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# Public health nurses' demographic factors and level of awareness as determinants to safe vaccine administration

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ABSTRACT

It was reported that vaccine misconceptions, lack of knowledge, and inaccurate conceptions were relatively common to healthcare workers. The study aims to assess public health nurses' level of awareness on safe vaccine administration. This descriptive-correlational study was conducted in the 44 community health centers in the municipalities of Lanao Del Sur Province, Philippines. This includes 200 public health nurses who were selected using proportionate sampling. The self-made survey questionnaire was adopted from the Philippines' Department of Health (DOH) and the World Health Organization (WHO) about safe immunization practices. It utilized SPSS version 24 software to statistically compute for frequency and percentage distribution, mean, standard deviation, and Chi-square test. Most of the public health nurses as respondents of the study are females, Bachelor degree holders in Nursing, have 1-3 years of experience, and lastly have not attended any seminar/training regarding safe vaccine administration. Most of the public health nurses in Lanao Del Sur Province have a high level of awareness of safe vaccine administration ($\bar{x}$=2.86, SD±47.23). A significant relationship was found between a number of pieces of training and vaccine transportation ($r^2$ 6.065; $p$=0.005) and education and vaccine preparation ($r^2$ 7.407; $p$=0.025) among public health nurses. A regular staff training course is highly recommended to improve the public health nurses' level of knowledge about immunization.



## 1. Introduction

According to the WHO (2010), the Philippines continues to witness outbreaks of emerging infectious diseases, including epidemic-prone communicable diseases such as polio, dengue, cholera, and measles among others. Meanwhile, the Philippines continues to face health security threats from re-emerging communicable diseases.

Immunization is the best method for preventing morbidity and mortality related to infectious illness from vaccine-preventable diseases (Bowling, 2018). Also, vaccination is the single most important public health measure and most beneficial important precautionary tool that allows nurses to help protect the population from serious infectious and communicable diseases (Fagundes et al., 2018). The accumulation of immunization programs globally includes eradication and control of smallpox, poliomyelitis, diphtheria, pertussis, tetanus, measles, and rubella. However, public health-related concerns regarding the safety and effectiveness of vaccines have increased remarkably (Pickering et al., 2009). The awareness and practices of immunization among nurses were found to be inadequate (Hadaye et al., 2018).

In a certain study, it was reported that vaccine misconceptions, lack of knowledge, and inaccurate conceptions were relatively common to public health workers (Salmon et al., 2004; Goins et al., 2007). Some healthcare workers are unaware of the seriousness of vaccine-preventable diseases, which

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makes the unimmunized child very susceptible to life-threatening infectious diseases (Salmon et al., 2004). In low and middle-income countries, immunization rates are influenced by restricted and lack of access to safe immunization (Goins et al., 2007). Furthermore, issues like an unreliable cold chain, unsterile technique, inadequate vaccine storage, insufficient supplies, and lack of expertise on vaccine administration have resulted in negative health and economic outcomes (Bajnok et al., 2018). Thus, experts overwhelmingly agree that awareness and understanding of the indications, benefits, and risks of a particular vaccine before it is administered to a patient are essential (Talbot and Schaffner, 2010). Therefore, the study revealed that professional competence constantly emanates from suitable knowledge (Feliciano et al., 2020).

Expanded programs on vaccination is a vital aspect of maintaining the trust of the general population in our national health program. Close monitoring of the safety and efficacy of vaccines also protects the public's health and contributes to safer immunization practices (Pickering et al., 2009). The majority of vaccines are given during infancy, which highlights public health nurses' roles of anticipatory guidance, surveillance, and health advocacy (Bowling, 2018).

Specifically, public health nurses play an integral role in monitoring the child's status, ensuring safe administration of vaccines, delivering vaccination programs, pioneering in immunization education, and implementing vaccine mandate policies (Fagundes et al., 2018; Bowling, 2018; Navin et al., 2019; Salmon et al., 2004).

Nurses' involvement and engagement in the full spectrum of immunization activities play a vital role in primary health care and serves as a key strategy for improving global immunization rates. The critical roles of nurses include awareness-raising, public advocacy about the importance of immunization, health education, dispelling myths, scheduling individuals for vaccination, administering vaccinations, and supervising vaccination programs. Thus, nurses' awareness level can influence vaccination rates globally (Bajnok et al., 2018). This prompted the researchers to come up with a research entitled "Public Health Nurses' Demographic Factors and Level of Awareness as Determinants to Safe Vaccine Administration" which aims to assess the level of awareness of public health nurses regarding safe vaccine administration.

### 1.1. Theoretical framework

The conceptual study framework was adapted to Nola Pender's Health belief model, which states the importance of adherence to health-promoting behaviors and the likelihood or commitment of taking the recommended health actions (Mejia et al., 2019a).

As an application to the study, it focuses on the level of awareness of safe vaccine administration among public health nurses. Furthermore, nurse's level of awareness of safe vaccine administration is adapted from the behavior-specific cognition aspect of the said model by Pender, which includes the perceived benefit of the action, the perceived barrier to action, self-efficacy, and activity-related effect.

### 1.2. Research objectives

- Identify the demographic factors of public health nurse respondents in terms of sex, highest educational attainment, pieces of training and seminars on immunization, and the number of years in service.
- Determine the public health nurses' level of awareness to safe vaccine administration in terms of schedules, potency, temperature, storage, vaccine transportation, dosage, preparations, route, and site.
- Test the presence of a significant relationship between demographic factors and public health nurses' level of awareness on safe vaccine administration.

### 1.3. Hypothesis

The following hypothesis is considered in this study.

**$Ho_1$:** There is no significant relationship between demographic factors and public health nurses' level of awareness on safe vaccine administration.

## 2. Materials and methods

### 2.1. Study design

The design of the study utilized non-experimental quantitative research using a descriptive-correlational approach. This design was used to describe variables in a certain phenomenon (Polit and Beck, 2018) that aims to describe the level of awareness of public health nurses regarding safe vaccine administration.

### 2.2. Setting and sample

The study was conducted in 44 community health centers (which includes rural health units and barangay health stations) in the selected municipalities of Lanao del Sur Province, Philippines. Specifically, it includes the municipalities of Saguiaran, Buadipuso Buntong, Marantao, Bubong, Piagapo, Kapai, and Tagoloan.

The respondents of the study were the selected 200 public health nurses who were selected using proportionate sampling. Proportionate stratified sampling is a sampling strategy used when selecting subjects in proportion/relative to the size of the stratum in the entire population (Polit and Beck, 2018). Thus, samples were proportionately taken for each municipality in Lanao Del Sur, Philippines.

Meanwhile, sample selection using inclusion and exclusion criteria were not utilized in the study.

### 2.3. Measurement/instrument

The self-made survey questionnaire was adopted from the Philippines' Department of Health (DOH) and the World Health Organization (WHO) about safe immunization practices.

The questionnaire was divided into two parts, namely: 1) respondent's demographic profile; 2) public health nurses' level of awareness on patients' safety about safe vaccine administration in terms of schedules, potency, temperature, storage, vaccine transportation, dosage, preparations, route, and site.

Moreover, a summated rating scaling was used to determine, understand, and explore the relationship of the variables under study. Accordingly, a mean score of 2.61-3.00 is interpreted as "Very High Awareness," 2.21-2.60 means "High Awareness," 1.81-2.20 mean score reflects "Moderate Awareness", 1.41-1.80 means "Low Awareness", and 1.00-1.40 is interpreted as "Very Low Awareness."

Furthermore, the adapted questionnaire underwent face, construct, and content validation by five (5) experts in the nursing profession and public health. Furthermore, pilot testing was conducted to 25 public health nurses, who were then excluded from the actual research sample. Afterward, the survey questionnaire was tested for reliability and obtained a 0.91 Cronbach Alpha score.

### 2.4. Data collection procedure

A letter of permission to conduct the research study was secured and supervised under the administration of the Integrated Provincial Health Office located in Lanao Del Sur Province, Philippines. Next, researchers purposively select the respondents for this research using inclusion criteria. Afterward, the researchers secured inform consent from the respondents. A survey questionnaire was administered to the selected respondents (public health nurses), which they need to accomplish within a 1-week duration. Then, the researchers retrieved the questionnaires right after it was completely answered. More so, data gathered were tallied, tabulated, and interpreted. Data gathering was conducted from December 2018 to March 2019.

### 2.5. Data analysis

Software Packages for Social Sciences (SPSS) version 5.0 was utilized in the study. Specifically, descriptive statistics such as frequency and percentage distribution were used in determining public health nurses' demographic profile. Whereas weighted mean and standard deviation were used for public health nurses' level of awareness to safe vaccine administration. A chi-square test was used to examine the relationship between two categorical variables (Polit and Beck, 2018). Thus, it determines the existence of a relationship between the level of awareness and satisfaction rate for public health nurses' level of awareness to safe vaccine administration practices.

## 3. Results

Table 1 depicts the public health nurses' demographic factors. Accordingly, majority of the public health nurse respondents are females (n=85 or 85.0%), Bachelor degree holders in Nursing (n=86 or 86.0%), have 1-3 years of experience (n=50 or 50.0%) and lastly have not attended any seminar/training regarding safe vaccine administration (n=52 or 52.0%).

**Table 1:** Registered nurses' demographic factors

| Demographic Profile | | *F* | % |
|---|---|---|---|
| Gender | Male | 30 | 15.0 |
| | Female | 170 | 85.0 |
| Educational Attainment | Bachelor | 172 | 86.0 |
| | Master | 24 | 12.0 |
| | Doctorate | 4 | 2.0 |
| Length of experience | Less than 1 year | 34 | 17.0 |
| | 1-3 years | 100 | 50.0 |
| | 3-5 years | 36 | 18.0 |
| | 5-10 years | 18 | 9.0 |
| | More than 10 years | 12 | 6.0 |
| Number of Training Attended | No training | 104 | 52.0 |
| | One training | 66 | 33.0 |
| | Two pieces of training | 18 | 9.0 |
| | Three pieces of training | 6 | 3.0 |
| | Four pieces of training | 6 | 3.0 |
| TOTAL | | 200 | 100.0 |

Table 2 presents the public health nurses' level of awareness of safe vaccine administration. Generally, most public health nurses in Lanao Del Sur Province have a high level of awareness of safe vaccine administration ($\bar{x}$=2.86, SD±47.23). Specifically, respondents have a high level of awareness in terms of route and site ($\bar{x}$=2.99, SD±56.53), vaccine preparation ($\bar{x}$=2.94, SD±52.51), dosage ($\bar{x}$=2.93, SD±52.43), potency ($\bar{x}$=2.82, SD±44.27), schedule ($\bar{x}$=2.81, SD± 43.95), temperature ($\bar{x}$=2.80, SD±42.68), storage ($\bar{x}$=2.80, SD±43.82), and lastly vaccine transportation ($\bar{x}$=2.77, SD±41.64).

**Table 2:** Public health nurses' level of awareness to safe vaccine administration

| Indicators for Safe Vaccine Administration | Mean | SD | Level of Awareness |
|---|---|---|---|
| Schedule | 2.81 | 43.95 | Very high level |
| Potency | 2.82 | 44.27 | Very high level |
| Temperature | 2.80 | 42.68 | Very high level |
| Storage | 2.80 | 43.82 | Very high level |
| Vaccine Transportation | 2.77 | 41.64 | Very high level |
| Dosage | 2.93 | 52.43 | Very high level |
| Preparation | 2.94 | 52.51 | Very high level |
| Route and site | 2.99 | 56.53 | Very high level |
| TOTAL | 2.86 | 47.23 | Very High |

1.00-1.40 Very Low Awareness; 1.41-1.80 Low Awareness; 1.81-2.20 Moderate Awareness; 2.21-2.60 High Awareness; and 2.61-3.00 Very High Awareness

Table 3 depicts the test of the relationship between demographic factors and public health

nurses' level of awareness of safe vaccine administration. Chi-square correlation reported that the following demographic factors are significantly correlated with public health nurses' level of awareness of safe vaccine administration domains. Specifically, the results of the study showed a significant correlation between the number of pieces of training and vaccine transportation ($r^2$ 6.065; $p$=0.005) and lastly, education and vaccine preparation ($r^2$ 7.407; $p$=0.025).

**Table 3:** Test of the relationship between demographic factors and public health nurses' level of awareness to safe vaccine administration

| Demographic Profile | Safe Vaccine Administration | Chi-square value ($r^2$) | $p$-value |
|---|---|---|---|
| Sex | Schedule | 2.580 | 0.161 |
| Education | | 0.857 | 0.652 |
| Years in Service | | 2.718 | 0.606 |
| Number of Training | | 2.098 | 0.835 |
| Sex | Potency | 0.003 | 0.718 |
| Education | | 2.059 | 0.357 |
| Years in Service | | 5.575 | 0.233 |
| Number of Training | | 4.492 | 0.481 |
| Sex | Temperature | 0.043 | 0.656 |
| Education | | 5.444 | 0.066 |
| Years in Service | | 2.251 | 0.690 |
| Number of Training | | 2.632 | 0.756 |
| Sex | Storage | 3.595 | 0.079 |
| Education | | 0.476 | 0.788 |
| Years in Service | | 3.524 | 0.474 |
| Number of Training | | 3.657 | 0.600 |
| Sex | Vaccine Transportation | 0.038 | 0.602 |
| Education | | 1.368 | 0.505 |
| Years in Service | | 6.065 | 0.194 |
| Number of Training | | 16.709 | 0.005** |
| Sex | Vaccine Preparation | 0.178 | 0.850 |
| Education | | 7.407 | 0.025** |
| Years in Service | | 4.602 | 0.331 |
| Number of Training | | 0.932 | 0.968 |

**Correlation is statistically significant if p < 0.05 level

## 4. Discussion

Study findings revealed that "most public health nurses in Lanao Del Sur Province have a high level of awareness to safe vaccine administration." This implies the public health nurses are always aware of the importance of safe vaccine administration in terms of schedule, potency, temperature, storage, vaccine transportation, dosage, preparations, route, and site. First is a high level of awareness of safe vaccine administration in terms of "vaccine schedule." This study finding was consistent with studies in the United States and Australia. Accordingly, Ohio nurses routinely practice anticipatory guidance and provided parents with written information about the specific immunizations planned for the next appointment. Being given a written plan enables parents the time to review the vaccine information and be more involved in the decision-making process. Thus, it facilitates adherence to the recommended schedule for immunizations (Bowling, 2018). Likewise, public health staff nurses in Michigan demonstrated adequate knowledge and a sympathetic attitude about vaccine schedules (Navin et al., 2019). Specifically, community nurses are 'active' in following-up children due and overdue for vaccines (Mahony et al., 1999). Next is a high level of awareness of safe vaccine administration in terms of "vaccine potency" and "temperature." A certain study discussed that nurses working in the public health centers were reported to have satisfactory knowledge scores in regards to vaccine storage, handling, and cold chain (El Shazly et al., 2016). Public health nurses' awareness, understanding, and practices are strong determinants in preventing vaccine adverse events. Sufficient knowledge in the cold chain system, proper handling, and safe administration of vaccines are substantial to maintain the vaccine's potency and effectiveness (El Shazly et al., 2016). Fourth is a high level of awareness among public health nurses to safe vaccine administration in terms of "storage." The vaccine requires a dependable technique of stock rotation and must be stored securely in a controlled climatic atmosphere. The first expiry, first-out (FEFO) stock rotation, helps ensure that older stock is used up first than the new stock. Correct FEFO rule safeguards that vaccine potency is maintained and preserved to the greatest extent possible. Also, proper storage must have minimal exposure to extreme heat and light. Furthermore, appropriate vaccine storage is essential for some vaccines which lose their potency when exposed to heat, light, and humidity. Thus, all vaccines should be stored either in the freezer or body of the refrigerator to preserve its potency (Jamison et al., 2006). The fifth is a high level of awareness among public health nurses to safe vaccine administration in terms of "vaccine transportation." The study finding is consistent with studies in India and New York. A study in India has cited that vaccine handling at the outreach sessions is needed to ensure optimal service delivery (Das et al., 2018). A study in New York has cited that vaccines are delicate products that are destroyed easily if handled inappropriately. Vaccine management involves vaccine transport and distribution from the manufacturers to the patients. Dimensions of vaccine management include distribution, storage, handling, and transport management (Jamison et al., 2006). Lastly, is a high level of awareness among public health nurses to safe vaccine administration in terms of "dosage," "preparations," "route" and "site" which is supported by a study in Egypt which revealed that community health nurses have higher knowledge score in regards to vaccine preparation, handling, administration, scheduling, dosage, routes, and contraindications of the different vaccines routinely used for children under 5 years of age in public health center facilities (El Shazly et al., 2016). In general, the majority of public health nurses in Lanao Del Sur Province have a high level of awareness of safe vaccine administration. Thus, nurses must be adequately and well-prepared in safe vaccine

administration. The public health nurses' level of preparedness to immunize will result in the largest increases in vaccination rates. The higher the preparedness means the higher the success rates of vaccination. Several factors were attributed to the preparedness of nurses, which include providing immunization information, education, assessment, administration, prescribing, and advising on immunization policy and programs. Thus, it is highly likely that preparedness has positively influenced both nurses' competence and confidence to promote immunization resulting in a positive impact on vaccination rates (Bajnok et al., 2018).

On the contrary, the study finding that "most of the public health nurses in Lanao Del Sur Province have a high level of awareness to safe vaccine administration" is not consistent with studies in India and the United States. Vaccine awareness is necessary to plan preventive measures related to vaccination. However, the awareness and practices of immunization among nurses were found to be inadequate. Specifically, the majority of Indian nurses are not aware and could not answer the correct doses, availability, and cost of these vaccines (Hadaye et al., 2018). In a certain study in Tennessee, it was reported that vaccine misconceptions, lack of knowledge, and inaccurate conceptions were relatively common to healthcare workers (Goins et al., 2007). Also, misconceptions about vaccination are common in school nurses in Maryland. Some health care personnel seem to be unaware of the seriousness of vaccine-preventable diseases, which makes the unimmunized child highly susceptible to diseases (Salmon et al., 2004). Moreover, the large proportion of the population in Western Australia considers that the information provided regarding vaccines provided by health professionals is not adequate. This perception is associated with negative attitudes toward vaccination. Thus, inadequate knowledge of the general population to vaccine-related information can be attributed to the lack of on-going nursing immunization education provided by the community health nurses (Mahony et al., 1999).

The results of the study showed a significant relationship was found between nurses' demographic profile (education and number of training attended) and level of awareness to safe vaccine administration (vaccine preparation and transportation). Education, knowledge, and practice about vaccine administration are substantial. Community nurses are knowledgeable about vaccine administration and must administer vaccines appropriately to children (Mahony et al., 1999). A certain study in Egypt found out that nurses who have higher educational attainment (bachelor degree in nursing) were reported to have a higher knowledge score in regards to vaccine preparation compared to diploma graduate nurses. Indeed, knowledge, skills, and abilities are necessary to perform a task and cultivate one's clinical performance (Feliciano et al., 2019a). In addition, nurses who received a regular training course about immunization were reported to have a satisfactory knowledge score in regards to vaccine handling and transportation (El Shazly et al., 2016). The lack of vigilance, inadequate training, and equipment failure are all contributed to vaccine failures. Not receiving a good education and training is becoming an issue of significant importance. Lack of fundamental training among nurses can make them feel unprepared to carry out specific skills, thus requiring specialized knowledge (Mejia et al., 2019b). Thus, it emphasized that training and basic education must be mandated to be received by public health nursing staff (Navin et al., 2019; Feliciano et al., 2019b). The training and experiences of nurses play a vital role in immunization education (Navin et al., 2019). Personnel-trained nurses in vaccine safety act as a valuable source of immunization information and education for parents. Health personnel who received proper training should serve as the primary contacts for parents regarding vaccination controversies and issues (Salmon et al., 2004). This required nurses to undergo proper training to make provisions for safe vaccination administration (Bajnok et al., 2018). In this connection, in-service training is significantly associated with the improvement of rural health unit nurses' level of knowledge and awareness, which later on promotes a positive attitude towards the care of patients (Sadang et al., 2019). The need for public health nurses to assess their knowledge about safe vaccine administration can help them becomes aware of the situation and to make appropriate/relevant interventions (Osman et al., 2019).

## 5. Conclusion and recommendations

Most of the public health nurses as respondents of the study are females, Bachelor degree holders in Nursing, have 1-3 years of experience, and lastly have not attended any seminar/training regarding safe vaccine administration. Most of the public health nurses in Lanao Del Sur Province have a high level of awareness of safe vaccine administration. A significant relationship was found between the number of training and vaccine transportation and education and vaccine preparation among public health nurses.

A regular staff training course is highly recommended to improve the public health nurses' level of knowledge about immunization. Furthermore, the study recommends the need to assess other areas/aspects like technical skills competency, knowledge, self-efficacy in performing vaccine administration must be explored. Maintaining high vigilance, regular equipment maintenance, and having adequate supplies are important components of safe vaccine administration. Additional public-information campaigns regarding misconceptions, unwanted beliefs, poor perception, and lack of awareness of the value of vaccination may be needed. Health literacy, such as public information/campaigns about

vaccination, must be strengthened. Currently, the limitation of the study was its locale because it was only conducted in 7 municipalities. The need to assess the public health nurses' level of awareness to safe vaccine administration in the other 32 municipalities must be conducted in future studies.

## Acknowledgment

Special appreciation to all the public health nurses in Lanao Del Sur Province who participated in the study.

## Compliance with ethical standards

## Ethical consideration

The ethical guidelines and standards in conducting research were scrutinized by the College of Health Sciences-Graduate Studies Ethics Committee of Mindanao State University with a letter-number of CHSGS/2019105243702. Thus, all information provided by the respondents was kept with strict confidentiality.

## Informed consent

Informed consent was secured from all public health nurses who have participated in the study.

## Conflict of interest

The authors declare that they have no conflict of interest.

## References

Bajnok I, Shamian J, Catton H, Skinner T, and Pavlovic T (2018). The role of nurses in immunization: A snapshot of OECD countries. International Council of Nurses, Geneva, Switzerland.

Bowling AM (2018). Immunizations-nursing interventions to enhance vaccination rates. Journal of Pediatric Nursing, 42: 126-128. https://doi.org/10.1016/j.pedn.2018.06.009 **PMid:30220374**

Das MK, Arora NK, Mathew T, Vyas B, Sindhu M, and Yadav A (2018). Documentation of vaccine handling and service delivery at outreach immunization sessions across 27 districts of India. Heliyon, 4(12): e01059. https://doi.org/10.1016/j.heliyon.2018.e01059 **PMid:30582062 PMCid:PMC6298194**

El Shazly HM, Khalil NA, Ibrahem RA, and Wahed SAA (2016). Knowledge and practice of healthcare providers as regards routine children vaccination in primary healthcare facilities of Quewisna District, Menoufia Governorate. Menoufia Medical Journal, 29(4): 1018-1024.

Fagundes dSL, Frota OP, and Silva EM (2018). Nursing practices in vaccination: An integrative review. Journal of Nursing Education and Practice, 8(8): 128-136. https://doi.org/10.5430/jnep.v8n8p128

Feliciano A, Feliciano E, Mejia PC, Boshra A, Feliciano JR, Osman A, and Alsharyah H (2019a). Exploring the practices employed by nurses in stethoscope care. International Journal of Allied Medical Sciences and Clinical Research, 7(2): 385-395.

Feliciano AZ, Feliciano EE, Feliciano JRD, and Fernandez ZS (2020). Philippine professional core competencies' impact on nurses' key performance indicators (KPIs) for patient safety outcomes. International Journal of Advanced and Applied Sciences, 7(1): 1-5. https://doi.org/10.21833/ijaas.2020.01.001

Feliciano EE, Boshra AY, Mejia PCG, Feliciano AZ, Alsharyah HM, Malabanan MC, and Osman A (2019b). Understanding Philippines nurses' competency in the delivery of healthcare services. Journal of Patient Care, 5: 146. https://doi.org/10.4172/2573-4598.1000146

Goins WP, Schaffner W, Edwards KM, and Talbot TR (2007). Healthcare workers' knowledge and attitudes about pertussis and pertussis vaccination. Infection Control and Hospital Epidemiology, 28(11): 1284-1289. https://doi.org/10.1086/521654 **PMid:17926280**

Hadaye RS, Shastri S, and Lavangare SR (2018). A cross-sectional study to assess the awareness and practices related to adult immunization among nursing students in a metropolitan city. Journal of Education and Health Promotion, 7: 129. https://doi.org/10.4103/jehp.jehp_55_18 **PMid:30505857 PMCid:PMC6225393**

Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, and Musgrove P (2006). Disease control priorities in developing countries. The World Bank, Washington, USA. https://doi.org/10.1596/978-0-8213-6179-5

Mahony A, Percival P, and Condon R (1999). Vaccine know-how: Kimberley immunisation study: Community nurses immunisation education, knowledge and practice. Collegian, 6(2): 16-22. https://doi.org/10.1016/S1322-7696(08)60325-X

Mejia PC, Feliciano EE, Feliciano AZ, Sadang JM, Pangandaman HK, Garcia LL, Al-Noaemi MC, Abdelhafiz IM, Breboneria BL, ElRazkey JY, Albougami A, and Lorica JD (2019a). The effectiveness of health education and lifestyle program in improving the blood pressure of hypertensive patients. International Journal of Advanced and Applied Sciences, 6(11): 21-29. https://doi.org/10.21833/ijaas.2019.11.004

Mejia PC, Osman A, Yngente AK, and Feliciano E (2019b). The relationship between professional nursing competencies and key performance indicators (KPIs) for patient safety outcomes among the Filipino staff nurses in selected private secondary hospitals in the Philippines. European Journal of Pharmaceutical and Medical Research, 6(1): 404-409.

Navin MC, Kozak AT, and Deem MJ (2019). Perspectives of public health nurses on the ethics of mandated vaccine education. Nursing Outlook, 68(1): 62-72. https://doi.org/10.1016/j.outlook.2019.06.014 **PMid:31375346**

Osman A, Mejia PCG, Feliciano E, Younis A, and Yngente AKN (2019). Smoking effects on health: Knowledge of nursing students in Alquwaiyah city. International Journal of Allied Medical Sciences and Clinical Research, 7(1): 247-254.

Pickering LK, Baker CJ, Freed GL, Gall SA, Grogg SE, Poland GA, and Zimmerman RK (2009). Immunization programs for infants, children, adolescents, and adults: Clinical practice guidelines by the Infectious Diseases Society of America. Clinical Infectious Diseases, 49(6): 817-840. https://doi.org/10.1086/605430 **PMid:19659433**

Polit DF and Beck CT (2018). Essentials of nursing research: Appraising evidence for nursing practice. 9th Edition, Wolters Kluwer Health/Lippincott Williams, and Wilkins, Philadelphia, USA.

Sadang JM, Mala ND, and Mejia PCG et al. (2019). Nurses' preparedness in responding to patients with suspected sexually transmitted infections in the rural health unit. International Journal of Advanced and Applied Sciences, 6(9): 31-37. https://doi.org/10.21833/ijaas.2019.09.005

Salmon DA, Moulton LH, Omer SB, Chace LM, Klassen A, Talebian P, and Halsey NA (2004). Knowledge, attitudes, and beliefs of school nurses and personnel and associations with nonmedical immunization exemptions. Pediatrics, 113(6): e552-e559. https://doi.org/10.1542/peds.113.6.e552 **PMid:15173536**

Talbot TR and Schaffner W (2010). On being the first: Virginia mason medical center and mandatory influenza vaccination of healthcare workers. Infection Control and Hospital Epidemiology, 31(9): 889-892. https://doi.org/10.1086/656211 **PMid:20653446**

WHO (2010). Communicable diseases. World Health Organization, Geneva, Switzerland. Available online at: https://bit.ly/2zBOCG8