percentages may be somewhat inflated; however, there is no indication that the associations observed were affected by this bias. Future studies, particularly qualitative ones, could explore these aspects in greater depth.

Among the strengths of this research is its focus on a pressing issue faced by many Brazilian municipalities: the use of epidemiological data for decision-making. Another advantage lies in the broad and representative nature of the sample, which comprised a census of all municipalities in the state of Rio Grande do Sul. This approach reduces the likelihood of selection bias and strengthens the interpretation of non-significant statistical results, since differences are unlikely to be due to random sampling error. Even when statistical significance is not achieved, the absence of selection bias and the ability to adjust for confounding factors are critical elements in ensuring robust conclusions[34]. Despite Brazil's considerable regional heterogeneity, the findings may be relevant to other municipalities with similar socioeconomic conditions or aligned health policy objectives. Nonetheless, the political, social, and historical specificities surrounding data

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generation and use in each locality preclude direct generalization without contextual interpretation.

Although municipal health secretaries consider epidemiological data from HIS highly useful, this does not necessarily mean that such information is systematically used in decision-making processes. Recognizing data as useful does not ensure its practical application. Managers' acknowledgment of epidemiological data usefulness should translate into more accurate situational diagnoses, better allocation of financial, structural, and human resources, and ultimately, improved population health outcomes. These findings can be disseminated in political and administrative forums — among mayors, council members, and legislators — to foster initiatives that prioritize evidence-informed leadership in health departments and encourage continuing education activities. Further research is needed to clarify the utility and feasibility of technical criteria for managerial training, as well as other contextual factors that may influence public health management decisions.

CONCLUSION

Although municipal health secretaries recognize the importance and usefulness of epidemiological data derived from Health Information Systems (HIS), this acknowledgment does not guarantee that such information is effectively utilized in decision-making processes. The discrepancy between recognizing the relevance of data and its practical application represents a key limitation of this study, suggesting the need for a deeper understanding of the factors that hinder the incorporation of such information into daily management practices. A positive perception of data use does not, in itself, ensure its integration into health strategies and planning, which may lead to decisions and policies that diverge from the evidence provided by the systems themselves. Thus, it is crucial to align discourse with practice, ensur-ing that available data concretely and continuously guide public health actions. Future research should further explore the utility and feasibility of technical criteria in managerial training, as well as other con-textual, organizational, and human factors influenc-ing health decision-making. Strengthening these dimensions may contribute to more efficient, participatory, and evidence-driven public health management.

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Thesis

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the workreported in this paper.

Data availability

The database and the analysis codes used in the research are available upon request to the authors.

Use of generative artificial intelligence

The authors declare that they did not use AI-assisted technologies in the preparation of the manuscript.

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