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Original Article

Essential public health competencies in nursing during the COVID-19 pandemic: A Delphi study

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ABSTRACT

Background & Aim: Nursing practice, characterized by its multifaceted nature, encompasses diverse settings and situations in public health, making it difficult to clearly define the role of nurses in this setting. The study aimed to determine the applicability and relevance of the Regional Core Competency Framework for Public Health in nursing practice during the COVID-19 pandemic.
Methods & Materials: Study based on the Delphi methodology, a structured approach to the systematic collection of expert opinions, to obtain group agreements. Twenty-one nurses working in public health areas during the pandemic participated.
Results: The competencies most applied by the nurses were in the domain of health situation analysis and surveillance and risk and damage control. 95% of the nurses were involved in care actions to prevent contagion; 71% analyzed social determinants of health, 100% were involved in the domain of policies, planning, regulation, and control, and 86% in the domain of health promotion. 89% made decisions to favor access to preventive and health care services. 78% valued social participation actions and 76% implemented immediate responses to COVID-19.
Conclusion: The main public health competencies used by nursing for dealing with the COVID-19 pandemic are the management of educational processes, health promotion, primary health care, analysis of social determinants, management of health policies, information analysis, and management of immediate responses to challenges generated by COVID-19.

Introduction

The essential public health functions (EPHF) represent the institutional capacities necessary for national and regional health authorities to address the health challenges of their populations (1). These functions constitute a conceptual, referential, and methodological framework that integrates the values of universal healthcare, the right to health, equity, and solidarity, ensuring effective public health actions through the protection, maintenance, and effective promotion of health (2). The EPHF was validated through the Regional Core Competency Framework for Public Health (RCCFPH) in the Americas (3,4) and adopted by various countries as a commitment to strengthening their health systems and achieving both the Sustainable Development Goals and global health security. The World Health Organization (WHO) has urged countries to strengthen EPHF as a key strategy to make their health systems more resilient (5).

The RCCFPH is an instrument that defines the knowledge, skills, and attitudes necessary for public health professionals to strengthen the workforce and improve the capacity to respond to health challenges (3). This framework guides training and professional development, ensuring that health workers have the competencies needed to address health issues effectively (3). The RCCFPH is organized into six substantive domains: health situation analysis, risk surveillance, and control, health promotion, policy and planning, equity in services, and international health. In addition, it includes transversal dimensions such as planning, management,

evaluation, communication, leadership, research, and the use of information technologies.

Although public health has a multidisciplinary workforce, the role of nursing is especially relevant in promoting actions that contribute to building health in various environments (6). Nurses play a fundamental role in guiding decision-makers in the care and preservation of health, risk assessment in different contexts, and the design of population interventions that promote healthy communities (7). Health systems have assigned nurses broad responsibilities that include competencies to provide care to individuals, families, and communities, both individually and collectively, within the framework of primary health care (PHC) (8,9).

These responsibilities include health promotion (3), disease prevention, health education (10), counseling, early detection, assessment, and patient diagnosis (11) case management, treatment monitoring, health services administration (6), community interventions (12), home care, palliative care, public policy formulation (3), and management of health information systems (13).

Nursing practice is characterized by its multifaceted nature and its presence in various public health settings. However, this breadth of competencies makes it difficult to clearly and precisely define the role that nurses should play in this context (14). The diversity of competencies also contributes to the lack of understanding of the role of public health nurses, which can lead to limitations in the allocation of responsibilities within the profession. Therefore, it is necessary to identify essential roles, functions, and competencies in nursing in addressing social determinants of health, health policies, health promotion, and environmental health equity (14).

The COVID-19 pandemic exacerbated these challenges (15), as health institutions were forced to redefine processes to address contingencies from a public health perspective. This led to a rethinking of the competencies of nurses to respond to new circumstances, reinforcing some EPHF while others were sidelined. The pandemic context affected the way nurses applied their competencies within the framework of the EPHF to meet the challenges of caring for individuals, families, and communities affected by COVID-19. In this context, there is a need to analyze the essential competencies that enable nurses to effectively participate in public health management during pandemics. The purpose of this research was to explore the role of nurses and their competencies in this field, supported by scientific evidence. The study aims to address a gap in the literature by examining how nurses apply EPHF in different settings affected by the pandemic, identifying strengths and limitations that influence their ability to meet public health challenges. It also highlights how they adapt their competencies and practices in the formulation of policies and strategies to strengthen the response of health systems, optimizing the role of nursing in building more resilient and equitable health systems. The study aimed to determine the applicability and relevance of the Regional Framework of Core Competency for Public Health (RCCFPH) in nursing practice during the COVID-19 pandemic.

Methods

The present study adopted the Delphi methodology (16), a structured approach to systematically gather opinions from experts, in this case, nurses working in public health. It is used to identify and analyze complex problems, generate new ideas, and develop recommendations, broadening discussions through reflective elements. This approach makes it possible to broaden discussions (17), build group consensus, and transform individual assessments into a higher collective judgment. The Delphi method is structured in rounds, maintains the anonymity of the responses, and ensures controlled feedback.

The Delphi method was used for its ability to generate opinions among experts in a context of uncertainty and rapid evolution, such as that experienced during the COVID-19 pandemic. This iterative method made it possible to collect and refine nurses' perspectives, ensuring a comprehensive and up-to-date assessment of the key competencies needed to meet the changing challenges of the pandemic in a Colombian city with 2.3 million inhabitants. Furthermore, as a remote and anonymous process, the Delphi facilitated the participation of geographically

dispersed experts, without the need for face-to-face meetings, which was crucial in a scenario of mobility restrictions and social distancing.

Participants

The study was conducted in health institutions in Cali, Colombia, and involved a panel of nursing experts with extensive experience in public health management during the COVID-19 pandemic. Nurses from different actors in the health system were selected through purposive sampling to ensure a diversity of perspectives. Inclusion criteria were nurses who were involved in population care management of people with COVID-19 and the control and mitigation of contagion in families and communities. Exclusion criteria were nurses with assignments unrelated to the care of individuals or groups during the pandemic. Thirty-five potential key informants were contacted and sent a letter of information about the study; 27 agreed to collaborate. After learning about the timelines and commitment required, 21 experts remained.

Procedure

To collect the information, an instrument based on the RCCFPH was applied, which establishes 37 competencies distributed in six domains (2). The Delphi study questions were administered in two initial rounds and one opinion round (18) through the Universidad del Valle's Google Forms web tool. Once the participants accepted, they were sent via e-mail a link that included the informed consent clauses and access to the electronic form. This form used a Likert-type scale with the options: Agree, partially agree, Disagree.

The process was a multi-stage iterative process, with each round based on previously obtained results. Each participant's responses were stored in a database created for the study, after being received by e-mail. Two initial rounds were held. To respond to the first round, a three-week deadline was established, with weekly reminders by e-mail and telephone contact. In this round, the professional and job characteristics of the participants were identified and the applicability of the RCCFPH competencies was assessed. Twenty-one nurses participated and their responses identified the most frequently mentioned

competencies. Subsequently, a new questionnaire was developed with these competencies, asking the experts to rate their importance and relevance in the context of the COVID-19 pandemic.

In the second round, and by the results of the initial phase, the experts were given a summary of the first round and asked to review their ratings and comments, in light of the information. Similarly, a second instrument was distributed to assess the relevance of the competencies that obtained less than 70% applicability. In addition, the possible reasons why these competencies were not applied were investigated. A Likert-type scale with three options was used: Essential, Useful but not essential, and Not necessary.

The experts' responses were analyzed to calculate the opinion values for each competency. A report was prepared with the results of the second round, which was distributed to the experts for review, seeking to reach opinions (19). In the final round, the expert panel received the results of the public health competencies, the order of importance, and the anonymous suggestions from the previous rounds. The panelists reviewed the final version and reached agreements. A three-week deadline was established for response, with weekly reminders by e-mail and telephone contact. All questions were required to be answered, to obtain the full opinion of all experts in both rounds on all issues raised.

In the event of unclear or ambiguous responses from experts, a clarification process was implemented through direct communication between researchers and experts. Follow-up questions were asked to obtain more detail, and in subsequent rounds, some questions were rephrased to improve understanding. After each round, responses were analyzed and summaries were provided to experts for review and adjustment in the next stage. Additionally, qualitative comments and discussions were used to contextualize the responses.

The dependent variables were the applicability and relevance of the RCCFPH domains: health situation analysis; surveillance and control of risks and harms; health promotion and social participation; policies, planning, regulation, and control; equity in access, and quality in individual and collective services; international/global health.

Data analysis

The analysis of the experts' opinions was carried out using percentages based on the degree of agreement between the responses to the questionnaire. A consensus threshold of 70% was established, which determined the minimum level of agreement required between the experts to consider that mutual approval had been achieved. After the responses were collected, they were grouped into categories according to the Likert scale, thus facilitating the calculation of the percentage of agreement. Qualitative data were analyzed using content analysis and integrated with quantitative data to inform decisions about competencies.

Ethical considerations

The research was classified as minimal risk according to the Declaration of Helsinki and was approved by the Ethics Committee of the Universidad del Valle (Registration No. 184020). Participants received and signed an informed consent form, which was explained to them in detail regarding the purpose of the study.

Results

Socio-demographic characterization

The participant population had an average age of 33 years. Seventy-one percent were women, with an average work experience of 10 years. The average time in years since obtaining their undergraduate degree was nine years. Fifty-eight percent had postgraduate studies; 56% of the professionals surveyed had worked in healthcare areas, while the remaining percentage had worked in administrative functions in public health secretariats, health insurance companies, and low-complexity hospitals.

Applicability of the RCCFPH by nursing professionals during the COVID-19 pandemic

Based on the analysis of the competencies of nurses according to the RCCFPH during the COVID-19 pandemic, it was established that the competencies in the domains of Health Situation Analysis and Surveillance and Risk and Harm Control were the most applied by the nurses. Table 1 shows that, in the Health Situation Analysis domain, 95% of the participants recommended evidence-based care actions to prevent COVID-19 infection; 71% analyzed health determinants and documented risks and access to services during the pandemic.

In the Risk and Damage Surveillance and Control domain, 76% carried out an immediate response in different situations to protect the health of the population in the face of the threat of COVID-19. Seventy-one percent communicated information to the population to identify health risks and improve the local response to contagion.

In the Health Promotion and Social Participation domain, 86% of the participants recognized the value and scope of health promotion programs to achieve positive changes before COVID-19.

Table 1. Applicability by nursing of the Regional Core Competency Framework for Public Health during the COVID-19 pandemic

	Competencies	A	PA	D
Domain: Health situation analysis	Analyzed the health determinants of the population it serves, documenting their risks and access to services in the face of the pandemic.	71%	24%	5%
	According to its functions, it had the opportunity to generate useful information to evaluate the performance of health services and the impact of care interventions in the population suspected or diagnosed with COVID-19.	67%	14%	19%
	It recommended evidence-based- and research-based healthcare actions to prevent COVID-19 transmission to patients, communities, and the general population.	95%	0	5%
	He has had the opportunity to contribute to the development of methodologies, technology, or practice for the management and communication of information on COVID-19.	62%	9%	29%
	He was responsible for conducting COVID-19 prevention and management training during the pandemic.	62%	14%	24%
Domain: Risk and damage surveillance and control	Analyzed threats, risks, and health damages brought about by COVID-19 that would allow it to contribute to the proper implementation and management of the surveillance system.	57%	24%	19%
	Made use of public health networks, services, and laboratories in the reporting of patients with COVID-19 to ensure public health surveillance and control.	67%	14%	19%
	Conducted risk monitoring of individuals with suspected or diagnosed COVID-19, taking into account the social determinants of each patient and thus identifying intervention needs.	29%	38%	33%

	Competencies	A	PA	D
Domain: Health situation analysis	Analyzed the health determinants of the population it serves, documenting their risks and access to services in the face of the pandemic.	71%	24%	5%
	According to its functions, it had the opportunity to generate useful information to evaluate the performance of health services and the impact of care interventions in the population suspected or diagnosed with COVID-19.	67%	14%	19%
	It recommended evidence-based- and research-based healthcare actions to prevent COVID-19 transmission to patients, communities, and the general population.	95%	0	5%
	He has had the opportunity to contribute to the development of methodologies, technology, or practice for the management and communication of information on COVID-19.	62%	9%	29%
	He was responsible for conducting COVID-19 prevention and management training during the pandemic.	62%	14%	24%
	As part of his daily work, he detected in a timely manner the signs and symptoms of the COVID-19 pandemic which allowed him to take actions to control, reduce, and mitigate its effects on the population.	67%	28%	5%
	Worked and articulated in an intersectoral manner to identify symptoms and outbreaks, to mitigate the risks of contagion by COVID-19.	57%	14%	29%
	Communicated to the population relevant information on the surveillance and control of COVID-19 to identify risks, and health damages and improve the effectiveness of the local response to this situation.	71%	10%	19%
	Designed risk management plans or interventions on COVID-19 to mitigate the effect of COVID-19 on health.	52%	24%	24%
	Executed an immediate response to protect patient health in the face of the threat posed by COVID-19.	76%	19%	5%
	Contributed to the planning and execution of post-pandemic interventions to rehabilitate and protect the health of the population.	47%	24%	28%
	He recognized the value and scope of health promotion programs in achieving positive changes in the health of individuals and the community before COVID-19.	86%	14%	0
Domain: Health promotion and social participation	Applied social participation tools with an intersectoral work approach to improving people's health during the pandemic and impact on public policies related to social determinants.	43%	28%	28%
	Conducted education and literacy activities for improvement in health promotion practices focused on COVID-19.	43%	19%	38%
	Designed communication and social marketing strategies related to the COVID-19 pandemic, fostering individual and collective change.	43%	14%	43%
	In public health practice in the context of coronavirus applied ethical considerations and cultural competency approaches.	62%	19%	19%
	Implemented strategies to promote the empowerment of social and community participation in health in the pandemic.	33%	33%	33%
	Worked in the development of strategies to strengthen primary health care and community services, achieving positive changes.	33%	14%	52%
	Managed the continuity of health promotion actions in the context of COVID-19.	43%	19%	38%
	It promoted the creation of spaces and participatory social processes to protect and understand health, improving the population's capacity to understand and control social services and public policies.	24%	24%	52%
	Participated in the design, execution, and evaluation of communication, education, and information strategies on COVID-19 aimed at the population.	28%	28%	43%
	Participated in the management of health policies and plans, contributing to the guarantee of the right to health, equity, and good performance of health systems.	29%	19%	52%
Domain: Policy, planning, regulation and control	Managed human, technological, and financial resources to improve health and control social determinants.	43%	14%	43%
	Performed assessment of the needs and problems of individuals, families, and human collectives, sustaining interventions and optimizing results.	57%	14%	29%
	Led groups involved in the analysis, formulation, implementation, and evaluation of public health policies, plans, and programs in the context of the COVID-19 pandemic.	24%	24%	52%
	Conducted planning and decision-making as a social, technical, and political process to achieve better health outcomes related to the pandemic.	43%	19%	38%
	Participated in making decisions that allowed access to preventive and health care services.	43%	14%	43%
Domain: Equity in access to and quality of individual and collective services	Implemented actions to improve access to health services in the face of social isolation (tele-nursing).	29%	19%	52%
	It was responsible for carrying out actions to guarantee the quality of health services in accordance with safety standards.	52%	19%	29%

	Competencies	A	PA	D
Domain: Health situation analysis	Analyzed the health determinants of the population it serves, documenting their risks and access to services in the face of the pandemic.	71%	24%	5%
	According to its functions, it had the opportunity to generate useful information to evaluate the performance of health services and the impact of care interventions in the population suspected or diagnosed with COVID-19.	67%	14%	19%
	It recommended evidence-based- and research-based healthcare actions to prevent COVID-19 transmission to patients, communities, and the general population.	95%	0	5%
	He has had the opportunity to contribute to the development of methodologies, technology, or practice for the management and communication of information on COVID-19.	62%	9%	29%
	He was responsible for conducting COVID-19 prevention and management training during the pandemic.	62%	14%	24%
	Participated in the coordination of integrated networks between the different levels taking into account the RIAS to respond to health problems related to COVID-19.	24%	19%	57%
	Observed safety conditions in the care of patients with suspected or diagnosed COVID-19 that contribute to risk control and management programs.	43%	14%	43%
	In accordance with its functions, it carried out activities that allowed for social participation with a multidisciplinary or community approach aimed at preventing COVID-19 infection.	33%	19%	48%
	His work experience and scientific knowledge allowed him to identify problems related to the control of the effects of the pandemic on the health of the population.	67%	24%	9%
Domain: International/ Global Health	In his role as a professional, he contributed proposals that facilitate a physical, psychosocial, cultural, and spiritual environment that promotes individual and collective security in the context of the pandemic.	57%	29%	14%

A: Agree, PA: Partially agree, D: Disagree

Relevance of the RCCFPH to Nursing Practice during the COVID-19 pandemic

Some competencies did not show in the experts' agreement a percentage higher than 70% in relevance (Table 2). In the analysis of the health situation, 100% considered it relevant to conduct training on the prevention and management of COVID-19, and 67% saw the need to generate useful information to evaluate the performance of health services and the impact of interventions on people with COVID-19. In the domain of surveillance, risk, and damage control, 100% analyzed threats, risks, and damage to health caused by COVID-19, in order to contribute to surveillance systems with actions to control and reduce its effects on the population.

Regarding health promotion and social participation, 100% considered it relevant to work on strategies to strengthen PHC and community services. In the domain of policies, planning, regulation, and control, 100% considered it essential to participate in the management of health policies and plans, contributing to the guarantee of the right to health, equity, and the good performance of health systems.

In the domain of equity in access and quality of care, 89% considered it relevant to participate in decision-making to improve access to preventive and care services, including tele-nursing, and in the coordination of integrated networks that consider comprehensive care routes to respond to health problems related to COVID-19. Finally, for 78%, it was important to carry out activities that allow for social participation with a multidisciplinary and community approach aimed at preventing COVID-19 infection.

Table 2. Relevance of the Regional Core Competency Framework for Public Health (RCCFPH) to Nursing Professionals during the COVID-19 pandemic

	Competencies	E	UNE	NE
Domain: Health situation analysis	To generate useful information to evaluate the performance of health services and the impact of care interventions in the population suspected or diagnosed with COVID-19.	67%	33%	0%
	Contribute to the development of methodologies, technology, or practices for the management and communication of information on COVID-19.	78%	22%	0%
	Conduct COVID-19 prevention and management training during the pandemic.	100%	0%	0%
Domain: Risk and damage surveillance and control	To analyze the health threats, risks, and damages brought about by COVID-19 in order to contribute to the proper implementation and management of the surveillance system.	100%	0%	0%
	Make use of public health networks, services, and laboratories in the reporting of patients with COVID-19 to ensure public health surveillance and control.	89%	11%	0%
	Perform risk monitoring of people with suspected or diagnosed COVID-19 taking into account the social determinants of each patient and thus identify intervention needs.	67%	33%	0%

	Competencies	E	UNE	NE
Domain: Health situation analysis	To generate useful information to evaluate the performance of health services and the impact of care interventions in the population suspected or diagnosed with COVID-19.	67%	33%	0%
	Contribute to the development of methodologies, technology, or practices for the management and communication of information on COVID-19.	78%	22%	0%
	Conduct COVID-19 prevention and management training during the pandemic.	100%	0%	0%
	To detect in a timely manner the signs and symptoms of the COVID-19 pandemic to take actions to control, reduce, and mitigate its effects on the population.	100%	0%	0%
	Work and generate intersectoral articulation to identify symptoms and outbreaks to mitigate the risk of infection by COVID-19.	89%	11%	0%
	Design risk management plans or interventions on COVID-19 to mitigate the effect of COVID-19 on health.	89%	11%	0%
	Contribute to the planning and implementation of post-pandemic interventions for the rehabilitation and protection of the health of the population.	67%	22%	11%
Domain: Health promotion and social participation	Apply social participation tools with an intersectoral work approach to improve the health of people during the pandemic and impact public policies related to social determinants.	78%	22%	0%
	Conduct education and literacy activities for improvement in health promotion practices focused on COVID-19.	78%	22%	0%
	Design communication and social marketing strategies related to the COVID-19 pandemic to foster individual and collective change.	67%	33%	0%
	Apply ethical considerations and cultural competency approaches to public health practice in the context of coronavirus.	78%	22%	0%
	Apply strategies to promote the empowerment of social and community participation in health in the pandemic.	89%	11%	0%
	Work on the development of strategies to strengthen primary health care and community services to achieve positive changes.	100%	0%	0%
	To manage the continuity of health promotion actions in the context of COVID-19.	78%	22%	0%
	Promote the creation of spaces and participatory social processes to protect and understand health, improving the population's capacity to understand and control social services and public policies.	78%	22%	0%
	Participate in the design, execution, and evaluation of communication, education, and information strategies on COVID-19 aimed at the population.	78%	22%	0%
Domain: Policy, planning, regulation and control	Participate in the management of health policies and plans contributing to the guarantee of the right to health, equity, and good performance of health systems.	100%	0%	0%
	To manage human, technological, and financial resources for the improvement of health and the control of social determinants.	67%	33%	0%
	To assess the needs and problems of individuals, families, and human groups, supporting interventions and optimizing results.	78%	22%	0%
	Lead groups that will participate in the analysis, formulation, implementation, and evaluation of public health policies, plans, and programs in the context of the COVID-19 pandemic.	56%	33%	11%
	Conduct planning and decision-making as a social, technical, and political process to achieve better health outcomes related to the pandemic.	67%	22%	11%
Domain: Equity in access and quality of individual and collective services	Participate in decision-making that would allow access to preventive and health care services.	89%	11%	0%
	Implement actions to improve access to health services in the face of social isolation (tele-nursing).	78%	22%	0%
	Carry out actions to guarantee the quality of health services in accordance with safety standards.	100%	0%	0%
	Participate in the coordination of integrated networks between the different levels taking into account the RIAS to respond to health problems related to COVID-19.	78%	22%	0%
	To observe safety conditions in the care of patients with suspected or diagnosed COVID-19 that contribute to risk control and management programs.	67%	22%	11%
	To carry out activities that enable social participation with a multidisciplinary and community approach aimed at preventing COVID-19 infection.	78%	22%	0%
Domain: International/ Global Health	Identify issues related to managing the health effects of the pandemic on the population.	67%	33%	0%
	Contribute with proposals that facilitate a physical, psychosocial, cultural, and spiritual environment that promotes individual and collective security in the context of the pandemic.	56%	44%	0%

E= Essential, UNE= Useful but not essential, NO= Not necessary

Discussion

The COVID-19 pandemic had devastating consequences on health systems worldwide. However, it opened an opportunity to highlight the advances of nursing in the implementation of the RCCFPH established by WHO (3). This scenario evidenced a predominance in the application of competencies through articulation and intersectoral work. This study highlights the crucial role of nurses in energizing public health actions during the pandemic and in using their competencies to foster integration in organizational processes, as shown by other studies (11). However, tensions that could affect nurses' performance during the pandemic

have been documented, related to time and space limitations to lead processes (20), insufficient investment in public health, staff shortages, lack of emergency preparedness (21), little experience in health crises (22), and communication difficulties (23), among others.

In this sense, the study provides evidence that reinforces and expands knowledge about the essential competencies of public health nurses. It confirms previous findings and introduces new perspectives on their integral role, especially in health crises such as the COVID-19 pandemic, highlighting the need to involve them in the creation, implementation, and management of health policies at national, regional, and local levels.

The analysis of the expert panel's responses revealed that the core competencies in public health, both in terms of applicability and relevance, are mainly related to the management of information and education processes; the establishment and management of strategies for health promotion, disease prevention and services based on PHC; the analysis of the social determinants of health; the management of health policies; the promotion of access to health services; the analysis of information to mitigate threats, risks and damages; and the immediate response to COVID-19. To elucidate these competencies, a description of each is provided below.

Competencies for the management of health information and education processes

According to the experts' responses, in a context of uncertainty and misinformation such as that of the pandemic, the ability of nurses to communicate effectively and empathetically was crucial to reduce fear and increase confidence in public health actions by creating reliable sources of information (8). They acted as intermediaries between scientific knowledge and its practical application, providing accurate and up-to-date information on hygiene measures, social distancing, and vaccination (24). New evidence reinforces nurses' ability to communicate effectively in uncertain contexts, such as the COVID-19 pandemic, thereby fostering compliance with preventive measures. Their ability to interact with people from diverse

backgrounds and levels of understanding is key. While these findings are consistent with previous studies (25), this work is distinguished by its focus on the pandemic context, where rapidly evolving information and misinformation pose unique challenges (22).

Competencies for the management of strategies for health promotion, disease prevention, and services based on PHC

The analysis of the experts' responses reveals that nurses adopt a comprehensive approach to public health management. This comprehensiveness is manifested in their proximity to people, allowing them to identify risk factors and design interventions adjusted to contexts that promote healthy processes. Similar studies (10) indicate that, because of their training and experience, nurses can detect early on challenges that represent potential risks to the health and life of the population, allowing them to implement appropriate preventive measures. The pandemic, however, exposed vulnerabilities in the health system, such as the reduction of the nursing workforce and its consequences on the comprehensiveness of care (26), as well as limitations in the effective response from health promotion actions (10).

This study reveals that nurses act as the backbone of PHC by performing multidimensional roles during the pandemic. They provided comprehensive care, from initial assessment to follow-up treatment and rehabilitation. Their responsibilities included directing outpatient and clinical care programs, managing immunization programs, contact tracing, and sample management, and consolidating themselves as the first point of contact between the health system and the population In a challenging context such as the pandemic scenario (27). Evidence has shown that PHC-based, people-centered health systems are more resilient and effective in the face of health crises. This study deepens this understanding by highlighting nurses' ability to collaborate with social and community organizations (28), thereby facilitating the adaptation of health interventions to local needs and consolidating their role as the first point of contact.

The findings confirm previous research (13) showing how the implementation of these roles in PHC-based, people-centered health systems increases resilience and strengthens the workforce to face pandemics in a structured manner. However, the study also reveals economic, political, labor, and social challenges that affected the role of nurses during the pandemic.

Competencies for the analysis of social determinants of health

According to experts, sustained and affordable access to health services during the COVID-19 pandemic was influenced by structural and social factors related to health inequality (29). Nurses, because of their comprehensive training and holistic approach, were in a unique position to identify and analyze the social determinants of health and propose addressing inequities (30). Their ability to understand the social, cultural, economic, and political context of individuals enabled them to assess community needs and identify patterns and trends that revealed disparities. By recognizing these disparities, nurses took action to promote social justice at the individual, organizational, and community levels through holistic care, especially targeting marginalized populations. Although some of the aspects mentioned have been evidenced in other studies (21), new evidence indicates that nurses faced difficulties in addressing these determinants in a comprehensive manner (31) and perceived a lack of voice, participation, and empowerment in decision-making at a higher level (23).

Competencies for Health Policy Management

The experts reflected on the role of nurses, which goes beyond direct care for people infected with COVID-19 to include a broad spectrum of functions such as planning, implementing, and evaluating health policies aimed at promoting the well-being of populations. Nurses combine their practical experience with a deep understanding of community needs, making them essential actors in the design, implementation, and evaluation of effective and sustainable policies. Their ability to adapt quickly and their focus on people-centered care was invaluable in addressing the health crisis triggered by the pandemic (19).

These findings complement existing literature by recognizing nurses' leadership skills, ability to advocate for the community, competence in resource management, and a focus on interdisciplinary collaboration. Their experience in holistic care models allowed them to contribute significantly to the promotion of health policies that strengthened the health of individuals, families, and communities (3), invaluable aspects during the health crisis.

Competencies to strengthen access to health services

Analysis of the responses shows that nurses have skills in assessing community needs, coordinating and managing services, advocating for effective policies, and identifying barriers to accessing health services. In the field of public health during the pandemic, they contributed to the design and implementation of strategies to overcome these challenges. These strategies focus on individual needs to improve infrastructure, strengthen funding for public health programs, and promote equity in access to services. New evidence highlights nurses' ability to identify and overcome barriers, thereby ensuring people's access to quality healthcare. This complements previous studies that focused on non-pandemic times (32).

Competencies for information analysis and hazard, risk, and damage reduction

Experts reflected on nurses' use of analytical skills to recognize and interpret clinical, epidemiologic, and community data that revealed population needs during the pandemic (25). This ability enabled them to identify patterns and trends that indicated potential health threats, as well as to recognize risk factors in the clinical and community setting. Through risk assessments, nurses were able to anticipate problems and develop strategies to mitigate them, using a constant flow of information that allowed policymakers to make evidence-based decisions, improve resource allocation, and design more effective interventions (9). Although studies have documented these aspects (9), the findings strengthen the evidence on the competencies

needed to mobilize health systems during health emergencies and underline the importance of defining specific roles in the nursing profession to optimize the use of information systems and the reduction of threats and risks (32).

Competencies for Immediate Response to COVID-19

Experts concluded that nurses proved to be reliable responders during the COVID-19 pandemic (15). In all practice settings, they implemented planning, resource management, team coordination, and direct care processes, overcoming barriers to meeting public health requirements, as demonstrated by other studies (5). Their experience in diverse settings allowed them to adapt nimbly to the demands of the pandemic and to play multiple roles on the front line of the fight against the virus (33).

Their collaboration with other health professionals, government authorities, and community organizations was instrumental in the implementation of preventive measures, mass vaccination campaigns, expansion of hospital capacity, and reorganization of workflows to minimize virus transmission in health facilities.

This study strengthens the scientific evidence base on the competencies needed for nurses to mobilize health systems during health emergencies. It also highlights the importance of defining specific roles in the profession to improve its performance in public health.

Within the limitations of this research, the results should be interpreted with caution due to the inherent characteristics of Delphi studies. These studies have some restrictions derived from their qualitative nature and the subjectivity of both participants and researchers. In addition, the selection of the sample, which included nurses with responsibilities in various health system settings, although it had a high response rate, has limitations and an unavoidable selection bias, since it is not a representative sample of professionals.

Conclusion

Nurses recognize the principles of the WHO Regional Framework of Essential Competencies in Public Health. Experts determined that the main essential public health

competencies that nurses should have to respond to the COVID-19 pandemic and future health emergencies include management of information and education processes; development and implementation of health promotion, disease prevention, and PHC-based services; analysis of the social determinants of health; management of health policies; access to health services; analysis of information to mitigate threats, risks, and harms; and immediate response to COVID-19. Thus, there is a need to clearly define a set of competencies that establish the role of the public health nurse. Strengthening a strong nursing workforce, both in the processes of care as well as in government management, is essential to effectively respond to pandemic challenges and public health emergencies.

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