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KNOWLEDGE AND ATTITUDES OF HEALTH WORKERS TOWARDS COVID-19 VACCINATION IN ACEH, INDONESIA

Pengetahuan dan Sikap Tenaga Kesehatan Terhadap Vaksinasi COVID-19 di Aceh, Indonesia

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Abstract

Introduction: Herd immunity through vaccination is one of the major strategies for overcoming the COVID-19 pandemic, but there are still doubts about vaccines among health workers.
Aims: This study aims to assess the relationship between knowledge of the COVID-19 vaccine and the attitudes of health workers.
Methods: This is a cross-sectional study, which involves the distribution of a validated online questionnaire through Google forms to health workers at Zainoel Abidin general Hospital Banda Aceh. The data consist of general characteristics, 13 questions regarding knowledge, and nine inquiries related to attitudes.
Results: There were 301 respondents, of which 87.4% were females, and 48.8% were nurses. Only 27.9% of the health workers have a history of COVID-19 courses, 67.8% have good knowledge about the vaccine, and 70.8% with a positive attitude. There was a significant relationship between the knowledge of the vaccine and health workers' attitudes. Furthermore, gender, age, education level, and training history did not affect the knowledge of vaccination, while profession was the main influential factor.
Conclusion: This study shows that there is a relationship between knowledge of the COVID-19 vaccine and health workers' attitudes. However, stakeholders must always focus on strategies that can increase understanding and practice of disease prevention

Keywords: attitude, COVID-19 vaccine, knowledge, health workers

Abstrak

Latar Belakang: *Kekebalan kelompok melalui vaksinasi merupakan salah satu kunci untuk mengatasi pandemi COVID-19. Tetapi keragu-raguan vaksin masih saja terjadi di kalangan tenaga kesehatan.*
Tujuan: *Penelitian ini bertujuan untuk menilai hubungan pengetahuan vaksin COVID-19 terhadap sikap tenaga kesehatan.*
Metode: *Penelitian ini merupakan penelitian cross sectional, menggunakan kuesioner yang disebarkan melalui google form kepada tenaga kesehatan di rumah sakit dr. Zainoel Abidin Banda Aceh. Data yang dikumpulkan berupa karakteristik umum, tingkat pengetahuan vaksin COVID-19 dan sikap tenaga kesehatan.*
Hasil: *Penelitian ini telah mengumpulkan 301 responden. Mayoritas responden adalah perempuan (87,4%) dan perawat (48,8%). Hanya sedikit tenaga kesehatan yang mengikuti pelatihan COVID-19 (27,9%). Sebagian besar tenaga kesehatan memiliki pengetahuan mengenai vaksin COVID-19 (67,8%) dan sikap positif (70,8%). Terdapat hubungan signifikan pengetahuan dengan sikap tenaga kesehatan. Jenis kelamin, usia, tingkat pendidikan, dan riwayat pelatihan tidak memiliki pengaruh terhadap pengetahuan vaksinasi. Profesi merupakan faktor utama yang berpengaruh terhadap pengetahuan mengenai vaksinasi COVID-19.*
Kesimpulan: *Penelitian ini menunjukkan bahwa terdapat hubungan pengetahuan vaksin COVID-19 terhadap sikap tenaga kesehatan. Namun, pemangku kepentingan harus selalu fokus pada strategi untuk peningkatan pengetahuan dan praktik pencegahan penyakit.*

Kata kunci*: pengetahuan, sikap, tenaga kesehatan, vaksin COVID-19*

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Introduction

The use of vaccine is among the major methods to curtail the escalation of Corona Virus Disease 2019 (COVID-19) (WHO, 2022) because it is highly contagious and affects the population globally. In response to its massive spread, the President of Indonesia has officially provided vaccination services for the community (Simangunsong, 2021). Previous studies showed that vaccine can increase individual and community immunity by lowering the spread of vaccine-preventable diseases (Wong, 2021). However, its presence caused a new polemic in the community due to concerns about the safety, halalness, and effectiveness in inhibiting the transmission of COVID-19 (Sholeh and Helmi, 2021). This hinders the goal of global immunization in the country; hence, health authorities have a significant role in providing knowledge about the importance of the developed vaccine (WHO, 2022).

Vaccination is the most effective preventive measure to inhibit the transmission of COVID-19. This has led to continuous competition and striving among developing countries to produce a vaccine. Due to various problems, there are demographic and geographic differences regarding the implementation of vaccination. However, it is reported that there is an estimated 67% vaccine acceptance rate globally (Malik *et al.*, 2020). This primarily determines the success of a vaccination program by health workers, including nursing students, as influential proponents of the process. Vaccination can potentially provide critical interventions that significantly limit the spread of this deadly infectious disease. The SARS-CoV-2 vaccine will be available by the end of 2020, and in many countries, health workers are being targeted as the first recipients. Moreover, safety concerns and the incidence of side effects have been reported during the implementation of vaccination programs, leading to many vaccine-related disadvantages and reducing public interest in the process. The refusal to vaccinate against COVID-19 can trigger the risk of transmission of the pathogen from patients to healthcare workers and reduce interest in getting vaccinated (Jiang *et al.*, 2021). Negative stigma and neglect of the COVID-19 vaccine can also hinder global vaccination coverage. Nurses are the most critical community partners in supporting the COVID-19 vaccination program. Therefore, the knowledge, attitudes, and practices of nurses are closely related to their ability to find solutions to mitigate the COVID-19 pandemic (Mostoles *et al.*, 2022).

The attitude of the community during the pandemic period shows a clear picture of vaccines and recipients that can affect their absorption in the community. A study reports that high side effects and protection, minimal effects, and full FDA recognition can increase American willpower (Ciardi *et al.*, 2021).

Another study shows that the factors influencing the ability to accept include young age, minority groups, non-health workers, and the individual's perceived low risk. According to Azlan *et al.* (2020), 86% of COVID-19 vaccine receipts with pre-existing respiratory conditions correlated with increased perceptions of morbidity.

Ensuring safe and life-saving vaccine is considered one of the most responsible weapons for eliminating and stopping all infectious diseases worldwide. It is generally accepted that vaccinating half the population against certain infectious diseases can indirectly protect the rest who are not vaccinated. Investigations have shown that vaccination is among the best preventive measures in dealing with the transmission and spread of COVID-19 as well as death. After several years of COVID-19, experts and the WHO continue to study and develop this vaccine (Dror *et al.*, 2020).

The COVID-19 vaccine has been developed much more rapidly than others in various parts of the world. Based on the analysis, it is discovered that in less than 12 months, more than 100 vaccines are still being developed at the pre-clinical stage, where 60 and above have been recognized for use globally. Despite the rapid development of the SARSCOV-2 vaccine and the availability of materials, public acceptance is still a significant obstacle.

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This is because vaccine doubts are still prevalent in Africa, including Ethiopia, which presents an excellent opportunity for another peak in the incidence of COVID-19, posing a significant threat to global public health, as confirmed by WHO (Spinewine *et al.*, 2021). Some reports indicate that only 60.5% of the global population has received the vaccine. As of November 24, 2021, there were 5.4 million people vaccinated in Ethiopia (WHO, 2021).

Several reports suggest that the non-acceptance of the vaccine in the community can increase COVID-19 cases and reduce the achievement of the vaccine itself. A study in Egypt shows that 80.5% of respondents are unaware of the COVID-19 vaccine (Abdelhafiz *et al.*, 2020). Other investigations reveal that respondents have good knowledge of the COVID-19 vaccine to accept vaccination. Furthermore, a study conducted in Dessie, Ethiopia, shows that participants have a negative attitude towards the COVID-19 vaccine, leading to an increase in indecision threefold compared to those with a positive attitude (Aklil and Temesgan, 2022). In Indonesia, every health worker is knowledgeable about vaccinations and wants to learn more about to inform their patients (Theodorea *et al.*, 2021). More than 1 million healthcare workers have already received the COVID-19 vaccine. This will protect and reduce the spread of disease among patients and healthcare personnel (COVID-19 Public Communication Team, 2021).

The development of vaccine production in a short time, the recognition obtained from Emergency Use Authorization (EUA) rather than full FDA approval, the mixed political perception, and the shallow level of safety are essential causes for hesitation. Regarding healthcare workers, a Hong Kong Nursing Staff socialization survey conducted on patients at the start of the pandemic showed 40% acceptance of the COVID-19 vaccine. However, extensive multicenter observation of health workers in October and November 2020 in parts of the midwest and southwestern states showed marked uncertainty ahead of the initial release of safety data, where only 36% of respondents immediately accepted as well as 56% were undecided [15]. Previous reports have failed to show a sufficiently diverse sample population, leading to limited data on ethnic groups. This is of concern because mixed data through public observations can identify vaccine acceptance and hesitation factors (Ciardi *et al.*, 2021).

COVID-19 has been recognized as a growing public health problem worldwide. Scientists are working diligently to develop vaccine and alternative therapies. Social scientists, public health, and health communication all seek to discover the level of knowledge, attitudes, and practices about COVID-19 among the public regarding healthy living behaviors as well as educational programs at low cost (Azlan *et al.*, 2020).

In the first hurricane of COVID-19 in the spring of 2020, public health in New York City (NYC) rapidly expanded treatment techniques and capabilities across all hospitals to deal with unprecedented acute cases in response to the pandemic. However, the keys to successful pandemic control are the adequate supply and minimal vaccines side effects. The government and stakeholders involved in the health sector must also ensure the trust and acceptance of the community, especially health workers. This is because rejection and restrictions can hinder vaccination program, harm general health, and delay the potential for health workers to minimize the challenges of a pandemic (Elhadi *et al.*, 2021). This study presents an overview of the knowledge and attitudes of health workers toward the COVID-19 vaccine in Aceh.

COVID-19 is an infectious disease discovered in 2019, with a devastating impact in a short time. Several published studies still exist on knowledge of and attitudes toward vaccination in Indonesia. As this disease evolves with uncertainties, stakeholders must develop further strategies for preparing and managing communities. Therefore, knowledge and attitudes are essential factors to learn in a population (Azlan *et al.*, 2020).

One of the major factors causing the low vaccination coverage is psychology, which is related to a person's awareness

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and practice of healthy living behaviors. The psychological factor has three aspects, namely thoughts and feelings, social processes, and direct practical attitude. In the attitude aspect, one of the problems faced is vaccine refusal, which causes low vaccination coverage. Furthermore, in the United States, 6-25% of parents have refused one or more types of vaccine for their children (Setyaningsih and Siregar, 2021). The success of a vaccination program is determined by the level of information absorption and understanding by the community, specifically health workers (Field, 2009). Therefore, it is very important to understand their knowledge and attitudes, which helps to curtail the spread of the disease (Adane, Ademas and Kloos, 2022).

Based on the WHO Strategic Advisory Group of Experts on Immunization (SAGE) Roadmap as well as a study from the National Immunization Expert Advisory Committee (Indonesian Technical Advisory Group on Immunization), health workers are very important in the vaccination program (Ministry of Health, 2016). They are also a trusted source of health information and the most important factor in influencing parents' decisions to vaccinate their children (Madkor *et al.*, 2020). Good knowledge and a positive attitude help them to promote vaccination in the community. This aligns with Ajens' Theory of Planned Behavior (TPB) that subjective norms, attitudes, and perceived control can influence an individual's behavior (Cvjetkovic, Jeremic and Tiosavljevic, 2017). The presence of differences or disparities in methods, demographic data from respondents, and accessibility of health care infrastructure are the cause of variation in knowledge level in each country (Raghupathi and Raghupathi, 2020). Therefore, this study aims to assess the relationship between knowledge of the COVID-19 vaccine and the attitude of health workers at Zainoel Abidin General Hospital Banda Aceh. This hospital is the largest, with the most significant number of health workers in Aceh. At the beginning of the vaccination, this hospital became the leading center for all health workers to get vaccinated.

Method

This is a cross-sectional study, and the respondents consisted of health workers at Zainoel Abidin general Hospital Banda Aceh. The inclusion criteria involved people who are still actively working, willing to fill out an e-informed consent and be contacted through social media applications.

The questionnaire consisted of 13 questions regarding knowledge and nine related to attitudes. The 13 questions used the Guttman scale to assess participants' knowledge. Each response was given a total score and depending on the mean score, it was determined whether the response demonstrated good or lack of knowledge. The nine questions comprised the Likert scale used to gauge attitudes. When the T score was less than 50%, the attitude was positive. Otherwise, it should be negative. In addition to socio-demographics such as professions, respondents also provided information about age, gender, education level, and attending COVID-19 courses. They tuned in to an online seminar hosted by many organizations of the Indonesian Doctors Association and the Ministry of Health. The questionnaire was modified from a previous study and translated by a standardized linguist (Cvjetkovic, Jeremic and Tiosavljevic, 2017). This study used a questionnaire to test knowledge and attitude. Each of these variables demonstrated greater than 0.497 validity as well as 0.883 and 0.841 reliability, respectively. All questions and answer choices were adapted to the COVID-19 vaccine. In the measurement, knowledge used the Guttman scale, and the Likert scale was used for attitudes.

Questions with COVID-19 vaccination knowledge were: 1. The COVID-19 vaccine is effective in handling the pandemic ; 2. The vaccine is essential for maintaining health during the pandemic, 3. When administered, the vaccination may be harmful, 4. Vaccinations can cause allergic reactions, 5. Self-vaccination is essential to protect others in the immediate community, 6. A decrease in vaccination rates can lead to

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high COVID-19 cases, 7. The vaccine can reduce the severity of COVID-19 symptoms, 8. Vaccination can improve the quality of life for individuals with chronic diseases, and 9. Giving the COVID-19 vaccine with other types simultaneously can affect an individual's immune system, 10. All vaccines offered by government programs are very beneficial, 11. The information I have received is accurate and trustworthy, 12. I do what my doctor or healthcare provider recommends about vaccine, 13. The best strategy to guard against the disease is to be vaccinated. Moreover, Figure 1 shows the percentage of respondents' responses on their knowledge of the COVID-19 vaccine.

Questions attitudes of vaccine COVID-19 are 1. The COVID-19 vaccine is essential for health workers, 2. When it is available in Indonesia, I will not think twice about getting it, 3. I will also invite my family/friends/relatives to vaccinate, 4. Vaccination can reduce the incidence of COVID-19, 5. I am worried about the side effects, 6. Pharmaceutical companies will develop a safe and effective COVID-19 vaccine, 7. I do not believe in the benefits of the COVID-19 vaccine, 8. Vaccine side effects prevent me from getting vaccinated to avoid COVID-19, 9. The vaccines produced in Europe or America are safer than those manufactured in other countries. Figure 2 displays the percentage of respondents who responded positively or negatively to the COVID-19 vaccination.

This study received ethical committee clearance from Zainoel Abidin General Hospital, with signed approval number 229/EA/FK-RSUDZA/2021. The data used were collected from health workers at Zainoel Abidin general Hospital Banda Aceh using a non-probability sampling technique, namely consecutive sampling. The required sample size was established by using a sample size calculator (http://www.raosoft.com/samplesize.html) with a 5% margin of error, a 95% confidence level, and a 50% response distribution. The relationship between knowledge of the COVID-19 vaccine and the attitude of health workers was assessed using the Chi-square test with a probability level of 95% ($p<0.05$). Meanwhile, the effect of the various variables was evaluated with a multivariate regression test.

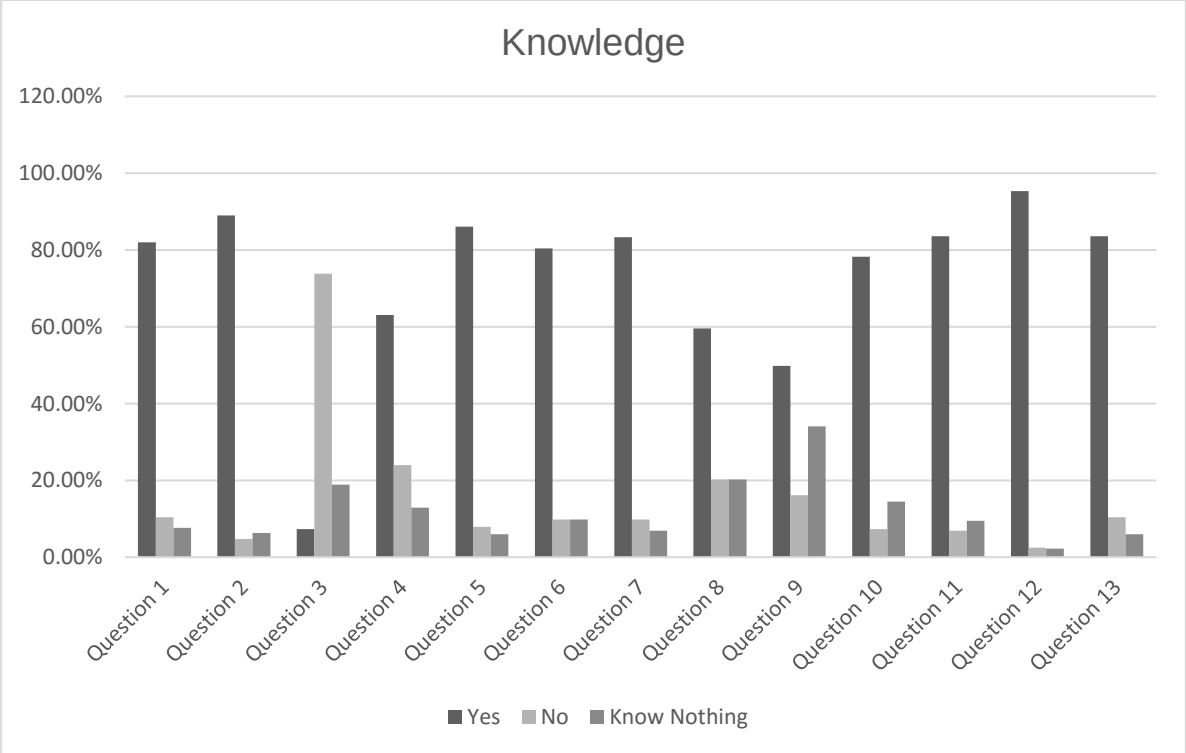

Figure 1. Participants' knowledge of COVID-19

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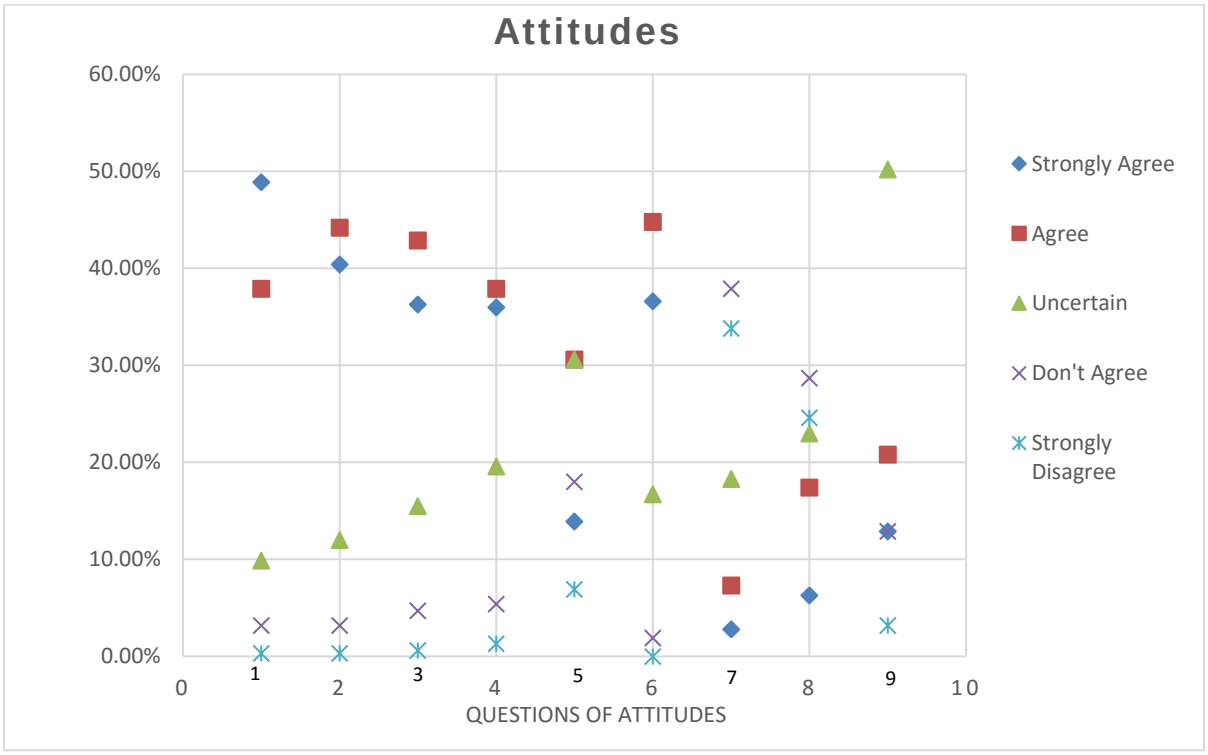

Figure 2. Participants' Attitudes of vaccine COVID-19

Result and Discussion

COVID-19 has been recognized as a growing public health problem worldwide. Scientists are working diligently to develop vaccine and alternative therapies. Social scientists, public health, and health communication are all seeking to discover the level of knowledge, attitudes, and practices about COVID-19 among the public regarding healthy living behaviors as well as educational programs at low cost (Azlan *et al.*, 2020).

In the first hurricane of COVID-19 in the spring of 2020, public health in New York City (NYC) rapidly expanded treatment techniques and capabilities across all hospitals to deal with unprecedented acute cases in response to the pandemic. However, the keys to successful pandemic control are the adequate supply and minimal side effects of the COVID-19 vaccine. The government and stakeholders involved in the health sector must also ensure the trust and acceptance of the community, especially health workers. This is because rejection and restrictions can hinder vaccination programs, harm general health, and delay the potential for health workers to minimize the challenges of a pandemic (Elhadi *et al.*, 2021). Therefore, this study presented an overview of the knowledge and attitudes of health workers toward the COVID-19 vaccine in Aceh.

COVID-19 is an infectious disease that was only discovered in 2019, with a devastating impact in a short time. Until now, there have been several published studies on knowledge of and attitudes toward the COVID-19 vaccination in Indonesia. As this disease evolves with uncertainties, stakeholders must develop strategies for preparing and managing communities. Therefore, knowledge and attitudes are essential things to learn in a population (Azlan *et al.*, 2020).

This study was carried out at Zainoel Abidin general hospital Banda Aceh with a total of 301 respondents. The general characteristics of the respondents consisted of gender, age, education, profession, and history of attending COVID-19 courses. The result showed 263 (87.4%) and 38 (12.6%) health workers were females and males, respectively.

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Furthermore, they were within the age range of 23-32 years and had undergraduate education with a total of 151 (50.2%) and 130 (43.2%), respectively. Approximately 147 (48.8%) were nurses, and only 84 (27.9%) had attended training on how to handle the COVID-19 pandemic, as presented in Table 1.

Table 1. Respondent characteristics

Characteristics	n	%
Gender		
Male	38	12,6
Female	263	87.4
Age		
23-32	151	50.2
33-42	108	35.9
43-52	33	11.0
>52	9	3.0
Educational Attainment		
Diploma level 1	124	41.2
Diploma level 4	20	6.6
Bachelor	130	43.2
Master	17	5.6
PhD	10	3.3
Profession		
Medical specialist	21	7.0
General practitioner	33	11.0
Nurse	147	48.8
Midwife	44	14.6
Pharmacist	24	8.0
Nutritionists	32	10.6
COVID-19 course		
Yes	84	27.9
No	217	72.1
Knowledge		
Good	204	67.8
Lack	97	32.2
Attitude		
Positive	213	70.8
Negative	88	29.2
Total	**301**	**100.0**

Nursing was the most common profession in this study, with a total of 147 nurses, accounting for 48.8% of the population, while 263 (87.4%) were females. It was discovered that the respondents were lazy to search for information in various media and were different from women who helped collect the latest information about the COVID-19 vaccine. Studies showed that laziness caused resignation in receiving the COVID-19 vaccine, while some women preferred non-pharmacological treatment for COVID-19. These different perceptions can affect the knowledge of men and women (Aklil and Temesgan, 2022).

Several investigations revealed that nurses played a vital role in mentoring, providing physical and psychosocial care, and serving as members of a large-scale healthcare team (Oldland *et al.*, 2020). They also pass through health promotion and prevention as well as maintain diseases, health, and well-being. Furthermore, nurses are generally united as a profession through common standards, codes of ethics, professional rights, and obligations. Women are also dominant in the field, where they perform various tasks, thereby negating the effects of gender segregation in other sectors (Clayton-Hathway *et al.*, 2020).

The result showed that the majority of health workers had good knowledge of the COVID-19 vaccine, although some did not attend training about the virus. Online social media platforms also affected their experience and knowledge (Glasdam *et al.*, 2022). A previous study revealed that 53% of nursing schools now use the media. For example, Twitter was used to improve clinical decision-making skills. Nurses can view videos of clinical scenarios and tweet their observations on the patient's condition for instructor feedback. Another study also used Twitter for nursing education by posting a live stream of student insights during class, or content material through resources, such as videos, websites, articles, and shareable photos. Media-sharing sites, such as YouTube, can also be used in class to stimulate discussion, illustrate a point, or reinforce a concept. Therefore, nurses can view videos and respond to questions that promote clinical reasoning (Lee Ventola, 2014).

The extensive knowledge and awareness of infectious diseases and COVID-19 vaccination, as presented in this study, can be applied as well as become an integrated part of the government's work program as a preventive effort in the public health sector. This is because interest in reading and health awareness influence a

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person's willingness to act based on health recommendations, which are important things to avoid since they can harm the pandemic. These include the disposal of personal protective equipment used and healthy living behaviors to reduce the burden of COVID-19 in the world. Therefore, there is a need to empower the interest in reading about public health through various social and educational programs to prepare individuals who are strong in facing the difficulties of the times and ensure the success of the vaccination program in the community (Islam *et al.*, 2020).

Observations in the field showed a great need for an education program that was more comprehensive, focused, and consistent in providing accurate news from the government and related authorities. Therefore, COVID-19 education efforts should be carried out proactively to eliminate fake news from conflicting opinions and misinformation. This referred to the level of media and communication technology use in society and evidence from other studies that the government will benefit from this mainstream and social media strategy in disseminating truthful information (Sukeri *et al.*, 2018).

The varying level of knowledge may reflect the current picture of COVID-19 information, especially in Indonesia. Although policymakers had made every effort to disseminate information on COVID-19 since this pandemic was first discovered, there is still much false information and inaccurate news circulating. Information overload can lead to confusion and difficulty ensuring correct information (Parzi, 2020).

Several studies in other Asian countries showed a high knowledge of COVID-19 among the general public and health workers. This can be due to differences in assessment and measurement methods; therefore, they can not be accurately compared (Azlan *et al.*, 2020).

High reading interest can also protect against harmful effects that arise in society and various problems due to COVID-19. Several investigations stated that higher education is interested in literacy related to COVID-19, leading to positive attitudes and practices towards COVID-19 problems reported in countries, including this study (Islam *et al.*, 2020).

COVID-19 has been recognized as a growing public health problem worldwide. Therefore, scientists are working diligently to develop vaccine and alternative therapies. Social scientists, public health, and health communications are also seeking to discover the knowledge, attitudes, and practices about the disease among the public regarding healthy living behaviors as well as educational programs at low cost (Azlan *et al.*, 2020).

Figure 1 displays respondents' opinions on the COVID-19 vaccination. It showed that the majority of respondents think positively about the COVID-19 vaccination. The results illustrated that Aceh's healthcare professionals had favorable perceptions of the COVID-19 vaccine. They also believed that vaccination is crucial for surviving the pandemic and allowing people to resume their normal lifestyles.

Table 2. Knowledge and attitude towards COVID-19 vaccination

Knowledge	Attitude				Total	p
	Positive		Negative			
	n	%	n	%		
Good	178	83.5	26	29.5	301	<0.001
Lack	35	16.5	62	70.5		

This study also revealed that 204 (67.8%) health workers had good knowledge about the COVID-19 vaccine, and 213 (70.8%) showed a positive attitude. A total of 178 (83.5%) health workers had good knowledge with a positive attitude, while 62 (70.5%) had less knowledge and negative attitudes. This indicated that good knowledge had a significant relationship with positive attitudes towards the COVID-19 vaccine among health workers at Zainoel Abidin general Hospital Banda Aceh (p<0.001), as shown in Table 2.

This result showed a relationship between knowledge of the COVID-19

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vaccine and the attitude of health workers at Zainoel Abidin general Hospital Banda Aceh (p<0.001). It only indicated that respondents' attitude toward the vaccine was related to their understanding of the vaccination program. This was in line with Marsa, where 58.65% of respondents were knowledgeable about the prevention (Marsa, 2021). Information about the vaccine can be obtained easily from the internet or independently (El-Elimat *et al.*, 2021). Vinkan and Michele reported that the internet plays an important role in providing complete information about the vaccine (Vinka and Michele, 2021). Nasir *et al.* also showed that 95.99% of respondents had a positive attitude toward its effectiveness, availability, and safety. Furthermore, it can influence the community's decision to accept vaccination (Cordina, Lauri and Lauri, 2021). These results are also in line with Madkor *et al.*, who stated that there was a significant relationship between knowledge and attitudes (Madkor *et al.*, 2020). According to Cvjetkociv *et al.*, good vaccine knowledge is often accompanied by improvement in the health sector (Cvjetkovic, Jeremic and Tiosavljevic, 2017). This indicates that knowledge is an important factor influencing a person's attitude. However, knowledge is not the most dominant influential factor (Fabrigar *et al.*, 2006). They believed that the level of knowledge was the best indicator of favorable attitudes about vaccination.

This study assessed the influential factors of knowledge related to the vaccine COVID-19. The results showed that gender, age, education level, and attending the course did not affect knowledge, where OR: 1.10; 95% CI: 0.54-2.27; p>0.05. Meanwhile, the profession had a significant effect of aOR: 0.04; 95% CI: 0.00-0.64; p<0.05, as shown in Table 3. Professional identity and previously acquired sources of professionalism, such as educational background, were closely related. It was also discovered that bachelor's degree graduates were most frequently employed in the nursing profession. This indicated that today's nurses are competent in practice, health policy, and system improvement. They also have a surplus of skills and the ability to assess knowledge. However, one aspect of knowledge varied throughout the occupations examined. According to a study conducted in Cyprus, nurses had higher vaccination knowledge scores (more in-depth knowledge) regarding the COVID-19 vaccine (Fakonti *et al.*, 2022).

In the multivariable analysis, age, gender, and education were not significantly related to knowledge of vaccine, but the profession of health workers was the main factor. The COVID-19 course was not significantly related because not all health workers had the same opportunity to participate in training due to crowded field conditions during the pandemic. Side effects of the vaccination were the cause of hesitancy, as stated in various studies among the aged and general public. A previous report showed that side effects and poor efficacy were the cause of doubt among university students. Meanwhile, studies among other demographic groups revealed that low knowledge, adverse effects, speed of development, uncertainty about the effectiveness, duration of effectiveness, and medical distrust led to hesitancy (Jain *et al.*, 2021). Similarly, Kabamba Nzaji et al (2020) stated that the health profession has a relationship with the acceptance of the COVID-19 vaccine (Kabamba Nzaji *et al.*, 2020). Kazi et al (2020) also showed that the high acceptance is supported by knowledge or information from the government or health authorities (Mannan and Farhana, 2021).

Health workers consisted of various professionals with different levels of education. Several studies have shown that education level plays a role in a person's ability to scout out the correct information about the COVID-19 vaccine (Ciardi *et al.*, 2021).

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Table 3. Unadjusted and adjusted logistic regression analyses showing factors associated with knowledge of COVID-19 vaccination

Characteristic	n (%)	Good Knowledge (%)	Unadjusted		Adjusted	
			OR (95% CI)	p–value	OR (95% CI)	p–value
Gender						
Male (R)	38 (12.6)	25 (66.67)	1			
Female	263 (87.4)	179 (68.02)	1.10 (0.54-2.27)	0.780		
Age						
23-32 (R)	151 (50.1)	99 (66.04)	1			
33-42	108 (35.9)	76 (69.36)	1.05 (0.25-4.37)	0.946		
43-52	33 (11.0)	23 (71.42)	0.84 (0.19-3.57)	0.816		
>52	9(3.0)	6 (66.67)	0.80 (0.18-4.18)	0.862		
Profession						
Medical specialist (R)	21 (7.0)	20 (95.00)	1		1	
Pharmacist	24 (8.0)	9 (37.50)	0.09 (0.01-0.74)	0.025	0.04 (0.00-0.64)	0.026
Nutritionists	32 (10.6)	12 (37.50)	3.23 (1.32-7.90)	0.010	3.15 (1.27-7.80)	0.013
General practitioner	33 (11.0)	29 (87.87)	3.23 (1.46-7.14)	0.004	3.36 (1.37-8.24)	0.008
Midwife	44 (14.6)	37 (84.09)	0.26 (0.08-0.80)	0.019	0.37 (0.11-1.25)	0.112
Nurse	147 (48.8)	97 (65.98)	0.36 (0.15-0.88)	0.025	0.33 (0.12-0.87)	0.025
Educational Attainment						
Diploma level 3 (R)	124 (41.2)	74 (58.69)	1		1	
Diploma level 4	20 (6.6)	15 (72.72)	6.08 (0.74-49.50)	0.092	0.55 (0.02-10.46)	0.691
Bachelor	130 (43.2)	93 (73.84)	3.00 (0.30-29.94)	0.349	0.26 (0.11-6.34)	0.408
Master	17 (5.6)	13 (76.47)	3.58 (0.43-29.26)	0.234	0.39 (0.21-7.51)	0.537
PhD	10 (3.3)	9 (90.00)	2.76 (0.26-29.04)	0.396	1.10 (0.57-21.47)	0.946
COVID-19 course						
Yes (R)	84 (27.9)	65 (77.52)	1		1	
No	217 (72.1)	139 (64.03)	0,52 (0.29-0.93)	0.028	0.64 (0.32-1.27)	0.206

Conclusion

The results showed a relationship between knowledge of the COVID-19 vaccine and the attitude of health workers. Furthermore, the profession was the major factor affecting the knowledge about vaccination. Health workers were partners, and they positively influenced the community's vaccination behavior. They can also be a source of health information and a determining factor for the acceptance of vaccine. However, stakeholders must always focus on strategies to increase understanding and practice disease prevention.

Abbreviations

COVID-19: Corona Virus Disease 2019; WHO: World Health Organization; SAGE: Strategic Advisory Group of Experts on Immunization; TPB: Theory of Planned Behavior;

Ethics Approval and Consent Participant

This study was reviewed and approved by the Institutional Review Board of the School

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Conflict of Interest
The authors declare there is no conflict of interest in this study.

Availability of Data and Materials
Data and material study can be provided at an open data repository.

Authors' Contribution
Handling manuscript and data collection: BY, RA, and IZ. Review and improvement: BY, IZ. All authors participated in the manuscript's preparation and agreed on the final version.

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