



## Factors Related to the Perceived Competency Regarding Knowledge and Skills of the Expanded Program on Immunization Staff in Thailand

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### Abstract

Although the rate of vaccination coverage is rather high in Thailand, epidemics of emerging infectious diseases are constantly occurring. The aims of this descriptive correlational study were to identify the level of competency regarding the knowledge and skills of expanded program on immunization (EPI) staff in Thailand, to investigate the relationships among age, duration of work in EPI service, experience with EPI training, position, and the perceived competency of the EPI staff. Three hundred and twenty-six subjects were recruited using simple random sampling. The instruments were a demographic data questionnaire and a questionnaire of perceived competency regarding knowledge and skills validated by three experts. The reliability was 0.97. Descriptive statistics, Spearman's rank correlation, Pearson's product moment correlation, and a chi-square test were used to analyze the data.

The results showed that the mean age of the EPI staff members was 40.04 years. The duration of work in EPI service averaged 7.14 years. Approximately 74.20 percent were nurses and 51.50 percent had experienced training. The overall mean score for perceived competency was at a high level ( $\bar{x} = 3.88$ ,  $SD = 0.64$ ). Reasoning that cannot vaccinate before appointment date ( $\bar{x} = 4.19$ ,  $SD = 0.75$ ) were perceived at a high level, whereas knowledge about the herd immunity threshold of diseases was perceived at a moderate level and showed the lowest score ( $\bar{x} = 3.47$ ,  $SD = 0.90$ ). The staff members that took part in the training program exhibited a significant difference in the perceived competency mean score when compared to the group not trained ( $P < 0.001$ ). In addition, duration of work in EPI service and experience with EPI training was positively related to the perceived competency of the EPI staff ( $r = 0.163$ ,  $r = 0.325$  respectively). It is suggested that the training of EPI staff might be able to improve the level of competency and enhance the quality of EPI service provision in Thailand.

### Keywords

Competency, Knowledge, Skills, Factors, Immunization

## **Introduction**

Immunization has been proven to be one of the most cost-effective aspects of health promotion since the achievement of high immunization coverage in many countries, with downward trends in the morbidity and mortality rates of vaccine-preventable diseases. In Thailand, the Expanded Program on Immunization (EPI) has been taking place since 1977. Under the academic supervision and support of the World Health Organization (WHO), Thailand's Ministry of Public Health (MOPH) has offered vaccination services based on the EPI through the combination or integration with the public health service system of the domestic public and private sectors from the beginning. The primary objective of the EPI is to offer maximum protection regarding the vaccine-preventable diseases for Thai people. According to the latest survey by the Department of Disease Control, the Ministry of Public Health, in 2008, Thailand's mean rate of coverage for all types of vaccinations given by the EPI (except for Diphtheria-Pertussis-Tetanus (DTP) and oral polio vaccine (OPV) No.5), was at a high rate of over 90 percent, with the Bacillus Calmette-Guérin (BCG) vaccine having the highest mean coverage rate (99.9%), followed by complete vaccinations for DTP and OPV (three shots) and Hepatitis B (HBV) (three shots), with mean coverage rates of 98.7 percent and 98.3 percent, respectively (Bureau of General Communicable Diseases, 2014). Although the rate of vaccination coverage is rather high, epidemics of previously-existing diseases and emerging infectious diseases are constantly occurring. According to a survey conducted by the Bureau of Epidemiology, Department of Disease Control, in 2011-2012, the rate of sickness caused by vaccine-preventable diseases only decreased slightly or even rose for some diseases, such as hepatitis B, which only decreased from 9.93 to 9.07 cases per 100,000 people, or measles, which saw an increase in prevalence from 5.02 to 8.10 cases per 100,000 people (Bureau of Policy and Strategy, 2013). Consequently, immunization work requires constant improvement.

In order to improve EPI against diseases in Thailand and to achieve the primary objective, four components must be relied upon: 1) Vaccination - standardized vaccines must be produced; 2) Budget - budgets for promoting production and research for new vaccines to stay up-to-date on emerging epidemics, along with capacity building budgets for EPI staff; 3) Administration - the EPI requires multi-level and multi-faceted administration involving the production, storage, and transportation and management of service units; and 4) EPI staff (vital) - although the EPI staff is composed of multidisciplinary medical professionals in fields involving EPI services such as pediatricians, pharmacists, nurses, epidemiologists, public health academics, etc. with varying EPI responsibilities, people make up the key factors, mechanisms, and core of work for the achievement of objectives regardless of the type of work. The present research, therefore, is focused on the EPI staff because they are

the most dynamic component. Hence, the researcher is interested in surveying the factors related to the perceived competency of EPI staff at every level of service in Thailand.

In Thailand, the EPI remains mired in obstacles. According to a situational assessment of the development of immunization in Thailand in 2007, operational flaws were discovered. For example, the EPI staff neglected to maintain vaccination quality according to the cold chain system, knowledge about the specifications for each type of vaccination was deficient, education about vaccines and proper service provision were absent, and the dissemination of practical knowledge and skills from previous EPI staff members to newer staff members was inadequate. Moreover, the EPI staff members learned independently and worked without training. In addition, vaccination knowledge is dynamic, which has hindered the EPI staff from making improvements and keeping up with changes. The consequences are service provision errors. Furthermore, data from the EPI observation of the Department of Disease Control in 2012 and sub-standard services such as vaccination administration and cold chain system that failed to meet standards, inadequate planning and insufficient preparation in providing assistance to persons with unusual symptoms and anaphylaxis following immunization, etc. were encountered. These findings are in line with a previous study conducted abroad by Cohen and colleagues in 550 doctors. (Cohen, Lauderdale, Shete, Seal & Daum, 2003). The doctors were instructed to answer questionnaires to evaluate their knowledge on vaccinating children late for vaccinations, along with vaccination restrictions. According to the findings, 32% of the respondents answered none of the vignettes correctly. Almost 50% of the physicians would not give MMR to a child living with a family member receiving chemotherapy, and one third would not give MMR to a child living with an HIV-infected person. These findings revealed that the doctors on the EPI staff with erroneous understanding about scheduling children late for vaccination and vaccination restrictions may prevent children from being properly vaccinated at the right times. The data highlights the presence of inefficiency and operational problems. Therefore, how perceived competency regarding knowledge and skills in immunization of the EPI staff in Thailand are, as well as factors related to perceived competency, are of interest.

According to a review of research conducted in Thailand over the past five years, a study was conducted to evaluate EPI service provision knowledge and skills according to the EPI plan and cold chain system in a province of Thailand (Widsanugorn, Suwattana, Harun-or-rashid & Sakamoto, 2011). However, the study was an epidemiological study, and was not focused on studying EPI staff. Furthermore, studies conducted abroad were carried out with the aim of surveying the personal factors and perceived self-competency only in one group of health service personnel or another (Al-Rukban et al., 2005). In the present study, therefore, the researcher is interested in studying the level of perceived competency

regarding knowledge and skills, including certain factors potentially correlated with perceived competency.

The findings of the present research will aid persons involved with EPI services in gaining knowledge and awareness of the level of perceived competency regarding knowledge and skills in the EPI service provision of EPI staff. The factors potentially correlated with perceived competency as preliminary data for setting policies, work plans or guidelines for properly developing staff consistently with the performance of EPI staff in order to lead to systematic work improvements and help the EPI achieve greater success in the future.

### **Objectives**

1. To study the level of perceived competency regarding knowledge and skills of EPI staff
2. To study the relationships among age, duration of work in EPI service, position, experience with EPI training, and the perceived competency of EPI staff

### **Hypothesis**

The personal factors of age, duration of work in EPI service, position, and experience with EPI training are correlated with perceived competency regarding the knowledge and skills of EPI staff members.

### **Scope of the study**

The present research is a study conducted on the level of perceived competency regarding knowledge and skills, and it also investigated the correlation of personal factors and perceived competency regarding the knowledge and skills of EPI staff members in Thailand. Data collection was conducted with the EPI staff of every region of Thailand from February 2015 to February 2016.

### **Methodology**

#### **Design**

The present research was based on a correlational descriptive research that aimed to describe the level of perceived competency regarding knowledge and skills, and to study the relationships among the personal factors of age, duration of work in EPI service, position, and the experience of EPI training with perceived competency regarding knowledge and skills.

## Population and Sample Group

The population consisted of EPI staff in Thailand.

The size of the sample group was calculated using the G\*power program 3.1.9.2. software Test family selected exact and Pearson's correlation were used for the data analysis. The effect size was 0.20, while the discrepancy (alpha) score was 0.05. The power score was 0.90. Thus, the sample size in this study required at least 258 subjects. Because the response rate in the postal mail survey was usually low, the sample number was increased by 30%. Therefore, the sample size that was expected to be used contained a total of 326 participants, requiring data to be compiled using the stratified random sampling method. Data were taken from staff members in six regions in Thailand. One province was then selected from each region: Chiang Mai in the North, Nakhon Ratchasima in the northeast, Chon Buri in the east, Ratchaburi in the west, Krabi in the south and Suphanburi in the central region. The EPI staff included in the study met the following conditions with operational staff providing direct immunization services to people during the year 2015-2016. Vaccine manufacturers and laboratory staff were excluded.

## Instrumentation and Instrument Quality

The instrumentation employed in the data collection were questionnaires. They were divided into the following two parts:

Part 1 - A demographic data evaluation form on gender, age, level of education, current occupation/position, length of immunization work, type of agency, and workshop training experience of the EPI staff from the National Vaccine Institute's EPI training program.

Part 2 - The perceived self-competency for EPI service provision Evaluation Form was developed by the researchers. This tool contained a total of 80 questions covering self-competency confidence on knowledge and skills regarding EPI service provision and administration based on the standard of service for the EPI training program of the National Vaccine Institute. The competencies range from basic knowledge of immunization, vaccine-preventable diseases and EPI scheduling, vaccine estimation and vaccine report registration, preparations and administering the vaccines, to dealing with adverse events following immunization (AEFI).

The evaluation form was divided into a five-level scale as follows: 1 = No Confidence, 2 = Least Confidence, 3 = Little Confidence, 4 = High Confidence, 5 = Highest Confidence. Mean perceived competency scores were divided into three levels: low perceived competency ( $\bar{x} = 1 - 2.33$ ), moderate perceived competency ( $\bar{x} = 2.34 - 3.67$ ), and high perceived competency ( $\bar{x} = 3.68 - 5$ ). The instruments were validated by three immunization experts, and the index of item objective congruence was 0.98. Then the researcher tested the reliability of the EPI staff associated with the inclusion criteria for the samplings, namely,

30 cases of EPI staff members, with operational staff providing direct immunization services to people, then using a standardized alpha coefficient. The Cronbach's alpha obtained was 0.97.

### **Ethical concerns**

The present research was approved by the Institutional Review Board on Research Involving Human Subjects, Thammasat University, Unit 2 No. 026/ 2558 ( B. C. 2015) . The researcher explained the details of the project, the research objectives, and the data collection with information sheets handed out with the research questionnaires in order to provide information to the sample group and so that the sample group could willingly decide to join the research by signing a consent form. If a subject refused to participate in the research, the subject was permitted to not respond to the questionnaires and was assured that refusal to participate in the research would have no impact on his or her treatment received. Furthermore, the findings of the research were reported from an aggregate perspective only.

### **Data Collection**

1. The researcher coordinated with related agencies, drafted letters to request permission for the data collection, and prepared information sheets and consent forms for the research participants.

2. Data were collected from the EPI staff from six regions in Thailand from randomly-sampled groups. The questionnaires, information sheets, and consent forms for participation in the research were sent in sealed and stamped envelopes by registered mail to the workplaces of the sample groups. The sample groups were instructed to return the questionnaires to the researcher within a set period of time.

3. Once all of the questionnaires had been returned, the researcher examined them for data completion and then performed the data analysis.

### **Data Analysis**

1. The researcher analyzed the demographic data and level of perceived competency regarding the knowledge and skills related to EPI service provision by using descriptive statistics, including frequency distribution, percentage, mean and standard deviation.

2. The researcher analyzed the relationships between personal factors and perceived competency regarding knowledge and skills on EPI service provision by using with Pearson's Product Moment Correlation Coefficient and Spearman's rank correlation.

3. The researcher analyzed the relationship between the non-trained group and the trained group in the workshops for EPI staff in terms of the level of perceived competency

regarding knowledge and skills in EPI service provision by using chi-square testing (Rojanapolakorn-Guch & Rueja, 2014).

## Findings

### 1. EPI staff's characteristics

Regarding the personal factors of the sample group, the majority of the subjects were females (85.9%) with a mean age of 40.04 years (SD = 9.2 years). Nearly one in five of the sample group was aged between 36-40 years, and 84.0 percent of the subjects had completed a bachelor's degree or equivalent education. The majority of the subjects worked in nursing (74.2%), followed by public health scholars (17.2%), with a mean duration of work in EPI service in immunization amounting for 7.14 years (SD = 6.81 years). Most of the subjects had worked one to five years (39.6 %). The sample group was mostly composed of operators under the jurisdiction of public health centers (39.3% ), followed by community hospitals (27.9%). The majority of the subjects had no experience with workshop training for EPI staff (51.5%) by the National Vaccination Institute.

### 2. Level of perceived competency regarding knowledge and skill

The EPI staff perceived competency regarding knowledge and skills at a high level, with a mean score of 3.88 (SD = 0.64), and the majority of subjects (68.4%) perceived competency at a high level (Table 1).

**Table 1** The level of perceived competency regarding the knowledge and skills in relation to EPI service provision by the sample group

Level of Perceived Competency Regarding Knowledge and Skills in EPI Service	No. of People	Percentage
Low Perceived Competency	8	2.5
Moderate Perceived Competency	95	29.1
High Perceived Competency	223	68.4

When the data were considered individually, the top three perceived competency aspects of the EPI staff were reasoning that cannot vaccinate before the appointment date ( $\bar{x} = 4.19$ , SD = 0.75), followed by correctly storing vaccines at the right temperatures ( $\bar{x} = 4.18$ , SD = 0.79) and correctly following procedures for each type of vaccination ( $\bar{x} = 4.17$ , SD = 0.76). On the other hand, the three lowest ranking perceived competency scores were herd immunity threshold of diseases ( $\bar{x} = 3.47$ , SD = 0.90), performing shake tests ( $\bar{x} = 3.55$ , SD = 0.96) and Herd immunity or community immunity ( $\bar{x} = 3.57$ , SD = 0.90).

**Table 2** Factors related to the perceived competency regarding knowledge and skills of EPI staff

Variables	Perceived Competency Regarding Knowledge and Skills in EPI Service Provision	P-value
1.Age	0.048 <sup>a</sup>	p > 0.05
2.Duration of work in EPI service in Immunization	0.163 <sup>a</sup>	p < 0.01
3.Position	0.023 <sup>b</sup>	p > 0.05
4.Workshop Training Experience for EPI staff	0.325 <sup>b</sup>	p < 0.001

<sup>a</sup> Pearson Product Moment Correlation; <sup>b</sup>Spearman Rank Correlation

When the correlations between the personal factors and perceived competency regarding knowledge and skills and service provision in promoting disease prevention were compared, age and position were not found to be correlated with perceived competency in EPI service provision, with a statistical significance at 0.05. However, the factors of duration of work in EPI service and workshop training experience for EPI staff were found to be positively correlated with perceived competency in EPI service provision with a statistical significance ( $r = 0.163$ ,  $p < 0.01$  and  $r = 0.325$ ,  $p < 0.001$  respectively) (Table 2).

**Table 3** The correlations between the non-trained group and the trained group in workshops for EPI staff on level of perceived competency regarding knowledge and skills

Level of Perceived Competency Regarding Knowledge and Skills in EPI Service Provision	Training Experience in Workshops for Immunization Staff		Chi-square
	Non-Trained	Trained	
Low Perceived Competency	7(2.15%)	1(0.31%)	$\chi^2 = 36.348$
Moderate Perceived Competency	75(23%)	17(5.21%)	p < 0.001
High Perceived Competency	86(26.38%)	140(42.95%)	
<b>Total</b>	168(51.53%)	158(48.47%)	

The correlations between the level of perceived competency regarding knowledge and skills in EPI service provision were considered and divided into the following three levels: low perceived competency, moderate perceived competency, and high perceived competency, and workshop training experience for EPI staff. Perceived competency and training experience were found to share correlations, meaning that the trained and untrained groups differed with a statistical significance ( $p < 0.001$ ).

## **Discussion of the findings**

The present study was focused on the personal factors and perceived competency regarding the provision of the service of EPI staff members in immunization work and on comparing the characteristics affecting perceived competency regarding knowledge and skills in EPI service provision. The sample group of 326 subjects was selected from 6 regions nationwide and the study was conducted from February 2015 to February of 2016.

1. According to the discussion of the personal factors, the findings on the level of perceived competency regarding knowledge and skills in EPI service provision, the EPI staff were found to have a high level of perceived competency in EPI service provision ( $\bar{x} = 3.88$ ,  $SD = 0.64$ ). These finding concurred with national vaccination policy for the immunization strategy set forth for personnel development, promotion and drive for the use of workshops for EPI staff. These workshops have been held from 2011 to the present with a variety of strategies (Office of the Secretary-General, 2005). For example, there is an agency for regulating immunization standards using random observations to monitor practice, and the distribution of immunization handbooks for workshops in practice to accompany the provision of vaccination services. These workshops available for government, private and medical school agencies nationwide, including hospitals under the jurisdiction of the Ministry of the Defense, the Ministry of Justice and independent government agencies (Bureau of Policy and Strategy, 2013). Campaigns have been waged in many sectors with ongoing practice, such as training workshop programs for immunization from 2011 to the present. As a result, the EPI staff have gained awareness and have continued to monitor changes. Accordingly, these staff have perceived self-competency at a high level. This finding agrees with the data found in the literature, which discovered work involving immunization to be dynamic in line with epidemiology, such as the epidemiologic rate over the past five years (2009 - 2013), where the reports show that the number of patients with measles to be on the rise and measles epidemics to be periodic. Hence, a resolution was passed to adjust the MMR vaccination schedule by moving the second booster vaccination from seven years to 2.5 years (Bureau of General Communicable Diseases, 2015) and to change the vaccine for Japanese encephalitis (JE) to an attenuated vaccine in order to reduce the discomfort associated with the vaccine (Prommalikit et al., 2016). Therefore, the EPI staff need to constantly review their knowledge about vaccines.

When the data were considered individually, the top three perceived competency aspects of the EPI staff were reasoning that cannot vaccinate before appointment date ( $\bar{x} = 4.19$ ,  $SD = 0.75$ ), followed by correctly storing vaccines at the right temperatures ( $\bar{x} = 4.18$ ,  $SD = 0.79$ ), and correctly following procedures for each type of vaccination ( $\bar{x} = 4.17$ ,  $SD = 0.76$ ). These findings might have been due to the fact that 74.20 percent of the EPI staff members in the present study were composed of professional nurses that were the main part of the EPI staff in preparing and injecting vaccines. In addition, nurses were obviously confident about the questions involving the characteristics of direct practice. Therefore, they were confident about the aforementioned matters.

Other aspects in which the EPI staff had the lowest three levels of perceived competency regarding knowledge and skills in EPI service provision were as follows: 1) herd immunity threshold of diseases ( $\bar{x} = 3.47$ ,  $SD = 0.90$ ); 2) performing shake tests ( $\bar{x} = 3.55$ ,  $SD = 0.96$ ); and 3) herd immunity or community immunity ( $\bar{x} = 3.57$ ,  $SD = 0.90$ ). These findings might have been due to the fact that the competencies mentioned in the present study involved specific epidemiological knowledge about immunization. From the viewpoint of practice in the field of immunization in various service units, the emphasis is on practical skills. As for the data on the herd immunity and herd immunity threshold, various policies are used, such as campaigns for having people get vaccinated to meet set goals, etc. The shake test is a test of vaccine quality and directly involves the pharmacy department. The present study covered every role of the types of work or occupations of the EPI staff, which might have affected the low individual perceived competency scores in line with the aforementioned findings.

2. The study of the correlation between the personal factors and perceived competency regarding knowledge and skills in EPI service provision found the following.

The duration of working in the EPI was positively correlated with perceived competency regarding knowledge and skills. The duration of providing EPI services had an average of 7.14 years per person, while the period of time for working in immunization was until retirement. The immunization worker in Thailand had not specify in the position in each provision but Ministry of public health need the EPI fully integrated into all of the basic health services. For example, all of the community hospitals in the 926 districts in Thailand should provide immunization for all people with high quality (Muangchana, Thamapornpilas & Karnkawinpong, 2010). Thus, the EPI staff should be integrated the knowledge about immunization for manage their community with high vaccine coverage. The vaccine coverage had calculated from the amount of population and encourage people to receive the routine of immunization. Therefore, the EPI staff that have worked for a long time will gain more knowledge and skill in immunization, which agrees with the high score of perceived competency in the present paper. In addition, vaccines need to be kept in the cold chain to

maintain their quality. Therefore, the EPI staff should be certain that vaccines are stored and transported to other facilities according to the WHO's recommendations (National Vaccine Institute, 2018). Now, the vaccines in the expanded program for immunization in Thailand are of more than 9 types with several trade names, and for this reason the experience of working in the EPI will help them manage their vaccine practice effectiveness. Knowledge and skill with vaccine practice will provide EPI staff with greater confidence in their work.

In the present study, the experience of EPI training was positively correlated with the perceived competency in EPI service provision. These findings might explain the fact that receiving training provides necessary knowledge and skills. Regarding the details of the training courses, the courses were found to cover basic knowledge about immunization, vaccine-preventable communicable diseases, preparing registration reports, vaccine disbursement, the cold chain system, vaccine preparations and service provision, and post-vaccination observation. Furthermore, the training model or format promotes knowledge, adjusts attitudes, and offers opportunities to practice skills, which can result in perceived competency. Bandura's self-efficacy theory states that self-efficacy is the confidence of a person in practicing a particular behavior to be linked with goals until the person is successful in achieving the desired outcome. However, self-efficacy can increase, and this might depend on hands-on actions until success is achieved when a person witnesses a practice model, verbally motivated and both physically and emotionally ready to practice the desired behavior (Boeree, 2006). This finding is in line with the training workshops held for EPI staff; diseases for which content was prepared in each section were varied with explanations of the objectives for each training session. As a result, the trainees set goals together and learned by resolving simulated problematic situations. Thus, the trainees practiced problem-solving skills and had hands-on training. The trainees learned the cold chain system by using real equipment that gave them the opportunity to view models, thereby building greater confidence in providing vaccination services. Therefore, the perceived competency regarding knowledge and skills in EPI service provision was high. At each training session, pre- and post-training tests were performed in order to evaluate the participants' knowledge about immunization in line with standards. Hence, the EPI staff were confident in their ability to provide standardized immunization services. This finding is similar to that of a study of Widsanugorn et al. (2011), who conducted research with 117 EPI staff members from 90 service agencies in the province of Kalasin, Thailand in order to evaluate knowledge and skills in EPI service provision. According to the research findings, the EPI staff that had previously practiced their skills in proper training had higher scores than the EPI staff that had never received training with statistical significance at  $p < .001$ . This finding is also similar to that of a study by Uskun, Uskun, Uysalgenc, & Yagiz (2008), who stated the training intervention increased primary healthcare workers' knowledge about immunization

significantly at  $p < 0.01$ . Therefore, the fact that the EPI staff was able to provide immunization services supported the research hypothesis. Hence, it is essential that EPI staff possess perceived competency regarding knowledge and skills in EPI service provision. The findings of the present study revealed that a high mean score for perceived competency regarding knowledge and skills was correlated with training experience with a statistical significance. Further, when the mean score for perceived competency regarding knowledge and skills was considered among the groups, the groups with course training experience had higher mean scores than the non-trained groups with a statistical significance.

Other factors, such as age and job position, were not found to be correlated with perceived competency regarding knowledge and skills in EPI service provision. Hence, age was not correlated with perceived competency, possibly due to the fact that work involving immunization frequently undergoes changes in the person or persons responsible for the job. The ages of the workers when they began to work with vaccines were not equal because the Ministry of Public Health system involves a large group of people. Furthermore, the nature of the workers' jobs involving vaccines means work transfers for the sake of advancement in work positions. Therefore, workers are constantly coming and going, which might result in differing levels of perceived competency for EPI staff.

The types of jobs or occupations, such as nurses, public health scholars/employees, medical professionals, were not found to be correlated with perceived competency regarding knowledge and skills in EPI service provision because the research findings revealed the majority of the workers to be nurses at a rate of 74.20 percent. Furthermore, the content of the courses on EPI service provision was not officially included in any courses about public health or medicine. The content of the courses was concerned with vaccines in concurrence with data obtained from reports on capacity building programs for EPI staff in 2015 (Faculty of Nursing, Thammasat University, 2015). Previous findings have discovered that 96 percent of trainees fail to pass the immunization courses, even though the trainees have a variety of work or occupation types.

### **Limitation of the study**

Because the majority of the subjects worked in nursing the sample may not be representative of the actual population.

### **Recommendations**

1. Policy should be set for staff members working with vaccines to receive training as a means of getting them ready to work, because once perceived competency regarding knowledge and skills can be achieved, they will engage in behavior confidently and be able to perform immunization work correctly.

2. Policy should be set for encouraging the staff members to remain in the EPI service as long as possible because the longer that the staff works in the EPI service, the higher their level of perceived competency regarding knowledge and skills will be.

3. Studies should be conducted with groups of service recipients regarding their opinions about the knowledge and skills of EPI staff.

4. Ongoing studies should be conducted on the topic of evaluating service provision behavior apart from measuring perceived competency regarding knowledge and skills.

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