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# Understanding Infection Control among Healthcare Workers: Insights from Rural Health Units in the Philippines

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**ABSTRACT**
Healthcare workers (HCWs) are vital in the response to the pandemic; however, their frequent and direct contact with patients considerably increases their vulnerability to infections.This emphasizes the importance of identifying key infection risk factors and ensuring the implementation of appropriate preventive strategies. This study focuses on the importance of infection control among healthcare workers (HCWs) to prevent healthcare-associated infections (HAIs), particularly in rural settings.The research seeks to examine the knowledge, attitudes, and practices (KAP) of healthcare workers (HCWs) regarding infection control protocols, particularly emphasizing the utilization of personal protective equipment (PPE) during the COVID-19 pandemic in the Rural Health Units of the Philippines. The objectives of the study include evaluating the HCWs' preparedness and adherence to infection control protocols, identifying gaps in their KAP, and informing strategies to improve infection prevention practices in rural healthcare settings. Using a descriptive-correlational research design, the study surveyed 126 healthcare workers at the rural health units of the Province of Biliran, Philippines. The findings showed that most respondents were young, female, midwives, and held a bachelor's degree. While a significant portion of the participants demonstrated a strong understanding on COVID-19 prevention and positive attitudes toward infection control, many only often practiced CoViD-19 prevention measures. A significant relationship was found between educational attainment and knowledge and attitude toward infection control. The study highlights the urgent need for targeted interventions to improve infection control practices in rural healthcare facilities. These measures are essential to ensure the safety and effectiveness of healthcare delivery in these settings, particularly in light of ongoing public health challenges, such as the COVID-19 pandemic.

**KEYWORDS**
attitude, knowledge, health care workers, practices, CoViD-19 , rural health unit

## 1. Introduction

The COVID-19 pandemic stands as one of the most significant public health emergencies in recent history. Emerging from China, this disease has quickly spread across nearly every nation, raising widespread alarm due to the swift increase in cases. The urgent need to control the outbreak and reduce transmission rates has garnered global attention and action Since the World Health Organization (WHO) declared COVID-19 a pandemic in 2020, the virus has affected the lives of individuals across all socioeconomic classes and in every nation.

The rapid transmission and severity of COVID-19 have posed unprecedented challenges for healthcare personnel across the globe (Temsah et al., 2020). As frontliners in managing the outbreak, healthcare workers are at heightened risk of infection, which raises significant concerns about their safety. This makes it essential to identify and address the risk factors associated with infection to ensure effective prevention measures. Proper infection control begins with a thorough understanding of these risks and the implementation of appropriate protective strategies. In the Philippines, 36 healthcare workers from both hospitals and rural health centers, particularly in Biliran Province were recorded to have contracted the virus (DOH, 2021). This highlights the necessity of evaluating healthcare workers' knowledge, attitudes, and practices (KAP) in these regions to gain a deeper insight into the factors that contribute to the transmission of COVID-19. Understanding these elements is crucial for developing targeted interventions and improving public health strategies.

Previous studies have shown that healthcare workers' understanding of COVID-19 directly influences their attitudes and practices, and poor adherence to protective measures can significantly increase the risk of infection (Zhang et al., 2020). Identifying gaps in knowledge and behavior is crucial for shaping relevant training and policies that prioritize healthcare workers' protection and reduce their exposure to the virus. While similar studies have been conducted in other countries, no such research has been carried out in the Province of Biliran, Philippines. This study seeks to address that gap by examining the KAP of healthcare workers in the rural health centers concerning COVID-19 prevention. Using a descriptive-correlational research design and an adapted survey questionnaire, the study provides insights into the current state of healthcare workers' preparedness. The findings underscore the need for a targeted action plan to enhance their awareness, attitudes, and practices in preventing the spread of the virus.

### 2. Objectives

This study seeks to examine the knowledge, attitudes, and practices (KAP) of healthcare workers at the Rural Health Units in Biliran Province, Philippines, concerning COVID-19 prevention. Furthermore, it aims to explore the interrelationships between these variables, offering crucial insights into how healthcare professionals in rural areas comprehend and apply infection control protocols.

### 3. Scope and Methodology

The researchers employed a descriptive-correlational research design, utilizing a modified standardized survey questionnaire to evaluate the knowledge, attitudes, and practices (KAP) of healthcare workers regarding COVID-19 prevention at selected Rural Health Units in Biliran, Province Philippines. This study, conducted from May 2020 to June 2021, aimed to explore the relationships between these variables among 126 healthcare workers in the Province of Biliran, Philippines. A purposive sampling method was used to select respondents, with inclusion criteria requiring participants to be residents of Biliran, actively employed at the Rural Health Unit during the study period, and willing to participate. Individuals who did not meet these criteria, including students who declined to participate, were excluded.

The study adopted survey tools from two previous studies: “Knowledge, Attitude, and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study” by Al-Hanawi et al. (2020) and “Knowledge, Attitude, and Practices Towards COVID-19 Among Chronic Disease Patients at Addis Zemen Hospital, Northwest Ethiopia” by Akalu et al. (2020). The modified questionnaire comprised 46 questions across four sections. The first section gathered demographic information, including age, gender, marital status, religion, occupation, educational attainment, and years of service. The second section consisted of 20 true-or-

false items assessing respondents' knowledge of COVID-19 prevention. The third section included eight items evaluating attitudes towards COVID-19 prevention, measured on a 4-point Likert scale. Finally, the fourth section contained 11 items regarding respondents' practices in preventing COVID-19, also assessed via a 4-point Likert scale.

Transmittal letters were sent to relevant authorities, including the Dean of the School of Nursing and Sciences, the municipal mayors of Biliran Province, and municipal health officers, to obtain permission for the study prior to data collection. Upon approval, a list of potential respondents was obtained. The researchers personally distributed the questionnaires and secured informed consent from the participants. Data confidentiality was maintained throughout the process, with results intended to enhance nursing care quality. The completed questionnaires were collected on the same day of distribution. Subsequently, data were organized, analyzed, tabulated, interpreted, and presented using statistical methods, including frequency counts, percentages, total scores, weighted means, and correlation coefficients.

**4. Literature Review**

The literature emphasizes the vital importance of infection control in healthcare environments, especially concerning healthcare workers (HCWs) who are crucial in preventing healthcare-associated infections (HAIs). Implementing effective infection prevention strategies can substantially decrease infection rates, benefiting both patients and healthcare providers (WHO, 2020). The Knowledge, Attitudes, and Practices (KAP) framework is commonly employed to assess the impact of health education, indicating that higher knowledge among HCWs is linked to more positive attitudes and better infection control practices (Zhang et al., 2020).

Studies show that HCWs in rural regions encounter distinct challenges, such as limited resources and insufficient training, which can negatively affect their adherence to infection control protocols (Cruz, et al., 2019). Despite an increasing number of studies on infection control, there is a significant lack of research focusing specifically on rural healthcare workers in the Philippines. Most existing studies have concentrated on urban hospitals, leaving a gap in understanding the implementation of infection control measures in rural health centers (DOH, 2021). This gap is critical since rural health units often serve as the first point of contact for patients, making effective infection control essential for public health.

To address this gap, the study aims to investigate the KAP of HCWs in rural health units in Biliran Province, Philippines, specifically regarding COVID-19 prevention. It will explore the relationships between these variables, ultimately offering insights to improve infection control practices in rural healthcare settings.

## 5. Result and Discussion

The study's findings encompass respondents' socio-demographic characteristics, along with their knowledge, attitudes, and practices regarding COVID-19 prevention. Additionally, the analysis explores the relationships between these variables to deepen understanding of the factors that shape healthcare workers' infection control behaviors within the pandemic context. This thorough assessment sheds light on how various elements influence healthcare workers' approaches to managing COVID-19 risks in their specific setting.

**I. Socio-demographic Profile of the Respondents**

The findings reveal that a considerable proportion of respondents (38.5%) are aged 30 or younger. The demographic profile shows that the majority are female (92.3%) and married (69.2%), with Roman Catholicism as the predominant religious affiliation (46.2%). Among the respondents, 34.6% are midwives, and a substantial majority hold at least a college degree (84.6%). Furthermore, 69.2% of the respondents have less than ten years of service in the healthcare field.

**II. Knowledge on COVID-19 Prevention**

Regarding the second objective, which involved evaluating the respondents' knowledge of COVID-19 prevention, the results indicate that most participants scored between 14 and 20, with an overall success rate of 65.38%. Among the respondents, two achieved the highest score of 16, while only one individual recorded the

lowest score of 11.

Majority of respondents demonstrated a strong understanding of COVID-19 prevention measures. However, there were notable gaps in knowledge, particularly concerning indicators 7, 13, and 15. These findings imply that a notable number of respondents may not be fully aware that symptoms like the common cold, nasal congestion, runny nose, and sneezing are less commonly linked to SARS-CoV-2 infections. Additionally, there appears to be some confusion regarding the use of general medical masks, as respondents may not fully understand that these masks are effective for the general public in preventing SARS-CoV-2 transmission. Overall, while most respondents exhibit a high level of knowledge about COVID-19 prevention, targeted educational interventions are necessary to address these specific misconceptions.

**III. Attitude on COVID-19 Prevention**

The evaluation of healthcare workers' attitudes towards COVID-19 prevention reflects a largely positive outlook. The findings show that most participants strongly agreed with these key statements: (1) Maintaining distance from others is essential to prevent virus transmission; (2) Hand-washing is crucial for personal protection against COVID-19; (3) If ill, staying home, unless seeking medical care, is necessary to avoid exposure; (4) COVID-19 will eventually be effectively controlled; (5) Strict measures in Biliran Province are instrumental in combating COVID-19; (6) Adherence to Ministry of Health guidelines will prevent virus spread; (7) Following directives from state and local authorities is important; and (8) Avoiding crowded gatherings is necessary. The overall average weighted mean was 3.96, categorized as "Strongly Agree."

**IV. Practices on CoVID-19 Prevention**

Regarding the fourth objective—to assess respondents' practices for COVID-19 prevention—the researchers found that most preventive actions were practiced often by the respondents such as participating in meetings, religious activities, events, and other social gatherings or any crowded place in areas with ongoing community transmission; worn a mask when leaving home, recently avoided cultural behaviors, such as shaking hands, use other workers' phones, desks, offices, or other work tools and equipment, touching their eyes, nose, and mouth frequently with unwashed hands; covering nose and mouth during coughing or sneezing with the elbow or a tissue, then throw the tissue in the trash, prefer to stay at home, in a room with the window open during the transmission period, stay home when sick due to common cold-like infection during the transmission period, listen and follow the direction of your state and local authorities . However, only two practices, social distancing and (5) frequent cleaning and disinfecting of commonly touched objects and surfaces, were consistently observed by the majority. This suggests that, overall, most respondents did not fully adhere to the range of recommended COVID-19 preventive measures.

**V. Relationship between the variables**

The result presents data examining the relationships among socio-demographic variables, levels of knowledge, attitudes, and preventive practices concerning COVID-19.

**A. Socio-demographic profile variables and level of knowledge towards CoViD-19 prevention**

Table 4 presents the correlation analysis between respondents' socio-demographic factors and their knowledge levels on COVID-19 prevention. Results show no significant relationship between knowledge and the socio-demographic factors, including age ($r = .139$, $p = .457$), sex ($r = .277$, $p = .171$), civil status ($r = .188$, $p = .564$), religion ($r = .217$, $p = .287$), occupation ($r = .079$, $p = .701$), and years of service ($r = .259$, $p = .202$). These findings suggest that knowledge levels regarding COVID-19 prevention are not significantly influenced by these socio-demographic characteristics. These findings suggest that there is insufficient evidence to conclude that these socio-demographic factors are directly associated with healthcare workers' understanding of COVID-19 prevention strategies.

In contrast, the results indicate a significant correlation with the variable of highest educational attainment ($r = .453$, $p = .020$). This strong relationship suggests that the educational background of healthcare workers at the Rural Health Units of Biliran, plays a crucial role in shaping their knowledge about COVID-19 prevention.

**B. Socio-demographic Profile and Attitude towards COVID-19 Prevention**

As to the correlation between the socio-demographic characteristics of respondents and their attitudes towards COVID-19 prevention. The data indicate that variables such as age ($r = .002$, $p = .992$), civil status ($r = .097$, $p = .637$), religion ($r = .170$, $p = .406$), occupation ($r = -.085$, $p = .681$), and years of service ($r = .253$, $p = .212$) did not demonstrate a significant relationship with attitudes toward COVID-19 prevention.

These findings suggest that there is insufficient evidence to support the notion that these specific socio-demographic factors directly influence healthcare workers' attitudes regarding COVID-19 preventive measures. Conversely, the analysis revealed a significant correlation with the variables of sex ($r = .394$, $p = .046$) and highest educational attainment ($r = .515$, $p = .007$). These results indicate that both sex and educational background are influential factors in shaping the attitudes of healthcare workers at the Rural Health Units in Biliran Province, towards COVID-19 prevention strategies.

**C. Socio-demographic profile and Practices on COVID-19 prevention**

As to the association between respondents' socio-demographic characteristics and their practices related to COVID-19 prevention. The analysis of various demographic factors, such as age, civil status, religion, occupation, and highest educational attainment, resulted in chi-square values with significance levels (2-tailed) greater than .05. This indicates that there is no significant correlation between these demographic factors and the respondents' preventive practices regarding COVID-19. However, the analysis revealed a significant relationship between sex and COVID-19 prevention practices, suggesting that gender may influence how healthcare workers adopt and apply preventive measures against COVID-19.

**D. Knowledge and Attitude Towards COVID-19 prevention**

Table 7 indicates that there is no significant relationship between respondents' knowledge and their attitudes toward COVID-19 prevention. This finding suggests that an increase in knowledge about COVID-19 does not necessarily correlate with a corresponding positive shift in attitudes toward preventive measures.

**E. Attitude and Practices towards COVID-19 Prevention**

As to the test of relationship between the respondents' attitude and practices towards COVID-19 reveals no relationship between respondents' attitudes and practices on CoViD-19 prevention. The result suggest that no significant relationship exist between these two variables. This implies that there is no sufficient evidence that the respondents' attitudes directly affect their practices toward CoVID-19 prevention.

## 6. Findings

The first objective of this study was to determine the socio-demographic profile of the respondents. The findings revealed several notable trends within the demographic characteristics of the participants. A significant portion, 38.5%, is relatively young, aged 30 years or younger, suggesting that this youthful demographic may introduce fresh perspectives and innovative approaches crucial for addressing evolving healthcare challenges (Davis et al., 2019). Morever, majority of respondents, comprising 92.3%, are female, highlighting the critical role women play in the healthcare workforce, particularly in midwifery and nursing. Research shows that female healthcare workers often dominate patient care and community health roles (World Health Organization, 2020).In addition, women usually wash their hands more frequently than men after using a bathroom (Borchgrevink et al., 2013), and women healthcare workers wash their hands more often than their male colleagues (Szilagyi, Haidegger, et al., 2013). Additionally, 69.2% of respondents are married, which may influence their perspectives on healthcare practices, especially regarding family health and community wellness (Hawthorne et al., 2019). In terms of religious affiliation, 46.2% identify as Roman Catholic, a factor that could shape their health attitudes and practices, reflecting the impact of cultural and religious beliefs on healthcare behavior (Pew Research Center, 2017). Furthermore, 34.6% of respondents are midwives, underscoring the importance of this role in maternal and infant health. Their experiences are vital for enhancing healthcare delivery and improving health outcomes (Brocklehurst et al., 2011). The educational profile is also noteworthy, with 84.6% of respondents being college graduates. This level of educational attainment is often associated with better health literacy and a

greater understanding of public health initiatives (Berkman et al., 2011). Finally, 69.2% have less than ten years of service experience, indicating a relatively recent influx of healthcare professionals who may bring new ideas and innovative practices to the field. This unique demographic composition significantly influences healthcare practices and attitudes, emphasizing the importance of understanding these dynamics to tailor health programs effectively.

The assessment of respondents' knowledge regarding COVID-19 prevention indicates that a significant majority scored between 14 and 20, accounting for 65.38% of participants. The highest score recorded was 16, while the lowest was 11. As detailed in Table II, respondents generally demonstrated a solid understanding of COVID-19 prevention measures. Notably, they struggled with specific indicators—particularly indicators 7, 13, and 15. This suggests a lack of awareness that symptoms like the common cold, congestion, runny nose, and sneezing are less prevalent among those infected with SARS-CoV-2. Furthermore, it appears that respondents were unaware that general medical masks are sufficient for preventing SARS-CoV-2 transmission. Overall, the findings indicate a high level of knowledge regarding COVID-19 prevention among the respondents. The study's results align with Gopalakrishnan et al. (2021) and Saqlain et al. (2020), which found that healthcare workers in India exhibited adequate knowledge of COVID-19 prevention. However, our findings contrast with those of Albahri et al. (2021), who reported that healthcare workers in Primary Healthcare Centers in Dubai demonstrated inadequate knowledge, revealing a significant knowledge gap in that context.

In addressing the third objective—evaluating the attitudes of respondents toward COVID-19 prevention—it was found that all indicators were positively viewed by respondents. This includes statements affirming the importance of social distancing, hand hygiene, self-isolation when sick, confidence in controlling the virus, and compliance with public health measures. The unanimous positive responses imply a proactive stance among respondents towards COVID-19 prevention. These findings are consistent with studies by Gopalakrishnan et al. (2021), Ejeh et al. (2020), and Farah et al. (2021), which similarly reported a positive attitude towards COVID-19 prevention among healthcare workers in various countries.

The fourth objective sought to determine the respondents' practices regarding COVID-19 prevention. The results revealed that while most indicators were frequently practiced, the behaviors of social distancing and regular cleaning and disinfection of frequently touched surfaces were not consistently adhered to. This indicates a gap between knowledge and practice, suggesting that while respondents understand the recommended measures, they may not fully implement them. These findings contrast with those of Maurya et al. (2022), which found that healthcare workers in Uttar Pradesh adopted proper COVID-19 prevention practices. Likewise, Gopalakrishnan et al. (2021), Ejeh et al. (2020), and Farah et al. (2021) reported that the majority of healthcare workers exhibited proper practices in COVID-19 prevention. However in the study of (Liu et al., 2020) found out that there is the need for continuous education and reinforcement of best practices to ensure that healthcare workers not only possess knowledge but also translate that knowledge into effective preventive practices

As to the relationship between variables: Table 4 outlines the relationship between respondents' socio-demographic profiles and their knowledge of COVID-19 prevention. The analysis revealed no significant correlations between knowledge and age, sex, civil status, religion, occupation, or years of service. However, a significant relationship was found between highest educational attainment ($r = .453$, $p = .020$) and knowledge levels, indicating that educational background positively influences understanding of COVID-19 prevention. These findings are consistent with Papagiannis (2020), which highlighted education as a critical factor in healthcare workers' knowledge about COVID-19 prevention.Awareness creation should be intensified through different local languages to overcome misconceptions, improve community awareness, and minimize the consequences of the disease (Endriyas, 2021).

As to the test of relationship between socio-demographic variables and attitudes toward COVID-19 prevention results reveal that age, civil status, religion, occupation, and years of service showed no significant relationships with attitudes. However, significant correlations were observed with sex ($r = .394$, $p = .046$) and highest educational attainment ($r = .515$, $p = .007$), suggesting that both factors influence attitudes toward COVID-19

prevention. These results align with existing literature indicating that gender-specific factors and educational levels significantly affect attitudes toward health interventions (Dyer, S. M., & Tyndall, J. (2020).

Moreover, relationships between socio-demographic factors and COVID-19 prevention practices. While no significant relationships were observed for variables such as age, civil status, religion, occupation, or educational attainment, a notable relationship was found with sex. Female healthcare workers were significantly more likely to engage in preventive practices than their male counterparts. This finding aligns with prior research, which suggests that gender plays a key role in health-related behaviors. Women, in particular, tend to demonstrate greater adherence to health guidelines and preventive measures compared to men (Rung & Zong, 2021; Dyer & Tyndall, 2020). Moreover, when examining gender-specific motivations for handwashing, studies show that women are more responsive to knowledge-based interventions (Suen et al., 2019), while men tend to react more to emotional triggers such as disgust (Judah, Aunger, et al., 2009).

Also, results indicate no significant correlation, implying that while knowledge levels may be adequate, they do not directly translate into positive attitudes.This implies that there was insufficient evidence that age, civil status, religion, occupation, and years of service were directly associated with their attitude toward CoViD-19 prevention. On the other hand, sex (r=.394, p=.046) and highest educational attainment (r=.515, p=.007) denotes a significant relationship with their attitude toward CoViD-19 prevention. This means that the sex and educational attainment of healthcare workers assigned at the rural health unit of Biliran Province affected their attitude on CoViD-19 prevention. When investigating the gender-specific incentives for hand washing it appears that women respond more to knowledge-based approaches (Suen, So et al., 2019), while men respond more to disgust (Judah, Aunger, et al., 2009). People who have higher level of education were more likely to have higher knowledge and a positive attitude toward the CoVID-19 prevention( Shampile et al., 2021).

Lastly, no significant relationship between respondents' attitudes and their practices regarding COVID-19 prevention. This finding suggests that even with a positive attitude, respondents may not consistently apply preventive measures. This contrasts with the study by Shampile et al. (2021), which found a significant correlation between positive attitudes and good practices among healthcare workers.

In light of the study's findings, it is advisable to create targeted educational programs aimed at improving the practical implementation of COVID-19 prevention measures among participants, especially those who already possess a strong understanding and positive attitudes. Although many respondents showed a good grasp of COVID-19 prevention and supported health practices like childhood immunization, the discrepancy between their knowledge and actual behaviors highlights the need for strategies to close this gap. Possible initiatives could involve workshops, training sessions, or community outreach activities designed to tackle obstacles to effective prevention. Furthermore, considering the notable correlation between educational background and both knowledge and attitudes regarding COVID-19 prevention, it is essential to prioritize ongoing education for healthcare professionals, particularly midwives. This will equip them with the necessary tools and resources to promote effective preventive practices within their communities. By cultivating an environment that encourages the application of knowledge in everyday practices, the overall success of COVID-19 prevention strategies can be improved, ultimately resulting in better health outcomes.

## 7. Conclusion

The findings underscore the necessity of targeted interventions to improve the practical application of COVID-19 prevention measures among healthcare workers. While knowledge and positive attitudes are present, they do not always translate into effective practices. Addressing the gap between knowledge and action is essential for enhancing infection control efforts, especially in rural healthcare settings. Further research is needed to explore the underlying reasons for the discrepancies between attitudes and practices, which could inform future strategies to enhance compliance with public health guidelines.

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