

## RESEARCH ARTICLE

## Unmet needs in continuing medical education programs for rural Chinese township health professionals

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### Abstract

**Purpose:** This study aimed to describe the system of continuing medical education (CME) in the Guangxi Zhuang Autonomous Region and to ascertain the perceived needs related to that system, in order to improve the performance of health professionals in Chinese township health centers (THCs). **Methods:** In-depth key informant interviews were conducted to gain insights into the current CME system. A cross-sectional survey using a self-administered structured questionnaire was also carried out from March to August 2014 in order to identify perceived needs among THC personnel in the Guangxi Zhuang Autonomous Region. Logistic regression was used to identify factors related to respondents' interest in pursuing different levels of degree study. **Results:** The areas of need perceived by the respondents included general clinical competence and emergency or first aid knowledge. Most respondents wanted to study at medical colleges in order to obtain a higher degree. Respondents aged below 45 years with neutral or positive attitudes about the benefit of degree study for the licensure examination were more likely to attend a bachelor-level CME program than their older peers and respondents with negative attitudes towards degree study. Female respondents and respondents aged below 45 years were more likely to attend a junior college CME program than males and older respondents, respectively. **Conclusion:** It is necessary to develop degree-linked CME programs to meet the need for young health professionals in Chinese THCs; therefore, this programs can improve the expertise of poorly educated young health workers, who overwhelm rural Chinese health systems.

**Key Words:** China; Clinical competence; Continuing medical education, First aid; Health services needs and demand

### INTRODUCTION

As an ethnic minority region in southwest China, 82% of the 51.59 million inhabitants of the Guangxi Zhuang Autonomous Region (hereafter abbreviated as Guangxi) live in rural areas [1]. The ratio of physicians and nurses per 100,000 inhabitants in rural Guangxi is 40 and 38, respectively. In order to improve the competency of medical professionals currently working in township health centers (THCs), many continuing

medical education (CME) programs have been implemented in Guangxi [2,3]. Access to CME is considered to be an essential issue for rural health professionals due to their broad scope of clinical practice and career isolation. However, the majority of CME programs are based on the concept of institutionally oriented planning, which is dictated by the interests of the organization rather than the needs of learners. In 2004, the Chinese Ministry of Health issued a regulation entitled "Training regulations for health personnel in township health centers." This regulation specified guidelines and policies for CME. Meanwhile, the regulation encouraged township health workers to obtain higher-level degrees through CME. Eleven years after the regulation was issued, it is imperative to review

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the CME system and to survey the current status of CME, barriers to pursuing CME, and perceived needs in CME. This study aims to describe the CME system for township health professionals in Guangxi, China by document review and in-depth interviews with multiple stakeholders. It also aims to describe the current status of CME, perceived needs in the CME system, and the characteristics of personnel who would like to pursue further degree study.

## METHODS

### Study site

This study was conducted from March to August 2014 in three counties of Guangxi: Pingguo, Luchuan, and Gongcheng, which are located in the northwest, southeast, and north of Guangxi, respectively [1].

### Study design

A mixed study combining in-depth interviews and a questionnaire-based survey was used.

### Study population

Various CME stakeholders were identified in consultation with specialist college educators at Guangxi Medical University. This list was expanded after the initial interviews, as the earlier interviewees suggested more informants. Recruitment stopped after the data were considered to be saturated by the researchers. The final informants were the directors of the county health bureau and provincial department of health, the heads of the county hospital and township health centers, CME providers (medical college educators), CME users (nurses, doctors, pharmacists, and laboratory technicians in THCs), and other relevant stakeholders (patients in THCs). The survey population of CME users in THCs included doctors, nurses, pharmacists, and laboratory technicians in all THCs of the three counties that were studied. However, professionals who had been employed at a given THC for less than six months or would retire within a year were excluded.

### Document review

Document review was based on the following types of documents: government policy papers; articles related to health training, CME, and adult education; licensure examinations from the China National Knowledge Infrastructure database; and articles from PubMed. The content of these documents was used to develop interview guidelines after consultation with specialists.

### In-depth interviews of stakeholders

In-depth interviews were conducted with multiple stake-

holders. The interview topics included comments on the current status of township health professionals, current CME programs, existing problems, and suggestions for the improvement of CME planning and degree study. The interviews were taped and transcribed verbatim for thematic analysis.

### Survey of health professionals

The questionnaire used in the Second National Survey of Demographic Data and Training Demand for Health Professionals in Township Health Centers by the Chinese Ministry of Health in 2011 was adapted for this study. Two epidemiologists, a statistician, and four health human resources specialists reviewed the questionnaire to ensure its validity. A small pilot study was conducted to verify the suitability of the questions. Variables included demographic data, current CME status, perceived CME needs, and interest in degree study. The medical professionals completed the questionnaires with help from trained research staff if required.

### Data analysis

Existing documents and government policy papers were used to review the CME system. Gaps between the current CME system and perceived future needs were analyzed in the quantitative study and validated with key informant interviews. Data entry was carried out through double entry and validation using EpiData (The EpiData Association, Odense M, Denmark). Data analyses were performed using the R language ver. 3.1.0 (The R Foundation, Vienna, Austria) and the Epicalc package ver. 2.15.1.0 (The R Foundation). Descriptive data were presented as frequencies and percentages. The chi-square test and Fisher's test were used as appropriate for categorical variables. Multivariable logistic regression analysis was performed to investigate the factors related to the level of desired degree study. P-values < 0.05 were considered to indicate statistical significance.

### Ethical approval

Ethical approval of the study was obtained from the Ethics Committee of the Faculty of Medicine, Prince of Songkla University (no. 56-317-18-5). Informed verbal consent was obtained from all participants.

## RESULTS

### The current continuing medical education system for Chinese township health professionals

The Chinese medical system has undergone many changes as it evolved from the system of 'barefoot' doctors in the mid-1950s to the current New Rural Cooperative Medical Scheme that began in 2003. These changes have also been reflected in

the medical education system. In order to serve China's large population, the government developed a large number of 'secondary medical schools' starting in the 1960s. These secondary schools still exist today and produce health professionals for township hospitals. Meanwhile, very few graduates from medical universities are willing to work in THCs because they offer fewer opportunities for professional development. In order to deploy rural health professionals in THCs and to increase their retention, township recruitment and general practitioner training programs have been conducted over the past decade. Township recruitment programs recruiting licensed doctors for THCs helped to change a situation in which rural doctors were extremely scarce. At the same time, rural health workers left THCs to pursue studies in institutes of higher education due to the limited opportunities for professional development in THCs. CME for current health professionals in THCs was considered essential in order to retain health workers in rural China.

Two CME systems have been established for township health professionals. The first is a non-degree program, carried out under the management of the National Health and Family Planning Commission. Medical associations at all levels plan and conduct these programs. These non-degree programs mainly focus on health professionals with intermediate technical titles or senior titles. The second CME program is a degree program under the jurisdiction of the adult education departments of medical colleges, in which medical professionals can work towards a higher degree through Hanshou (correspondence courses), self-education, and remote and video education.

Barriers to retraining in rural health were categorized as follows. First, not enough time was reported to be available for work and study. A consensus was observed among the participants that the lack of time to work and study was the biggest barrier to pursuing CME. Almost all THCs were found to have a shortage of medical professionals, aggravating this dilemma. The quotes from informants below illustrate this issue. Second, budgets were described as insufficient. Financial investment from the government has mainly focused on upgrading facilities and medical equipment, and insufficient funds have been made available for training medical professionals. Third, competing interests between the two CME systems were identified. Educational degrees are conferred under the administration of the Education Department, while technical titles are conferred under the administration of the Health Department. Both CMEs exist in parallel. The Health Department does not recognize educational degrees obtained by Hanshou (correspondence courses) when candidates attempt to register for licensure examinations. This conflict was found to discourage township health professionals from pursuing degree studies and to have created policy barriers for health professionals in THCs. Fourth, our results indicated widespread ignorance of the health needs of the rural population. Rapid developments in transportation have provided rural inhabitants with convenient access to county hospitals. However, the role of THCs in the prevention of non-communicable diseases and emergency and first aid services has become more important, making it necessary for township health professionals to be trained in dealing with non-communicable diseases and emergencies.

**Table 1.** Demographic information about the medical health professionals included in this study

Demographic	Category	Physicians (n = 231)	Nurses (n = 233)	Other health professionals (n = 205)	Total (n = 669)
Gender***	Male	110 (47.8)	3 (1.3)	54 (26.5)	167 (25.2)
	Female	120 (52.2)	228 (98.7)	150 (73.5)	498 (74.7)
Age*** (yr)	< 25	3 (1.3)	58 (24.9)	81 (39.5)	142 (21.2)
	25–34	97 (42.0)	113 (48.5)	85 (41.5)	295 (44.1)
	35–44	109 (47.2)	48 (20.6)	34 (16.6)	191 (28.6)
	≥ 45	22 (9.5)	14 (6)	5 (2.4)	41 (6.1)
Work experience*** (yr)	Median (interquartile range)	13 (8,18)	8 (4,14)	4 (2,10)	9 (4,15)
Education***	Senior secondary school and below	4 (1.7)	4 (1.7)	14 (6.8)	22 (3.3)
	Secondary technical school	49 (21.2)	110 (47.2)	94 (45.9)	253 (37.8)
	Junior college	147 (63.6)	116 (49.8)	93 (45.4)	356 (53.2)
	Undergraduate	31 (13.4)	3 (1.3)	4 (2)	38 (5.7)
Technical titles***	Senior	0	0	1 (0.5)	1 (0.2)
	Intermediate	62 (27.0)	35 (15.1)	15 (7.9)	112 (17.2)
	Junior	97 (42.2)	80 (34.5)	20 (10.5)	197 (30.2)
	No titles	71 (30.9)	117 (50.4)	155 (81.2)	343 (52.2)

Values are presented as number (%).

\*\*\*P-value < 0.001.

**Table 2.** Characteristics of current continuing medical education for health professionals in township health centers

Variable	Category	Physicians (n = 231)	Nurses (n = 233)	Other health professionals (n = 205)	Total (n = 669)
Format <sup>a)</sup>	Conference sessions***	122 (52.8)	64 (27.5)	61 (29.8)	247 (39.0)
	Further clinical education/visiting ***	109 (47.2)	31 (13.3)	23 (11.2)	163 (25.0)
	Study in medical schools	19 (8.2)	24 (10.3)	11 (5.4)	54 (8.0)
	Guidance from senior colleagues*	92 (39.8)	122 (52.4)	85 (41.5)	299 (47.0)
	Self-education	47 (20.3)	37 (15.9)	27 (13.2)	111 (17.0)
	Remote/video education***	27 (11.7)	7 (3.0)	13 (6.3)	47 (7.0)
	Never attend <sup>d)</sup> ***	20 (8.7)	53 (22.7)	63 (30.7)	136 (21.0)
Content <sup>a)</sup>	Basic theory**	106 (45.9)	140 (60.1)	95 (46.3)	341 (62.0)
	Clinical skills	123 (53.2)	123 (52.8)	88 (42.9)	334 (61.0)
	Appropriate local technology	45 (19.5)	38 (16.3)	32 (15.6)	115 (21.0)
	General practice knowledge***	43 (18.6)	24 (10.3)	9 (4.4)	76 (14.0)
	Emergency or first-aid knowledge***	63 (27.3)	91 (39.1)	29 (14.1)	183 (33.0)
	Clinical methodology*	27 (11.7)	21 (9.0)	10 (4.9)	58 (11.0)
	Rational drug use ***	64 (27.7)	36 (15.5)	27 (13.2)	127 (23.0)
	Preventive health*	68 (29.4)	84 (36.1)	49 (23.9)	201 (36.0)
Place*	Current working hospital	56 (26.8)	115 (43.2)	70 (58.4)	241 (42.4)
	County hospitals	87 (41.6)	58 (38.3)	62 (29.4)	207 (36.4)
	City hospitals	53 (23.9)	13 (11.1)	18 (6.6)	81 (14.3)
	Medical colleges	11 (5.3)	10 (6.8)	11 (5.1)	32 (5.6)
	Other hospital	5 (2.4)	1 (0.6)	1 (0.5)	7 (1.2)

Values are presented as number (%).

<sup>a)</sup>Indicated multiple options. \*P-value < 0.05. \*\*P-value < 0.01. \*\*\*P-value < 0.001.

**Table 3.** Perceived needs for various aspects of continuing medical education

Variable	Category	Physicians (n = 231)	Nurses (n = 233)	Other health professionals (n = 205)	Total (n = 669)
Format***	Conference sessions	53 (25.5)	37 (20.3)	39 (27.7)	129 (24.3)
	Further clinical education/visiting	126 (60.6)	79 (43.4)	46 (32.6)	251 (47.3)
	Study in medical schools	11 (5.3)	15 (8.2)	17 (12.1)	43 (8.1)
	Guidance from senior doctors	7 (3.4)	34 (18.7)	30 (21.3)	71 (13.4)
	Self-education	7 (3.4)	15 (8.2)	7 (5.0)	29 (5.5)
	Remote/video education	4 (1.9)	2 (1.1)	2 (1.4)	8 (1.5)
Content <sup>a)</sup>	Basic theory**	70 (30.3)	42 (18)	62 (30.2)	174 (26.0)
	Clinical skills*	98 (42.4)	86 (36.9)	97 (47.3)	281 (42.0)
	Appropriate local technology	54 (23.4)	69 (29.6)	22 (10.7)	145 (22.0)
	General practice knowledge	52 (22.5)	63 (27.0)	67 (32.7)	182 (27.0)
	Emergency or first-aid knowledge***	134 (58.0)	137 (58.8)	71 (34.6)	342 (51.0)
	Clinical methodology	29 (12.6)	20 (8.6)	18 (8.8)	67 (9.5)
	Rational drug use	37 (16.0)	12 (5.2)	21 (10.2)	70 (10.0)
	Preventive health	95 (41.1)	81 (34.8)	75 (36.6)	251 (38.0)
Place <sup>a)</sup>	Current working hospital*	9 (4.4)	12 (5.6)	21 (11.2)	42 (6.9)
	County hospitals	58 (28.2)	57 (26.5)	65 (34.8)	180 (29.6)
	City hospitals***	82 (39.8)	114 (53)	59 (31.6)	255 (41.9)
	Medical colleges	99 (47.8)	121 (57.1)	106 (56.4)	326 (53.7)
Interest in degree study***	Secondary technical school	0	11 (4.7)	12 (5.9)	23 (3.4)
	Junior college	32 (13.9)	64 (27.5)	45 (22.0)	141 (21.1)
	Bachelor's degree	110 (47.6)	108 (46.4)	102 (49.8)	320 (47.8)
	Postgraduate	38 (16.5)	21 (9.0)	17 (8.3)	76 (11.4)
	No demand	51 (22.1)	29 (12.4)	29 (14.1)	109 (16.3)

Values are presented as number (%).

<sup>a)</sup>Indicated multiple options. \*P-value < 0.05. \*\*P-value < 0.01. \*\*\*P-value < 0.001.

**Table 4.** Demographic data and factors related to interest in further degree study

Variable	Category	No demand <sup>a)</sup> (n = 100)	Junior college <sup>b)</sup> (n = 141)	Bachelor's degree <sup>c)</sup> (n = 317)	P-value
Gender	Male	32 (32.3)	19 (13.5)	81 (25.6)	0.002
	Female	67 (67.7)	122 (86.5)	235 (74.4)	
Age (yr)	< 25	13 (13.0)	43 (30.5)	66 (20.8)	< 0.001
	25–34	28 (28.0)	62 (44.0)	155 (48.9)	
	35–44	44 (44.0)	27 (19.1)	85 (26.8)	
	≥ 45	15 (15.0)	9 (6.4)	11 (3.5)	
Current education level	Senior secondary school and below	5 (5.0)	5 (3.5)	7 (2.2)	< 0.001
	Secondary technical School	37 (37.0)	97 (68.8)	88 (27.8)	
	Junior college	58 (58.0)	39 (27.7)	222 (70.0)	
Profession	Doctor	45 (45.0)	32 (22.7)	108 (34.1)	0.004
	Nurse	28 (28.0)	64 (45.4)	108 (34.1)	
	Other health professional	27 (27.0)	45 (31.9)	101 (31.9)	
Affordable fees for degree study every year	1,000–1,500	32 (65.3)	70 (51.5)	166 (53.4)	0.278
	1,500–2,000	13 (26.5)	42 (30.9)	77 (24.8)	
	2,000–2,500	3 (6.1)	20 (14.7)	53 (17.0)	
	> 2,500	1 (2.0)	4 (2.9)	15 (4.8)	
Perceived benefit for the licensure exam	Yes	33 (64.7)	77 (61.1)	191 (63.9)	0.05
	Neutral	7 (13.7)	36 (28.6)	80 (26.8)	
	No	11 (21.6)	13 (10.3)	28 (9.4)	
Perceived minimum degree required to work in township health centers	Secondary school	31 (53.4)	77 (55.4)	134 (42.8)	0.026
	Junior college	23 (39.7)	56 (40.3)	170 (54.3)	
	Bachelor	4 (6.9)	6 (4.3)	9 (2.9)	

Values are presented as number (%) unless otherwise stated.

<sup>a)</sup>The respondents did not want to obtain a higher degree. <sup>b)</sup>The respondents wanted to obtain a junior college degree. <sup>c)</sup>The respondents wanted to obtain a bachelor's degree. \*P-value < 0.05. \*\*P-value < 0.01. \*\*\*P-value < 0.001.

### Needs in continuing medical education programs

Out of the 706 working medical professionals who were surveyed, 669 (94.7%) completed the questionnaire. The demographic characteristics of the respondents are summarized in Table 1. Regarding the training format, conference sessions were most frequently used among doctors, whereas nurses and other health professionals mostly relied upon guidance from their senior colleagues. Basic theory, basic skills, and preventive health were the top three content types (Table 2). Almost half of the respondents (47.3%) desired to continue their clinical education by attending higher-level medical institutes. Approximately half of the respondents (51.0%) identified emergency medicine as the most pressing area where CME training is necessary, followed by clinical skills and preventive health. Nurses had a lower interest in basic theory as part of CME. Medical colleges were the most commonly desired location for CME (53.7%), followed by city hospitals and county hospitals. The respondent's current working hospital

was the least desired location for CME (Table 3).

The demographic data and factors related to the desire for different levels of degree study were analyzed. These factors were gender, age, current education level, profession, the perceived benefit of degree study for the licensure examination, and the perceived minimum degree required to work in THCs. Ninety-seven respondents with a secondary technical school education (68.8%) and 222 respondents with a junior college education (70.0%) intended to attain a higher level of education by completing junior college or a bachelor's degree program, respectively (Table 4).

The factors associated with having an interest in attending junior college included gender and age. Females were 2.7 times more likely to desire a junior college education, and respondents aged less than 45 years were 6.4 times more likely to do so. The factors associated with an interest in pursuing a bachelor's degree included age, the perceived benefit of degree study for the licensure exam, and the perceived minimum de-

**Table 5.** Association between demographic factors and interest in further degree study

Variable	Explanation of variable	Model 1 <sup>a)</sup>		Model 2 <sup>a)</sup>	
		AOR (95% CI)	P (LR-test)	AOR (95% CI)	P (LR-test)
Gender	Male	1.00 (reference)	0.039	1.00 (reference)	0.624
	Female	2.73 (1.05–7.12)		1.22 (0.55–2.73)	
Age (yr)	≥ 45	1.00 (reference)	0.002	1.00 (reference)	< 0.001
	< 45	6.4 (1.87–21.93)**		7.19 (2.51–20.55)***	
Current education level	Senior secondary school and below	1.00 (reference)	0.06	1.00 (reference)	0.474
	Secondary technical school	0.49 (0.04–5.57)*		0.49 (0.05–5.12)	
	Junior college	0.13 (0.01–1.56)		0.76 (0.07–7.84)	
Profession	Doctor	1.00 (reference)	0.375	1.00 (reference)	0.786
	Nurse	1.99 (0.72–5.55)		1.72 (0.70–4.23)	
	Other health profession	1.65 (0.62–4.38)		2.09 (0.85–5.15)	
Perceived benefit for the licensure exam	No	1.00 (reference)	0.122	1.00 (reference)	0.027
	Yes	1.32 (0.45–3.82)		2.89 (1.17–7.18)*	
	Neutral	3.27 (0.89–12.01)		4.76 (1.50–15.06)*	
Perceived minimum degree for working in township health centers	Secondary school	1.00 (reference)	0.718	1.00 (reference)	0.054
	Junior college	1.4 (0.59–3.32)		1.75 (0.86–3.57)	
	Bachelor's	1.00 (0.191–5.23)		0.32 (0.08–1.26)	

AOR, adjusted odds ratio; CI, confidence interval; LR, likelihood ratio.

<sup>a)</sup>Model 1, interest in junior college versus no demand; model 2, interest in bachelor's degree versus no demand. \*P-value < 0.05. \*\*P-value < 0.01. \*\*\*P-value < 0.001.

gree necessary to work in a THC. Respondents aged below 45 years were 7.2 times more likely to desire a bachelor's degree than those aged 45 years or more. Those with a positive or neutral attitude about the benefit of degree study for the licensure examination were 2.9 and 4.8 times more likely to desire a bachelor's degree, respectively (Table 5).

## DISCUSSION

The fact that most of the health workers were young and had attained a low level of professional education has two implications. First, if these workers do not improve their professional education, they will work in the same capacity for decades. This would hinder the development of healthcare among the rural population, making it difficult to reduce rural/urban health inequalities. However, since these workers were young, investing in appropriate CME would have a long-term return in terms of improved health services. The finding that the content of the current CME system focused on general health management, whereas the majority of health professionals felt that they needed more clinical competency, was an example of unmet needs in the current CME system. The health personnel in THCs showed a similar demand for further training in emergency medicine as the rural health personnel profiled in a Canadian study [4]. The need for improvement in this domain must exist at a global level [5]. However, with rapid development and the epidemiological transition, the need to train health personnel in the management of chronic diseases also cannot be overemphasized [6].

Young rural health professionals were more interested in pursuing formal training than their senior peers. Further education, leading to higher degrees, may lead to more opportunities for these workers to climb the career ladder, meaning that the community will benefit from the ability of the young health leadership to provide better services [7]. Degree-linked CME programs should therefore have priority in public investment.

A qualitative review indicated a problematic level of complacency in current CME. As mentioned, in rural China, human resource training has been operating in the same fashion since the 1980s. Rural training institutes need to be strengthened. The fact that medical colleges in large cities currently play a relatively small role in rural development indicates a need for all of these institutes to engage in a greater degree of collaboration in order to solve the problem of human resource shortages among rural health workers in China. The findings in this study have implications for policy makers by indicating the necessity of developing degree-linked CME programs to meet the need for young health professionals in Chinese THCs. A further stakeholder analysis of the preparedness of education providers, including medical universities, county or city hospitals, and health departments would clarify the feasibility of CME degree programs.

In conclusion, priority should be given to CME degree programs to improve the performance of health professionals in THCs in China. More collaboration between medical education programs in city-based medical universities and rural institutions is needed to implement CME degree programs suit-

able for health professionals in THCs.

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### CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

### SUPPLEMENTARY MATERIAL

Audio recording of abstract.

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