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# Forecasting the demand of public health professionals at the primary care level at the present and in the next 5 - 10 years in Thailand (2026– 2031)

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## ABSTRACT

**Background**: An increase in the number and proportion of senior citizens, chronic diseases including mental illnesses and the incidence of emerging diseases cause the medical and public health workforce to increase the workload. This situation demand influences the public demand and expectations to increase the manpower of the health system.

**Objectives**: This cross-sectional study aimed to analyze and forecast the demand for public health professionals at the primary care level in Thailand in the present and the next 5 to 10 years (2026-2031).

**Methods**: The data was analyzed by using a Health Needs Method and Health Demand Method; all health services provided were in consideration with promotive, preventive, curative, rehabilitative, and other public health services.

**Results**: The study results forecasted the demand of manpower in the health system using the Health Needs Method at the present (2020), revealed the demand of public health professionals with 7,268 individuals, 5,637 nurses, 3,005 dental personnel and 3,942 physical therapists respectively. The forecasting of the demand for manpower at the present using the health demand method revealed that the demand for public health professionals were 3,386 individuals, 2,431 nurses, 4,862 dental personnel, 66,001 physical therapists and 19,171 Thai traditional-medicine personnel. The health system manpower demand forecast in the next 5-10 years (2026 – 2031) using the Health Demand Method found that the demand of public health professionals will be 7,356 - 7,378 individuals, 5,706 - 5,723 nurses, 3,041 - 3,050 dental personnel and 3,990 - 4,002 physical therapists. However, the forecast of the demand for manpower in the health system at the present using the Health Demand Method for the next 5-10 years (2026 – 2031) indicated the demand of public health professionals will be 3,427 - 3,437 individuals, 2,460 - 2,468 nurses, 4,921 - 4,936 dental personnel, 66,799 - 66,999 physical therapists and 19,403 - 19,461 Thai traditional medicine personnel.

**Conclusion**: The demand of public health professionals in this study is higher than the standard of the Ministry of Public Health. Therefore, there should be a forecast to support manpower planning to have continuous operations.

**Keywords:** forecast of manpower demand, health necessity, health service needs

## 1. Introduction

Growth of the economy and society influences the public demand and expectations to increase the manpower of the health system that needs cooperation between local government organizations and public health agencies to have equal access to medical services under the Universal Health Insurance Policy. An increase in the number and proportion of senior citizens, chronic diseases including mental illnesses and the incidence of emerging diseases cause the medical and public health workforce to increase the workload. This situation demands more Thai public health personnel [1,2]. Hence, human resources are one of the most important factors that drive healthcare systems at all levels. The increase in demands stated above along with the limitations of public health resources, an effective health workforce plan will help bring out equity even further [3-20]. If there are insufficient healthcare providers or healthcare personnel in some fields, it will result in an increase of workload for those personnel and providers. That also applies to areas that do not have the needed public health services, despite the needs for the services for the population in those areas. In another hand, if there are more healthcare providers than necessity, the unemployed health professional will be compelled to join the job below their educational qualifications. The imbalance of health workforce (under staffing, over staffing, or the demands of healthcare) may cause negative effects on the health service system, resulting in reduction of production efficiency and affecting the morale and the motivation to work [21].

The first step in manpower planning is to forecast the need for manpower in the healthcare system. In the present, World Health Organization has proposed the concept of health system manpower allocation consisting of two important factors. This includes the component of input the healthcare needs of the population and the public health service system in use and other factors. This affects the management of the supply of health manpower [21]. In addition, the management of public health information related to both the supply and demand factors of manpower must be continually considered [4]. This is to achieve a dynamic plan for manpower and to be consistent with changes in population, incidence of disease in the public health service system and other factors related based on the archive of literature reviews. The previous research stated that the demand along with health needs depend on many factors including population structure, life expectancy, health impairment, service use patterns, development

in treatments and the use of technology in diagnosis, community expectation, healthcare system infrastructure and funding models, and supply which is divided into three main parts [5, 10, 18]. Firstly, new entries into the labor market consist of graduate profile, graduate career preference and re-entries after temporary leave. Secondly, current individuals in the labor force, which consists of demographic profile, geographic distribution, within-profession distribution, and lifestyle choice, for example, work hours, availability, and productivity in work hours. Lastly, exit from the labor market consists of retirement, attrition or career change, emigration, and premature mortality. Additionally, the research of Segal et al., provided more viewpoints that puts supply into consideration and is considered in detail of the structure of the population that is being studied [18]. For example, considering the ratio of current healthcare personnel compared to the past or the age structure of healthcare personnel, etc.

In practice, many developed countries have run into the problem of providing the frameworks or the manpower planning. It must consider the demand and supply that are consistent with the healthcare system and the allocation of manpower that requires dynamic planning to allocate according to the change of time. Therefore, it is essential to forecast the manpower demand in accordance with the desired healthcare system, analysis of the problem of inconsistency between human resources and health requirements, and sufficient human resources for health supply [12].

Manpower demand forecasting can be carried out on a larger spectrum at the national level, at the local level or even at the service facility level. The known country or region forecasting methods are based on population ratio, health needs, health demand, and service target methods. Each method has different strengths and limitations [17]. For example, in countries that use the universal health insurance systems or have the characteristics of a welfare state in terms of health is a forecast based on public health needs. However, the forecast method of public health needs is a complex and demanding approach in which it needs very predictive information. Hence, in practice, many countries have chosen to use an easier method. For community healthcare professionals in Thailand, the field of public health is a field that is very difficult to determine the workload, especially in the hospital [15, 16]. Other than that, public health professionals perform other duties assigned,

such as quality development, rehabilitation medicine work, etc.

The calculation of workload should bring the main workload in the public health hospital to calculate the rate of labor in the hospital, therefore, analysis of the rate is based on Service Base 3. These include health promotion, health education, and family medicine work, disease control and epidemiological, occupational health and environmental health work in the hospital areas. This approach predicts manpower based primarily on the use of in-service health services. This study applied the concept of health service or service utilization method. This forecast is based on the current service usage database and analysis of the Health Demand Method by analyzing service users in various fields together with the concept of health manpower analysis developed to assess the health needs of the area [18]. Then, the workload of public health academics and public health officials were analyzed. The population base is equal to 1 public health academic per 1,250 in the population [9-10]. Forecasts are based on future population projections. According to literature reviews, there have been no studies in Thailand that analyzed the health workforce needs of community healthcare professionals in healthcare settings using the health needs and health demand methods, including forecasts over a period of 5 to 10 years, specifically. The primary healthcare system is a frontline service system that is the sub-district health promoting hospital which is the smallest component of the healthcare system located in the sub-district. This sub-district health promoting hospital focuses on health promotion that prevents diseases rather than cures and recover from the disease. Most public health officials, mainly public health officers and public health academics, work in this hospital [14].

With the importance of health manpower planning and healthcare services, this study was conducted with the main objectives to forecast the need for manpower in community healthcare professions in the primary care system in Thailand. This can be used to plan the health workforce in the community healthcare profession in accordance with the design of the health system consistent with the health needs of people in each area.

## 2. Methods

Analysis of manpower in the healthcare system, community health professions, public health academics/public health officers was carried out by using the power rate analysis. The power rate analysis forecasts manpower demand between the Health Needs Method and

Health Demand Method. By applying the conceptual framework, Utilization-based Model coupled with the health workforce analysis, a concept is developed by Segal, it considers the main service tasks which branches out into medical services, health promotion, disease control, rehabilitation, and other public health services [18]. For each service, an analysis is performed based on the type of workforce that is done by the service provider in the healthcare team [14]. Then, the standard of manpower and manpower productivity (staffing norm and productivity) is taken and calculated for the need for manpower to change the workload to the amount of manpower required by forecasting the need for manpower for medical treatment using the Heath Demand Method. In terms of manpower forecasting for other services, the health needs method is used. This study only investigates from the demand perspective. However, it does not consider the capacity or the production, forecasting that required data from educational institutions in Thailand.

**2.1 The Health Needs Method**

By using the Health Needs Method, the study is conducted on operational activities and the time taking to perform the work of the personnel who work at the primary care centers. Selection is done by selecting specialists from educational institutions using multi-stage randomized sampling. The study population was grouped into 13 health service areas. Then, a draw was done to select a province from the health service area as a representative. Lastly, the district was selected by randomization and then the sub-district health promoting hospital service facility. Data were collected from the 13 health service areas, from the sub-district health promoting hospitals, 105 samples were collected.

**2.2 Analysis of Manpower Demand using the Health Demand method**

Forecasting manpower demand: this method is used for medical treatment in which there are personnel that are involved and work as a team in the field of treatment including doctors, nurses, public health personnel, pharmacists, medical technicians, and Thai traditional medicine by Thai traditional medicine specialists. Analysis of manpower demand method uses the information mainly on the use of healthcare services. The data is from the archives of the Health Data Center, Ministry of Public Health fiscal year 2020 [9]. The process begins with the collection of secondary data to support the development of the desired healthcare systems and health service work at the primary level. Development of foundational data of manpower demand is done

by obtaining information from interviews with workload data specialists. Studies of operational activities and the time spent in performing the tasks of the personnel from the 105 sample areas were done by multi-stage randomization of the controlled study facility and is considered together with the policies of the Office of Policy and Strategy Ministry of Health.

**2.3 Ethical Considerations**

In this study, the researcher has applied for ethical consideration of human research and has been approved for review by the Human Research Ethics Committee Khon Kaen University No. HE-632277 approved on December 29, 2020.

**3. Results**

**3.1. Using the Health Needs Method**

The study of the operational activities and time spent in the work of personnel who work at the primary care facility in the health promoting district hospitals, 105 areas from the 13 health service areas were carried out by using the working records (time diary) of different types of personnel as the productivity data to analyze the workload, performance of each profession and productivity at this stage. The productivity data includes manpower productivity, which is the analysis of the time spent on service per time from interviewing personnel's operational data, the proportion of the main work compared to the total time for each profession and the proportion of skill mix/collaboration or substitution for each profession as summarized in Table 1.

Analysis of manpower needs covers mainly health promotion services, disease prevention, rehabilitation, and elimination of various risk factors. It does not include medical treatment and Thai traditional medicine services. From surveying the various services mentioned from the sub-district health promoting hospital, there are 105 sites with a population of 515,466 personnel responsible for work per year mentioned in Table 1. Then, the time spent on each activity is multiplied to convert the amount of work into man-hours and the distribution of work to various people involved. Then, the workload data and performance standard were used to analyze and forecast current manpower needs by using manpower performance standards by the Office of the Public Sector Development Commission (OPDC). In which throughout 1 year, the personnel will have 240 working days, 7 hours each day, which is equivalent to 1,680 hours per year (Full Time Equivalent; FTE).

Table 1. Data on manpower productivity of various professions in operation and proportion of collaborative/cooperative work (skill mix).

| Workload | Service time (per time/hour) (proportion of work skill mix %) | | | |
|---|---|---|---|---|
| | Public health | Nurse | Dentist | Physical therapist |
| **Health Promotion Work** | | | | |
| EPI (person/time) | 0.15(100%) | 0.15(100%) | | |
| Before/After Birth (person/time) | 0.35(100%) | 0.35(100%) | | |
| Family Planning (person/time) | 0.20(100%) | 0.20(100%) | | |
| Screening test (person) | 0.10(100%) | 0.10(100%) | | |
| General consultation (person) | 0.10(100%) | 0.10(100%) | | |
| **Home visit/rehabilitation** | | | | |
| Pregnant/Postpartum | 0.75(50%) | 0.75(50%) | | 0.75(100%) |
| Handicap | 0.75(50%) | 0.75(50%) | | 0.75(100%) |
| Elderly home-bound/chronic/bedridden | 0.75(50%) | 0.75(50%) | | 0.75(100%) |
| **School health** | | | | |
| School/Children's Center | 0.10(100%) | 0.10(100%) | | |
| **Community work/Disease control** | | | | |
| Investigate information in the Community | 3(100%) | 3(50%) | 3(50%) | |
| Disease control | 3(100%) | | | |
| Conduct other activities in the community | 3(100%) | 3(50%) | 3(50%) | |
| Restaurant/Fresh-food market | 0.5(100%) | | | |
| **Dental Service** | | | | |
| Outbound patients | | | 0.50 (100%) | |
| School health | | | 0.10 (100%) | |
| Service in the community | | | 0.80 (100%) | |
| Other services | 40% | 20% | 20% | 20% |

There is an increase in the proportion of administration, management, and other jobs by 20 percent except for healthcare officials which has increased by 40 percent. This shows the overview of the number of hours worked in 1 year of work which includes disease prevention, health promotion, rehabilitation, and elimination of risks factors for sub-district health promoting hospitals with the total of 105 sites with the population of 515,466 under responsibility. This includes public health academics/community public health officers in which they have 67,945 working hours, professional nurses have 61,544 working hours, public health dental personnel have 32,834 working hours and physical therapists have 42,951 working hours. When comparing work standards to analyze the similar needs for manpower (Full Time Equivalent: FTE) and with the increase the proportion of other activities, it was found that the public service of 515,466 people needs 56.6 FTE public

health officials, 43.9 FTE professional nurses, 23.4 FTE dental personnel and 30.7 FTE physical therapists. When compared with the population, it was found that the need for healthcare workers, professional nurses, dental personnel, and physical therapists is shown as a ratio of 1:9,107 1:11,741 1:22,028 and 1:16,790 personnel to the population, respectively, as detailed in Table 2 and Table 3.

Table 2. Workload and the need for manpower in various services in health promotion, disease prevention, rehabilitation, and elimination of risk factors in 2021.

| Services | Workload | | Manpower in service (working hours) | | | |
|---|---|---|---|---|---|---|
| | Times (Quantity) | Man/ hour (hours) | Public health | Nurses | Dentists | Physical therapists |
| **Health Promotion** | | | | | | |
| EPI | 27,800 | 4,170 | 4,170 | 4,170 | | |
| Before/After Birth | 27,265 | 9,543 | 9,543 | 9,543 | | |
| Family Planning | 25,750 | 5,150 | 5,150 | 5,150 | | |
| Screening tests | 40,450 | 4,045 | 4,045 | 4,045 | | |
| General consultation | 91,250 | 9,125 | 9,125 | 9,125 | | |
| **Home visit/rehabilitation** | | | | | | |
| Pregnant/Postpartum | 6,385 | 6,385 | 3,192 | 3192 | | 6,385 |
| Handicapped | 4,320 | 4,320 | 2,160 | 2160 | | 4,320 |
| Elderly home-bound/chronic/bedridden | 32,246 | 32,246 | 16,123 | 16,123 | | 32,246 |
| **School health** | | | | | | |
| School/Children's Center | 24,600 | 2,460 | 2,460 | 2,460 | | |
| **Community work/Disease control** | | | | | | |
| Investigate information in the Community | 321 | 965 | 965 | 482 | 482 | |
| Disease control | 346 | 1,040 | 1,040 | | | |
| Conduct other activities in the community | 3,252 | 9,756 | 9,756 | 4,878 | 4,878 | |
| Restaurant/Fresh-food market | 2,900 | 435 | 216 | | | |
| **Dental Service** | | | | | | |
| Outbound patients | 34,256 | 17,128 | | | 17,128 | |
| School health | 32,300 | 3,230 | | | 3,230 | |
| Service in the community | 8,245 | 6,596 | | | 6,596 | |
| **Total workload (working hours)** | | | 67,945 | 61,544 | 32,834 | 42,951 |
| **Amount FTE (/1680)** | | | 40.4 | 36.6 | 19.5 | 25.6 |
| Other services | | | 40% | 20% | 20% | 20% |
| **FTE including another workload** | | | 56.6 | 43.9 | 23.4 | 30.7 |

Table 3. The need for manpower for health promotion, disease prevention, rehabilitation, and risk factor elimination services in 2013 and in the next 5 and 10 years (2026 and 2031).

| Manpower type | Ratio per population | The need for Health Manpower on a National scale | | |
|---|---|---|---|---|
| | | 2020 (Population of 66.2 million) | 2026 (Population of 67.0 million) | 2031 (Population of 67.2 million) |
| Public health | 1:9,107 | 7,268 | 7,356 | 7,378 |
| Nurses | 1:11,741 | 5,637 | 5,706 | 5,723 |
| Dentists | 1:22,028 | 3,005 | 3,041 | 3,050 |
| Physical therapist | 1:16,790 | 3,942 | 3,990 | 4,002 |

After that, the number of manpower was compared with the population in the responsible areas of the sub-district health promoting hospitals of 105 areas/hospitals. There were 515,466 people has been included to analyze the proportion of manpower per population and use this proportion to analyze the manpower that is needed for health promotion, disease prevention, rehabilitation, and elimination of risk factors in the next 5-10 years (2026-2031) as detailed in Table 3.

### 3.2. Analysis of Manpower Needs by Health Demand Method

The Health Demand Method is used for healthcare work that involves personnel who work as a team including doctors, professional nurses, public health personnel, pharmacists, medical technicians, and the services of Thai traditional medicine by Thai traditional medicine specialists. Health demand analysis of manpower needs mainly uses data of health service use. The data is from the archive of the Health Data Center (HDC), Ministry of Public Health fiscal year 2020. The process begins with the collection of secondary data to support the development of the desired healthcare system and health service work at the primary level. Development of baseline data for manpower needs forecast is based on interviews with workload data specialists, studies of operational activities and the time spent in the work of personnel from the 105 areas where samples were collected (Multistage random sampling). Together, it was taken into consideration with the policy of the Office of Policy and Strategy Ministry of Health; it was found that primary care service providers consist of approximately 60 percent of the services which are provided by nurses and approximately 40 percent are provided by public health personnel. As for dentistry, it is carried out by dental personnel in which 20 percent of outpatient's care. As for rehabilitation services, the workload for outpatient care is about 5 percent carried out by physical therapists. As for Thai traditional medicine services, approximately 8 percent are provided for outpatients by Thai traditional medicine specialists performing diagnostics. Those who have been diagnosed will receive procedures from Thai traditional medicine specialists as shown in Table 4

Table 4. Baseline data of manpower forecasting in various fields.

| Services | Quantity | Manpower | Proportion (%) | Time/ Activity (hours) | Other activity times |
|---|---|---|---|---|---|
| Treatment | OP | Nurse | 60 | 0.20 | 30% |
| | | Public Health | 40 | 0.20 | 40% |
| Dentistry | 20% of OP | Dentists | 100 | 0.30 | 30% |

| Services | Quantity | Manpower | Proportion (%) | Time/ Activity (hours) | Other activity times |
|---|---|---|---|---|---|
| Rehabilitation | 5% of OP | Physical therapists | 100 | 0.10 | 15% |
| Thai traditional medicine | Diagnostics 8% of OP | Thai traditional medicine specialists | 100 | 0.15 | 30% |
| | Procedure | Thai traditional medicine specialists | 20 | 1.00 | |

* Derived from the results of a study of personnel's operational activities (duties performed) from interviews with experts.

This analysis of health manpower needs focuses on healthcare and Thai traditional medicine services which involves manpower of professional nurses, public health personnel, dental personnel, physical therapists, and Thai traditional medicine specialists using mainly data on the use of primary care services of the Ministry of Public Health. Then the workload is distributed to various professions and the time spent on performing the work of 1 service and multiply that by the amount of work to analyze the man-hours. Subsequently, use the 1-year performance standard which is 1,680 hours, and divide the workload and increase the proportion of other activities by 15 to 40 percent. The manpower involved in medical treatment and Thai traditional medicine services include professional nurses, public health personnel, dental personnel, physical therapists, and Thai traditional medicine specialists. In the field of medical services, there are 293,234,295 medical services performed. After distributing the workload to various professions and analyzing the need for manpower, it was found that quantity needed of nurses, public health personnel, dental personnel, physical therapists, and Thai traditional medicines specialists are 27,228, 19,548, 13,613, 1,003, and 3,453, respectively. After increasing the proportion of other activities, approximately 15 to 40 percent as shown in Table 5. Forecasting this manpower needs is the forecast of manpower needs in 2020 and in the next 5 and 10 years (2026 and 2031) as detailed in Table6.

Table 5. Workload and the manpower need in other services in medical services and Thai traditional medicine in 2020.

| Services | Quantity (times) | Demand for Manpower | | | |
|---|---|---|---|---|---|
| | | Category | Manpower (Man/ hour) | Needs (FTE) | Additional tasks* 15 - 40% |
| Medical treatment | 293,234,295 | Nurses | 35,188,115 | 20,945 | 27,228 |
| | | Public health | 23,458,743 | 13,963 | 19,548 |
| Dentistry | 58,646,859 | Dentists | 17,594,057 | 10,472 | 13,613 |
| Rehabilitation | 14,661,715 | Physical therapists | 1,466,171 | 872 | 1,003 |

| Services | Quantity (times) | Demand for Manpower | | | |
|---|---|---|---|---|---|
| | | Category | Manpower (Man/ hour) | Needs (FTE) | Additional tasks* 15 - 40% |
| Thai traditional medicine (Diagnostics) | 13,177,487 | Thai traditional medicine specialists | 1,976,623 | 1,177 | 3,453 |
| - Procedure | 12,421,573 | Thai traditional medicine specialists | 2,484,314 | 1,479 | |

* The proportion of work other than those analyzed will be added after the FTE analysis by approximately 15 percent, except nurses, dental personnel and Thai traditional medicine by 30 percent, and public health by 40 percent.

Table 6. The demand for manpower required for various service tasks medical care and Thai traditional medicine in 2013 and in the future 5 and 10 years (2026 and 2031)

| Manpower types | Standard of the Ministry of Public Health | The need for Health Manpower on a National scale | | |
|---|---|---|---|---|
| | | 2021 (66.2 million people) | 2026 (67.0 million people) | 2031 (67.2 million people) |
| Nurses | 1: 2,500 | 2,431 | 2,460 | 2,468 |
| Public health | 1: 1,250 | 3,386 | 3,427 | 3,437 |
| Dentistry | 1: 10,000 | 4,862 | 4,921 | 4,936 |
| Physical therapists | 1: 30,000 | 66,001 | 66,799 | 66,999 |
| Thai traditional medicine | 1: 10,000 | 19,171 | 19,403 | 19,461 |

## 4. Discussion

In this study, two methods were used to forecast manpower needs: The Health Needs Method and Health Demand Method. These two approaches are used together to provide the most accurate and near-realistic manpower forecasts of primary care systems in which PHC health services are in terms of medical treatments, health promotion, disease prevention, rehabilitation as well as eliminating various health risk factors. The manpower forecast from this study found that the need for manpower was greater than the forecast of the need for manpower in the healthcare system by the Ministry of Health. The ratio of manpower needs in healthcare to the population number were found to be higher than the standard of the Ministry of Public Health, especially in community health professions (1:1,250). The ratio of community health professions manpower needs to the population number is as much as 5 times in healthcare needs and 3 times in the demand for health services in the next 5 and 10 years. The reason that the demand for manpower needs in this study is higher than that of the Ministry of Health is due to the consideration of the Health Need Methods that will change in the future including emerging diseases, the development of the development of technology, communication, and transportation that facilitates more communication. Also, the analysis includes

current health problems that are a result of development, emphasis on growth and modernization to fight with disease and non-infectious diseases, new emerging diseases, more chronic diseases with the increasing aging population causing unpredictable problems. These findings were similar consideration with the studies of Thailand, Africa, Saudi Arabia, high OECD countries, and Switzerland [3, 13, 16, 19, 21].

Thus, primary care services are not limited to services at the sub-district health promoting hospitals but also includes holistic services in primary care, health promotion, disease prevention, rehabilitation, and elimination of risk factors that provide services at various health facilities such as medical centers, municipal health facilities, community hospitals, provincial hospitals, and other hospitals [14]. These includes mainly the use of health services or health demand for services but unable to access services with many factors related to the service users in various fields such as the type of illness, age, and gender [7]. The study found that there is a growing demand for personnel in all professions based on the needs for healthcare personnel including community health professions. As a result, the community public service profession is insufficient to meet the health needs of the population, both in 5 and 10 years though the country's health workforce is planning for the next decade (2017-2026) of the Health Workforce Planning Subcommittee. It is reported that the production of public health academics has the highest production rate, 26,200 academics per year, and the workforce is forecasted to have 267,255 graduates of public health in 2026 [15]. But in fact, according to interviews, various higher education institutions can only produce an average of 50-99 public health graduates per year which may not be sufficient to meet the future needs of the aging society that will increase the number of outpatient services. There are elderly/chronic patients and people with disabilities who are stuck in bedridden homes that also increases the public health academics role in providing proactive services in the community. Therefore, considering the community health professional workforce in the actual health system may need to consider in addition the method of calculating proportions or refer to only the area Population Ratio. However, the workload and Full Time Equivalent (FTE) workload have not been calculated factually. If considering the results of the study, it can be found that community public health professions are still inadequate with the health systems of Thailand both in terms of number and geographical distribution.

Developing a process for forecasting the need for health workforce (manpower), especially community health professions, the professional workforce should be analyzed at each service level to avoid duplication of the work. Also, there should be a forecast to support manpower planning to have continuous operations. The development of a modern and accurate forecasting database system to respond to the situation of health needs and the use of health services that are constantly changing should be done for future studies.

## 5. Conclusion

In this study, compared with the standard of the Ministry of Public Health the demand of public health professionals is relatively higher. The proportion of demand for public health professionals might be fivefold
higher for health needs and threefold higher for health service needs in the next 5 and 10 years. Hence, planning in workforce (manpower) in the health profession must be consistent with the design of health systems that are in line with the health needs of the population in each area by using long-term planning principles, taking immediate action, and the plans are adjusted regularly to be in line with the situation, able to support a wide range of health needs and to achieve the goal of the health of the people in the future.

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