Original Research Paper

Curriculum gaps in Family Medicine education across the Americas: an institutional assessment of educational preparedness for 21st century practice

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Abstract

Background: Family medicine training programs must evolve to meet emerging healthcare challenges, such as climate change, digital health integration, and emergency preparedness. Understanding institutional perspectives on curriculum gaps is essential for strategic educational planning and resource allocation across diverse healthcare systems. **Objective:** To assess family medicine training curriculum coverage across the Americas from the institutional perspective of professional associations, and identify priority areas for educational modernization. **Methods:** We made a cross-sectional institutional assessment across 19 countries in the Americas. All WONCA-affiliated family medicine professional associations completed standardized 22-item surveys assessing curriculum coverage across 25 core competency areas. Analysis focused on identifying institutional curriculum gaps using threshold methodology (competencies with <70% adequate coverage classified as priority gaps). **Results:** Professional associations achieved 100% participation across all target countries. Traditional clinical competencies showed universal institutional coverage (100% for non-communicable diseases, communicable diseases, emergency medicine, women's health, children's health, and adult health). Critical curriculum gaps emerged in contemporary competencies, with significant disparities, particularly in areas such as climate change and environmental health, telehealth integration, and healthcare management training. **Conclusions:** While family medicine institutions demonstrate strong curriculum coverage in traditional clinical areas, critical gaps exist in emerging competencies essential for 21st-century healthcare, with marked regional disparities. Climate change and environmental health represent the most significant institutional curriculum gaps, particularly affecting Latin American programs. Strategic curriculum modernization and targeted support are urgently needed to prepare family physicians for the contemporary healthcare challenges they face.

Keywords: family medicine education, medical curriculum, institutional assessment, professional associations, competency-based education, curriculum development

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INTRODUCTION

Family medicine (FM), also known as family and community medicine (FCM), is an academic and clinical discipline that is a necessary core component of Primary Health Care (PHC). It provides continuous, comprehensive, coordinated, responsive, patient-centered, and contextually relevant care to individuals, families, and communities. It incorporates prevention and health education into clinical care.[1,2] FM and other primary care specialties are the only components of the healthcare workforce for which there is evidence of improving population health outcomes, including mortality.[3] It is an alternative to hospital- and

subspecialty-centric care, a segmented approach to medical practice, reduced to physiological systems and specific diseases. This segmented model of specialty-driven care has proven unsustainable for public and universal health systems, which aim to provide comprehensive coordinated care from prevention to treatment, to rehabilitation and palliative care.[4]

Family medicine education faces unprecedented challenges, including increased resource constraints, rapidly changing technological advances, and novel situations such as the recent pandemic, all requiring institutional curriculum evaluation and strategic modernization. Professional associations, as representatives of educational institutions and training programs, provide critical perspectives on curriculum coverage and educational priorities across diverse healthcare systems.[5,6] Understanding institutional assessments of curriculum adequacy is essential for strategic academic planning, resource allocation, and coordinated improvement efforts. The COVID-19 pandemic exposed critical gaps in primary healthcare preparedness.[7] At the same time, climate change, digital health transformation, and evolving disease patterns demand new physician competencies that may not be adequately addressed in traditional medical education curricula.[8,9] Professional associations, through their oversight of training standards and program accreditation, possess unique insights into curriculum coverage and educational priorities across their respective healthcare systems.

The World Health Organization emphasizes that primary healthcare training must address emerging global health challenges while maintaining excellence in fundamental clinical care.[10] However, systematic institutional assessment of curriculum coverage across diverse healthcare systems remains limited, particularly regarding emerging competencies essential for 21st-century practice.[11] In the Americas, family medicine training exhibits substantial institutional variation across countries, which may lead to disparities in educational standards and physician preparedness. The Pan American Health Organization's 2030 Health Workforce Policy emphasizes the urgent need for competency-based education that addresses contemporary health challenges through coordinated efforts.[12] Professional associations, as key stakeholders in medical education governance, provide essential perspectives on curriculum gaps and improvement priorities. This study addresses these knowledge gaps by examining institutional assessments of training adequacy across 25 core competency areas in family medicine programs throughout the Americas. It provides actionable recommendations for strategic curriculum modernization and the allocation of educational resources.

METHODS

Study Design and Setting

We conducted a cross-sectional institutional curriculum assessment survey across 19 countries in the Americas from August to October 2024. The survey consisted of multiple-choice and narrative response items and was available in English, Portuguese, and Spanish. We used cognitive pretesting to ensure the correct understanding of the questions.[13] After minor revisions, the instrument was pilot-tested by individuals not associated with the research and modified as needed without further psychometric testing to determine instrument validity. The survey was administered using the secure University of New Mexico RedCap platform[14] and disseminated via email directly to professional associations between August 2024 and October 2024.

This educational evaluation was conducted in collaboration between the Pan American Health Organization (PAHO), the World Organization of Family Doctors (WONCA) in the Ibero-American and North American regions, and the University of New Mexico's WHO/PAHO Collaborating Center.

Ethical Considerations

The research protocol received approval from the PAHO Ethics Review Committee (PAHOERC), protocol number 0742.01. All participating associations provided informed consent through RedCap, a secure online survey platform.[14] Participation was voluntary without financial incentives. Institutional data were anonymized and securely stored in accordance with UNM SOM data protection protocols.

Participants and Sampling

All WONCA-affiliated family medicine professional associations in the Americas were eligible and invited to participate. No inclusion/exclusion criteria were established in the study as a single respondent was tasked with completing the survey at the discretion of their association. Target associations included representatives from: Argentine Federation of Family and General Medicine, Bolivian Society of Family Medicine, Brazilian Society of Family and Community Medicine, Chilean Society of Family Medicine, Colombian Society of Family Medicine, Costa Rican Association of Specialists in Family and Community Medicine, Cuban Society of Family Medicine, Dominican Society of Family and Community Medicine, Ecuadorian Society of Family Medicine, Mexican Federation of Specialists and Residents in Family Medicine, Nicaraguan Association of Family Medicine, Panamanian Association of Family Medicine, Paraguayan Society of Family Medicine, Peruvian Society of Family and Community Medicine, The Society of Teachers of Family Medicine, Uruguayan Society of Family and Community Medicine, Venezuelan Society of Family Medicine,, The College of Family Physicians of Canada, and Caribbean College of Family Physicians.

For regional analysis, associations were grouped into two categories: Latin American and North American, comprising Canada, the United States, and the Caribbean. Additionally, South American associations were analyzed as a distinct subregion within the Latin American grouping to identify more specific regional patterns in curriculum coverage.

Data Collection Instrument

In collaboration with PAHO and WONCA leaders, we created a questionnaire to analyze the situation of family medicine in the Americas. From this questionnaire, we pulled the questions related to education for this paper and report on the results of the 22-item Professional Association Curriculum Assessment Survey based on contemporary frameworks for family medicine competency and international standards in medical education (See Appendix A: Professional Association Curriculum Assessment Survey Questions) The instrument assessed institutional perspectives on curriculum coverage across 25 competency domains, training requirements, educational policies, and faculty development needs. Each competency area was evaluated using 5-point Likert scales assessing institutional perception of training adequacy ("strongly disagree," "disagree," "neither agree nor disagree," "agree," "strongly agree").

Training Structure Assessment: Questions addressed training duration, certification requirements, accreditation policies, and professional development infrastructure.

Although both specialization and residency education refer to postgraduate training, the words are used in different contexts depending on when and how their medical education programs developed.

Educational Priorities: Open-ended questions identified specific curriculum gaps, improvement priorities, faculty development needs, and resource constraints.

The survey was professionally translated and available in English, Portuguese, and Spanish. We also developed a comprehensive 25-competencies framework based on international family medicine standards, WHO primary healthcare competencies, and emerging healthcare challenges:

Traditional Clinical Competencies (11 domains): Principles of family medicine and public health, non-communicable diseases, communicable diseases, emergency medicine, pediatric health, adolescent health, adult health, geriatric health, women's health, maternal health, mental health, palliative care.

Population Health and Health Systems (6 domains): Health policy, social determinants of health, health education, interprofessional education, healthcare services management, evidence-based medicine.

Emerging 21st-Century Competencies (5 domains): Climate change and environmental health, emergency preparedness and disaster response, telehealth integration, utilization of health information systems, and bioethics and professionalism.

Specialized Practice Areas (3 domains): Home care, rehabilitation, rural and underserved population care, and research methodology.

Data Analysis

Descriptive statistics were calculated for institutional curriculum coverage across all competency domains. Training adequacy responses were categorized as: adequate coverage ("agree" and "strongly agree"), neutral ("neither agree nor disagree"), and inadequate coverage ("disagree" and "strongly disagree"). We selected 70% as our upper limit threshold to balance sensitivity and specificity. This limit is high enough to avoid over-interpreting weak trends, while not so restrictive as to exclude patterns that are clearly present in the majority of the responses.

Institutional Gap Analysis: Competencies with <70% positive institutional ratings were classified as critical gaps requiring immediate attention. Competencies with 70–85% positive ratings were classified as moderate gaps requiring strategic improvement. Competencies with ratings of 85% or higher were classified as having adequate institutional coverage.

Regional Comparative Analysis: We compared curriculum coverage between Latin American (n = 16) and North American (n = 3) associations to identify regional disparities and priorities in resource allocation. We parsed South American responses for comparative purposes where appropriate.

RESULTS

All 19 target professional associations participated, achieving a 100% institutional response rate across the Americas region. Participating associations represented diverse healthcare systems, including universal health coverage systems, mixed public-private systems, and predominantly private healthcare models. When interpreting the results, we remind readers that a consideration is the uneven

Table 1: Profile of Family Medicine/Family & Community Medicine in the Region of the Americas Reported by Professional Associations

Variables	N	%
Training Pathways		
Specialization	13	68
Residency	12	63
Masters	1	5
Other	2	11
Professional Roles		
Assistance	18	95
Administrative	17	90
Teaching	19	100
Research	19	100
Training Requirements		
FM/FCM specialty training accreditation sanctioned or spelled out in government policy	14	74
Training as an FM/FCM specialist as a requirement for entry into any FM/FCM physician job	12	63
Competency or certifying exam required	12	63
Professional association or certifying board participation as a requirement for working as an FM/FCM physician	4	21
Renewal of professional registration/certification	8	42
Workforce Development		
Policies/programs on working conditions and professional retention	7	37
Internal mobility data	4	21
Immigration data	3	16
Emigration data	1	5

number of professional associations in each region. North America includes only a small number of associations, so each response has a large effect on the reported percentages and may make results appear more uniform. Latin America includes more associations, which allows for greater variation but may also hide differences between countries. For this reason, regional comparisons should be interpreted as showing general patterns rather than precise percentage differences.

Profile of Family Medicine/Family & Community Medicine in the Region of the Americas Reported by Professional Associations

Training Program Characteristics: Family medicine specialization was the primary training pathway in 68% of countries (n = 13), while residency programs were utilized in 63% of countries (n = 12). Training duration ranged from 2 to 4 years, with most programs requiring 3 years of post-medical school education. Government support for family medicine training exists in 74% of countries (n=14) and is embedded in training accreditation or spelled out in government policy. Competency or certification examinations were required in 63% of countries (n = 12). Professional association participation was mandatory for practice in only 21% of countries (n = 4), while certification renewal was required in 42% of countries (n = 8).

Traditional Clinical Competency Coverage

Professional associations reported universal or near-universal coverage of the curriculum across

Table 2: Topics Covered in FM/FCM Training by Regional Groupings Based on Professional Association Reports

	Latin America N = 16						**North America** N=3		**Overall** N=19	
Topics	**Overall N=16**	**Central America N=6**			**South America N=10**					
Traditional Clinical Competencies										
Principles of family medicine and introduction to public health	15	94%	6	100 %	9	90%	3	100%	18	95%
Non-communicable diseases	16	100 %	6	100 %	10	100 %	3	100%	19	100%
Communicable diseases	16	100 %	6	100 %	10	100 %	3	100%	19	100%
Mental health	15	94%	6	100 %	9	90%	3	100%	18	95%
Women's health	16	100 %	6	100 %	10	100 %	3	100%	19	100%
Children's health	16	100 %	6	100 %	10	100 %	3	100%	19	100%
Population Health & Systems										
Health policy	10	63%	4	67%	6	60%	3	100%	13	68%
Determinants of health	15	94%	6	100 %	9	90%	3	100%	18	95%
Evidence-based medicine	15	94%	6	100 %	9	90%	3	100%	18	95%
Healthcare services management	9	56%	4	67%	5	50%	3	100%	12	63%
Critical Gap Areas										
Climate change and environmental health	5	31%	2	33%	3	30%	3	100%	8	42%
Telehealth incorporation	9	56%	4	67%	5	50%	3	100%	12	63%
Health information systems	9	56%	4	67%	5	50%	3	100%	12	63%
Emergency preparedness	12	75%	5	83%	7	70%	3	100%	15	79%
Research development	14	88%	6	100 %	8	80%	3	100%	17	89%
Specialized Practice: Rural and underserved areas	12	75%	6	100 %	6	60%	3	100%	15	79%
Specialized Practice: Home care	12	75%	5	83%	7	70%	3	100%	15	79%
Specialized Practice: Rehabilitation	10	63%	5	83%	5	50%	3	100%	13	68%

Note: Latin America includes Mexico, Central America, the Caribbean, and South America. South America is a subset of Latin America, including Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.

traditional clinical competencies, including non-communicable diseases, communicable diseases, emergency medicine, women's health, children's health, and adult health, which achieved complete institutional coverage across all participating associations.

Near-Universal Coverage (>90% institutional adequacy): Principles of family medicine and public health (95%, n=18), maternal health (95%, n=18), mental health (95%, n=18), health education (95%, n=18), and evidence-based medicine (95%, n=18) demonstrated strong institutional coverage.

Strong Coverage (85–90% institutional adequacy): Adolescent health (90%, n = 17) and bioethics/professionalism (90%, n = 17) demonstrated robust institutional coverage with minimal gaps.

Topics Covered in FM/FCM Training by Regional Groupings Based on Professional Association Reports

Critical Gaps in 21st Century Competencies

Substantial institutional curriculum deficiencies were seen in contemporary healthcare competencies essential for modern practice, with notable disparities. Climate change and environmental health represent the most significant institutional gap, exhibiting marked regional differences. Less than one-third (31%) of Latin American associations (n = 5) reported adequate curriculum coverage, compared to 100% of North American associations (n = 3). This 69-percentage-point gap indicates a critical disparity in preparing family physicians for climate-related health challenges, including the impacts of extreme weather, the expansion of vector-borne diseases, health effects of air quality, and environmental justice issues.

Regional disparities were also evident in the integration of telehealth and digital health. Slightly more than one-half, 56% of Latin American associations (n=9) reported adequate coverage compared to 100% of North American associations (n=3). This 44-percentage-point gap suggests substantial differences in digital health infrastructure and access to educational technology between regions. Similar regional patterns emerged in the utilization of health information systems, with 56% of Latin American associations (n=9) reporting adequate coverage versus 100% of North American

Table 2: Topics Covered in FM/FCM Training by Regional Groupings Based on Professional Association Reports

Assessment Areas	Positive		Neutral		Negative	
	N	(%)	N	(%)	N	(%)
Educational Infrastructure						
There are activities to promote and maintain the wellness of FM/FCM physicians	8	42%	3	16 %	6	32 %
There is regular monitoring of the workplace to improve working conditions	4	21%	6	32 %	7	37 %
There is an immunization program for workers	16	84%	5	26 %	0	0%
Clinical Practice Support						
Clinical care is guided by up-to-date and relevant clinical protocols	16	84%	0	0%	2	11 %
There is a career progression program for FM/FCM physicians	4	21%	3	16 %	9	47 %
FM/FCM physicians have continuing education options/requirements	14	74%	2	11 %	3	16 %
Research and Policy Integrations						
Health services have a research program	4	21%	1	5%	13	68 %
There is adequate involvement of FM/FCM specialists in the development of public health policies	6	32%	3	16 %	8	42 %

associations (n=3), indicating a 44-percentage-point disparity in health informatics preparation.

While showing better overall coverage, differences persisted in emergency preparedness and disaster response, with 75% of Latin American associations (n =12) reporting adequate coverage, compared to 100% of North American associations (n=3), representing a 25-percentage-point gap.

Professional Practice and Working Conditions Assessment by Professional Associations

Population health competencies demonstrated moderate to strong institutional coverage with some strategic gaps and notable variations. For example, disparities emerged with health policy and advocacy, with 63% of Latin American associations reporting adequate coverage compared to 100% of North American associations, representing a 38-percentage-point gap. This suggests differential emphasis on policy education and advocacy training between regions. Substantial regional differences were identified in healthcare services management, with only 56% of Latin American associations reporting adequate coverage, compared to 100% of North American associations, indicating a 44-percentage-point gap in management and leadership preparation. Overall institutional coverage (84%, n = 16) with minimal variation in interprofessional education suggests widespread recognition of team-based care approaches across both regional groupings.

There was strong institutional coverage of social determinants of health (95%, n =18), with similar patterns across regions, indicating widespread recognition of population health approaches in curriculum design, regardless of context. There is also strong institutional coverage of research methodology, with 90% (n=17) indicating widespread recognition of the importance of evidence-based practice and research skills, showing minimal regional variation (88% in Latin America and 100% in North America).

Rural and underserved population education had moderate to strong coverage (74%, n=14) with regional differences (69% in Latin America, 100% in North America), particularly relevant given the challenges of rural access across the Americas. This is also true for home care (79%, n =15), with regional gaps (75% in Latin America and 100% in North America), indicating opportunities for enhanced community-based care preparation. Rehabilitation had moderate coverage (68%, n = 13), with a substantial disparity (63% in Latin America and 100% in North America), which is particularly important for managing aging populations and chronic diseases.

Training Infrastructure and Professional Development

Associations identified significant faculty development requirements, particularly in emerging competency areas, including climate health, digital health technologies, and advanced research methodologies. While 74% of associations (n=14) reported adequate continuing education provision, gaps in 26% of countries suggest a need for enhanced professional development infrastructure. Only 21% of associations (n=4) reported having adequate career progression programs, indicating substantial gaps in professional advancement pathways for family medicine specialists. Policies supporting professional retention were in place in only 37% of countries (n=7), indicating widespread challenges in maintaining stability in the family medicine workforce.

Institutional Priorities and Barriers

The main challenges identified by professional associations include a lack of policies and programs specifically tailored to the specialty of family medicine, resulting in it not receiving the same level of recognition as other medical specialties, as well as insufficient compensation for their training and responsibilities. There is also a lack of training standards and a need for improved infrastructure and resources, including additional supplies, medicines, and medical equipment, to support healthcare. Overall, the associations identified inadequate working conditions, leading to burnout and low professional retention rates.

The Associations suggested several interventions needed to strengthen FM/FCM:

(1) Expand political advocacy with the Ministry of Health, professional associations, and other stakeholders.
(2) Strengthen education through competency-based training, expand and maintain a sustainable supply of training posts, and implement continuing education programs.
(3) Adopt adequate remuneration for specialist physicians and financial incentive mechanisms.
(4) Modernize educational curricula by incorporating climate change and environmental health competency development (particularly urgent in the Latin American context), integrating telehealth and digital health technology topics, enhancing emergency preparedness and disaster response training, and incorporating competencies in health information systems and data analytics.

The Associations recognize that implementing these recommendations presents significant challenges, including garnering government support for family medicine specialty recognition, developing healthcare system integration and career pathway development, strengthening professional associations and coordination, and establishing regional cooperation and resource-sharing mechanisms.

DISCUSSION

The 100% participation rate from professional associations demonstrates a strong commitment to educational improvement and collaboration. There was widespread agreement that many of the critical educational components exist in the curriculum. For example, interprofessional education was noted in 84% of responses. However, our survey does not capture how the curriculum is delivered, where it occurs, or the depth of integration. Perceived inclusion of components may overestimate actual curricular integration. For example, contemporary literature on IPE in medical education suggests that IPE is widely visible, highly endorsed, and institutionally present, episodic, or unevenly implemented and not assessed.[15]

Professional associations demonstrate confidence in traditional clinical training coverage; however, substantial institutional deficiencies in climate health, digital health, and emergency preparedness threaten healthcare system preparedness for 21st-century challenges.

The consistent pattern of lower curriculum coverage across multiple competency domains in Latin American associations compared to those in North America raises critical questions about educational gaps. These disparities may perpetuate differences in healthcare quality, physician preparedness, and population health outcomes. The most significant finding is the inadequate coverage of climate change and environmental health training, with dramatic regional disparities. This represents a critical vulnerability, given the accelerating climate impacts across the Americas, including an increased frequency of extreme weather events, expanding ranges of vector-borne diseases, deteriorating air quality, and food security challenges, which disproportionately affect Latin American populations.[16]

Family physicians, as frontline primary care providers, require comprehensive competencies in environmental health assessment, climate adaptation counseling, and population-level intervention strategies. The institutional gap in climate health education reflects broader challenges in medical education adaptation to emerging global health threats, with Latin American institutions facing additional resource and infrastructure constraints compared to their North American counterparts. The institutional gap in climate health education reflects broader challenges in medical education adaptation to emerging global health threats. Professional associations recognize this deficit but often lack the necessary resources, faculty expertise, or curricular frameworks to address climate health competencies effectively. Latin American associations face particular challenges in resource allocation and faculty development.[17]

Digital Health and Healthcare Modernization

The COVID-19 pandemic accelerated digital health adoption globally; however, over 40% of Latin American institutions report inadequate preparation for telemedicine, electronic health record optimization, and the utilization of health informatics.[18,19] These disparities may reflect the rapid technological evolution outpacing curriculum

development in resource-constrained settings, limited faculty expertise in digital health technologies, or infrastructure constraints that prevent the integration of educational technology. Professional associations recognize these deficiencies but require targeted regional support for curriculum modernization and faculty development, particularly in Latin American contexts.

Emergency Preparedness and Health System Resilience

The Americas face diverse emergency threats, including hurricanes, earthquakes, volcanic eruptions, and infectious disease outbreaks, requiring comprehensive emergency medicine and public health preparedness.[20] Family physicians play a crucial role in emergency response, disaster recovery, and maintaining the resilience of the health system. Regional gaps in emergency preparedness education may compromise the capacity for effective disaster response and population health protection during crises, particularly in Latin American countries that face higher disaster vulnerability.

These dramatic threats suggest an urgent need for coordinated curriculum modernization efforts, targeted resource allocation, and capacity-building initiatives.

Study Limitations and Future Directions

This institutional assessment reflects professional association perspectives on curriculum coverage but cannot directly measure actual curriculum content, teaching quality, or student learning outcomes. Association perceptions may not fully reflect implementation challenges or educational effectiveness, particularly regarding resource-constrained settings. In addition, responses may reflect the views of individual representatives and may not fully capture aggregated organizational perspectives or internal variation within associations.

Regional grouping limitations include a small North American sample size (n=3) and potential heterogeneity within the Latin American grouping. Because the regions do not collaborate on curricula or training sites, future research should consist of subregional or individual country analysis and direct evaluation of curriculum content. The authors recognize that U.S.-based persons authored this paper; however, the study design was completed in collaboration with experts from PAHO and WONCA who are based in Brazil and Argentina, and one of the study authors, E.B., has strong family roots in Guatemala. As a future direction, we recommend adding artificial intelligence as a curricular domain and including a qualitative component to this survey.

CONCLUSIONS

While professional societies indicate strong coverage of traditional clinical competencies across regions, emerging 21st-century competencies require urgent attention and differentiated regional resource allocation. The consistent pattern of lower curriculum coverage in Latin American associations across multiple domains raises critical concerns about educational equity, requiring targeted international cooperation and capacity-building initiatives.

Professional associations play a crucial role as leaders in medical education governance and curriculum development. Their identification of specific gaps and regional disparities provides actionable guidance for educational planners, faculty developers, and health workforce strategists seeking to enhance the relevance and effectiveness of family medicine training while addressing concerns related to educational equity.

Success in addressing these institutional gaps requires coordinated hemispheric action involving medical schools, professional associations, government agencies, and international development organizations committed to strengthening primary healthcare through educational excellence and regional cooperation. The findings provide evidence-based priorities for strategic curriculum modernization efforts addressing both immediate educational needs and long-term regional health equity goals.

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