

# **China's Higher Pharmaceutical Education: Evolution, Current Status, and Prospects**

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## **Abstract**

China's higher pharmaceutical education has gone through more than 100 years. The rapid development of pharmaceutical industry and patients' needs for better medical care are requiring more talented pharmacy professionals, which pose many challenges for the current higher pharmaceutical education system. This paper provides a retrospective review of the evolution of China's higher pharmaceutical education, descriptions of its current status, and the prospects of China's higher pharmaceutical education in the future.

**Keyword:** China; higher pharmaceutical education; prospects

## **1. The Evolution of China's Pharmaceutical Education**

Over more than 100 years of evolution, China's higher pharmaceutical education development model can be summarized into two kinds: 1. "Connotative development" model, namely, expands the overall size of higher education by exploring the potentials of existing schools, improving internal efficiency, and expanding the enrollment capacity. 2. "Extension development" model, namely, expands the overall size of higher education by establishing new schools or new campus.

China's modern higher pharmaceutical education has gone through approximately three stages: origination (1906-1949), adjustment (1950-1970), and development (1970-now). During the origination stage, the main development model is "extension". Before 1949, due to the authority's indifference or even discrimination attitude, pharmaceutical education did not develop properly, despite the effort made by visionary people. From 1906 to 1949, there were almost 20 pharmaceutical schools or departments in China; however, the pharmaceutical education at that time was chaos. There was no uniform school system or education system, no specific curriculum or educational objectives, no specialized syllabus or domestic textbooks.

During the adjustment stage, the development model is mainly "connotative", complimented by "extension" model. At the early stage of the establishment of People's Republic of China, the main national task was to consolidate the new regime and develop domestic economy; thus a large number of professionals were needed urgently. To satisfy the need, since 1952, several national pharmaceutical education adjustments have been implemented. After series of restructures and adjustments, a "2 Colleges + 3 Departments"—Pharm. Education System was in shape. Consequently, the basic structure of China's pharm. education

was formed, with better-utilized resource, significantly improved teaching conditions, better education qualities, and higher efficiency. Taking Nanjing College of Pharmacy (currently known as China Pharmaceutical University), and Shenyang College of Pharmacy (currently known as Shenyang Pharmaceutical University) as examples, during 1953-1965, the total enrollment number was 6,509, and the graduate number was 5,900, which were triple compared to 1906-1949.

During the development stage, the model is a combination of “extension” and “connotative”. This stage was featured by two characters: firstly, the diversification of school ownership. There were 3 types of school ownerships at that time: (1) state-owned school, (2) state-owned private school, (3) private school. The second character was the diversification of pharmaceutical education institutions. Before 1980s, only medical or pharmaceutical schools offered pharmacy and pharmaceutical science program. Nowadays, besides two pharmaceutical universities and one independent pharmaceutical college, there are various institutions offer pharmacy-related programs, which include comprehensive universities, institutions of science and technology, institutions of agricultural, forestry and marine sciences, business schools, Universities of post and telecommunication, etc.

The rapid development of China’s healthcare system and the increasing demand for healthcare professionals provide foundation and opportunity for higher pharmaceutical universities to cultivate professional talents, the nation’s pharmaceutical education has stepped into a rapid development. According to 1999’s statistics, there are 84 schools offer pharmacy-related programs, which ranks 1st in the world. By the end of 2012, there are 367 undergraduate programs and 261 higher vocational schools.<sup>[1]</sup> Figure 1 shows the increase of undergraduate pharmacy-related programs from 1949 to 2012.

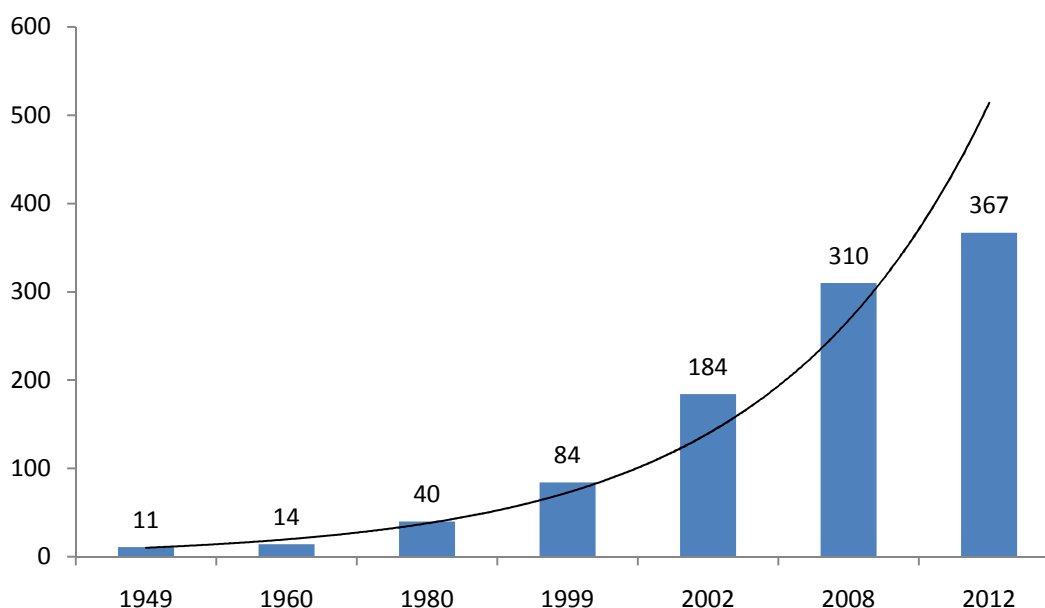


Figure 1. Increase in number of institutions that offer pharmacy-related programs in China (1949 – 2012)

## 2. Current Status of China's Pharmaceutical Education

According to the Chinese Pharmaceutical Yearbook in 2013<sup>1</sup>, there are 703 schools offering pharmacy and pharmacy-related programs. Among these schools, there are 371 undergraduate programs and 332 higher vocational schools. In 2013, the undergraduate enrollment is 48,735, while the higher vocational education enrollment is 71,637. An overview of pharmacy programs in China and their total enrollment in 2013 is shown in Table 1.

**Table 1. China's Undergraduate Programs in Pharmaceutical Education (2013)**

Category	Pharm. programs institutions	Number of	Enrollment
Pharmacy	199	19,015	
Pharmacy-related Programs (7)	Pharmaceutics	1046	332
	Clinical Pharmacy	241	447
	Pharmaceutical Administration	10	655
	Marine Pharmacy	2	61
	Pharmaceutical Analysis	7	431
	Medicinal Chemistry	42	11
T.C.M-related programs (6)	Traditional Chinese Pharmacy	97	7,677
	TCM Resources Development	30	1,437
	Plantation and Authentication of TCM Herbs	11	613
	Traditional Chinese Pharmaceutics	11	771
	Tibetan Pharmacy	4	165
	Mengolian Pharmacy	2	92
Chemical & Pharmaceutical Engineering	Pharmaceutical Engineering	262	18,201
	Biopharmaceutical Engineering	30	2,994

### 2.1 Overall Layout of Clinical Pharmacy Education in China

Clinical pharmacy program in China is targeting to cultivate clinical pharmacists who are

experts in drug and drug therapy, work collaboratively with other healthcare professionals and provide pharmaceutical care service to the patients, which is very similar to the Pharm.D program in America. Although clinical pharmacy education in China only started recently, with the emphasis of pharmacy practice shifting to clinical pharmacy, the discipline is striving in China.

In 1989, China's first 5-year program of clinical pharmacy was started at West-China Medical University, and clinical pharmacy education in China began to increase after that. In 2006, the Ministry of Education approved the independent undergraduate program of clinical pharmacy at China Pharmaceutical University, which is a first level, 5-year BS degree. Up to 2013, there are 24 independent undergraduate programs of clinical pharmacy in China (see Table 2). The general length of these programs is 5 years.

For graduate level education, in 1986, Shanghai Medical Univ. School of Pharmacy (now as Fudan Univ. School of Pharmacy) started the first postgraduate class of clinical pharmacy. Up to 2011, there are 8 schools offering the 3-year master's programs, and 7 schools offer PhD programs in clinical pharmacy. Some schools also offer a 6-year or 7-year joint undergraduate-postgraduate program of clinical pharmacy.

For continuing education, majority of professional development currently focus on obtaining clinical pharmacy skills for practicing pharmacists. The Ministry of Public Health in China approves 93 hospitals in total as the base for the 1-year on-job training of clinical pharmacists.

**Table 2 Undergraduate Program of Clinical Pharmacy in China (up to 2013)**

No.	University	Started in	Number years	Enrolment 2013
1	China Pharm. Univ.	2006	5	60
2	Shenyang Pharm. Univ.	2008	4	96
3	China Medical Univ.	2009	5	120
4	Harbin Medical Univ.	2007	5	95
5	Capital Medical Univ.	2008	5	20
6	Nanjing Medical Univ.	2008	5	58
7	Xuzhou Medical College	2009	5	100
8	Guangdong Pharm. College	2008	5	62
9	Chongqing Medical Univ.	2008	5	150
10	Kunming Medical College	2009	4	40
11	Sichuan Univ. West-China School of Pharmacy	2009	5	—
12	Dalian Medical Univ.	2011	5	—

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13	Qiqihaer Medical College	2011	5	—
14	Wenzhou Medical College	2011	5	—
15	Anhui Medical Univ.	2011	5	—
16	Fujian Medical Univ.	2011	5	—
17	Luzhou Medical College	2011	5	—
18	guangxi University of Chinese medicine	2012		—
19	Zunyi medical university	2012		30
20	Tianjin medical university	2012		30
21	Tianjin university of traditional Chinese medicine	2012		50
22	Hebei medical university	2012		30
23	Inner mogolia medical university	2012		40
24	Jilin university	2012		70

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## 2.2 China's Pharmaceutical Education Accreditation

In order to ensure the quality of pharmaceutical education, to set up an integrated quality assurance system for the higher pharmaceutical education, and to further facilitate international communication, it's quite necessary to implement pharmaceutical education accreditation in China.

China's pharmaceutical education accreditation has learned from America and other developed countries' experiences, it started late but is still ongoing. The accreditation program is led by the Advisory Board for Pharmacy Teaching MOE, memberships include delegates from educational institutions and pharmaceutical industry, experts from committees associated with licensed pharmacists. In 2007, the pilot program of pharmaceutical accreditation was initiated, and a pharmacy accreditation plan underwent 4-round comments and revision work from July to December. In December 2007, a pilot accreditation program was conducted at Guangdong Pharm. College. In 2009, pilot accreditation programs were conducted at Hainan Medical University and Inner Mongolia Medical University in June; and at China Pharmaceutical University and Shenyang Pharmaceutical University in December. In 2010, based on the previous experiences of pilot accreditation, the original pharmacy accreditation standard was revised and elaborated into two levels: fundamental standard and advanced standard. The fundamental standard is an entry-level standard, while the advanced standard is a higher standard.<sup>[2]</sup>

## 2.3 Characteristics of Pharm. Education in Current China

Currently in China, pharmacy programs are designed to prepare students to meet the market demand of the medical and pharmaceutical sectors. Higher pharmaceutical education is mainly targeted towards the needs of the drug manufacturing industry, pharmaceutical care, and pharmaceutical research. The growth of pharmaceutical education in China has been increasing rapidly, with the number of institutions offering programs of pharmacy and pharmaceutical engineering increase from 84 (in 1999) to 351 (in 2011), up by 417.86%, and the number is still growing.

The comprehensive system of pharmaceutical education with a relatively large scale has come into shape. The overall structure is “higher vocational education—undergraduate education — postgraduate & doctoral education —continuing education —professional pharmacists education”.

Quality assurance system for higher pharmaceutical education has been set up and the accreditation program for degree programs of pharmacy and traditional Chinese pharmacy has been initiated.<sup>2</sup>

### **3 Prospects of China’s Pharmaceutical Education**

#### **3.1 Cultivation of Advanced Pharmaceutical Science Talents and Pharmaceutical Care Talents**

In China, the total output value of the pharmaceutical industry is growing by an annual increase of approximately 20%, and statistics show that over 60% of the students of pharmacy-related programs work for the industry after graduation. Within a long time in the future, the main task of higher pharmaceutical education is still to cultivate talents for the industry: especially the high-tech pharmaceutical engineers for basic research and novel drug R&D; the talents for pharmaceutical business and administration; and talents with practical skills for the industry frontline. With a population of 1.3 billion people, China’s demand for pharmaceutical care is large domestically, with more and more focus on pharmaceutical care both internationally and domestically, growing demand for rational and safe drug use, China is also putting more attention on the cultivation of pharmaceutical care talents.

Traditionally, Chinese pharmaceutical education is mainly chemical-oriented, aiming to cultivating talents in pharmaceutical science field. Nowadays, China is also putting more and more emphasis on pharmaceutical care in pharmacy practice, trying to transform the chemical-oriented pharmaceutical education model to a patient-oriented model. In fact, there are many reforms being carried out in the clinical pharmacy programs both in didactic teaching and practice experience. The country is exploring a way of establishing our own “Pharm.D” program with Chinese characteristics.

#### **3.2 Future of Pharmacy Accreditation in China**

China is continuing to promote its pharmaceutical education accreditation actively, aiming to establish the linkage between accreditation conclusion and licensed pharmacist examination admittance. It will encourage more universities and schools to include licensed pharmacists’ cultivation into its teaching goals, and attract more qualified graduates to take up licensed

pharmacist as their career.

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