

OVERVIEW OF PREVENTIVE MEDICINE PHYSICIAN TRAINING: A SCOPING REVIEW

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Received 22 September 2025

Accepted 30 September 2025

Abstract: This study aimed to provide an overview of the global status of preventive medicine physician training. A descriptive scoping review was conducted. The results show that preventive medicine physician training worldwide varies, with undergraduate programs in Russia, China and Vietnam, and postgraduate training in the U.S., Canada, France, and Italy. Common challenges include limited specialty recognition, inconsistent competencies, and unclear professional identity. In China, training is theory-heavy; in the U.S., workforce shortages and unstable funding persist; Italy shows high contract placement but some residents continue job searching. In Vietnam, the six-year undergraduate program ensures a workforce pipeline but lacks practical exposure, interdisciplinary collaboration, and modern skills such as digital health and emergency response. Recommendations include strengthening field-based and practical training; standardizing curriculum programs and certification; expanding career opportunities; ensuring stable funding; and integrating preventive medicine with clinical practice to enhance professional recognition and prepare physicians for evolving public health challenges.

Keywords: *preventive medicine, training programs, curriculum, scoping review.*

1. Introduction

Preventive medicine contributes significantly to the healthcare system, particularly in disease prevention, epidemic control, and the protection and promotion of public health. Preventive medicine involves implementing preventive healthcare measures to improve patient health. Its ultimate goal is to prevent disease, disability, and death [1]. The main areas of preventive medicine focus on disease prevention, including primary prevention (vaccination, environmental improvements), secondary prevention (early detection and prevention of spread), and tertiary prevention (minimizing the impact of chronic diseases). Preventive medicine is not only the responsibility of governments and physicians but also requires active participation from individuals in managing their own health [2].

In the face of global challenges such as emerging infectious diseases, non-communicable diseases, climate change, and environmental impacts, there is an increasing need for highly skilled preventive medicine (PM) professionals. A preventive medicine physician,

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<https://doi.org/10.56086/jcvb.v5i3.230>

or PM specialist evaluates and implements preventive interventions based on expertise across various healthcare competencies, including biostatistics, epidemiology, health service planning and evaluation, healthcare organization management, research, and clinical preventive practice. Through these efforts, they aim to improve the health and quality of life of individuals, families, communities, and populations by preventing disease and promoting health [1].

Worldwide, many countries have developed and adapted preventive medicine training programs to meet practical needs and align with international recommendations. However, these programs differ in training objectives, curriculum structure, course content, and teaching methods due to variations in governmental policy, as well as healthcare systems and the specific health issues of each country.

A global overview of preventive medicine physician training is essential for providing information to identify training trends, thereby supporting the evaluation and improvement of domestic training programs. Accordingly, we conducted a scoping review with the objective of providing an “Overview of Preventive Medicine Physician Training.”

2. Method

2.1. Subject

Research reports, articles, theses, dissertations, and conference reports worldwide up to 2025.

2.2. Research Method

The study applied a descriptive scoping review method. Protocol registration under Decision No. 2940/QĐ-BYT dated October 3, 2024, on the development of the standard curriculum for the field of Preventive Medicine.

2.3. Research Questions

1. What is the current status of preventive medicine physician (PM physician) training worldwide?
2. How are PM physician training programs structured globally?
3. What are the challenges in PM physician training worldwide?
4. What are the roles and scope of practice of PM physicians worldwide?

2.4. Keywords

Vietnamese keywords used: chương trình; đào tạo; chuẩn chương trình; chuẩn trung trình đào tạo; chuẩn đầu ra; Y học dự phòng.

English keywords used: Curriculum; Curriculum Standards; Training Curriculum Standards; Program Learning Outcomes; Preventive Medicine.

2.5. Data Sources

Online databases: PubMed (U.S. National Library of Medicine), MEDLINE, Embase, Google Scholar.

Statistical summaries and reports from preventive medicine conferences.

Google.

2.6. Search strategy

Boolean operators (AND, OR, NOT) and truncation were applied to capture relevant literature.

Database	Query
PubMed/MEDLINE	("Curriculum"[tiab] OR "Curriculum Standards"[tiab] OR "Training Curriculum Standards"[tiab] OR "Program Learning Outcomes"[tiab] OR "Preventive Medicine"[tiab] OR "Preventive Medicine"[MeSH]) AND ("Physicians"[MeSH] OR "Education, Medical"[MeSH] OR "Residency"[MeSH] OR "physician training"[tiab] OR "medical education"[tiab] OR "residency"[tiab] OR "program"[tiab]) AND ("international"[tiab] OR "global"[tiab] OR "United States"[tiab] OR "Europe"[tiab] OR "China"[tiab] OR "Vietnam"[tiab])
Embase	('curriculum':ti,ab OR 'curriculum standards':ti,ab OR 'training curriculum standards':ti,ab OR 'program learning outcomes':ti,ab OR 'preventive medicine'/exp OR 'preventive medicine':ti,ab) AND ('physician'/exp OR 'medical education'/exp OR 'residency'/exp OR 'physician training':ti,ab OR 'medical education':ti,ab OR 'residency':ti,ab OR 'program':ti,ab) AND ('international':ti,ab OR 'global':ti,ab OR 'United States':ti,ab OR 'Europe':ti,ab OR 'China':ti,ab OR 'Vietnam':ti,ab)
Google Scholar	("Curriculum" OR "Curriculum Standards" OR "Training Curriculum Standards" OR "Program Learning Outcomes" OR "Preventive Medicine") AND ("physician training" OR "medical education" OR "residency" OR "program") AND ("international" OR "global" OR "United States" OR "Europe" OR "China" OR "Vietnam")

2.7. Inclusion and Exclusion Criteria

Inclusion criteria: Full-text documents; Select all studies from past to present but preferably published within the last 10 years (2015–2025); Language: Vietnamese or English.

Exclusion criteria: Documents unrelated to the research subject or objectives.

2.8. Data Synthesis Procedure

- + Search and collect documents: A comprehensive search strategy was developed for multiple databases (e.g., PubMed, MEDLINE, Embase, Google Scholar).
- + Screen, select, and exclude documents that do not meet the inclusion criteria. All retrieved records were imported into a reference management software (e.g., EndNote, Zotero, or Mendeley) to remove duplicates.
- + Filter documents stepwise: first by title, then abstract, and finally full text. Two independent reviewers screened the titles and abstracts of all records according to the

inclusion and exclusion criteria. Discrepancies were discussed and resolved through consensus; if disagreement persisted, a third reviewer was consulted. Full-text articles meeting the eligibility criteria were then included for data extraction.

- + Data extraction: Selected documents were organized in a data table to extract relevant information, including related concepts, current training status, and PM physician curricula. A standardized Excel form was developed and pilot-tested to ensure consistency. Two reviewers independently extracted data on study characteristics, program level, curriculum content, and competencies. Discrepancies were resolved by discussion or consultation with a third reviewer.
- + Analyze and synthesize data: Extracted data were thematically coded, compared across contexts, and synthesized to highlight similarities, differences, and emerging trends. The extracted data included: author, year, country, study design, type/level of training program (undergraduate, postgraduate, residency), curriculum structure (objectives, content, credits), competencies covered (epidemiology, biostatistics, health management, modern skills), training outcomes, challenges, and recommendations for reform.
- + Critical appraisal was not conducted, as it is optional for scoping reviews, and the aim of this study is to map existing evidence rather than to assess methodological quality

3. Results

3.1. Results of Literature Screening

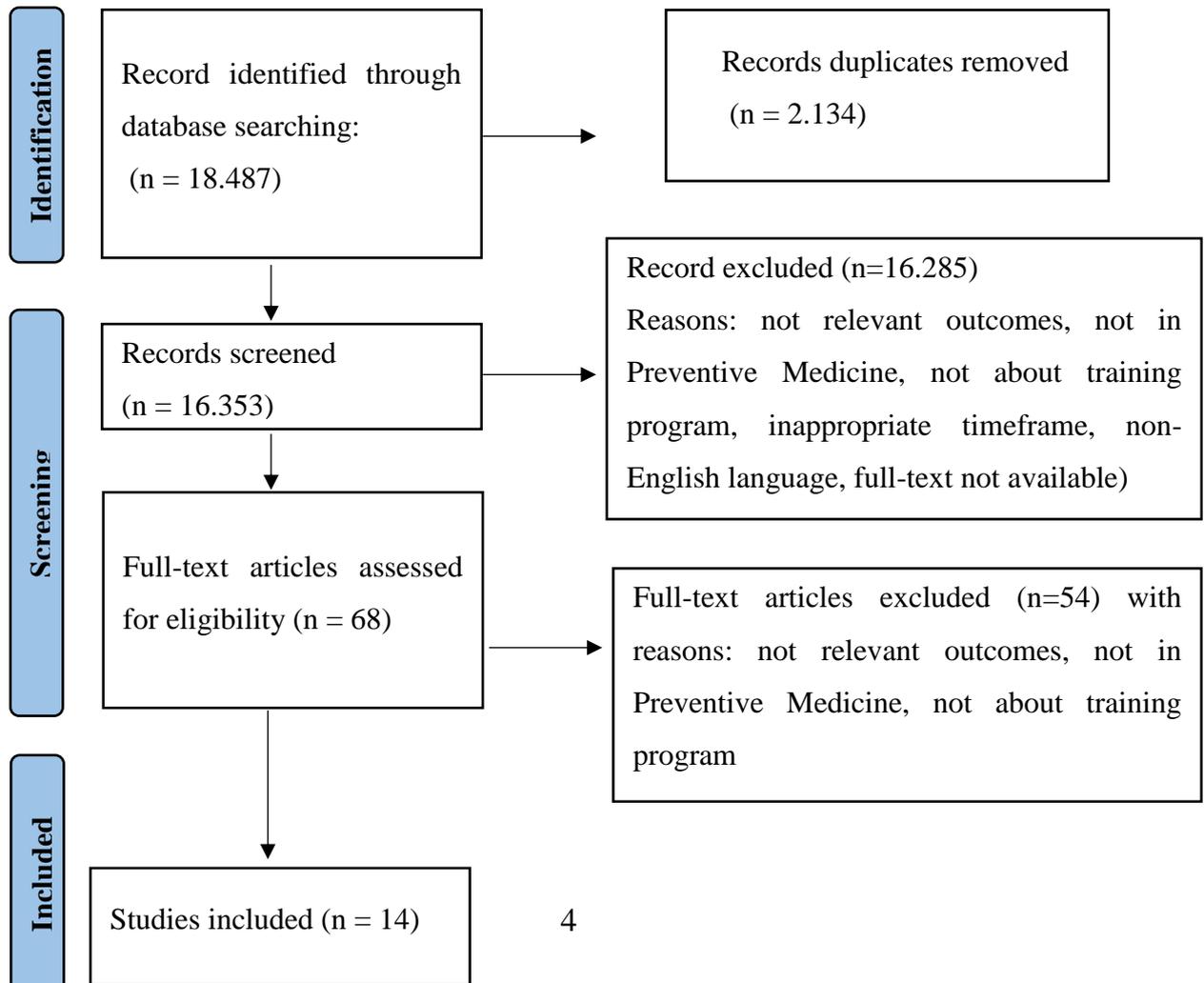


Figure 1. Diagram of PRISMA flow
3.2. History of Preventive Medicine Physician Training Worldwide

Table 1. Preventive Medicine Specialty Titles

No.	Nation	Year of Training Start	Specialty Name	Notes
1	US	1947	Preventive Medicine includes three subgroups: Public Health and General Preventive Medicine; Occupational and Environmental Health; and Aerospace Medicine.	Post graduate training
2	Canada	1976	Community Medicine In 2011, Public Health and Preventive Medicine was renamed	Post graduate training, 5 years
3	France	1982	Public Health and Social Medicine	Post graduate training
4	Italy	1968	Hygiene and Preventive Medicine	Post graduate training, (Previously 5 years, since 2015 reduced to 4 years)
5	China	1950	Health Profesional In 1993, Preventive Medicine comprised four main specialties: Preventive Medicine, Environmental Health, Sanitary Technology, and Nutrition and Food Health.	Post graduate training

Worldwide, the history and training of Preventive Medicine physicians vary across countries. There are differences in specialty titles, with some countries separating Preventive Medicine and Public Health, while others combine the two fields. Specifically, in the United States, the specialty of Preventive Medicine has been recognized since 1947. It includes three subgroups: Public Health and General Preventive Medicine; Occupational and Environmental Health; and Aerospace Medicine [3,4]. The specialty of Public Health and Preventive Medicine in Canada, initially recognized as Community Medicine in 1976, was renamed in 2011. The training program in Public Health and Preventive Medicine in Canada lasts five years and begins immediately after medical school graduation [5]. In France, the specialty of Public Health and Social Medicine was established in 1982 and, since 2005, has been certified through a national examination after students complete six years of medical education [6]. In Italy, the Hygiene and Preventive Medicine program, managed by the Ministry of Education,

Universities, and Research (MIUR), lasts 4 years instead of 5 since 2015 to comply with European Union standards [6]. In China, preventive medicine education began in 1950, following the Soviet model. The original title was “Health Professional,” comprising 10 subspecialties. By 1993, the preventive medicine program was officially renamed, though its content remained largely unchanged. At that time, preventive medicine included four main specialties: preventive medicine, environmental health, sanitary technology, and nutrition and food health [7].

3.3. Current Status of Preventive Medicine Physician Training

Preventive medicine physicians around the world are trained through various pathways. Some countries, such as Russia, Singapore, and China, provide training at the undergraduate level, while in the United States, Canada, France, and Australia, the programs are implemented at the postgraduate level.

A comparative study examined public health and preventive medicine specialty training programs in six countries: Canada, France, Italy, Japan, the United Kingdom, and the United States. The study reviewed training programs, available statistics, certification requirements, key stakeholders, and current challenges in each country. The results showed significant differences among countries in training strategies, scope of practice, stakeholders, certification structures, and funding. However, all six countries faced common challenges regarding specialty recognition. Other challenges included unclear training competencies and strategies, as well as the need for public health and preventive medicine professionals to assert their role in addressing public health threats. These findings highlight differences between countries in training structure, funding sources, training positions, and integration with other specialties [6].

The United States

After obtaining a medical degree (MD or MBBS), students enter a three-year residency program, which includes one year of clinical training, one year of public health content equivalent to a Master’s in Public Health (MPH), and one year of practical experience in various preventive medicine fields [3,4]. Statistics on Preventive Medicine residency training in the United States (1994–1999) show a declining trend in the number of trainees, particularly in Public Health, although the number of training programs remained relatively stable. Occupational Medicine maintained the largest trainee cohort (168 trainees per year), while Aerospace Medicine had the smallest (11 trainees per year) out of more than 400 trainees annually. This raises concerns about a potential shortage of preventive medicine professionals in the future [8].

The current training of preventive medicine physicians faces multiple challenges, including shortages in both the quantity and quality of the workforce, especially in public health and general preventive medicine, with declining numbers of certified residents and specialists. Financial constraints with limited funding hinder program maintenance and expansion. Faculty shortages and dispersion across departments reduce training depth. Additionally, licensing regulations (e.g., the three-year postgraduate requirement) are misaligned, creating barriers for preventive medicine residents. The decline in the preventive medicine workforce poses a serious threat to public health, necessitating urgent actions such as increased funding, Medicare GME reform to support non-hospital programs and prioritize preventive medicine training, debt

reduction for residents, and faculty development. Medical schools play a key role, but dispersed faculty and lack of dedicated departments hinder effective training [8].

Canada

The Public Health and Preventive Medicine (PHPM) residency program in Canada lasts five years, beginning immediately after medical school graduation. The program includes at least one year of clinical training, one year of postgraduate study (usually a Master of Public Health), and one year of practicum in public health agencies [5]. Clinical training is often integrated through two years of Family Medicine residency. Upon completion, residents typically receive dual certification in Family Medicine and PHPM, along with a Master of Public Health degree. By 2015, Canada had 14 PHPM programs, with 11 English-language programs at medical faculties and three French-language programs in Quebec, accommodating over 100 residents within five years [4].

Enrollment increased significantly after Canada expanded programs in 2003 following the Severe Acute Respiratory Syndrome (SARS) outbreaks in Toronto and Vancouver [9]. Canada faces challenges in public health workforce planning, with an oversupply of physicians in urban areas but shortages in rural regions, compounded by competition from other specialties, exacerbating inequities in access to healthcare [6].

France

In France, the Public Health and Social Medicine specialty has been recognized since 1982, with selection from 2005 onward through a national examination after six years of medical school. The four-year residency combines a theoretical master's program with eight six-month rotations in academic centers, hospitals, and community settings [6]. In 2015, France allocated 113 out of 8,626 residency positions to public health (a 25% increase compared to 2008), but many positions remained unfilled due to low interest. Only 1,673 physicians (0.8% of the total) practice in the field, primarily in salaried positions within hospitals and public health agencies; some pursue academic careers requiring a PhD [6].

The public health specialty in France faces limited resources, uneven training quality, and restricted practical opportunities, particularly in health economics and non-academic environmental health. CliSP organized workshops to enhance theoretical training, yet confusion persists regarding the term "public health physician" and challenges remain in delineating the scope of practice from non-physician public health professionals [6].

Italy

In Italy, the Hygiene and Preventive Medicine (HPM) program, managed by the Ministry of Education, University and Research (MIUR), has lasted 4 years since 2015 in accordance with EU standards. Residents must complete 240 credits through theoretical courses, practical training, and electives; pass annual examinations; and defend a thesis. Practical training takes place in university hospitals and affiliated centers, with admission requiring physicians to have passed the national medical exam [6]. A major current challenge for HPM in Italy is the reduction of training duration from 5 years to 4 years, placing significant pressure on institutions to adjust curricula. Additionally, the system needs to expand the professional scope of HPM specialists to meet the increasingly diverse demands of society [6].

China

The preventive medicine physician training program described in this study has several notable features. Preventive medicine education in China began in 1950, based on the Soviet model. Initially, the program focused on traditional subjects such as epidemiology, medical statistics, environmental health, and occupational hygiene. From the 1980s, the program began to adopt approaches from Western countries, but still retained the traditional subjects. By 1993, the preventive medicine program was officially renamed, although its content remained largely unchanged. The current public health/preventive medicine curriculum does not meet the requirements of modern public health. Updates to the curriculum have been slow and do not reflect the development of public health professionals. The current program is considered outdated, lacking education on emergency response, on-site ethical practice, and scientific research [7].

3.4. Training Programs for Preventive Medicine Physicians

A comparative study of PHPM programs in Canada, France, Italy, Japan, the UK, and the US revealed differences in admissions, curricula, certification, and career pathways, but all faced common challenges in recruitment, role definition, and career advancement. Core content—epidemiology, biostatistics, management, and health policy—remained consistent, highlighting the need for international collaboration to improve training [6].

A 2022 national survey in the US showed that most preventive medicine physicians graduated from domestic medical schools. Residents typically had less clinical experience (46% with only 1 year) compared to graduates (55.4% with ≥ 3 years) and were less likely to hold additional specialty certifications (32% vs. 63%). Common specialties included family medicine, internal medicine, and pediatrics. While 91% of graduates were board-certified in preventive medicine, most became aware of the specialty through informal channels [10].

Assessment of the US training environment indicated that residents valued communication skills most, whereas graduates prioritized leadership skills (52.4% vs. 86.2%). Over 75% felt the program developed essential skills, yet many sought additional training in healthcare finance, health systems, clinical skills, grant writing, advanced data analysis, and career preparation [10].

Kori’s 2019 US study found that most graduates rated 13 out of 18 sub-competencies as important and adequately trained, but gaps remained in emergency preparedness and system surveillance. Leadership skills such as stakeholder engagement (85%), conflict management (82%), and organizational innovation (82%) were valued, though training in conflict resolution, recruitment, and legal issues was limited. Key management skills included teamwork (98%) and meeting facilitation (89%), with notable differences between academic and government sectors regarding advocacy and legal issue handling [11].

Table 2. Accredited Preventive Medicine Residency Programs in the United States and Number of Residents, Academic Year 2018–2019

Specialty	Number of Accredited Residency Programs in the U.S	Number of Residents in Accredited Programs in the U.S.	Number of U.S. Residents Covered	% of U.S. Residents Covered
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All Preventive Medicine (Total)	75	695	353	51%
Public Health & General Preventive Medicine (PH&GPM)	45	375	179	48%
Occupational Medicine	25	214	123	57%
Aerospace Medicine	5	106	51	48%
All HRSA-Funded Residency Programs	17	148	74	50%
All Non-HRSA-Funded Residency Programs	58	547	274	50%
HRSA-Funded PH&GPM Residency Programs	15	123	62	50%
Non-HRSA-Funded PH&GPM Residency Programs	30	252	117	46%
HRSA-Funded Occupational Medicine Residency Programs	2	25	17	68%
Non-HRSA-Funded Occupational Medicine Residency Programs	23	189	106	56%

In the United States, there are currently 75 accredited Preventive Medicine residency programs with 695 residents, but only 51% of positions are filled, indicating a recruitment shortage. Among these, Public Health & General Preventive Medicine (PH&GPM) includes 45 programs with 375 residents, yet the fill rate is only 48%. Occupational Medicine has 25 programs with 214 residents, achieving the highest coverage at 57%, while Aerospace Medicine has 5 programs with 106 residents, covering 48%. Regarding funding, both HRSA-supported and non-HRSA programs have a fill rate of 50%, with HRSA-supported Occupational Medicine reaching 68%. In 2018, five PH&GPM programs were initially accredited [12].

Paul Jung’s 2020 study indicates that the U.S. Preventive Medicine residency comprises three years: clinical, academic, and practicum. The current clinical year is not specialized, as residents may complete it in any PGY-1 program, resulting in a lack of distinct identity. A proposed solution is to create a dedicated clinical year in public health clinics, integrating lifestyle medicine education, similar to Canada’s longer training model. The academic year is mainly linked to an MPH degree, but this does not clearly distinguish Preventive Medicine physicians from other MPH holders. Therefore, developing a Master of Preventive Medicine (MPM) or a specialized MPH in Preventive Medicine is recommended. The practicum currently requires a minimum of two months in patient care and two months in a public health agency, but it is too broad and can be fulfilled by other specialties. To address this, practicum rotations should be specifically conducted in public health settings with clear objectives in management and quality improvement. The author proposes a 4-month clinical – 4-month academic – 4-month practicum cycle to strengthen the identity and uniqueness of the Preventive Medicine specialty [12].

Li’s study (2017, China) found that the Preventive Medicine physician program consists of five components: basic preventive medicine knowledge, basic medical sciences, clinical medicine, foundational and specialized courses, and practicum. However, theoretical

instruction predominates, with practical training focusing mainly on clinical skills, professionalism, and scientific research. The program lacks updates in modern content, humanities, and non-natural sciences, as well as advanced teaching methods. West China School of Public Health has implemented reforms by adding courses, integrating interdisciplinary knowledge, applying new teaching methods, and improving assessments to enhance practical skills. In conclusion, the program requires comprehensive reform to meet societal needs, though the study reflects only one school and is not nationally representative [7].

Table 3. Structure of Preventive Medicine/Public Health Programs at Six Schools by Credit Hours

Under graduate	HUST (%)	SCU (%)	CSU (%)	FDU (%)	ZSU (%)	ZJU (%)
Requirements	89.7	84.8	88.4	95.8	84.0	90.7
Theoretical Courses	85.0	82.9	88.4	91.5	80.1	83.8
Basic Courses	30.6	25.0	39.6	25.2	33.1	39.4
Basic Medical Courses	20.5	30.0	23.7	29.1	27.8	21.1
Clinical Courses	27.3	13.0	17.7	13.5	24.3	15.0
Preventive Medicine/Foundation Courses	21.6	32.0	18.9	32.1	14.8	24.5
Practical Courses	15.0	17.1	24.7	8.5	19.9	16.2
Clinical Practice	57.1	40.0	46.3	53.3	38.1	23.8
Practice	9.5	20.0	14.8	6.6	14.3	19.0
Thesis	33.3	40.0	38.9	40.0	47.6	57.2
Elective Courses	10.3	15.2	11.6	4.2	16.0	9.3
Specialty Electives	-	35.3	27.6	75.0	67.5	30.0
Interdisciplinary Electives	-	45.0	20.7	-	-	20.0
Quality-Oriented Courses	-	13.0	51.7	25.0	32.5	50.0
Creative Courses	-	7.0	-	-	-	-

Note HUST: Huazhong University of Science and Technology; SCU: Sichuan University; CSU: Central South University; FDU: Fudan University; ZSU: Sun Yat-sen University; ZJU: Zhejiang University

Evaluations of preventive medicine programs in China show a high program coverage rate (84–95.8%), with theoretical courses predominating (80–91.5%). However, emphasis on basic knowledge, clinical training, and preventive medicine foundations varies among universities (clinical courses 13–32%, foundational courses 14.8–32.1%), while general practical training remains low (8.5–24.7%). A high proportion of theses (33–57%) indicates research opportunities, but elective courses, quality-oriented, and innovation-focused modules are limited and need strengthening to develop future professional skills [7].

A 2020 Chinese study assessing 36 clinical medical programs found that 22 programs (61%) did not include preventive medicine in their objectives, and the core preventive medicine courses had very few hours (average 156.7 hours, accounting for 4.3% of total curriculum), with significant variation between schools. The study concluded that preventive medicine teaching needs to be enhanced, closely integrated with clinical medicine, and combined with the development of clinical research skills to improve training quality [13].

3.5. Work of Preventive Medicine Physicians

Preventive medicine physicians in the United States have opportunities to work across various sectors, including government, public health departments, non-governmental organizations, the private sector, and research/academic institutions. Key challenges for the specialty include a difficult funding environment due to unstable and fragmented resources; a declining public health workforce, as many professionals approach retirement; challenges in defining the role of public health within traditional medical practice; and pressure from physicians with other certifications or non-physician public health professionals covering public health roles [6].

A 2022 U.S. national survey found that most residents and graduates chose to work in government or academic settings, with significant differences in local and state government employment. The main motivation was improving community health (78.6% of residents, 75.4% of graduates). However, 60% of graduates reported difficulty marketing themselves, 12% had trouble finding jobs due to lack of certification or experience, while none reported licensing difficulties [10].

Kori's 2019 U.S. study surveyed 80 of 173 former residents (46%) and found that 81% worked full-time, with an average tenure of 9.4 years in their current positions. Common positions were in academia (44%) and government (25%). Academic roles focused on patient care, teaching, and research, while government positions emphasized epidemiology, public health management, and international health. Over half of participants provided direct patient care and conducted research, with other activities including teaching, healthcare management, consulting, and international health [11].

In Italy, a survey of 39 residency programs in Hygiene and Preventive Medicine revealed a prolonged shortage of public health professionals and diverse career aspirations among young physicians. In 2022, 483 professional contracts were issued—a 37% decrease from the previous year—with 17.6% of positions unallocated. Six months post-residency, 1.5% of residents were still seeking employment, while 75.4% of fourth-year residents had signed contracts under the "Decreto Calabria." The study emphasized the importance of updating training programs and adopting innovative approaches to meet national healthcare system needs [14].

4. Discussion

Globally, preventive medicine education varies in structure and level, with undergraduate training dominant in countries like China, Russia, and Singapore, and postgraduate residency systems in the United States, Canada, and Europe. Despite these differences, shared challenges include defining a clear professional identity, ensuring competency-based standards, and integrating modern skills such as emergency preparedness, health economics, and digital health. Evidence from the U.S. shows a shortage of residents and difficulty sustaining workforce pipelines due to unstable funding, while in China, curricula remain theory-heavy with insufficient practice orientation. Italy, meanwhile, highlights both workforce shortages and reforms aimed at aligning training with health system demands.

In Vietnam, preventive medicine has developed distinctively as a six-year undergraduate degree, expanded since its introduction in 2006 at Hanoi Medical University and Hue University of Medicine and Pharmacy. By 2020, 10 universities nationwide were offering the program, with a total enrollment of 6,994 students from 2006–2020 and 3,344 graduates. At the postgraduate level, the training pipeline is substantial, with 17,095 graduates from 2010–2020, including 5,789 master's, 4,940 bachelor's in public health, and 3,344 preventive medicine doctors. This reflects both the growing demand for training at multiple levels and the government's prioritization of preventive medicine workforce development [15].

Curricula across Vietnamese universities share commonalities with international models—emphasizing epidemiology, biostatistics, environmental and occupational health—but are characterized by variation in credit distribution, with total credits ranging from 180 to 225. Preventive medicine-specific modules vary significantly, from 28 credits at Tra Vinh University to 80 credits at Can Tho University, reflecting diverse institutional approaches. However, consistent with findings in China, Vietnamese programs remain theory-oriented, with relatively limited clinical exposure, community-based practice, or modern interdisciplinary competencies such as health technology assessment and emergency response.

Key challenges in Vietnam also mirror global concerns: the need to standardize competency frameworks, upgrade curricula to reflect modern public health needs, improve recruitment and retention (especially in underserved areas), and enhance professional recognition through clear certification and career pathways. Policy documents such as Notice 744/TB-BYT emphasize upgrading qualifications, building competency standards, and improving incentive policies [16].

Taken together, while Vietnam's undergraduate-based system has ensured a consistent workforce pipeline, further reforms are needed to align with international standards. Strengthening practice-based training, integrating leadership and research skills, and developing postgraduate residency or fellowship models could help reinforce the professional identity of preventive medicine physicians and prepare them for evolving domestic and global public health challenges [17],[18].

This study has some limitations. First, it explicitly did not conduct critical appraisal, meaning the quality and reliability of the included research was not assessed, risking the synthesis of weak or biased evidence. Second, the study focuses solely on mapping existing evidence and thus lacks new, primary, qualitative data. This restricts its ability to provide in-depth, firsthand insights into the practical challenges facing Preventive Medicine training programs, particularly in Vietnam.

5. Conclusion

In conclusion, the global review of preventive medicine training reveals both diversity in models and shared challenges. While undergraduate programs are common in countries such as China, Russia, and Vietnam, postgraduate residency training remains the standard in the

United States, Canada, and much of Europe. Vietnam's six-year undergraduate pathway ensures a continuous supply of preventive medicine physicians but, similar to China, still emphasizes theory over practice, offers limited community-based and interdisciplinary training, and lacks internationally standardized residency or certification frameworks, thereby constraining professional recognition and global comparability. To address these gaps, several reforms are recommended: strengthening field-based and practice-oriented learning; integrating modern competencies such as digital health, health technology assessment, health economics, and emergency preparedness into the curriculum; developing competency frameworks and certification systems aligned with international standards; expanding postgraduate pathways including residency and fellowship opportunities; and implementing supportive workforce policies to ensure equitable distribution and professional growth. Taken together, these measures would modernize Vietnam's preventive medicine training and better equip its physicians to meet emerging domestic and global public health challenges.

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