



# Pharmacy workforce in Myanmar public sector

Lwin Nyein Aye<sup>1,2</sup>, Puree Anantachoti<sup>1</sup>

<sup>1</sup>Graduate Program in Social and Administrative Pharmacy, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Patumwan, Bangkok 10330, Thailand, <sup>2</sup>Department of Food and Drug Administration, Medical Device Control Division, Myanmar

## Corresponding Author:

Puree Anantachoti, Graduate Program in Social and Administrative Pharmacy, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Phayathai Rd., Patumwan, Bangkok 10330, Thailand.  
E-mail: puree.a@pharm.chula.ac.th

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## ABSTRACT

**Objective:** Pharmacist shortage in Myanmar was recognized, but previous local study was unavailable. This study aimed to analyze Myanmar's pharmacist workforce situation focusing on public sector. **Materials and Methods:** Mixed method combining secondary data analysis and face-to-face interview was used. The government human resources registry databases were used as data sources. The pharmacist density, the pharmacist distributions in public-private sector, across geographic region, and across settings were analyzed. In-depth interview was conducted to explore current and future roles and responsibilities of pharmacists in public setting. **Results:** The findings showed that pharmacist density was 0.73 per 10,000 population. This ratio was 7 times lower than the International Pharmaceutical Federation 2015–2017 survey. Pharmacists were clustered in big states: Mandalay, Yangon, and Naypyitaw. Only 15% of pharmacists worked in the public sector. Skill shortage was predominantly found in hospital rather than other settings. Hospital pharmacists focused on procurement and inventory management, but rarely performed clinical functions. **Conclusions:** The numerical, distribution, and skill shortages of pharmacist workforce were identified in the public sector. To further expand pharmacist function, the government must prepare to increase the number of pharmacists and empower them to perform necessary omitted functions. Pharmacist workforce utilizing supply-based approach is needed for human resource planning.

**Keywords:** Human resource planning, Myanmar, Pharmacist shortage, Pharmacist workforce, Public sector

## INTRODUCTION

The World Health Organization (WHO) revealed that there were health workforce shortages among 57 countries worldwide. The shortage was as much as 4.3 million in 2006 and 7.2 million in 2012. The WHO forecasted that the situation would be aggravated and estimated that the shortage was as high as 12.9 million in 2035.<sup>[1]</sup> Inadequacy of health workers restricts the nations to improve maternity and child health or to combat with HIV/AIDs, malaria, and other diseases.<sup>[2,3]</sup>

There are three common types of health workforce crisis; (i) numerical shortage, (ii) skills shortage, and (iii) distributional shortage.<sup>[3,4]</sup> In health-care system context, numerical shortage refers to the inadequate numbers of health workers to deliver health-care services. Numerical shortage was commonly observed among low-income countries. Skill shortage stands for a situation where existing personnel lack of particular required skills or has inadequate qualified

trainers and has insufficient training facilities.<sup>[4]</sup> Distribution shortage implies unequal distribution of health workers across geographic regions, public-private sectors, or settings.<sup>[5]</sup>

Myanmar, located in South-East Asia, had approximately 54.4 million population in 2019.<sup>[6]</sup> The country comprised seven regions, seven states, and one Union Territory. Myanmar has 1134 public and 193 private hospitals, 3911 private general clinics, 201 private specialist clinics, and 776 private dental clinics.<sup>[7]</sup> Myanmar has two public and eight private pharmaceutical manufacturers. Myanmar has four Medical Universities, two Pharmacy Universities, two Dental Medicines Universities, and two Nursing Universities.<sup>[8]</sup>

Myanmar was among the 57 countries identified by the WHO as suffering with health workforce crisis.<sup>[1]</sup> In 2017, health service providers density was reported 1.79 per 1000 population.<sup>[9]</sup> A study conducted in 2016 found doctors and nurses' shortage in 13 out of 15 states and regions. Urban and rural disparities were also observed.<sup>[7]</sup> Dentists and

pharmacists were under-produced in comparison with doctors and nurses.

In Myanmar, there are two Pharmacy Universities, University of Pharmacy (Yangon) which was established in 1992, and University of Pharmacy (Mandalay) which was established in 2000.<sup>[10,11]</sup> Until 2018, the cumulative numbers of pharmacists graduated from the two Universities were 3778.<sup>[10,11]</sup> An average class size of each university is 130 students per year. Although there are health-care personnel licensing systems, they are limited only for physician, dentist, nurse, and traditional medicine practitioner.<sup>[12]</sup> Myanmar Pharmaceutical Association proposed the law which defined licensing requirements to register pharmacists; however, this law is not yet implemented.

Internationally, pharmacists play key roles across drug product life cycles ranging from drug discovery and development, clinical research, production, quality control, regulatory process, drug dispensing, and patient outcome monitoring. Although they are the third largest group among the healthcare professionals, pharmacist shortages are recognized in many countries.<sup>[13]</sup> Poor distribution of the pharmacy workforce results in poor drug access, counterfeit and sub-standard medicines, medication errors, and medication misuse and abuse.<sup>[14]</sup>

Although it was recognized that pharmacists are an important workforce in health-care system, there was no previous study focusing on current pharmacist workforce situations in Myanmar. It was expected that the shortage situation in the country was even worse in public sector. This study, therefore, aimed to analyze the current situation of pharmacists' workforce, especially in the public sector in Myanmar.

## MATERIALS AND METHODS

To assess current pharmacist workforce in Myanmar's public sector, a mixed method using both secondary data analysis and semi-structured face-to-face interviews was performed. The method was separately described according to each study design.

### Secondary Data Analysis

To capture current Myanmar pharmacist workforce situation in public sector, human resource registry database from Ministry of Health and Sports, Government Pharmaceutical Industries, and Ministry of Home Affairs was used. All data were updated as of April 30, 2019. These databases were officially approved for use in this research study.

Key variables, including type of organization, workplace location, type of work, vacant position, and occupied position, were extracted from human resource registry databases for data analysis. Primary outcomes reflecting numerical and distributional shortage composed of:

- Pharmacist per 10,000 population
- % Pharmacist workforce in public sector: % Pharmacist workforce in private sector
- Geographic distribution of pharmacists in public sector
- Pharmacist work setting distribution
- Pharmacist vacancy rate in each public setting.

## Semi-structured Face-to-Face Interviews

Semi-structured face-to-face interviews were conducted during February–June 2019. Seven government settings (public hospitals, Department of Food and Drug Administration, Universities of Pharmacy, Department of Medical Research, Department of Traditional Medicines, the Pharmaceutical Industry, and the Chemical Examiners' Office) were included in the study. For each setting, non-proportional stratified sampling was used. The study planned to select at least six settings from each stratum.<sup>[15]</sup> For each selected setting, two key informants were included in the study. The first key informant was the head of the organization such as hospital director, medical superintendent, rector, manager, and/or human resource management officer. The second key informant was the pharmacist officer currently in-charge of the work setting. Telephone interview was performed for remote settings. The interview ended when answers for each stratum were saturated.

Semi-structure questionnaire was used to collect data from key informants. The questionnaire composed of the following questions:

- What are the roles and responsibilities of pharmacists in your setting?
- Is there any pharmacist function currently delegating to other staff or health workers?
- Is there any pharmacist function which your setting plan to initiate in the future?

Collected information from all key informants was re-checked with audio-record for accuracy. Data were transcribed verbatim. Content analysis was performed. Pharmacists' roles and responsibilities were extracted and grouped by type of settings.

## Ethical Consideration

This study was reviewed and approved by the Institutional Review Board of University of Public Health, Ministry of Health and Sports, Myanmar. The IRB approval number was UPH-IRB (2019/Research/5).

## RESULTS

The results were divided into three parts to describe the pharmacist workforce in terms of the numbers, the distribution, and the skill of pharmacists.

### Whether Myanmar has Adequate Number of Pharmacists

To answer whether Myanmar has adequate number of pharmacists, pharmacist per 10,000 population was depicted. The data from the two Universities of Pharmacy showed that the cumulative pharmacy graduates up until April 2019 was 3965. Based on the Department of Population, Ministry of Labor, Immigration, and Population, the estimated number of population in 2019 was 54.34 million.<sup>[6]</sup> With these numbers, the pharmacist per 10,000 population was calculated.

For the best-case scenario (100% pharmacy graduates work as pharmacist), the pharmacist/10,000 population was 0.73. According to the median pharmacist density reported

in Pharmacy at a Glance 2015–2017 by International Pharmaceutical Federation (FIP), the median pharmacist density per 10,000 population was 5.09.<sup>[16]</sup> Myanmar was 6.97 times experiencing pharmacy shortage comparing to 74 studied countries.<sup>[16]</sup> However, compared to other low-income countries which the median pharmacist density was 0.6 per 10,000, Myanmar situation was comparable.<sup>[16]</sup>

Sensitivity analysis was conducted by varying percentage of pharmacy graduates remaining in pharmacy profession. The result is displayed in Table 1.

## How Pharmacists were Distributed in Myanmar?

Pharmacist distribution was illustrated through three outcomes: (i) Public versus private distribution, (ii) geographic distribution, and (iii) pharmacist work setting distribution.

### *Distribution of pharmacists in the public and private sectors*

One of the indicators assessing the pharmacist distribution is the ratio of pharmacists in public and private sectors. From the government registry database, there were 605 pharmacists working in public settings. If all pharmacy graduates (3,965) were in pharmacy workforce, those working in private sectors were 3,360 (=3,965–605). The ratio of pharmacists working in public to private sector would be 15.26%: 84.74% (605: 3,360).

If 80% of pharmacy graduates were in pharmacy workforce, a total pharmacist would be 3172 (=3965 × 0.8). Given the number of public pharmacists was 605, the ratio of pharmacists working in public to private sector would be 19.08%:80.92% (605: 3,127). Pharmacists in private sector were at least 4 times outweighed their public sector counterparts.

### *Geographic distribution of pharmacists in public sector*

The geographic distribution of pharmacists was analyzed using the data from the government registry database. The state or region with highest pharmacist density was Naypyitaw Union Territory (0.85 pharmacist/10,000 population), followed by Mandalay (0.24 pharmacist/10,000 population) and Yangon (0.21 pharmacist/10,000 population). Rakhine State was reported having the lowest pharmacist density (0.02 pharmacists per 10,000 population). Detailed information regarding pharmacist distribution by geography is showed in Table 2.

### *Distribution of pharmacists across settings*

The distribution of pharmacists across settings was measured as percentage of pharmacists in each setting and the vacancy

rate across settings. Among 605 pharmacists in public sectors, most of them work in hospital settings (48%), followed by FDA (27%) and university (17%), respectively. Table 3 illustrated the percentage of pharmacists across different settings.

When the vacant positions across seven settings were compared, it was found that FDA had the highest vacancy rate (57.6%), followed by the university (41.3%) and the hospital (33.1%).

Vacancy rate of four other organizations; Department of Medical Research, Department of Traditional Medicine, the Pharmaceutical Industry and chemical examiner's office, could not be reported. This is because these positions were open not only for pharmacist but also for other biomedical sciences personnel such as medical doctors and scientists. The numbers of pharmacists in each setting are shown in Table 4.

## Current and Future Pharmacist Roles and Responsibilities

In-depth interview was conducted across seven public settings to disclose current roles and responsibilities of

**Table 2:** Distribution of pharmacists by geographical location

Name of region and state	Pharmacist per 10,000 population
Naypyitaw Union Territory	0.8518
Mandalay Region	0.2443
Yangon Region	0.2134
Kayah State	0.0927
Kachin State	0.0843
Chin State	0.0770
Sagaing Region	0.0539
Magway Region	0.0483
Tanintharyi Region	0.0471
Mon State	0.0452
Kayin State	0.0435
Bago Region	0.0425
Shan State	0.0313
Ayeyarwady Region	0.0271
Rakhine State	0.0210

**Table 3:** Distribution of pharmacists across settings

Name of setting	Number of pharmacists	Percentage of pharmacists
Hospital	289	48
Department of Food and Drug Administration	165	27
University of Pharmacy	104	17
Department of Medical Research	7	1.20
Department of Traditional medicine	4	0.70
Pharmaceutical Industry	28	5
Chemical examiner's office	8	1

**Table 1:** Density of pharmacist per 10,000 populations

Scenario	No. of pharmacist	Pharmacist/ 10,000 population
100% pharmacy graduates are in pharmacist workforce	3965	0.73
90% pharmacy graduates are in pharmacist workforce	3,569	0.66
80% pharmacy graduates are in pharmacist workforce	3,172	0.58
70% pharmacy graduates are in pharmacist workforce	2,776	0.51

pharmacists, their working environments, and the expansion of pharmacists' role and responsibility in the next 5 years. A total of 46 government settings were selected in this study (Table 5 for more detail). Nineteen head of organizations and 81 pharmacists from these settings were interviewed.

Among all settings, excluding hospital, pharmacists' roles and responsibilities were broad and covered most standard pharmacists' functions. When asked about future functions, these six settings mentioned about improve work efficiency such as implementing electronic submission for cosmetics products and strengthening health product vigilance activity (mentioned by FDA). On the contrary, hospital pharmacists' roles and responsibilities were very limited.

**Table 4:** Pharmacist vacancy rate across different settings

Settings	# workforce frame	# filled position	Vacancy rate
Hospital	432	289	33.1%
Department of Food and Drug Administration	380	161	57.6%
University of Pharmacy	184	108	41.3%
Department of Medical Research	N/A	7	N/A
Department of Traditional Medicine	N/A	4	N/A
Pharmaceutical Industry	N/A	28	N/A
Chemical Examiner's office	N/A	8	N/A

**Table 5:** Number of public settings included for face-to-face interview

Setting	Number of setting interviewed/total	
Hospitals <sup>†</sup>	Specialized	General
XL (700–2000 bed)	2/3	3/4
L (500–699 bed)	3/10	2/13
M (200–499 bed)	4/8	4/33
S (100–199 bed)	3/7	4/42
XS (50 bed)	0/4	3/115
Department of Food and Drug Administration <sup>†</sup>	5/45	
University of Pharmacy <sup>†</sup> (Yangon, Mandalay)	2/2	
Department of Medical Research <sup>†</sup> (Yangon, Pyin Oo Lwin)	2/2	
Department of Traditional Medicine <sup>†</sup>	1/1	
Pharmaceutical Industries <sup>‡</sup>		
R&D	2/3	
QA	2/3	
QC	2/3	
Production	2/3	
Procurement	1/1	
Chemical examiner's office <sup>§</sup>	1/3	

<sup>†</sup>Ministry of Health and Sports, <sup>‡</sup>Ministry of Industry, <sup>§</sup>Ministry of Home Affairs

The findings revealed that the majority of hospital pharmacists were mainly responsible for procurement and inventory management [Table 6]. Hospital pharmacists unanimously expressed that they would like to see all hospitals perform OPD dispensing service. They think that IPD dispensing and effective management of sub-stock were the tasks that should be initiated in the near future. Moreover, the key informants perceived that hospital pharmacists should cover clinical pharmacist functions such as the drug information service, drug therapeutic monitoring, adverse drug reaction management, medication reconciliation evaluation, and counseling for specific patient groups. Examples of key informants' expression were elaborated:

KI#5-hospital administrator: "I hope there are clinical pharmacists in my hospital in the coming year. In other countries, pharmacists provide pharmaceutical care after doctors prescribe medicines to patients. I wish pharmacists in public hospital expand their role to provide more clinical service shoulder to shoulder with doctors in caring patients. In this case, hospitals would need more pharmacists to perform clinical pharmacy functions."

KI#2-hospital administrator: "Current job description of hospital pharmacist is procurement management. As a hospital administrator, I wish pharmacist could provide clinical role in both out-patient and in-patient settings. The Ministry of Health and Sports policy does not include broader clinical pharmacist job function in hospital pharmacist job description. Other health professionals do not know what other function pharmacist can perform."

KI#4-pharmacist: "As a hospital pharmacist, I'd like to take care of patient's drug related problem. Providing pharmaceutical care is the profession's mission. If hospital had more pharmacist manpower, pharmaceutical care function could be established."

Key informants from hospital settings further revealed that many factors, such as limited number of pharmacists, limited drugs and medical supplies budget, partial computerized equipped system, and inadequate skills to perform clinical work, prevented hospital pharmacists to perform other clinical functions. Examples expression of some key informants was revealed.

KI#7-pharmacist: "Almost 100% of hospital pharmacist focuses on procurement function. We would be happy to perform clinical functions if we have enough pharmacists."

KI#18-pharmacist: "updated knowledge and skills are needed to ensure that pharmacists effectively perform clinical pharmacy functions in hospitals."

KI#6-hospital administrator: "Pharmacist manpower right now is not a problem as they manage procurement on the scarce annual budget. However, if the budget is not a problem, hospital might need more pharmacist and IT system to effectively manage the procurement. Definitely, if pharmacist performs their expected role, for example, clinical pharmacist, more pharmacist manpower is needed."

KI#2-hospital administrator: "In most hospitals, the procurement was manually operated. Computerized system should be considered to free some pharmacists from routine procurement function and allow them to take care of patients. Part of the preparedness to successfully expand clinical pharmacist role are adequate pharmacist manpower, skill training, and IT facilities."



**Table 6:** Current, future pharmacists' role and responsibility across seven settings

Settings	Current roles and responsibilities	Expected roles and responsibilities
Hospital	<ul style="list-style-type: none"> <li>• Procurement</li> <li>• Inventory management</li> <li>• OPD dispensing (Fifteen out of 28 interviewed hospitals [53.6%] performed OPD dispensing function.)</li> </ul>	<ul style="list-style-type: none"> <li>• OPD dispensing (for all hospitals)</li> <li>• IPD dispensing</li> <li>• Electronic central and ward inventory linkage</li> </ul>
Department of Food and Drug Administration	<ul style="list-style-type: none"> <li>• Pre-marketing control activities for</li> <li>• Health products</li> <li>• Post-marketing control activities</li> <li>• For health products</li> <li>• Consumer education</li> <li>• Quality control testing activities</li> </ul>	<ul style="list-style-type: none"> <li>• Electronic submission for cosmetics products</li> <li>• Strengthen health product vigilance activity</li> <li>• To sample and test the quality of health products in the market</li> <li>• To increase the coverage of quality testing items of drug products</li> </ul>
University of Pharmacy	<ul style="list-style-type: none"> <li>• Teaching</li> <li>• Academic services</li> <li>• Research</li> <li>• Administrative work</li> </ul>	<ul style="list-style-type: none"> <li>• Include specialty area</li> <li>• Pharmaceutical management, pharmaco-economics, and health and drug policy</li> <li>• Clinical pharmacy</li> <li>• Increasing both number and quality of research</li> <li>• Curriculum review and improvement</li> <li>• Drug Information Center</li> </ul>
Department of Medical Research	<ul style="list-style-type: none"> <li>• Quality control of vaccine</li> <li>• Pharmacology and biochemistry research</li> <li>• Perform acute and sub-acute toxicity</li> </ul>	<ul style="list-style-type: none"> <li>• Pharmacokinetic and Pharmacodynamic study in Yangon branch</li> <li>• Public health research</li> </ul>
Department of Traditional Medicine	<ul style="list-style-type: none"> <li>• Market approval</li> <li>• Quality testing</li> </ul>	<ul style="list-style-type: none"> <li>• Production plants (production, QC, QA)</li> </ul>
Pharmaceutical Industry	<ul style="list-style-type: none"> <li>• Research and development</li> <li>• Demand planning</li> <li>• Procurement of raw materials and excipients</li> <li>• Quality control</li> <li>• Bioequivalence for some generic drugs</li> <li>• Production</li> <li>• Quality assurance</li> </ul>	<ul style="list-style-type: none"> <li>• New drug products (new generic drugs with new active ingredient)</li> <li>• New dosage forms</li> <li>• Bioequivalence for all generic drugs</li> </ul>
Chemical examiner's office	<ul style="list-style-type: none"> <li>• Analysis of the narcotic drugs, psychotic substances and their precursors</li> <li>• Measure quality of alcohol and presence of methanol</li> <li>• Identification of counterfeit products</li> <li>• Analysis of samples from the human body parts for the presence of narcotic drugs, psychotropic and toxic substances, alcohol, spermatozoa and seminal fluid</li> </ul>	<ul style="list-style-type: none"> <li>• To build up the quality control result database for further production tracing</li> </ul>

From the interview, it was found that pharmacists delegated some of their responsibilities to other non-pharmacist staffs. Some hospitals delegated out-patient drug dispensing to pharmacy assistants, while some hospitals delegated in-patient drug dispensing to nurses. Double checking of prescribed drug for drug interaction or possible ADR may be omitted when drugs were handed to patient by non-pharmacists.

## DISCUSSION

This was the first local study assessing pharmacist workforce situation in Myanmar. The study focused mainly on public sector as human resource database for pharmacist was available. The findings ascertained that Myanmar severely

suffered pharmacist shortage. In the FIP 2017 survey, the median density of pharmacist per 10,000 population was 5.09 among 74 countries and territories; however, the density was 0.6 pharmacists per 10,000 population among low-income countries. Estimated Myanmar's pharmacist density (0.51–0.73 pharmacists per 10,000 population) conformed with the FIP 2017 findings and was 4 times lower than the South-East Asia countries.<sup>[16]</sup> Numerical shortage led to other kinds of shortage problems, namely, distribution and skills shortage. To solve the shortage problem, root causes analysis should be conducted.

Several possible factors might affect pharmacist shortage in Myanmar. Inadequate number of pharmacy graduates

was suspected the main cause of shortage. Myanmar had two pharmacy universities which produced about 200–260 pharmacists annually. Comparing to neighboring countries, Cambodia had three pharmacy schools producing 280 pharmacy graduates annually, while Vietnam had 26 pharmacy schools producing approximately 4300 pharmacy graduates annually.<sup>[17,18]</sup> Increasing numbers of pharmacy graduates are highly recommended.

Uneven distribution of pharmacists across public-private sector, across state-regions, and across settings was conformed to the previous systematic review findings.<sup>[19]</sup> Each year, the government announces publicly to recruit pharmacist for hundreds of vacant positions, those positions were rarely filled. Many common explanations were “relatively low compensation,” “unattractive fringe benefits,” and “slow career advancement.” When demand overly outweighed supply, pharmacy graduates were free to choose the better paid jobs. The situation will be even worse if there is no strategic for pharmacist human resource management.

Lack of current situation of pharmacist workforce can be seen as another cause of pharmacist shortage. Although the government realized about pharmacist shortage problem, without solid information, the magnitude and the consequence of the problem might be diluted, and the problem was put aside. Routine monitoring and strategic human resource planning for pharmacists should be considered a priority for policy makers.

In Myanmar, skill shortage was observed in many settings, but was obviously noticed among hospitals. The scope of responsibility of hospital pharmacist in Myanmar was very limited. Most hospital pharmacists concentrated in procurement function, while delegated dispensing functions to compounders and nurses. The situation was similar to the finding in eastern Indonesia where half of public health centers did not have pharmacist on duty.<sup>[20]</sup> Although most hospital pharmacists participated in this study agreed that their roles and responsibilities should be expanded, multiple barriers, including limited budget, lack of standard job definition, lack of knowledge, and training might limit them from initiating those clinical tasks. As of 2018, the Master program in clinical pharmacy was initiated in two universities of pharmacy. It was expected that the first batch of clinical pharmacists graduating from these programs would start to fill the health-care system from 2021.

Our rough estimate of pharmacist density showed that both public and private sector face pharmacist shortage situation. This study explored only public sector. There is a need to conduct a study covering private sector to estimate the magnitude of pharmacist shortage and specify, in which area is short.

As of now, Myanmar does not have a Pharmacy Council. A pharmacy licensing system: Pharmacy licensing examination, pharmacy continuing education, and re-licensing, was not yet implemented. If the pharmacy council is settled, pharmacist database would be available.

This study mainly used supply-based approach to estimate current pharmacy workforce. Further study using demand-based approach or service target-based model should be conducted.

## CONCLUSIONS

The numerical, distribution, and skill pharmacist shortages were identified. There is a strong need for human resource planning to increase the number of pharmacy graduates into the system, especially in the public sectors. Further, modeling study is required to propose strategic policy to solve the problem.

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## CONFLICTS OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

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