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Educational Policy of Public Health Talents in China Under the Background of Comprehensive Health

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Abstract: With respect to the ever-changing global health status and the increasing popularity of Healthy China as a national strategy, there exists some deficiencies and problems in the input, process, and output stages of the public health talent education currently underway in China. Based on an international perspective and domestic demand, this study analyzes the status and problems of the public health education offered in China and proposes a series of policy recommendations, including the construction of a comprehensive public health talent training system that has Chinese characteristics and involves college, postgraduate, and continuous education; standardization of undergraduate education, optimization of postgraduate education, and strengthening of continuous education; and establishment and improvement of the permit standards for medical colleges and universities, professional education, and medical practitioners for public health. Furthermore, the government should fulfill its responsibility in terms of implementing public health education reforms.
Keywords: Comprehensive Health; public health; preventive medicine; personnel training

1 Introduction

Along with rapid socioeconomic development and accelerated urbanization, China is encountering increasingly severe aging, a continuous increase in the prevalence and incidence rates of chronic diseases, an increase in the prevalence of emerging infectious diseases, the frequent occurrence of public health emergencies, and aggravated environmental pollution, which pose severe challenges to China's public health development [1–4]. However, various favorable factors (e.g., the advent of the Health for All and Global Health concepts, promotion of the health cooperation strategy under the Belt and Road (B&R) strategy, formation of the Comprehensive Health concept, and implementation of Healthy China as a national strategy) present China's public health initiatives with an important development opportunity. Under the guidance of the Comprehensive Health concept, a scientific and reasonable public health talent training system can guarantee the development of high-caliber public health talents,

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which help provide high-quality public health services and improve the health literacy of the population. Based on a major consulting project implemented by the Chinese Academy of Engineering, this study analyzes the problems prevalent in China's public health talent training and development initiatives. After referring to advanced foreign experiences and considering China's specific conditions, this study formulates a multistage and multisector strategy for public health talent training and development and proposes a training system specific to China within the context of the Comprehensive Health concept. The study's final purpose is to provide a basis for decision-making on the formulation of related policies, laws, and regulations and action guidelines, as well as ensuring continuous impetus to the realization of the Healthy China initiative.

2 Connotation and denotation of public health

In the early 19th century, Charles Winslow (an American public health expert) argued that ensuring public health is a public cause committed to the protection and promotion of the health of the general population [5]. Further, Chinese scholars and government officials have provided their own interpretations of public health, arguing that both the state and society should jointly prevent and control diseases and disabilities, improve the health-related natural and social environments, provide basic medical and health services, develop the population's health literacy, and create a society that ensures health for all [6].

In the new era, public health includes new contents and can be defined from the microscopic, mesoscopic, and macroscopic perspectives both in stages and continuously. Before the outbreak of the Severe Acute Respiratory Syndrome (SARS), public health was primarily concerned with the prevention of commonly occurring and frequently occurring diseases. Once the SARS outbreak was brought under control, public health efforts received increasing importance. Both the connotation and denotation of public health underwent continuous enrichment. Public health is not limited to acute and chronic disease prevention and treatment, food safety, occupational health, infant health, health of women and children, health supervision, and public health emergency management. In the new situation, the denotations of public health include the following: 1) the impact of psychological problems (e.g., self-mutilation) on lifestyles, obesity, poverty-caused illnesses, and long-distance transmission of infectious diseases; 2) the transmission and impact of mental diseases; 3) the new types of public health problems arising from network communication, advanced transportation, and changes in modern lifestyles; 4) health cooperation under the B&R strategy; and 5) global health issues.

3 Status quo and the problems faced by public health education in China

In China, the provision of public health education started in the early 20th century. During the past century, China established a public health education system providing both undergraduate and graduate education (e.g., master's and doctor's degrees and professional degrees such as master of public health) and ensured the education of large numbers of public health talents to meet the needs of various health organizations and research institutes. The public health education system has unique characteristics and advantages and undertakes various responsibilities, including the provision of primary healthcare, maternal and child healthcare, society-wide patriotic health campaigns, planned immunization, and medicine-backed public health talent training. China resolved the problem of ensuring public health for 22% of the world's total population with only 1% of the world's total public health funds, which is a world-renowned achievement in itself. In addition, China has accumulated valuable public healthcare experience [7,8]. However, in the new era, while facing new healthcare situations, China's public health education system is encountering many problems in the input, process, and output stages of the public health talent training program.

3.1 Input stage of public health talent training

3.1.1 Inadequate attention and insufficient resource input

In China, public health maintenance is an objective of public welfare efforts. Due to the long-standing practice of "emphasizing treatment but disregarding prevention," the public health expenditure of China is lower than that of developed countries. In 2011, the country's public health expenditure accounted for merely 2.89% of its total gross domestic product. In addition, resources are not reasonably allocated between medical treatment provision and disease prevention, the governments' financial budgets obviously favor clinical treatment, and the resource input for preventive medicine and public health is severely insufficient. These conditions fundamentally restrict China's capabilities for effective disease prevention and control.

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3.1.2 Unsatisfactory enrollment quality and overall competence of teaching staff

In China, candidates' scores in college entrance examinations for both public health and preventive medicine and their cut-off enrollment scores are universally lower than those for clinical medicine. In addition, the admission rate of the candidates' first choice for the two subjects is very low, and the enrollment quality for them is not satisfactory. The existing structure of teachers in public health education is not reasonable, and the shortage of practice-oriented teachers and the teachers' deficient teaching ability are major constraints to the quality of public health talent training. Studies show that 78.83% of the teachers working in public health colleges have a disciplinary background in public health. Such a single disciplinary background makes it difficult for teachers to develop compound and application-oriented public health talents.

3.2 Ongoing stage of public health talent training

3.2.1 Fuzzy objectives, outdated concepts, and absence of the perfect talent training system

For a long period, the talent training objectives of more than 90 public health colleges and/or departments in China tended to converge in terms of orientation, types, and specific requirements. Specifically, the orientation of talent training is fuzzy; further, the concept of talent training is outdated and not adaptable to the shift in medical talent training from the biomedical model to the biopsychosocial medical model. Moreover, the concept of public health fails to shift its focus from disease prevention to healthcare provision.

In China, the standardized clinical medical talent training system with Chinese characteristics comprises three organically linked stages, including college education, graduate education, and continuous education. The public talent training system comprises the same three stages, as well. However, the three stages are neither planned in a combined or systematic manner nor smoothly linked with each other; in addition, the three stages are not hierarchized, systemized, or operable. In other words, a comprehensive and systematic public health talent training system is yet to be established.

3.2.2 Unreasonable knowledge structure and curriculum system

In China, preventive medicine is the dominant topic in public health talent training. The stereotyped basic curriculum is still dominated by the five traditional subdisciplines (e.g., food hygiene health, child and adolescent health, radiological health, environmental health, and occupational health) and lacks contents pertaining to management science, sociology, and psychology. As a result, medicine is not closely linked with public health or, specifically, preventive medicine students lack sufficient clinical knowledge and practical experience and clinical medicine students cannot completely understand the significance of public health. Moreover, humanistic literacy education is weak, and the scientific aspect of public health is separated from its humanistic and artistic aspects. Students majoring in public health lack a sense of identification and professional cognition toward this discipline and do not clearly understand the strategies of Healthy China and Health for All, which severely restricts the implementation of such national strategies.

3.2.3 Confounded training models

At present, graduate education in public health involves the acquisition of academic and professional degrees. In practice, academic degrees are dominant in terms of the enrollment scale, training mode, and graduation appraisal, and most of the graduates with professional degrees or postgraduates are trained based on the standard pertaining to the respective education level. As a result, neither the quantity nor quality of educated professional degree graduates or postgraduates can satisfy social needs.

3.2.4 Inadaptable talent training regime and an inflexible mechanism

The existing public health management regime is not sufficiently perfect and has many loopholes. Unlike clinical physicians, preventive medicine physicians, who form the backbone of public health efforts, are not trained in a standardized manner. In addition, the regimes for college, specialty, and occupational admissions are not perfect, and some problems (e.g., public health talent training and degree curriculum articulation) do not have satisfactory solutions. Since public health is a social issue, it is not sufficient that public health efforts are dominantly administered by the National Health Commission and Ministry of Education alone. In addition, the collaboration of respective governmental departments is insufficient. Therefore, it is necessary to establish a government-dominated public health management mechanism, in which all the relevant governmental departments fulfil their respective responsibilities, public health institutions and social organizations cooperate with each other, all the people supervise and participate in public health initiatives, and lower and upper level departments take joint public health actions.

3.3 Output stage of public health talent training

3.3.1 Insufficient quantity and quality of public health talents

The *Outline of National Medical and Health Service System Planning (2015 to 2020)* predicts that the number of public health personnel per 1000 permanent residents will be increased to 0.83 or above in China by 2020. Statistical data reveal that the number of public health personnel per 1000 permanent residents was merely 0.61 by the end of 2013. Further, the statistical data released by the Chinese Center for Disease Control and Prevention and health inspection authorities reveal the following: 1) In 2012, China employed 224 000 workers for disease prevention and control in total, that is, on average, 1.65 disease prevention and control workers were deployed per 10 000 population (below the specified national standard, i.e., 1.75–3 workers for disease prevention and control per 10 000 population); 2) In 2013, China had a total of 83 000 health inspectors; further, in 2020, there were merely 0.6 health inspectors per 10 000 population (which is far below the national standard specified in 2010, i.e., 1–1.5 health inspectors per 10 000 population). In the future, community health services, old-age care industry, and the B&R strategy will generate significant demand for high-caliber public health talents. Evidently, China is facing severe shortage of public health talents (particularly high-caliber technical talents).

Existing public health talents do not have sufficient compound ability. Some public health professionals lack not only the requisite clinical knowledge, experience, and skills for disease treatment but also the core abilities to ensure public health, particularly practical ability and emergency ability. Continuous education neither has a unified, systematic, and long-term talent training plan nor discriminates between novice and veteran personnel. Some public health personnel place excessive emphasis on credits but fail to improve their professional skills through continuous education. Therefore, continuous education is not satisfactorily effective.

3.3.2 Unreasonable scale and hierarchy of public health talent training

This aspect primarily manifests in the unreasonable hierarchy of educational levels. Statistical data show that, in 2016, 12 700, 2 500, and 400 students were enrolled in undergraduate, graduate, and postgraduate courses, respectively, for public health disciplines. The number of candidates enrolled in master's and doctoral courses was lesser, resulting in a shortage of high-level public health talents in China. Among the graduate candidates in public health disciplines, in the study period for the master's course, graduates with an academic degree (e.g., master's students) are dominant compared to those with professional degrees (e.g., MPH). During the doctoral study period, postgraduates with academic degrees (e.g., PhD) remain dominant, and the DrPH training is at an exploratory stage. In addition, some colleges have initiated a reform and examination of public health talent training. For example, the Schools of Public Health in Peking University and Xi'an Jiaotong University offered DrPH education on trial, and Nanjing Medical University and Guizhou Medical University examined the model for application-oriented public health talent training [9].

3.3.3 Inefficient talent hierarchy and severe talent drain

As exemplified by Chinese institutions for disease prevention and control, a human resource structure survey was conducted. According to the results, public health talents with a master's degree or higher account for 31%, 19%, and 4% and those with a bachelor's degree account for 42%, 43%, and 36% of the enrollments in public health institutions at the provincial, municipal, and county levels, respectively. Highly educated and high-caliber public health professionals are scarce, and the existing public health talent structure cannot satisfy the current public health requirements.

In practice, there is structural wastage of public health talents. Survey data show that only 53.09% of college graduates with a bachelor's degree in public health choose to work in public health related institutions, whereas approximately 50% of these graduates choose to work in other sectors. Further, studies reveal that public health and preventive medicine sector personnel encounter various problems, such as a low vocational sense of honor, an unstable state of mind, and severe talent drain due to different reasons (e.g., low pay, few promotion opportunities, high work intensity, and low social status). All these conditions affect the stability of the public health talent team to some extent.

4 Foreign experience in public health education

Foreign experiences in public health talent training can be used as references in the following aspects: (1) Humanistic literacy education is emphasized. Based on the curricula followed in general education, colleges universally demand that students acquire humanistic, social, and specialized knowledge. (2) Public health schools are operated jointly with public health institutions. For example, in conjunction with the centers for disease control

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(CDCs), public health colleges in the United States conduct teaching and scientific research to improve the technological, scientific, managerial, and leadership abilities of public health personnel. (3) Encyclopedic education is conducted for public health students. Further, diverse curricula are offered to develop students' thinking, communication, and judgment abilities, as well as their ability to identify universal value. (4) Diverse experimental teaching methods are used. In the United States, public health education is dominated by methods such as on-the-spot teaching, and graduate education is conducted through open teaching and comprehensive experimental teaching. (5) The tutorial teaching mode is implemented. Often, talent training is project oriented and, accordingly, the guiding role of teachers is emphasized. (6) Some institutions offer open public health education. Every year, public health colleges arrange large numbers of training classes to teach new knowledge and technologies so that public health personnel have sufficient opportunities to continuously update their professional knowledge [10–13].

5 Policy suggestions for building a public health talent training system in the context of Comprehensive Health with Chinese characteristics

This study analyzes the status quo of China's public health talent training and development and refers to foreign experiences in public health talent training. From the perspective of dialectical materialism, this study affirms some unique characteristics of China's public health talent training, points out the existing defects and deficiencies, and offers highly targeted policy suggestions. Finally, it aims to establish a public health talent training system in the context of Comprehensive Health with Chinese characteristics.

5.1 Standardization of undergraduate education, optimization of graduate education, and strengthening of continuous education

The key to providing effective public health education is to improve the quality of schools by, specifically, guiding and controlling the enrollment scale at the levels of institutional design and policies and improving the overall quality of graduate students. First, it is necessary to standardize undergraduate education, specifically, as follows: (1) for colleges offering undergraduate curricula in public health and preventive medicine, adjust the enrollment scale of undergraduate students according to regional development characteristics; further, (2) for public health colleges or departments whose educational quality is low and whose graduate students find it difficult to obtain course-related employment, reduce the enrollment scale gradually or even stop the enrollment.

Second, it is necessary to optimize graduate education and develop application-oriented talents and research-oriented talents, respectively. In the professional degree education, MPH is dominant, and DrPH follows. In academic degree education, Doctor's degree is dominant and Master's degree follows. Specifically, it is necessary to increase the enrollment scale of professional master's degree candidates, increase the enrollment scale of professional doctoral degree candidates, stabilize or reduce the enrollment scale of academic master's degree candidates, offer combined master–doctoral or bachelor–master–doctoral degree curricula, and set up associated doctoral stations. In addition, it is necessary to promote the professional degree programs offered by public health institutions (e.g., CDCs), improve the abilities of professional degree candidates by promoting the combined efforts of professional degree awarding colleges and public health institutions, and reestablish the associated public health institutions (e.g., preventive medicine institutes).

Third, it is necessary to strengthen continuous education, in which public health institutions (e.g., CDCs) should play a dominant role by taking the following actions: (1) select backbone personnel from the personnel employed in the field of public health and disease prevention and control, and enable them to receive onsite epidemiologic training or simplified-version standardized MPH training and (2) implement lifelong continuous education; create a well-planned, scientific, and operable continuous education system with clear guidelines and well-defined key points; diversify the forms of continuous education; and improve the practical abilities of public health talents.

5.2 Building a talent training system comprising college education, graduate education, and continuous education

To address the existing problems (e.g., separation between learning and application, poor quality of the teacher team, and shortage of new types of public health talents), it is important to build a multistage talent training system in which colleges and employers closely cooperate with each other. College education is the requisite and basis for the public health talent training system in the context of Comprehensive Health and must be reformed in terms of its educational concepts, training programs, teacher quality, teaching contents and methods, curriculum offerings,

teaching management and supervision, and evaluation and quality control. Graduate education is the inevitable path that helps graduate students adapt to the requirements of their future work and of society better. Therefore, it is necessary to establish a standardized training system that integrates four certificates (i.e., master's degree certificate, graduation certificate, practicing certificate, and standardized training certificate for resident doctors) for public health physicians, bring graduate education under the purview of unified management by the standardized training system for resident doctors, and implement supporting policies (e.g., policies on wage and treatment). Further, continuous education refers to lifelong education. Hence, it is necessary to create a good top-level design, establish a demand-oriented continuous education model, formulate systematic and long-term talent training programs, and examine a new model for public health talent training.

5.2.1 Updating the educational concept and clarifying the talent training program

It is necessary to update the concept of public health education; make a top-level design that is sufficient in terms of strategic objectives, steps, quantity, and quality; and develop excellent, innovative academic, and highly skilled application-oriented compound talents. Undergraduate education is intended to develop general talents with core competence [14], focusing on professional knowledge, practice, innovation, foreign language proficiency, and cultivation of moral values. In addition, characteristic talents can be developed by public health institutions in different regions and at different levels. Graduate education, which is oriented toward professional education and elite education, primarily aims to develop two types of talents: (1) academic research talents, who are centered on developing innovative and scientific research abilities and committed to the research on technologies or policies in the field of public health; and (2) professional application-oriented talents, who focus on job competence and are trained in two modes, that is, "5+2" elite education integrated with clinical medicine (standardized training of public health physicians) and "4+3" engineer training (public health professionals). As a type of vocational education, continuous education is intended to develop high-caliber professional talents who focus on job competence. In addition to enhancing students' theoretical knowledge and experimental skills, continuous education focuses on professional ability training, particularly the training of field epidemiological investigation, health statistics and data analysis, document writing, and management training abilities [15].

Talent training models include the provision of free training to grassroots public health talents and customized training to employers. It is recommended to carry out long-term public health education trials, for example, education of research-oriented talents using a combined bachelor–master–doctoral degree program and education of professional talents in the "5+2" or "4+3" mode.

5.2.2 Formation of a high-caliber double-position public health teacher team

It is necessary to build a teacher team comprising members with different abilities, increase the requirements of teachers' qualifications; standardize the teachers' appraisal procedure; perfect the standard for teachers' promotion by attributing equal importance to lectures and scientific research; develop double-position public health teachers; and, particularly, implement the double-tutor system in MPH candidate education.

5.2.3 Creation of diverse teaching methods for public health talents with Chinese characteristics

It is necessary to learn from advanced foreign experiences, introduce new types of teaching methods, and promote the use of flexible and diverse teaching methods (e.g., small-class teaching, case teaching, situational teaching, and the implementation of massive open online courses (MOOCs)) based on the conditions specific to China's students, teachers, software, and hardware. Since only a few mature cases are available in case teaching, teachers should compile typical, teachable, and timely cases in conjunction with public health network information systems, CDCs, and community healthcare centers.

5.2.4 Development of a public health curriculum system having a solid theoretical basis and integrating practice and theory

Curriculum offerings determine the knowledge framework of trained talents. To address the separation between curriculum offerings and social demand, the following points must be considered while constructing a curriculum system: (1) retain the preventive medicine characteristics of public health education; (2) emphasize practical teaching, and encourage teachers to consolidate theoretical teaching while conducting practical teaching and apply practical spirit to theoretical teaching; (3) attach equal importance to specialized, compulsory, and optional curricula, and invite senior professors to teach optional curricula (e.g., engineering, diplomacy, and architecture curricula); (4) highlight the benefits of humanistic literacy education; (5) provide general public health education, integrate the basic ideas of public health into other educational systems, and create public health education models

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(for clinical medicine students, students learning other disciplines, and the general population); (6) ensure that the discipline of health management highlights highly technical curricula (e.g., health economics); and (7) offer health education and global health curricula, as well as international exchange curricula.

5.2.5 Building a complete and normative quality evaluation system for public health education

To build a multilayer education quality supervision and teaching evaluation system (which covers governments, the public health sector, colleges or departments, teaching research offices, teachers, and students), the following measures should be considered: (1) formulate effective regulations and rules, conduct quality evaluation and provide feedback at different levels, and promote the spiral development of teaching; (2) build channels of communication with students, and channels through which the public health sector, society, and students can provide suggestions on college talent training and comments on teaching methods and quality; and (3) use network information technologies to create information channels at different levels (e.g., official websites of colleges, e-mail inboxes of teachers and students, and mobile terminals) so that students and teachers can access a wider range of information services.

5.3 Creation of a humanistic education model for public health in the context of Comprehensive Health

Since the humanistic spirit is absent in medical education and the significance of this aspect in the context of Comprehensive Health, Duan et al. proposed the model of "all people, comprehensive, whole process, all time, and all-round" to construct a humanistic education teaching system in the context of Comprehensive Health. The teaching system will be applied to humanistic education for public health. Here, "all people" implies the improvement in health literacy of all people; health maintenance across the complete life cycle; and the inclusion of psychological, physiological, social, moral, and environmental perspectives in public health education. To implement the humanistic spirit anytime and anywhere, public health talents must acquire humanistic education from various people (e.g., personnel in schools, hospitals, and training bases, as well as socially concerned personnel) in different ways (e.g., school opening ceremonies, entrance education, class-based teaching, extracurricular activities, practical teaching, clinical practice, after-school activities, and graduation ceremonies) and through various media (particularly, new media, multimedia, and rich media). General education should be combined with professional education. Teachers of specialized curricula should receive humanistic spirit training and pass relevant examinations, so that students can develop a humanistic spirit while learning the specialized curricula and during professional practice. In addition, an all-round and operable test and evaluation system should be developed, and the final goal is to ensure that public health students develop the humanistic spirit synchronously and scientifically and practice this aspect as early as possible.

5.4 Establishment of the criteria for college, specialty, and occupational admission

To improve the quality of talent training and provide more smooth channels for the employment of public health talents, it is necessary to build and perfect relevant admission regimes for public health talent training. In China, public health education is closely related to preclinical medicine and clinical medicine and, hence, public health talents must have a solid clinical foundation. This is the fundamental reason why China's public health practice, which is backed by traditional preventive medicine, has attained significant achievements since the reform and opening-up of the economy. Therefore, rigorous criteria should be applied in the founding of public health colleges. Specifically, such public health colleges must have the capability to provide education in relevant disciplines (e.g., preclinical medicine, clinical medicine, preventive medicine, and public health), necessary software facilities (e.g., teaching force, cutting-edge scientific research ability, implementation of advanced teaching concepts, a complete set of enrollment and training programs, and advanced quality control), and perfect hardware facilities (e.g., perfect laboratory devices, sufficient teaching and tutoring space, and practice bases).

To perfect the public health education quality evaluation system, it is necessary to actively implement the certification of public health and preventive medicine, specifically, by establishing and perfecting China's certification system, forming independent professional certification bodies, and developing scientific certification standards and a normative certification procedure. In addition, colleges are allowed to function in a differentiated and distinctive manner if their undergraduate curricula are certified and to improve their educational and talent training quality through professional certification [16,17].

Employers should establish occupational standards and specifications, implement standardized training for public health physicians, and facilitate continuous education reform. Only those who hold public health physician certificates or MPH certificates are eligible to work in public health institutions. Continuous education credits or

certificates are required as evidence to determine remunerations and award professional titles. Talents with a bachelor's degree are eligible to work in county- or community-level public health institutions, those with an MPH certificate or a master's degree are eligible to work in provincial or city-level public health institutions, and talents with a doctoral degree or highly skilled talents with a master's degree are eligible to work in national public health institutions. Public health institutions such as the National Health Commission are highly technical administrative organs. To prevent situations where laypeople lead experts, only those individuals with a background knowledge of medicine, biology, and public health are eligible to work in such public health institutions.

5.5 Development of compound public health talents within a large scope

Public health covers an increasingly wide range of services; hence, the existing public health management regime can no longer satisfy the requirements of this discipline. Further, in the fields of diplomacy, urban planning, and civil engineering, the demand for talents with background knowledge of public health and medicine is increasing [18]. Therefore, the enrollment of graduate candidates should extend to different relevant industries or sectors, rather than being limited to the medical and health sector. In addition, it is necessary to perfect the associated curriculum and practice system and encourage the undergraduate students of public health and preventive medicine to study the graduate curricula of their interest.

In China, public health education is offered to students having medical knowledge. The public health occupational specifications require public health talents to enhance their clinical knowledge and ability in various aspects, for example, health management and the three-grade prevention of chronic diseases; the screening, diagnosis, and treatment of occupational diseases; and the research on infectious diseases and development of vaccines for infectious diseases. To develop the public health sector and increase its competitiveness compared to other sectors, strengthening the effectiveness of disease treatment is an inevitable requirement. The public health education system's curricula should include topics such as global health, health-influencing factors, emerging infectious diseases, and medical humanism. The purpose is to develop the compound ability of talents, enrich the directions of talent training, improve the talents' work-related competence, and extend occupational directions.

In the National Health Conference held in August 2016, Xi Jinping (general secretary of the Communist Party of China) proposed some new guidelines for public health in the new era, specifically, "focus on grass-roots health, motivated by reform and innovation, give priority to disease prevention, attach equal importance to traditional Chinese medicine and Western medicine, incorporate health into all policies, and create and share by all people." Further, implementing the guideline "give priority to disease prevention" was emphasized. From the perspectives of health economics and reducing the disease burden, prevention is more cost-efficient than disease treatment. Further, from the social and psychological perspectives, patients prefer to take their doctors' advice. Therefore, it is very important to develop the disease prevention ability of clinical talents, since it helps increase the communication and trust between patients and doctors, represents an effective response to national health guidelines, is necessitated by the Healthy China and humanistic medicine initiatives, and is a manifestation of the humanistic spirit.

5.6 Environmental and policy guarantee for public health talent development

Public health development is a type of system engineering and is of vital importance to the health of the people of a country or region. In China, public health is an objective of public welfare efforts. Therefore, the provision of public health education not only is a duty of public health colleges but also necessitates a favorable social environment and policy guarantee. Accordingly, this study provides the following suggestions to enhance the recruitment and retention of talents in the public health domain. First, it is necessary for governments to fulfill their responsibility regarding the reform of public health education. Specifically, governments should increase investment in and provision of guidance to public health institutions in various aspects (e.g., budgets, law, policies, ethics, and morals), and public health development should be included in the performance appraisal indices of central, provincial, and prefecture governments. In a government-dominated manner, the National Health Commission, in conjunction with other governmental organs and the society, should establish a public health talent team comprising individuals with solid theoretical knowledge, proficient practical skills, and high health and humanistic literacy. Second, it is necessary to realize medicine–education synergy between provincial CDCs and public health colleges and formulate detailed rules and regulations for the medicine–education synergy among public health talents. Provincial CDCs may be directly affiliated to colleges to overcome the absence of pacesetters in the MPH education team. In addition, it is advisable to train double-

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position public health teachers and enable colleges and public health institutions to become proficient in both teaching and scientific research efforts. Third, it is necessary to increase the financial input, implement a financial policy favoring middle and western China and grassroots public health institutions, and take other relevant measures (e.g., build superior software and hardware facilities, implement an incentive salary system, and attract more resources). Fourth, it is necessary to provide reasonable treatment to public health talents to prevent talent drain, increase the talents' self-identity and sense of honor, and attract more public health talents to this sector. Fifth, it is necessary to simplify the relevant procedures and attribute more managerial autonomy to colleges so that the colleges can determine their orientations and characteristics regarding schooling and examine a path with Chinese characteristics to provide world-class education. Sixth, it is necessary to give more publicity to public health, popularize professional public health education, and propagate the notable results of public health and health knowledge through various modern media to boost public cognition of public health.

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