saúde
EM DEBATE

Mapping essential competencies: knowledge, skills and attitudes for public health management

Mapeamento de competências essenciais: conhecimentos, habilidades e atitudes para gestão em saúde pública

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ABSTRACT This is a cross-sectional study, with a quantitative exploratory descriptive approach that aimed to mapp essential competencies in public health among professionals working in the management of a state health department. Data collection was conducted online through a questionnaire. Data were analyzed descriptively, and the competencies were assessed according to six domains of the Regional Framework for Essential Competencies in Public Health and the Degree of Competency Expression at Work. A total of 119 professionals participated in the study, with a predominance of females (70.6%) and an average age of 46.7 years. Domain 1 – Health Situation Analysis showed the highest Degree of Competency Expression at Work; while Domain 6 – International and Global Health obtained the lowest value. There was a significant relationship between the variables studied and education, highlighting that lower levels of education are associated with lower competence scores across the six analyzed domains. It is concluded that developing competencies is a challenge in public management due to its specificities. In this context, competency mapping plays a fundamental role in planning and implementing effective actions for Continuing Health Education.

KEYWORDS Health management. Public health. Health personnel. Professional competence.

RESUMO *Trata-se de estudo de corte transversal, com abordagem quantitativa do tipo exploratório descritivo que teve como objetivo mapear as competências essenciais em saúde pública de profissionais que atuam na gestão de uma secretaria de estado da saúde. A coleta de dados ocorreu de modo on-line, por meio de um questionário. Os dados foram analisados descritivamente, e as competências avaliadas de acordo com seis domínios do Marco Regional de Competências Essenciais em Saúde Pública e o Grau de Expressão de Competências no Trabalho. Participaram do estudo 119 profissionais, com predomínio do sexo feminino (70,6%) e idade média de 46,7 anos. O Domínio 1 – Análise de Situação de Saúde – apresentou o maior Grau de Expressão de Competências no Trabalho; e o Domínio 6 – Saúde Internacional e Global – obteve o menor valor. Houve relação significativa entre as variáveis estudadas e a escolaridade, evidenciando que níveis mais baixos de escolaridade estão associados a menores escores de competência nos seis domínios analisados. Conclui-se que desenvolver competências é um desafio na gestão pública devido às suas especificidades. Nesse contexto, o mapeamento de competências desempenha um papel fundamental para que ações de Educação Permanente em Saúde sejam planejadas e implementadas de forma assertiva.*

PALAVRAS-CHAVE *Gestão em saúde. Saúde pública. Pessoal da saúde. Competência profissional.*

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Introduction

Public health management in Brazil faces complex debates, given the various transformations that have occurred in recent decades across social, economic, demographic, and environmental dimensions, posing significant challenges for professionals working in the management of the Unified Health System (SUS). The World Health Organization (WHO) emphasizes that, in the face of such challenges, effective management requires commitment, facilitation of changes, efficient use of resources, and a foundation in competencies[1,2].

Competency-based management represents a strategic approach to workforce and organizational development, focusing on the identification, assessment, and utilization of individual competencies to achieve an organization's objectives. In this model, competencies comprise a core set of knowledge, skills, and attitudes for effective and efficient communication, negotiation, decision-making, and problem-solving related to the health of the population, regardless of the professional's area of practice[3-6].

Countries that have adopted public health systems have incorporated competency-based management, such as Canada, which has been working with core public health competencies since 2008. The Association of Schools of Public Health in the European Region (ASPHER) published the first edition of the European List of Core Competencies for Public Health Professionals in 2006, developed through collaboration with public health experts and professionals from various European countries, including Denmark, Belgium, Switzerland, France, the United Kingdom, the Netherlands, Poland, Serbia, and Hungary. This list is currently in its 5th edition (last published in 2018) and aims to establish common standards for the education, training, and practice of health professionals and decision-makers, which are considered essential for building better public health[6,8].

In Brazil, competency-based management in the health sector is relatively new, with the Regional Framework of Core Competencies in Public Health (MRCESP) for the Americas, published in 2013, serving as a reference. This document complements other key strategies of the Pan American Health Organization (PAHO), the WHO, and the United Nations, such as Primary Health Care, Essential Public Health Functions (EPHF), and the Millennium Development Goals[1,6]. Thus, it emerges as a response to the challenges identified in the Americas and can be directed to any organization involved in the provision of health and/or public health services that trains or employs people in these areas. This includes national, regional, and local health authorities, health services, academic institutions, volunteer organizations, the private sector, and other sectors whose management impacts health and well-being[1].

The MRCESP can be used to provide a more coherent view of the health sector, facilitating the recognition of the contributions of the various stakeholders involved and the interactions between them; develop a more unified and skilled health workforce to address health inequalities and support the development of public health plans; inform the knowledge, skills, attitudes, and professional development paths needed for those who wish to contribute to the improvement of the population's health and well-being; provide a framework for the development of curricula, training plans, and career pathways; and, finally, enhance the consistency of terms of reference for job positions and professional performance evaluation in health services, connecting education and service delivery[1,5,9].

In the search for professionals prepared to work in public health management, the importance of conducting research in the area of workforce development is highlighted, given the scarcity of studies, particularly in Brazil. From this perspective, the realization of this study in the Brazilian context is justified, as it is based on an innovative approach that will

contribute to the formulation of tools that facilitate the development of professionals in this field. In this sense, the objective of this study was to map the core competencies in public health of professionals working in the management of a state health department.

Material and methods

This is a cross-sectional study with a quantitative, exploratory, and descriptive approach, developed with professionals working in public health management in the state of Paraná, between February and May 2020.

Paraná is located in the southern region of Brazil, with a territorial area and population comparable to entire countries. In the scope of public health management, the state level is responsible for planning, formulating, coordinating, and executing policies, programs, and actions aimed at health promotion, prevention, care, and surveillance within the state. This level is coordinated by the State Health Department of Paraná (SESA-PR), a governmental public agency with a central structure in the city of Curitiba, where support, advisory, sectoral, and managerial structures operate, and a decentralized structure, where administrative headquarters are located in the state's 22 Health Regions. The technical teams (central and decentralized) of this department are composed of professionals from various fields of knowledge, who perform public health management functions in three main areas: health care and management, health surveillance, and administration, playing a crucial role in promoting care and developing health actions.

Data collection

The sampling process was probabilistic, using a simple random sampling method, with proportions as the outcome. Considering the target population of 612 individuals, an expected frequency of the event of interest of 50%, which is the worst-case scenario considered for simple random sampling, a margin of error of 5%, and a confidence level of 95%, the sample size was calculated using Epi Info 7[10] software, resulting in 277 individuals. There were 368 accesses to the data collection instrument and 353 respondents, exceeding the minimum calculated sample size; however, only 119/353 (35.7%) provided complete responses. Considering the same expected frequency of 50%, for a total of 353, with a confidence level of 95%, the margin of error for 119 respondents was equivalent to 7.3%. This was higher than the initial margin of error of 5%, due to the criterion of completeness for all questionnaire responses, which, although necessary to ensure data quality, increased the sampling error relative to the total population.

The inclusion criteria also adopted were: professionals engaged in activities related to management within SESA-PR, whether through decision-making, mediation, planning, control, or evaluation; without any restriction on gender, age, education level, professional background, whether a permanent or commissioned employee, time in the role, or management experience. Specifically, the criterion that did not impose any restriction on time in the role or minimum experience in management was defined by considering that the ability to learn and adapt also impacts the competencies required for public health management roles. The exclusion criteria included: SESA-PR professionals who did not answer all the questions in the questionnaire, the subject of this study, or provided duplicate responses.

The data collection instrument used was a semi-structured self-assessment questionnaire, developed based on the MRCESP, translated and adapted to the Brazilian context[5]. The questionnaire consists of a five-point Likert scale (score range from 1 to 5 points), bivalent, asymmetrical, with predefined intervals, totaling 56 questions

or core competencies grouped into six Domains: 1 – Health Situation Analysis (nine competencies); 2 – Surveillance and Control of Risks and Damages (14 competencies); 3 – Health Promotion and Social Participation (10 competencies); 4 – Policies, Planning, Regulation, and Control (seven competencies); 5 – Equity in Access and Quality of Individual and Collective Services (eight competencies); and 6 – International and Global Health (eight competencies)[1,5].

Data collection was conducted online through the completion of the questionnaire on the Onlinepesquisa® virtual platform, with the participation link provided in an email sent to the participants. The questionnaire data were securely and anonymously stored on the platform, managed by the researchers. This enabled the analysis of responses immediately after completion, with the capability to generate reports in spreadsheet format in Microsoft Excel® and another descriptive report, including charts, in Adobe Acrobat Reader DC®.

Data analysis

For data analysis, a descriptive analysis was initially performed with simple frequency (n) and relative frequency (%) of the variables related to the characteristics of the study participants. Subsequently, each set of competencies was analyzed descriptively by domain, according to the MRCESP, with estimates of mean, median, standard deviation, first quartile, third quartile, and interquartile range. It is noted that, specifically, the mean value of each domain corresponded to the Degree of Competency Expression at Work (GECT), according to the studies by Almeida and Albini, considering the scores corresponding to the alternatives of the Likert scale questionnaire, as presented in the *box 1*.

Box 1. Scores for calculating the Degree of Competency Expression at Work (GECT) based on the questionnaire alternatives

Scores	1	2	3	4	5
Questionnaire alternatives	I have no knowledge of the subject	I have heard of it but have limited knowledge of the subject"	I have limited knowledge about the subject for practical application	I have knowledge of the subject and know or would know how to apply it in practice	I have a good knowledge of the subject, apply it in practice, and would be able to teach it to others

Source: Adapted from Almeida[5].

To assess the differences between scores and participant characteristics, the Shapiro-Wilk normality test was used to determine whether a parametric or non-parametric approach was appropriate. Since all scores did not follow a normal distribution, a non-parametric approach was used. Differences between participant characteristics with two groups were evaluated using the Mann-Whitney U test, and differences among three or more groups were assessed using the Kruskal-Wallis test, followed by Dunn's post-hoc test. All tests were considered significant when p < 0.05, and the analyses were conducted in the R Core Team environment[11].

Ethical approval

The study was approved by the National Research Ethics Committee of the National Health Council (CONEP), under opinions nº 3.242.059 and 3.284.670 (CAAE 09188519.9.0000.0102 and CAAE 09188519.9.3001.5225, respectively). All ethical principles outlined in Resolution

CNS nº 466/2012 and Resolution nº 510/2016 were respected[12,13].

Results

The study included 119 professionals, of whom 70.6% (n = 84) were female and 29.4% (n = 35) were male, with an average age of 46.7 years (standard deviation: 10.06 years), ranging from 29 to 67 years. It was also found that among the respondents, professionals from the central level and 21 of the 22 Regional Health Departments of SESA-PR participated. Data regarding the demographic and functional characteristics of the participants are presented in *table 1*.

Table 1. Demographic and functional characteristics of participants (n = 119)

Variable		n	%
Gender	Female	84	70.6%
	Male	35	29.4%
Age group	29 to 40 years	41	34.5%
	41 to 50 years	29	24.4%
	51 to 59 years	37	31.1%
	60 years or older	12	10.1%
Education level	High School	3	2.5%
	Undergraduate Degree	17	14.3%
	Specialization	60	50.4%
	Master's Degree	30	25.2%
	Doctorate	9	7.6%
Level of Operation	Central	47	39.5%
	Regional	72	60.5%
Experience in Public Health Management	Up to 6 months	24	20,2%
	7 months to 3 years	17	14.3%
	4 to 10 years	40	33.6%
	11 to 20 years	26	21.8%
	21 to 30 years	5	4.2%
	More than 30 years	6	5%
Professional Category	Veterinarian	8	7%
	Social Worker	4	3%
	Biologist	4	3%
	Physiotherapist	2	2%
	Psychologist	3	3%
	Sanitation Technologist	2	2%
	Occupational Therapist	2	2%
	Public Management Technologist	2	2%
	Nursing Technician	4	3%
	Bachelor of Law	3	3%
	Administrator	9	8%

Table 1. Demographic and functional characteristics of participants (n = 119)

Variable	n	%
Pharmacist	7	6%
Doctor	9	8%
Nurse	44	37%
Nutritionist	2	2%
Others	13	11%

Source: Own elaboration.

The descriptive data from the questionnaires and the GECT were tabulated based on the weights assigned to the questionnaire responses, grouped by domains. The GECT was calculated as the mean, median, and standard deviation, along with variance, range, minimum and maximum values, standard deviation, first and third quartiles, interquartile range, and p-value (*table 2*).

Table 2. Descriptive data from questionnaires and Degree of Competency Expression at Work by domains (n = 119)

Domain	GECT[a]	MD[b]	Min	Máx	DP[c]	Q1[d]	Q3[e]	IIQ[f]	p-value
D1 – Health Situation Analysis	3.76	3.78	1.78	5	0.84	3.22	4.44	1.22	0.001
D2 – Risk and Damage Surveillance and Control	3.36	3.43	1	5	1.01	2.82	4.07	1.25	0.007
D3 – Health Promotion and Social Participation	3.61	3.7	1	5	0.92	3	4.2	1.2	< 0.001
D4 – Policies, Planning, Regulation, and Control	3.71	3.86	1	5	0.93	3.14	4.43	1.29	< 0.001
D5 – Equity in Access and Quality of Individual and Collective Services	3.65	3.88	1	5	0.93	3.25	4.25	1	< 0.001
D6 – International and Global Health	3.15	3.12	1	5	1.02	2.75	3.81	1.06	< 0.001

Source: Own elaboration.

GECT[a] – Degree of Work Competency Expression (corresponds to the average response values in each domain); MD[b] – Median; DP[c] – Standard Deviation; Q1[d] – First Quartile; Q3[e] – Third Quartile; IIQ[f] – Interquartile Range.

Domain 1 (Health Situation Analysis) achieved the highest GECT value (3.76); followed by Domain 4 (Policies, Planning, Regulation, and Control) (3.71); Domain 5 (Equity in Access and Quality in Individual and Collective Services) (3.65); and Domain 3 (Health Promotion and Social Participation) (3.61), all of which approach Score 4 – 'I have knowledge about the subject and know or would know how to apply it in practice'. On the other hand, Domain 6 (International and Global Health) showed the lowest GECT (3.16), followed by Domain 2 (Surveillance and Control of Risks and Damages) (3.43), both approaching Score 3 – 'I have limited knowledge about the subject for practical application'. All domains had standard deviation and interquartile range (IQR) values close

to 1, indicating a moderate dispersion of the data. Additionally, with a p-value < 0.05, there was a statistically significant relationship between the analyzed variables.

Educational level was the variable that had the greatest influence and impact on the GECT scores across the six analyzed domains. It was observed that, even with the presence of outliers, the educational levels of the study participants had a directly proportional impact on the obtained scores; that is, the lower the level of education, the lower the GECT (*figure 1*).

Figure 1. Boxplot of domain scores according to educational level
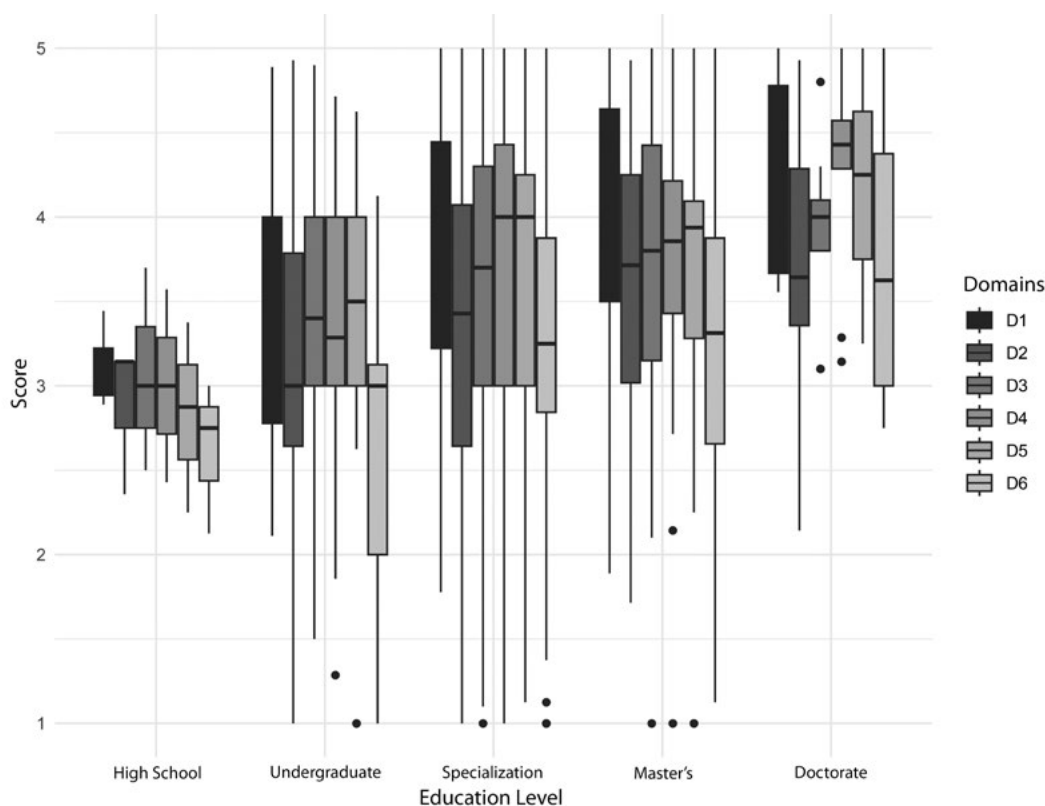
Source: Own elaboration.

Discussion

Of the 119 participants in this study, 70.6% (n = 84) were female. An article published by the National Association of Public Policy and Government Management Specialists (Anesp) identified that more than 65% of the healthcare workforce in both public and private institutions are women. Similarly, in the management of the SUS in Brazil, 69.2% of the roles are occupied by females. Thus, the higher representation of women among managers may indicate an empowerment of the female role in leadership positions and in the national political sphere[15].

The average age of 47 years is justified by the fact that professionals in public health management typically hold positions acquired through years of expertise[16,17]. According to

the phases of 'Professional Formation' (ages 26-35), 'Professional Maturity' (ages 36-50), and 'Professional Deceleration' (ages over 51), the participants of the study are, on average, within the 'Professional Maturity' phase. This profile represents professionals who are fully developing their cognitive, technical, and practical skills, being well-prepared and qualified, and firmly established in the job market[18].

Regarding education, 83.2% (n = 99) of the professionals held a *latu sensu* or *strictu sensu* postgraduate degree. This data configuration supports studies indicating that professionals with higher education levels possess greater competencies concerning the complexity of public health management and the necessary qualification for their roles. Such advanced education prepares them to handle daily challenges and make well-informed decisions[17,19].

Among the participants, the majority worked at the regional level (60.5%), while the remainder worked at the central level (39.5%). This information is significant for the study, given the comprehensive representation of different geographic areas within the state of Paraná, covering both the regional level, with 21 Regional Health Offices, and the central level due to the state's regional diversity. In Paraná, there are 22 Regional Health Offices, each responsible for territorial and administrative management of public health in their respective region, under the coordination of SESA-PR, which, at the central level, consolidates information and indicators, as well as health policy and planning for the state[20].

Regarding the experience in public health management, the range of 4 to 10 years had the highest number of responses (33.6%), followed by the range of 11 to 20 years (21.8%). This finding aligns with the association of positions in this area with professional expertise acquired over the years[17]. However, a significant number of participants reported having less than 6 months of experience (20.2%). This could be attributed to a selection process that took place in 2016 for 969 positions in the Health Servants' Own Framework of SESA-PR.

This process had an appointment validity period of two years, which was extended for an additional two years[21]. Thus, it can be inferred that the presence of professionals with up to six months of experience in public health management is correlated with this public competition.

Regarding professional categories, it is notable that 37% of the participants are nurses. However, the findings of this study reveal considerable heterogeneity among the professional categories. In addition to nurses, the study included professionals from various fields such as administrators, doctors, veterinarians, pharmacists, occupational therapists, dentists, biologists, social workers, economists, nutritionists, lawyers, accountants, physical educators, psychologists, physiotherapists, geographers, nursing technicians, public management and sanitation technologists, among others.

A plausible justification for nurses occupying a significant portion of management positions in public health is that nursing is a polyvalent profession with training that spans a wide range of health fields. Nurses are equipped to work in various domains, including direct patient care in hospitals and clinics, health promotion and protection in community settings, and public health management. This broad expertise allows them to adapt to and effectively handle the diverse responsibilities required in public health management roles[22]. The prominence of nursing in management may also be attributed to the fact that nurses, when performing administrative functions such as leadership and supervisory roles, are closely linked to the development of caregiving processes, as well as planning and organizing health actions[22,23]. However, the presence of other professions signifies the incorporation of multidisciplinary perspectives, which ensures a diverse and comprehensive view that contributes increasingly to the improvement of public health management[16].

In the evaluation of the GECT across the six domains proposed by the MRCESP, it was

found that Domain 1 – Analysis of the Health Situation (the ability to assess the health situation of the population and its trends based on the study of its determinants for decision-making and defining public health policies) – achieved the highest value (very close to score 4). Similarly, the GECT, in descending order of values, was close to score 4 in: Domain 4 – Policies, Planning, Regulation, and Control (the ability to manage within the regulatory framework of public health protection and oversight, for international cooperation, in the development of new laws and regulations for creating healthy environments and protecting citizens); Domain 5 – Equity in Access and Quality in Individual and Collective Services (the ability to ensure access to services, which should be provided universally without barriers, promoting quality and safety in service provision, and a multisectoral approach to addressing health inequities); and Domain 3 – Health Promotion and Social Participation (the ability to use health education and social participation as tools for change)[5].

It is noteworthy that score 4 reflects a substantial level of knowledge, indicating that participants not only have a comprehensive understanding of the topics analyzed but also the ability to apply them. This GECT value may have been influenced by the professionals' educational background combined with their time spent in public health management. It is reasonable to consider that professionals with a solid educational foundation and extensive experience accumulate more in-depth knowledge, skills, and attitudes, leading to higher scores. Additionally, the ongoing discussion of topics in Domains 2, 4, and 5 within the context of public health management also promotes the dissemination of knowledge, as practical interaction and dialogue enrich and contextualize theoretical learning[9,24,25].

On the other hand, Domain 6, which addresses International and Global Health (the ability to use relationships between national health authorities through health diplomacy and technical cooperation), had the lowest

GECT and therefore the greatest competence gap. This was followed by Domain 2 – Surveillance and Risk and Damage Control (the capacity to conduct research and surveillance on the emergence of epidemics, and models of presentation of communicable and non-communicable diseases, behavioral factors, accidents, and exposure to toxic substances or harmful environmental agents). Similar results have been found in previous research, which also identified competence gaps in Domains 2 and 6[9,24,25].

The significant competence gap identified in Domain 6 – International and Global Health – may be related to the current context, where international and global health is considered a new and constantly evolving field. This field is characterized by the reexamination of old ideological, geopolitical, and methodological disputes on a global scale. This scenario creates a complex landscape of genuine opportunities for pursuing equity, while also potentially obscuring various interests and agendas of different natures[26-28].

 A concrete example of this process occurred during the international emergency related to the Zika virus congenital syndrome, with Brazil at the epicenter in 2016[29] Similarly, the current declaration of emergency due to COVID-19 has opened space for intense scientific production in high-impact international journals, which have prioritized and advocated for open access to publications as a means to contribute to the global response[30]. However, the history of health crises warns that this prioritization will likely decrease after the end of the COVID-19 emergency, revealing a cyclical global investment strategy, with a focus that is unpredictable and subject to specific emergencies.

The competency gap identified in Domain 2 – Surveillance and Control of Risks and Damages – may be related to the restriction of knowledge, skills, and attitudes to a specific group of professionals. This domain addresses essential competencies related to the intersectoral planning of continuous monitoring

of all aspects related to the occurrence and dissemination of risks and damages to public health[5,6]. A study conducted on the contributions of a Simplified Competency Management Model for a municipal health department with 91 managers from a city in the state of Paraná also identified a competency gap in Domain 2, primarily related to: risk management, health risk reduction, immediate response, and recovery, all concerning disasters[9]. These results highlight a significant knowledge gap among professionals regarding the topic.

In this context, it is crucial to emphasize the importance of ongoing education and training within the framework of Continuing Health Education. Promoting professional development opportunities and expanding specialization offerings in public health management are essential. This approach ensures that professionals involved in public health management are adequately prepared to tackle challenges in Surveillance, Risk and Damage Control, as well as International and Global Health. The goal is to ensure comprehensive protection of public health across all dimensions[9].

Finally, regarding the influence of education on the six domains of the MRCESP, it was evidenced as a significant factor in determining the competency levels demonstrated by professionals working in public health management. The observed trend was that as education levels decrease, GECT scores also decrease. This indicates that participants with lower levels of education tend to exhibit lower competency scores in their work, not only in Domains 2 and 6 but also across all other domains. This highlights the importance of educational level in perceived ability to perform tasks and fulfill roles within the analyzed context.

The relationship between education and GECT also underscores the need for strategies to develop specific competencies for groups with lower educational levels, aiming to enhance their knowledge, skills, and attitudes to achieve more effective performance in their roles[9,16,19].

As a limitation of this study, difficulties were encountered in obtaining complete questionnaire responses from professionals managing SESA-PR, as data collection occurred at the onset of the Covid-19 pandemic in Brazil. Despite the researchers' efforts to contact participants to increase participation, the timing proved to be unfavorable for data collection. Additionally, there was no means of contact other than email, which negatively impacted participant recruitment. Another limitation was that, in this context, professionals faced a lengthy instrument, leading to some dropping out while responding to the survey.

Conclusions

It is considered that the mapping conducted enabled the identification of essential competencies expressed in the respective domains of professionals working in state management and the existing gaps, based on the MRCESP; and the determination of GECT.

The MRCESP addresses the competencies required for professionals in state management, and the quantitative data of the study show that most participants have knowledge of the subject and would know how to apply these competencies in practice. However, significant gaps in essential competencies were identified in Domain 2, which deals with Surveillance and Risk and Damage Control, and in Domain 6, which pertains to International and Global Health. Therefore, it is emphasized that there is a need to strengthen the integration of education-service-community in public health, as well as to reinforce these topics in the curricula of health professional undergraduate programs, considering the limited knowledge on the subject for practical application evidenced in this study.

It is recommended to conduct further research on the topic, expanding to include other stakeholders working in state health

departments across Brazil. Additionally, proposals for performance evaluation should be incorporated to facilitate improvements, targeted interventions, and the reorganization of management processes and Continuing Health Education, ultimately leading to high-quality service delivery to users of the health system in various contexts.

Finally, developing essential competencies is a challenge to be addressed in public management due to its specificities in producing satisfactory results. In this regard, competency mapping plays a fundamental role in ensuring that Continuing Health Education actions are planned and implemented effectively.

Collaborators

Zago DPL (0000-0003-1684-8770)* contributed to the design, conception, data analysis and interpretation, and writing of the manuscript. Peres AM (0000-0003-2913-2851)* and Sade PMC (0000-0001-5021-5147)* contributed to the design, conception, data analysis and interpretation, writing, critical review, and approval of the manuscript. Goto DYN (0000-0001-5405-829X)* contributed to the data analysis and interpretation, writing, and critical review of the manuscript. Almeida ML (0000-0001-7547-2991)* and Martins MMFPS (0000-0003-1527-9940)* contributed to writing and critical review of the manuscript. ∎

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