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Competency and factor associated with recruitment of community public health professional personnel in public health organization in Thailand

Krittiyanee Thammasarn[1], Wongsa Laohasiriwong[2*] Paisan Bangchuad[3], Tasanee Boukam[3], Anak Timtub[3], Sauyba Hawhere[3], Mana Paotui[3]

[1]Lecturer, Faculty of Public Health, Khon Kaen University, Khon Kaen
[2]Professor, Faculty of Public Health, Khon Kaen University, Khon Kaen
[3]Council of Community Public Health, Muang, Nontaburi

*Corresponding author: Prof. Dr. Wongsa Laohasiriwong, Email: drwongsa@gmail.com

ABSTRACT

Background: The development of health manpower is an important issue for the aim of the population to receive health services with quality, efficiency, and equity. Thus, it is necessary to have a plan to create public health academics who are capable in applying academic knowledge and managing tasks that are assigned to them effectively in planning, evaluation, and research development to be consistent with the changing situations at present.

Objectives: This cross-sectional study was aimed to describe the situation, distribution, job characteristics, competency and identify factors associated with recruitment in public health organization of community public health professional in Thailand.

Method: A total of 2,085 community public health professional staff were selected by multi-stage random sampling method to response the self-administered structured questionnaire. Multivariable analysis was performed to identify the factors associated with recruitment in public health organization among community public health professional in Thailand.

Results: The results indicated that among 2,085 community public health professionals, factors associated with recruitment in public health organizations were; Bachelor of Public Health graduates (AOR=4.81, 95% CI: 2.99-7.76; P-value < 0.001), Bachelor of Science (Public Health) graduates (AOR=3.46, 95% CI: 2.06 – 5.84; P-value < 0.001), working in community hospital (AOR=1.99, 95% CI: 1.43 - 2.75; P-value < 0.001), work characteristics were corresponds with their degrees (AOR=1.67, 95% CI: 1.12 - 2.47; P-value < 0.001), graduated from public health college (AOR=5.27, 95% CI: 3.42 - 8.13; P-value < 0.001), graduated from public university (AOR=3.71, 95% CI: 2.41 - 5.72; P-value < 0.001), graduated from Rajabhat University (AOR=1.37, 95% CI: 1.00 - 2.02; P-value < 0.001), organization had position (AOR=2.49, 95% CI: 2.05 - 3.04; P-value < 0.001), organization employed correspondent with the graduated field (AOR=1.89, 95% CI: 1.17 - 3.04; P-value < 0.001) and employed close to the graduated field (AOR=2.21, 95% CI: 1.43 - 3.40; P-value < 0.001) respectively.

Conclusion: Community public health professional personnel suggested that their professional development should be supported by promoting to a higher position with the same position code.

Keywords: Competency, Community public health professional, public health organization

1. Introduction

In the past, Thailand had experienced rapid changes in all aspects as a result of consistent development that aimed for the nation to get rid of poverty and raise the standard of living. As a result, the country has prospered economically in continuation. Subsequently, the global economic recession has influenced the development of the country and a change of direction of the world [1]. Advancements in technology has made a major impact to Thai societies including the changes of health problems such as chronic diseases, accidents and the recurrence of emerging diseases [2]. Parallel to the structural changes of the population becoming an elderly society, there is an importance in health and public health service systems to solve problems and create health with the process of health promotion, disease prevention, treatment and rehabilitation to maintain the health of the population based on the foundation of self-reliance [3-20] For this reason, the public health service system not only provide services but also provide readiness for population self-care by relying on the public health manpower that have specialized knowledge and skills in the profession [13, 18, 21, 22].

The development of health manpower is an important issue for the aim of the population to receive health services with quality, efficiency and equity [6, 23]. The goal to achieve the desired health system is a hope that must be achieved together in order to be successful in the near future [12, 18, 24]. The development that will lead to the desired health system requires sufficient and qualified health manpower [16, 25]. Simultaneously, the development of potential health services to be capable of solving problems and improving the health of the population to have better health conditions, the Ministry of Public Health, therefore, has developed standards for service providers especially in the determination to have public health academic positions. These positions are groups that are in the line of work that has the characteristics of vocational career path or in the line with specific depths of the profession [1, 2, 26]. The practitioner must have specialized knowledge, has received training at a bachelor's degree level or higher and has experience in working in that specialized area or in the nature of the work that the practitioner has been trained especially with the proper capabilities [15]. This includes other characteristics that enabling the individual to create outstanding results compared to their colleagues in the organization [3, 16].

Thus, it is necessary to have a plan to create public health academics who are capable in applying academic knowledge and managing tasks that are assigned to them effectively in

planning, evaluation, and research development to be consistent with the changing situations at present [21]. In the past, most of the public health manpower planning were research projects and were vocational studies that had different purposes, e.g., a database for the preparation in the production of manpower to set measures to solve the problem of manpower shortages [27]. Therefore, this present study aimed to explain the situation of manpower in the community public healthcare professional groups in Thailand as well as the competency of the community public health profession and various factors related with desire to work in public health. The information is to be used to determine the guidelines for development or to determine the competence of public health academics. The information is also supposed to be used to produce community public health professions sufficiently and appropriate to be consistent with the services provided with standards, quality, and efficiency.

2. Methods

This was a cross-sectional study conducted with primary data about capability, work experience, performance, characteristics and selecting the work in the public health department. This study was conducted by interviewing community health professionals including those having graduated but not working and those who had already worked in all sectors including government agencies including Ministry, Department, Unit, Division, Hospital Centers, General Hospitals, Tambon Health Promoting Hospitals, local government agencies which are municipalities, agencies under the municipalities, Provincial Administrative Organizations (PAOs) and private sectors which are hospitals, factories, service places and service centers.

The sample size was determined by using a formula to calculate the sample size for the case of estimating the proportion by using a sample formula for the correlation with the binomial (0, 1) distribution of dependent variables. The correlation was analyzed for multiple variables (Multivariable analysis) (Hsieh et al., 1998). An adjusted sample size of 2085 individuals were obtained, and a multi-stage random sampling was performed. The study population was divided into 13 health service areas then the provinces were drawn according to the health service areas to obtain the number of provinces in proportion to the personnel of each province. Random sampling of the list of community health professionals was completed by using a table of random numbers according to the calculated sample.

2.1 Research instruments

A structured questionnaire was applied to conduct face to face interview among the study participants. The questionnaires covered the main issues which includes general information about the community health professional manpower and the number of personnel in the department, roles and responsibilities, performance in each activity, health promotion, disease prevention and rehabilitation services of community health professionals. The questionnaires were developed from the literature review and synthetic review approach from the conceptual framework in the previous topics from five domains including; (1) epidemiology and surveillance; (2) health promotion and control; (3) public health administration and health system; (4) disease diagnoses and basic treatment; (5) biostatistics and public health research. The questionnaire was tested for content validity by five experts and also tested for reliability with the Cronbach's alpha coefficient equal to 0.87.

2.2 Data analysis

Data analysis was performed using STATA version10 Texas USA 2007 (copyright of Khon Kaen University). Means, standard deviations, and percentages were calculated for continuous and categorical data respectively. An association between factor and recruitment of community public health professional personnel in public health organization were examined by simple logistic regression analysis in which crude odds ratio values (Crude OR or OR crude) and 95%Cl of Crude OR were included. Then, Multivariable analysis was performed. The Multivariable analysis shows Adjusted OR (AOR) and 95%Cl with a statistical relationship level at $p < 0.05$.

2.3 Ethical Clearance

For this study, the researcher has applied for ethical consideration for human research and has been approved by the Human Research Ethics Committee, Khon Kaen University No. HE632277 on 29 December 2020.

3. Results

A total of 2085 group of community health professionals in Thailand were participated in which 54.77% of the respondents were working in the service group, followed by the service support group (20.10%) and other working groups (11.37%). Of the total respondents, 68.20% were females with the average age of 32.48 years. The age group with the highest proportion was the group younger than the age of 30 (47.19%) and were single (57.46%). 69.93% of the respondents had a bachelor's degree in public health as the highest level of education. 82.06% of the

respondents were in regular semester studies having the relevant experience with an average of 7.15 years and 42.88% had the experience in the position of 15 years. The median monthly income was 18,000 baht with mean income 20,606.74 (12,369.55) baht and the lowest were being no income, similarly the highest was 100,000 baht, of which, 31.51% had an average monthly income between 15,000 - 20,000 baht respectively (Table 1).

Table 1. Personal characteristics of community health professionals (n = 2,085)

Personal Characteristics	Number	Percentage (%)
1. Work Group		
Service Group	1,142	54.77
Service Support Group	419	20.10
Management Group	287	13.76
Others	237	11.37
2. Sex		
Female	1,422	68.20
Make	663	31.80
3. Age (Years)		
< 30	984	47.19
3039	717	34.39
4049	232	11.13
≥ 50	152	7.29
Mean (Standard Deviation)	32.48 (8.73)	
Median (Minimum Maximum)	30 (22-60)	
4. Marital Status		
Single	1,198	57.46
Married	795	38.13
Widowed/Divorced	83	3.98
Separated	9	0.43
5. Highest Level of Education		
Diploma	43	2.06
Bachelor's Degree	1,805	86.57
Postgraduate	237	11.37
6. Graduated Field of Study		
B. Sc. (ONEP and Occupational Health)	198	9.50
B.P.H. (Continuous)	113	5.42
B.Sc. (Public Health)	316	15.16
B.P.H. (Community Public Health)	1,458	69.93
7. Education System		
Regular Semester	1,711	82.06
Special Study Semester	374	17.94
8. Experience in Position (Years)		
Does not work	36	1.73
< 1	207	9.92
1-5	894	42.88
6-10	482	23.12
11-20	343	16.45
≥ 20	123	5.90
Mean (Standard Deviation)	7.15 (7.17)	
Median (Minimum Maximum	5 (<1-51)	

Personal Characteristics	Number	Percentage (%)
9. Monthly Income (Estimated Salary and Other Income and Expenses are not Deducted)		
Does not work	36	1.73
Did not receive salary	118	5.66
≤ 15,000	566	27.15
15,001 – 20,000	657	31.51
20,001 – 30,000	376	18.03
30,001 – 40,000	176	8.44
> 40,000	156	7.48
Mean (Standard Deviation)	20,606.74 (12,369.55)	
Median (Minimum Maximum	18,000 (0 - 100,000)	

Factors Related to Recruitment after Graduation of Community Health Professionals in Thailand

Factors related to the recruitment of community health professionals after graduation were; a completion of the Bachelor of Science Program (Public Health Sciences) with a correlation with employment after graduation of community health professionals by 3.80 times (95% CI: 2.34 – 6.18; P-value <0.001), completion of the Bachelor of Public Health program with employment after graduation of community health professionals by 4.55 times (95% CI: 2.92 – 7.11; P-value <0.001). Compared to the B.Sc. (Environmental and Occupational Health) program, the type of department that was recruited to the sub-district health promoting hospital was 2.14 times more likely (95% CI: 1.50 – 3.06; P-value <0.001) and communities' hospitals by 3.50 times (95% CI: 2.51 – 4.89; P-value <0.001) compared to other departments (hospital centers, public health office, district public health). However, the nature of work that corresponds to the partial field of study was 2.21 times correlated with post-graduate employment among community health professionals (95% CI: 1.56 – 3.13; P-value <0.001). The job description corresponding to the field of study that were related to the employment after graduation of community health professionals by 3.62 times (95% CI: 2.62 – 5.02; P-value <0.001). When compared to graduation not related to the branch, graduates from Rajabhat University had a chance of employment by 1.56 times (95% CI: 1.08 – 2.25; P-value <0.001), graduates from public universities are 3.90 times more likely to be employed (95% CI: 2.61 – 5.84; P-value <0.001), graduates from the College of Public Health were 5.37 times more likely to be employed (95% CI: 3.62 – 7.96; P-value <0.001). Compared to private universities, the department had a correlation rate framework with the employment after the graduation of community public health

professionals by 2.15 times (95% CI: 1.80 - 2.56; P-value <0.001). When comparing to departments that do not have an employment framework that includes the employment department related to the graduate degree had 2.28 times chance to be employed (95% CI: 1.50 – 3.48; P-value <0.01). The department had 3.47 times chance of being employed in accordance with the qualification upon graduation (95% CI: 2.41 – 4.99; P-value <0.001) when compared to employment that does not match the graduation qualification and registration for a license to be a community health professional had 1.52 times correlation with employment after graduation of community health professionals (95% CI: 1.24 – 1.87; P-value <0.001) shown in table 2.

Table 2. Factors Related to Post-Graduation Employment among Community Health Professional in Thailand with Bivariate Analysis (n=2085 individuals).

Factors	No.	% Employment	Crude OR	95%CI	p-value
1. Graduated Field of Study					<0.001
B. Sc. (ONEP and Occupational Health)	113	23.89	1	1	
B.P.H. (Continuous)	198	27.27	1.19	0.70 – 2.04	
B.Sc. (Public Health)	316	54.43	3.80	2.34 – 6.18	
B.P.H. (Community Public Health)	1,458	58.85	4.55	2.92 – 7.11	
2. Type of Department					<0.001
Others (hospital centers, public health office, district public health)	924	44.32	1	1	
District Health Promoting Hospital	921	44.17	2.14	1.50 – 3.06	
Community Hospital	240	11.51	3.50	2.51 – 4.89	
3. The Nature of Work that Relates to the Field of Study					<0.001
Does not relate to the field of study	201	28.86	1	1	
Partially relates / have a relationship	562	47.33	2.21	1.56 – 3.13	
Relates to the field of study	1,322	59.53	3.62	2.62 – 5.02	
4. Department of Graduation					<0.001
Private University	149	32.21	1	1	
Rajabhat University	1,034	42.65	1.56	1.08 – 2.25	
State University	383	65.01	3.90	2.61 – 5.84	
College of Public Health	519	71.87	5.37	3.62 – 7.96	
5. The Department that has Capacity Framework					<0.001
No open framework	1,000	43.50	1	1	
Has framework	1,085	62.30	2.15	1.80 – 2.56	
6. The Employment Department that Meets Qualification of Graduation					<0.001
Is not related	156	27.56	1	1	
Partially related	286	46.50	2.28	1.50 – 3.48	
Related	1,643	56.91	3.47	2.41 – 4.99	

Factors	No.	% Employment	Crude OR	95%CI	p-value
7. Examination for Registration for a License to be a Community Health Practitioner					<0.001
Did not take the exam	547	47.35	1	1	
In the process of taking the exam	471	49.89	1.11	0.87 – 1.42	
Have passed the exam	1,067	57.83	1.52	1.24 – 1.87	

A multivariate correlation analysis done after controlling the influence of other variables found the factors related to the post-graduation recruitment of community health professionals in Thailand, which are ;having completed Bachelor of Public Health program (AOR=4.81, 95% CI: 2.99 – 7.76; P-value <0.001) and Bachelor of Science program (Public Health) (AOR=3.46, 95% CI: 2.06 – 5.84; P-value <0.001) compared to graduates of B.Sc. (ONEP and Occupational Health) working in a community hospital (AOR=1.99, 95% CI: 1.43 - 2.75; P-value <0.001). When comparing to other departments (hospital centers, provincial public health office and district public health), the nature of work that relates to the field of study (AOR=1.67, 95% CI: 1.12 - 2.47; P-value <0.001), graduated from College of Public Health (AOR=5.27, 95% CI: 3.42 - 8.13; P-value <0.001), from state university (AOR=3.71, 95% CI: 2.41 - 5.72; P-value <0.001), graduated from Rajabhat University (AOR=1.37, 95% CI: 1.00 - 2.02; P-value <0.001) compared to graduating from private universities. The department has a capacity rate framework (AOR=2.49, 95% CI: 2.05 - 3.04; P-value <0.001), the employment department closely related to the degree of graduation (AOR=1.89, 95% CI: 1.17 - 3.04; P-value <0.001) and the employment department that meets the qualifications of graduation (AOR=2.21, 95% CI: 1.43 - 3.40; P-value <0.001) as detailed in Table 3.

4. Discussion

From the results of the study, the guidelines for producing the country's community health professional workforce needs to focus on the appropriate production in terms of quantity and quality. When it is distributed to all types of departments at all levels, there will be equity in the accessibility of quality health services as needed by the population [1, 4] However, it cannot solely focus on solving problems quantitatively by simply adding personnel to the system [12, 30] but it is necessary to focus on solving the misdistribution of human resources to achieve coverage of community health professionals in the appropriate proportion to the service place. It must be in

parallel with the provision of services that is based on the proportion of professionals (skills mix) that is appropriate for health services, promotes the inclusion of civil servants and the adjustment to the position of public health academicians to solve the problem of relocation and resignation from the lack of advancement in another line of work [4, 8, 10, 11, 14, 23, 28, 29]. At the same time, educational institutions are responsible for producing and solving health manpower problems qualitatively [15, 25, 31]. The production system should be reformed in terms of educational management by adjusting the learning process by transformative learning and curriculum reformation including the process of teaching parallel to the health needs of the population and the context of Thai society [1, 3, 16, 20, 24]. Emphasis is placed on the ability to analyze data, conduct research and use statistics in order to produce graduates according to the needs of the department according to the ability and educational qualifications in line with current and future situations.

Recommendations for the Development of Community Health Professionals in Thailand are as follows:

1. By opening the framework of the capacity rate or planning to allocate the community health professional workforce to be authentically sufficient such as calculating the proportion of community health professional needs in the department to propose to the organization in planning the manpower and determine policies for selecting and recruiting and placing community health professionals appropriately.

2. There should be joint health care workforce needs plan between health care facilities and graduate-producing institutions by emphasizing the ability to do data research analysis, use statistics in order to produce graduates to meet the needs of the department, have the ability and qualifications correlated with the current situation and have competency in correlation with the context and work systems in the area.

3. The creation of occupational security by considering the various motivating factors such as the recruitment of civil servant as professional compensation and the adjustment of position when a license registration has been approved to be a community health professional especially in scarce areas. In the future there should be development of a new hiring system that is not a bureaucratic but has no less privileges than being a civil servant that can meet the needs of security, advancement, educational opportunities, compensation, and benefits. It should be designed as a benefit

package that government officials should receive.

5. Conclusion

Community public health professional personnel suggested that their profession development should be supported by promoting to a higher position with the same position code, likewise, there should be manpower frame to allocate community public health professional adequately.

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References

[1] Bookboon, P. (2016). *Population-centered district health system development*. Office of Community Based Health Care Research and Development.
[2] Choochotkaew, N., Chankong, W., & Thammakun, T. (2021). Factors Affecting the Functional Competencies of Public Health Technical Officers (Professional Level) at Central Units under the Department of Disease Control. *Public Health Policy and Laws Journal*, *7*(2), 243–256. https://so05.tci-thaijo.org/index.php/journal_law/article/view/248294
[3] Hasuwannakit, S. (2007). *Network management for contracted unit for primary care (CUP)*. Office of Community Based Health Care Research and Development.
[4] Hongoro, C., & McPake, B. (2004). How to bridge the gap in human resources for health. *Lancet*, *364*(9443), 1451–1456. https://doi.org/10.1016/S0140-6736(04)17229-2
[5] Hsieh, F. Y., Bloch, D. A., & Larsen, M. D. (1998). A SIMPLE METHOD OF SAMPLE SIZE CALCULATION FOR LINEAR AND LOGISTIC REGRESSION. *STATISTICS IN MEDICINE Statist. Med*, *17*, 1623–1634.
[6] International Labour Organization. (2013). *Thailand - Community Health Professional Act, 2556 [2013]*. https://www.ilo.org/dyn/natlex/natlex4.detail?p_isn=96447&p_lang=en
[7] J Jeawkok, W. D. P. K. (2015). Retention and intention of resignation to the job of registered nurses in the university hospital, Songkhla Province. *NIDA Dev J*, *55*(3), 109–144.
[8] Jithitikulchai, T. (2021). Area-based Network of Health Workers to Mitigate the Shortage of Health Workforce: A Case Mix Index Approach for Thailand. *Research Square*. https://doi.org/10.21203/rs.3.rs-288165/v1
[9] Jithitikulchai, T. (2022). Improving allocative efficiency from network consolidation: a solution for the health workforce shortage. *Human Resources for Health*, *20*(1), 1–12. https://doi.org/10.1186/S12960-022-00732-1/TABLES/8
[10] K Sawaengdee, V. T. T. T. P. T. W. T. P. P. N. C. K. T. C. T. B. T. (2016). Thai nurse cohort study: cohort profiles and key findings. *BMC Nurs*, *5*(10), 1–12.
[11] K Seema, B. I. J. P. (2015). Registered nurse's intention to leave the profession in Bangkok Metropolitan Administration hospitals. *J Nurs Division*, *42*(3), 142–158.
[12] Kabene, S. M., Orchard, C., Howard, J. M., Soriano, M. A., & Leduc, R. (2006). The importance of human resources management in health care: A global context. *Human Resources for Health*, *4*. https://doi.org/10.1186/1478-4491-4-20
[13] N Pagaiya, P. P. A. B. T. N. K. K. (2019). Forecasting imbalances of human resources for health in the Thailand health service system: application of a health demand method. *Hum Resour Health*, *17*(4), 1–12.
[14] N Thongniran, B. I. J. P.-A. (2015). Intention to stay in occupation of registered nurses at a community hospital region 1: Central, Thailand. *J Nurs Division*, *42*(3), 69–83.

[15] Noree, T., Pudpong, N., Wisaijohn, T., Chiangchaisakulthai, K., Thanormwat, Y., Theerawit, T., Seneerattanaprayul, P., Gongkulawa, K., Sawaengde, K., & Chuenkongkaew, W. (2016). *Strengthening Human Resources for Health through Transformative Education and Rural Retention in Thailand*. Thailand-Dr. Krisada Sawaengdee.
[16] Office of the Civil Service Commission (OCSC). (2010). *Threshold Competency*.
[17] P Panda, P. C. (2020). Do rural health worker incentive schemes work? Evidence from Thailand. *Econ Bull*, *40*(2), 1583–1595.
[18] Pagaiya, N. (2018). Human resources for health requirements projection: crucial baseline to support human resources for health planning. *J Health Syst Res*, *12*(2), 342–355.
[19] Pagaiya, N., Khaonuan, B., Phanthunane, P., Bamrung, A., & Jirawattanapisal, T. (2018). Human resources for health projections for primary health care services in Thailand 2026. *J Health Syst Res*, *12*(2), 189–204.
[20] Pagaiya, N., & Noree, T. (2009). *Thailand's health workforce: a review of challenges and experiences. Health, nutrition and population (HNP) discussion paper*. World Bank.
[21] Pagaiya, N., Phanthunane, P., Bamrung, A., Noree, T., & Kongweerakul, K. (2019). Forecasting imbalances of human resources for health in the Thailand health service system: application of a health demand method. *Human Resources for Health*, *17*(4), 1–12. https://doi.org/10.1186/s12960-018-0336-2
[22] Phanthunane, P., Bamrung, A., Jirawattanapisal, T., Pagaiya, N., Khaonuan, B., & Noree, T. (2019). A Utilization-Based Model to Predict Human Resources for Health (HRH) in Secondary Care Services of Thailand 2026. *Journal of Health Systems Research*, *12*(2), 209–220. https://kb.hsri.or.th/dspace/handle/11228/4904
[23] Rakhab, A., Jackson, C., Nilmanat, K., Butterworth, T., & Kane, R. (2021). Factors supporting career pathway development amongst advanced practice nurses in Thailand: a cross-sectional survey. *Int J Nurs Stud*, *117*. https://doi.org/10.1016/j.ijnurstu.2021.103882
[24] Saeiew, K. (2016). *Health System Charter 2016*. https://en.nationalhealth.or.th/health-system-charter2016_publish/
[25] Sawaengdee, K. (2017). Crisis of Nursing shortage in Health Service Facilities under Office of Permanent Secretary, Ministry of Public Health: Policy Recommendations. *Journal of Health Science - วารสารวิชาการสาธารณสุข*, *26*(2), 448–456. https://thaidj.org/index.php/JHS/article/view/103
[26] Thianjuruwatthana, W., & Nawsuwan, K. (2021). Development of the Public Health Workforce of the Office of the Permanent Secretary, Ministry of Public Health to Support Health Region. *Journal of Health Science - วารสารวิชาการสาธารณสุข*, *30*(3), 531–546. https://thaidj.org/index.php/JHS/article/view/10223
[27] Tursunbayeva, A. (2019). Human resource technology disruptions and their implications for human resources management in healthcare organizations. *BMC Health Services Research*, *19*(1), 1–8. https://doi.org/10.1186/S12913-019-4068-3/PEER-REVIEW
[28] W Srisuphan, K. S. (2012). Policy recommendation for nurse shortage in Thailand. *Thai J Nurs Counc*, *27*(5), 5–12.
[29] Wibulpolprasert, S., & Pengpaibon, P. (2003). Integrated strategies to tackle the inequitable distribution of doctors in Thailand: four decades of experience. *Hum Resour Health*, *1*(1), 1–17. https://doi.org/10.1186/1478-4491-1-12
[30] Willis-Shattuck, M., Bidwell, P., Thomas, S., Wyness, L., Blaauw, D., & Ditlopo, P. (2008). Motivation and retention of health workers in developing countries: a systematic review. *BMC Health Serv Res*, *8*(1), 1–8. https://doi.org/10.1186/1472-6963-8-247
[31] Witthayapipopsakul, W., Cetthakrikul, N., Suphanchaimat, R., Noree, T., & Sawaengdee, K. (2019). Equity of health workforce distribution in Thailand: an implication of concentration index. *Risk Management and Healthcare Policy*, *12*, 13–22. https://doi.org/10.2147/RMHP.S181174