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Prevalence of Covid-19 Vaccination in a Selected Level 2 Public Hospital: A Basis for Policy Plan

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A B S T R A C T

This research aimed to determine the demographic characteristics of participants regarding age, gender, religion, marital status, and geographic location, as well as the prevalence rates of COVID-19 vaccination concerning co-morbidities, allergies, the type of COVID-19 vaccine administered, the number of vaccine doses received, adverse reactions following immunization, and the duration of those reactions. It also investigated the correlation between the prevalence of COVID-19 vaccination and the demographic characteristics of the participants. The study employed a retrospective research design with a selected sample of 345 individuals who received the COVID-19 vaccine during the period from March 2021 to March 2022. Data collection involved reviewing medical records and vaccination documents. Frequency counts, percentage distributions, and multiple linear regression analysis were applied for statistical data treatment.

The study's results indicated that most respondents were 40 years old or younger, were female, identified as Catholic, were married, and resided in rural regions. A significant number of the participants reported having had no comorbidities and no allergies, whether to food or medications. They received two doses of the Sinovac COVID-19 vaccine and experienced adverse effects, primarily pain at the injection site, which lasted from one to four days for the respondents.

There was a notable correlation between the prevalence rates of COVID-19 vaccinations concerning co-morbidity and demographic factors such as age, gender, religion, civil status, and geographic location when considered together; however, this relationship did not extend to food or drug allergies, the specific type of COVID-19 vaccine administered, the number of vaccine doses received, adverse reactions following the first and second doses, and the duration of these adverse reactions. This indicated that the demographic characteristics of the participants did not affect food or drug allergies, the specific type of COVID-19 vaccine, the total number of doses received, the occurrence of adverse events, or the length of these adverse events. Additionally, age and civil status were recognized as significant predictors of co-morbidity among the participants, while gender, religion, and geographic location were not.

Keywords: Prevalence of COVID–19 vaccination, co-morbidity, allergy, type of COVID–19 vaccine, number of doses of COVID–19 vaccination, adverse events, duration of adverse events, and Demographic Profile.

Introduction

In late December 2019, an outbreak of an unknown form of pneumonia was reported in several healthcare facilities in Wuhan, located in Hubei Province of China [1]. It was characterized by symptoms of viral pneumonia such as fever, dry cough, fatigue, and chest discomfort, while in severe cases, patients experienced dyspnea and bilateral lung infiltration [2,3]. The disease rapidly spread to many provinces and cities in China. Furthermore, it reached other countries such as Italy, Thailand, Vietnam, Korea, Germany, the United States, and Singapore [4], creating a pandemic as it continued to spread worldwide, including the Philippines. The World Health Organization (WHO) later identified and named the pathogen as the 2019 novel coronavirus (2019-nCoV) [5]. COVID-19 quickly affected daily life, the economy, global trade, and healthcare systems, tragically resulted in a significant loss of human lives [6].

Vaccines became one of the strongest tools in public health, particularly when effective treatments for infectious diseases were unavailable [7]. During the height of the pandemic, the Philippine government authorized the Food and Drug Administration to issue Emergency Use Authorizations (EUA) for the use of COVID-19 drugs and vaccines, including Sinovac®, Oxford-AstraZeneca®, Pfizer-BioNTech®, and Gam-COVID-Vac (Sputnik®) [8]. Various efforts to develop effective vaccines were essential in combating COVID-19 by saving lives, preventing severe illness, and helping the population return to normalcy [9].

To date, billions of people worldwide had been vaccinated. Still, the Centers for Disease Control (CDC) continued to monitor the safety of these vaccines by performing high-quality vaccine safety research, documenting vaccine reactions in certain cases, and identifying post-vaccination adverse events through public surveillance [10,11]. This study aimed to investigate the prevalence of COVID-19 vaccination in a selected level 2 public hospital. It sought to identify and evaluate how demographic, and background factors impacted the outcomes related to COVID-19 vaccination. The findings served as a guide for the surveillance of adverse events after immunization, the improvement of the vaccination process, and the enhancement of the healthcare delivery system.

Methodology

Research Design. This study used a retrospective research design to determine the prevalence of COVID-19 vaccination in a selected level 2 public hospital by utilizing a chart review that covered the initial period of COVID-19 vaccination, March 2021 to March 2022.

Research Site. The study was conducted at a selected Level 2 public hospital, a DOH-retained hospital that had expanded its services from a Leprosarium to a General Hospital in Westen Visayas Region.

Research Period. The study had been conducted for three months after the research proposal was approved by the Research Adviser. This time frame allowed a comprehensive data collection process and ensured sufficient time for chart review, data gathering, and analysis.

Research Population. The population of the study consisted of respondents who had received the COVID-19 vaccine.

The inclusion criteria for participation were as follows: respondents must be 18 years old and above, must have completed two doses of the COVID-19 vaccine, must have a fully accomplished Symptom Monitoring Chart detailing adverse events following immunization and the duration of symptoms, and must have signed the Informed Consent Form provided by the Department of Health corresponding to the vaccine they received.

Exclusion criteria included charts with incomplete data or missing checklist inputs, respondents who received the first dose but were lost to follow-up, those who received only the first dose due to medical conditions or personal reasons, and any data related to booster doses, which were excluded due to insufficient records stemming from inconsistencies among service providers.

Sample and Sampling Scheme. This study employed a mixed-method sampling approach, it integrated purposive sampling, which selected participants based on predefined inclusion criteria, and probability sampling, which ensured all eligible respondents had an equal chance in the selection process. Initially, 3,153 respondents met the inclusion criteria. To determine an appropriate sample size, the Raosoft Sample Size Calculator was utilized, which calculated 343 participants for the study and was rounded off to 345. To maintain equal selection opportunities, random sampling using the fishbowl method was conducted.

Data Gathering Procedure. The data on each respondent’s chart was evaluated and gathered accordingly with the observance of the following procedures: First, a research proposal was submitted and presented to the Research Adviser for evaluation and approval before the start of the study. An Approval letter was obtained from the Chief of the Hospital, the Head of the COVID-19 Vaccination Team, and the Department Head of the Medical Records. Respondents' profiles and data will be evaluated and recorded, and all such data will be kept confidential. Data were gathered during office hours, which were from 8 a.m. to 4 p.m., Monday to Friday. All data collected were tabulated and secured on a password-protected laptop.

Research Instrument. The researcher utilized a data-gathering form to guide the collection of relevant information from medical records. Additionally, the study examined notable medical histories, such as co-morbidities, previous illnesses, or hospitalizations, as well as the type of vaccine and number of doses received. The symptom monitoring chart, which was attached to their charts and had been previously provided by the hospital's Public Health Unit during the vaccination period, was also used to identify adverse events and their duration following immunization.

Data Analysis Procedure and Statistical Tools. Data had been gathered, categorized, counted, and organized in Microsoft Excel. Statistical analyses involved calculating frequency counts, percentage distributions, and conducting multiple linear regression. The findings were subsequently examined and interpreted.

Scope and Limitation

This study focused on records of respondents who had been screened and deemed eligible for the COVID-19 vaccination program in a selected Level 2 public hospital from March 2021 to March 2022. It was limited to exploring their demographic profile, medical histories, type of vaccine received, adverse events, and duration after immunization, which provided valuable insights that helped enhance vaccination strategies and public health policies.

Results

Problem no. 1: What is the demographic Profile of the respondents in terms of age, gender, religion, civil status, and geographic location?

Table 1: Frequency and Percentage Distribution of Respondents according to Demographic Profile

Profile	Frequency	Percentage (%)
Age Level		
30 years old and below	133	38.6
31 – 40 years old	121	35.1
41 – 50 years old	59	17.1
51 – 60 years old	21	6.1
61 – 70 years old	7	2.0
71 years old and above	4	1.1
Total	**345**	**100%**
Gender		
Male	138	40
Female	207	60
Total	**345**	**100%**
Religion		
Roman Catholic	323	93.6
Baptist	11	3.2
Jehovah's Witness	1	0.3
Protestant	9	2.6
Islam	1	0.3
Total	**345**	**100%**
Civil Status		
Single	50	14.5
Married	287	83.2
Widow	7	2.0
Widower	1	0.3
Total	**345**	**100%**
Geographic location		
Urban	137	39.7
Rural	208	60.3
Total	**345**	**100%**

Table 1 presented the distribution of respondents in terms of frequency and percentage based on their demographic characteristics, such as age, gender, religion, civil status, and geographic location. In terms of age, the largest segment of respondents—133 individuals, equating to 38.6%, was in the age category of 30 years or younger. A total of 121 respondents, or 35.1%, fell into the 31–40 age group. The third most populous group consisted of 59 respondents (17.1%) aged between 41 and 50, followed by 21 respondents (6.1%) in the 51–60 age range. The smallest group included four respondents (1.1%) who were 71 years and older, and just above them were seven respondents (2.0%) in the 61–70 age range. These findings were consistent with the research from the University of the Philippines Population Institute (UPPI) and the Demographic Research and Development Foundation (DRDF) conducted in 2020, which showed increased vaccination rates within younger age groups.

A significant number of respondents—207 (60%)—were female, compared to 138 (40%) who were male, indicating a predominance of female participants. This result was aligned with the investigation conducted by Skjefte et al. (2021) as they surveyed 17,871 women across 16 countries on vaccine willingness. They found that 52% of pregnant women, 73.4% of non-pregnant women, and 69.2% of mothers were willing to vaccinate their children. Acceptance was highest in India, the Philippines, and Latin America, and lowest in Russia, the U.S., and Australia. Concerning religious identification, most respondents—323 (93.6%)—had identified as Roman Catholic, with 11 (3.2%) having identified as Baptist and 9 (2.6%) as Protestant. A limited number belonged to Jehovah's Witnesses and Islam, with one respondent (0.3%) in each category. The results demonstrated that most participants had practiced Christianity, especially Roman Catholicism. This outcome aligned with the findings of Chakhunashvili et al. (2024), which indicated that Catholics had higher vaccination rates compared to non-religious individuals, with lower uptake observed in Muslim and Eastern Orthodox populations. In relation to civil status, most respondents—287 (83.2%)—had been married, while 50 (14.5%) were single. A smaller number, seven respondents (2.0%), were widows, and only one respondent (0.3%) had been a widower. This supported the findings of Jabar et al. (2022), who identified marital status as a contributing factor in vaccine decisions, influenced by trust in vaccines, government policies, and health concerns. Finally, the geographical distribution indicated that most respondents, 208 (60.3%), had originated from rural areas, while 137 (39.7%) had lived in urban locations. The study highlighted that most participants came from rural regions. Rural dwellers comprised 60.3% of the respondents, which correlated with the study of Nanyonjo et al. (2023), who emphasized that mobile clinics, outreach initiatives, and media campaigns had helped overcome barriers like misinformation and limited healthcare access to rural areas.

Problem no. 2: What is the prevalence of COVID–19 Vaccination among the respondents in terms of Co-morbidity, allergies, type of COVID–19 vaccine received, number of doses of COVID–19 vaccine received, adverse event following immunization, and duration of adverse events?

Table 2 displayed the frequency and percentage breakdown of participants according to the prevalence rate of COVID-19 vaccinations from March 2021 to March 2022. It included elements such as co-morbidities, the specific types of COVID-19 vaccines received, the total number of doses given, adverse events following vaccination, and the duration of these adverse events.

Table 2: Frequency and Percentage Distribution of Respondents according to the Prevalence of COVID–19 vaccination

Factors	Frequency	Percentage %
1. Co – morbidity		
Absence of Comorbidity.	268	77.7
Bronchial Asthma not in AE.	16	4.6
Hypertension with Diabetes Mellitus (DM) Type 2 – (NIR).	6	1.7
Hepatocellular Disease	1	0.3
Hypertension	32	9.3
Hyperthyroidism	8	2.3
Hypertensive Cardiovascular Disease (HCVD) and CVD (Stroke).	3	0.9
Mitral Valve Prolapse (MVP) not in Failure and Rheumatic Heart Disease (RHD).	9	2.6
Chronic Obstructive Pulmonary Disease (COPD).	1	0.3
Systemic Lupus Erythematosus (SLE).	1	0.3
Total	**345**	**100%**
2. Medical History (Food/Drug Allergy)	**Frequency**	**Percentage %**
No Allergy.	315	91.3
Seafood Allergy.	19	5.5
Seafood Allergy and Drug Allergy (Clindamycin).	1	0.3
Food Allergy (Coconut milk) and Drug Allergy (Tranexamic).	3	0.8
Food Allergy (Dried Fish).	1	0.3
Drug Allergy (Mefenamic).	2	0.6
Drug Allergy (Analgesic).	1	0.3
Drug Allergy (ERIG).	1	0.3
Drug Allergy (Ibuprofen).	1	0.3
Drug Allergy (Penicillin).	1	0.3
Total	**345**	**100%**
3. Type of COVID–19 Vaccine Received	**Frequency**	**Percentage %**
Sinovac®	285	82.6
AstraZeneca®	60	17.4
Total	**345**	**100%**
4. Number of Doses	**Frequency**	**Percentage %**
All received two doses	345	100.0
Total	**345**	**100%**
5.1 Adverse Events Following the First Dose of Immunization	**Frequency**	**Percentage%**
No Adverse Events.	4	1.2
Pain on Injection Site	113	32.8
Fever, chills, and sometimes accompanied by muscle/joint pain	9	2.6
Tiredness/Fatigue	79	22.9
Tiredness/Fatigue and muscle/joint pain	42	12.1
Dizziness and Headache	9	2.6
Pain on Injection Site, Headache, and sometimes	8	
Accompanied by Fever	18	2.3
Pain on Injection Site and Nausea/Vomiting	22	5.2
Pain and Swelling of the Injection site	4	6.4
Tiredness/Fatigue and Shortness of Breath	16	1.2
Pain on Injection Site, Tiredness, and Hunger	9	4.6
Pain on Injection Site and Itchiness/Allergies	12	2.6
Sleepiness/Somnolence		3.5
Total	**345**	**100%**
5.2 Adverse Events Following the Second Dose Immunization	**Frequency**	**Percentage%**
No Adverse Events.		
Pain on Injection Site.	39	11.3
Pain on Injection Site with Fever	109	31.6
Tiredness/Fatigue.	10	2.9
Tiredness/Fatigue and Muscle/Joint pain.	73	21.1
Pain on Injection Site and Headache.	18	5.2
Pain on Injection Site, Headache, and Nausea/Vomiting.	4	1.2
Dizziness and Headache.	18	5.2
Pain and swelling of the Injection Site.	20	5.8
Tiredness/Fatigue and Hunger.	24	7.0
Tiredness/Fatigue and Sleepiness/Somnolence.	9	2.6
Pain on Injection Site and Itchiness/Allergies.	10	2.9
	11	3.2
Total	**345**	**100%**
6.1 Duration of Adverse Events Following the First Dose (in days)	**Frequency**	**Percentage%**
No Adverse Effect		
1 day	4	1.2
2 days	97	28.1
3 days	72	20.8
4 days	81	23.5
5 days	37	10.7
6 days	32	9.3
7 days	9	2.6
8 days	12	3.5
	1	0.3
Total	**345**	**100%**
6.2 Duration of Adverse Events Following the Second Dose (in days)	**Frequency**	**Percentage%**
No Adverse Effect		
1 day	39	11.3
2 days	133	38.5
3 days	95	27.5
4 days	29	8.4
5 days	27	7.8
6 days	12	3.5
7 days	5	1.5
8 days	4	1.2
	1	0.3
Total	**345**	**100%**

Most of the respondents (77.7%) reported no existing comorbidities. Among those with health conditions, hypertension (9.3%) and bronchial asthma (4.6%) were the most common, while others like mitral valve prolapse and hyperthyroidism were less frequently reported. Serious illnesses such as COPD and SLE appeared in only 0.3% of cases. Notably, individuals managing chronic conditions showed a higher tendency to receive vaccination. When it came to allergies, 91.3% indicated no history of food or drug sensitivity. Seafood was the most common allergen (5.5%), with isolated reports (0.3% each) of reactions to items such as coconut milk, tranexamic acid, and mefenamic acid. These findings reinforced the overall safety of vaccination, even among those with minor allergic histories.

Most participants indicated they had no history of food or drug allergies, with only a small percentage reporting seafood as a known allergen. Previous research by Glover et al. (2021) showed that individuals with minor, non-vaccine-related allergies were not at greater risk for severe reactions. These findings were consistent with global health authorities like WHO and CDC, which maintained that COVID-19 vaccines were safe for most individuals, including those with known allergies. Proper screening further supported vaccine safety and reduced unnecessary worry. From March 2021 to March 2022, two vaccines were administered: Sinovac® and AstraZeneca®. Most participants (82.6%) received Sinovac®, while the rest (17.4%) were given AstraZeneca®. All 345 respondents completed two doses, with no reported booster shots during the study period.

For the first dose, the most reported side effect was injection site pain (32.8%), followed by fatigue (22.9%), and fatigue with muscle or joint discomfort (12.1%). Other symptoms included swelling, nausea, hunger, drowsiness, and mild allergic reactions. A few individuals (1.2%) reported no side effects or experienced fatigue with shortness of breath. After the second dose, injection site pain remained the most frequent reaction (31.6%), with tiredness (21.1%) as the next most common. Some (11.3%) had no symptoms, while others experienced swelling, dizziness, headaches, rashes, or combinations of these. A smaller number noted symptoms such as fever, drowsiness, or hunger-related fatigue. Overall, the reactions were generally mild and short-lived, indicating that side effects from both vaccine doses were manageable and not severe. Following the first dose, most respondents (28.1%) experienced symptoms like pain and fatigue for just one day. Others reported durations of 2–3 days (44.3%) or up to five days (9.3%). A few cases extended to 6–8 days, while 1.2% reported no symptoms at all as for the second dose, adverse effects again lasted one day for the majority (38.5%), followed by two days (27.5%) and three to four days (16.2%). Around 11.3% experienced no side effects, and only a few had symptoms beyond five days. Overall, most reactions were brief and manageable. The overall findings in response to the Statement of the Problem 2 confirmed the safety of COVID-19 vaccines—particularly those from Sinovac and AstraZeneca—across diverse populations, including individuals with allergies. This was aligned with research conducted by Yuan et al. (2020), which found that most reported adverse events had been mild to moderate, with no serious adverse reactions. Additionally, the Food and Drug Administration Philippines (2023) emphasized that healthcare providers could confidently recommend these vaccines without specific precautions related to allergy history or dosing schedules.

Problem no. 3: Is there a significant relationship between the rate of prevalence of COVID–19 Vaccination and the demographic profile among the respondents?

The regression analysis of the substantial correlation between the respondents' demographic profile and the COVID-19 vaccination prevalence rates in terms of comorbidity was presented in **Table 3**.

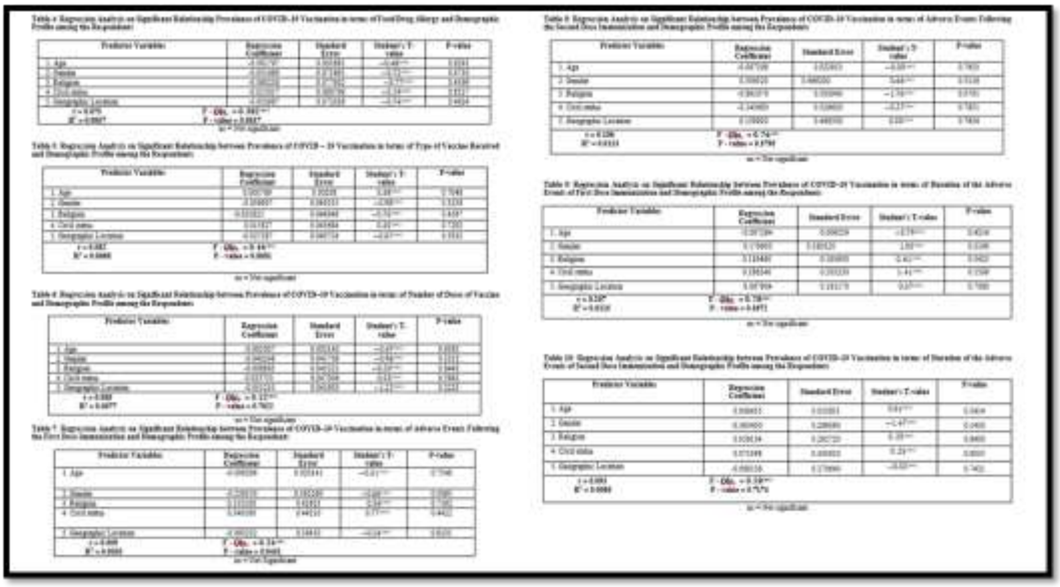
Table 3: Regression Analysis on Significant Relationship between Prevalence of COVID–19 Vaccination in terms of Comorbidity and Demographic Profile among the Respondents

Predictor Variables	Regression Coefficient	Standard Error	Student's T-value	P-value
1. Age	0.046905	0.009387	$5.0^{(**)}$	0.0000
2. Gender	-0.129150	0.182820	$-0.71^{(ns)}$	0.4804
3. Religion	-0.054324	0.198660	$-0.27^{(ns)}$	0.7847
4. Civil status	0.464910	0.206040	$2.26^{(*)}$	0.0247
5. Geographic Location	0.081899	0.183670	$0.45^{(ns)}$	0.6560
r = 0.329 $R^2 = 0.108$	F - Obs = $8.089^{(**)}$ P - value = 0.0000			

(**) = Significant at 1% Level, (*) = Significant at 5% level of Significance, ns = Not significant

According to the table, the coefficient (r = 0.329) indicated that, when considered collectively among the respondents, there had been a weak linear relationship between the prevalence rates of COVID-19 vaccination in terms of comorbidity and demographic characteristics like age, gender, religion, civil status, and geographic location. Similarly, the respondents' demographic profile explained 10.8% of the variance in comorbidity, according to the coefficient of determination (R2 = 0.108). It also indicated that the demographic profile did not account for 89.2% of the factors that influenced changes in the prevalence rate of comorbidity. With a probability value below the alpha level (P-value = 0.000 < 0.01) and an F-Obs = 8.089, it was confirmed that there had a highly significant correlation between the respondents' demographic profile and the COVID-19 vaccination prevalence in terms of comorbidity. Among the five variables analysed, age and civil status showed statistically significant relationships with comorbidity prevalence. Older individuals and those who were married were more likely to report comorbid conditions. In contrast, geographic location, gender, and religion did not show any significant association. While place of residence had no notable impact, the overall analysis confirmed that a person's demographic profile, particularly age and marital status, could influence the likelihood of having comorbidities.

Regression analysis was also conducted to examine the relationship between demographic profiles and various aspects of COVID-19 vaccination. The results as showed in **Table 4-10** showed no significant correlation between demographics and factors like allergies, vaccine type, number of doses, or recorded adverse events, as all probability values exceeded 0.05. These findings indicate that demographics do not significantly impact an individual's COVID-19 vaccination experience. The lack of correlation with factors such as allergies, vaccine type, dosage, or adverse events suggests that vaccine reactions are primarily shaped by individual health conditions rather than demographic traits. This supports the need for inclusive vaccination campaigns, prioritizing universal messaging on safety, efficacy, and personalized healthcare rather than demographic-specific approaches.



Problem no. 4: What is the best plan to improve the prevalence of COVID-19 vaccination?

To enhance COVID-19 vaccination coverage, a strategic plan was formulated that responds to current community needs. The approach prioritized reaching individuals aged 40 and below through tailored education campaigns that addressed misconceptions and emphasized the value of immunization. Recognizing that many respondents were women, messages were customized to highlight the role of vaccination in protecting families. Partnerships with religious leaders helped spread accurate health information within communities. In rural areas, mobile vaccination teams and community health workers made vaccines more accessible. Education remained key, especially for individuals with existing health conditions. Public guidance addressed potential allergic reactions and explained common side effects, promoting transparency and easing public concern. To further encourage participation, the plan introduced incentives such as complimentary medical checkups and basic health services. Local advocacy was reinforced by empowering community figures and health professionals to share their vaccination experiences. To support accessibility, vaccination sites offered extended hours and transportation options for residents in isolated areas. On an institutional level, the plan called for improved staff training, resource allocation, and operational support to ensure effective implementation. Originally, the country's vaccination program emphasized high-risk groups like senior citizens and healthcare workers. However, this updated strategy broadens the focus to include younger adults, incorporates gender- and faith-based engagement, and promotes community involvement through education and open discussions on vaccine experiences.

Summary of Findings

- Most of the respondents were in the age range of 40 years old and below (74.1%), identified as females (55.9%), practiced Roman Catholicism (96.2%), were married (80.3%), and resided in rural areas (56.5%).
- The degree of prevalence of COVID–19 vaccination among the respondents in relation to comorbidity revealed that the majority reported no comorbid condition (77.4%) and no food or drug allergies (91.8%). The most administered vaccine was Sinovac® (83.8%). All respondents received two doses of COVID–19 vaccine (100.0%). The most frequently reported adverse events after the first dose (32.4%) and second (30.6%) was pain at the injection site. The duration of adverse events following both the first and the second doses ranged from one to four days.
- There was a significant relationship between the prevalence of COVID–19 vaccination in terms of comorbidity and the respondents' collective demographic profile. However, no significant relationship was found in relation to allergies, vaccine type received, number of doses received, or adverse events following the first and second doses. Additionally, the findings showed that age and civil status were significant predictors of comorbidity while gender, religion and geographic location were not.

Conclusions

- Younger participants (aged 40 and under, 74.1%) and those who were married (80.3%) served as significant indicators of comorbidities. These findings aligned with the Protection Motivation Theory's emphasis on threat assessment, where perceived risk varied according to age and marital status.
- The complete vaccination rate (100%) and the large proportion of respondents reporting no comorbidities (77.4%) or allergies (91.8%) indicated that the participants recognized the substantial advantages of vaccination. Minor side effects, such as localized pain lasting one to four days, were perceived as manageable, reinforcing the Health Belief Model's concept of perceived barriers and benefits. In contrast, geographic location (56.5% rural) and religion (96.2% Roman Catholic) showed no significant effect, suggesting that social and cultural influences did not serve as major barriers in this situation.
- The absence of comorbidities and high vaccination rates suggested that participants believed in the vaccine's effectiveness (response efficacy) and their ability to manage minor side effects (self-efficacy). These beliefs reflected key components of the Health Belief Model and Protection Motivation Theory, highlighting the significance of coping appraisal in motivating health-protective actions and behavior.
- The high acceptance rate of Sinovac® (83.8%) and full completion of two doses (100%) reflected successful diffusion of the COVID-19 vaccine within the community, consistent with the Diffusion of Innovations Theory. Its compatibility with the health needs and cultural norms facilitated its adoption, while seeing others completing their vaccination doses reinforced public trust. The vaccine's established safety profile and wide distribution increased community confidence, thereby promoting acceptance and increased uptake.

Recommendations:

- Increasing COVID-19 vaccination coverage involved the use of targeted health communication strategies. Social media platforms and community influencers were employed to reach individuals aged 40 and below, while broader engagement efforts included collaborations with healthcare organizations and partnerships with religious institutions to ensure credible and inclusive outreach across various age groups and households.
- Information about the importance of vaccination was communicated through public forums and educational campaigns, with a focus on individuals with co-morbidities. These initiatives provided clear expectations regarding mild side effects and helped maintain transparency around adverse events, thereby strengthening public trust and encouraging vaccine acceptance.
- Efforts to improve access included extending vaccination center operating hours, offering transportation services, and deploying mobile units and community health workers to better serve rural and hard-to-reach populations.
- Further investigation was encouraged to explore behavioral factors influencing booster shot uptake, obstacles to equitable access, and the perceived and actual effectiveness of vaccines against new variants. These inquiries aimed to enrich understanding of the evolving challenges surrounding COVID-19 immunization.

- Additional studies were recommended to focus on underrepresented groups, such as those living in urban areas or adhering to diverse religious beliefs, to generate more inclusive insights into the influences shaping vaccine-related attitudes and outcomes.
- To improve readiness for future pandemics and guide effective vaccine distribution strategies, upcoming research should utilize randomized controlled trials (RCTs) to comprehensively evaluate the effectiveness of current COVID-19 vaccines against recently identified variants such as NB.1.8.1 and XBB-EG.5. These investigations will be crucial in yielding strong data on the durability and extent of immune responses, along with thorough assessments of vaccine safety and tolerability among various population groups.

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