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The Acceptance of Covid-19 Vaccine in North Sulawesi Community: Prevalance and Risk Factor

Jeini Ester Nelwan[1]*, Oksfriani Jufri Sumampouw[2], Jansje Vera Ticoalu[3], Ester Candrawati Musa[4], Ronald Imanuel Ottay[5]
[1,2,3,4]Faculty of Public Health Sam Ratulangi University, Indonesia, 95115
[5]Faculty of Medicine Sam Ratulangi University, Indonesia, 95115
Corresponding Author: Jeini Ester Nelwan jeini_ester83@unsrat.ac.id

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ABSTRACT

Vaccination stands as the sole preventive measure against the transmission of COVID-19. The vaccination rollout in Indonesia comprises three stages: primary vaccinations 1 and 2, along with an additional 3rd or booster vaccination. However, certain regions still exhibit a stage 2 vaccination coverage below 70%. Various factors, including age and gender, impact the acceptance of the Covid-19 vaccine. The objective of this study was to scrutinize the association between age, gender, and the acceptance of Covid-19 vaccination in the jurisdiction of the Kawangkoan Barat Public Health Center. Conducted between February and July 2022, this correlational research involved 400 respondents aged 18 and above. The study variables encompassed age, gender, and vaccination acceptance, assessed through a fill-in sheet. Bivariate data analysis employed the chi-square test, revealing a significant correlation between age and vaccination acceptance. The prevalence ratio (PR) of 1.504 indicated that individuals aged 18-59 years were 1.504 times more likely to have incomplete vaccinations. However, gender did not exhibit a significant correlation with vaccination acceptance. In conclusion, age emerges as a correlated factor influencing the acceptance of Covid-19 vaccination

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INTRODUCTION

The Covid-19 disease, caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), is an infectious ailment affecting the human respiratory system (WHO 2022). Although the mortality rate of this novel coronavirus remains uncertain, it is still controllable and preventable. Covid-19 spreads easily and rapidly among humans through human-to-human contact, as stated by the Indonesian Lung Doctor Association, which highlights various transmission modes, including close contact with contaminated objects, airway droplets, and airborne particles (Perhimpunan Dokter Paru Indonesia 2020). Recognizing its global impact, the World Health Organization (WHO) has declared Covid-19 a global health emergency, with reported worldwide cases reaching 308,458,509 as of January 11, 2022. In Indonesia, as of January 9, 2022, there were 4,266,196 confirmed cases, with North Sulawesi contributing 34,724 cases (Dinkes Sulut 2022; Kementerian Kesehatan RI 2022).

Numerous studies emphasize factors that can impede the spread of Covid-19, including population density, hygiene practices, public perceptions, and vaccination efforts (Nelwan, 2020; Nelwan & Musa 2020; Nelwan et al., 2020; Lebang et al., 2020). Vaccination serves as a pivotal strategy employed by the Indonesian government and globally to combat Covid-19. The goal of vaccination is to establish specific immunity, minimizing the severity of the disease in case of exposure. Indonesia has approved seven vaccine types for Covid-19, including Sinovac, AstraZeneca, Pfizer-BioNTech, Moderna, Sinopharm, Novomax, and Biofarma. The vaccination regimen involves two doses administered 24-82 days apart. According to the Covid-19 task force, 129,089,388 individuals in Indonesia have received the first dose, and 82,818,292 have completed both doses. However, vaccination rates in North Sulawesi stand at 74.44% for the first dose and 32.05% for the second dose. Manado city leads with 100% and 62.8% for the first and second doses, respectively, while Minahasa Regency lags with 46% for the first dose and 31% for the second (Dinas Kesehatan Sulut 2022; Kementerian Kesehatan RI 2022).

Lawrance Green's theory identifies factors contributing to low vaccination coverage, including predisposing factors like knowledge, attitudes, beliefs, values, social norms, culture, and sociodemographic elements; enabling factors such as facilities and infrastructure; and reinforcing factors represented by the attitudes and behavior of health workers or other influential figures in the community (Pakpahan 2021).

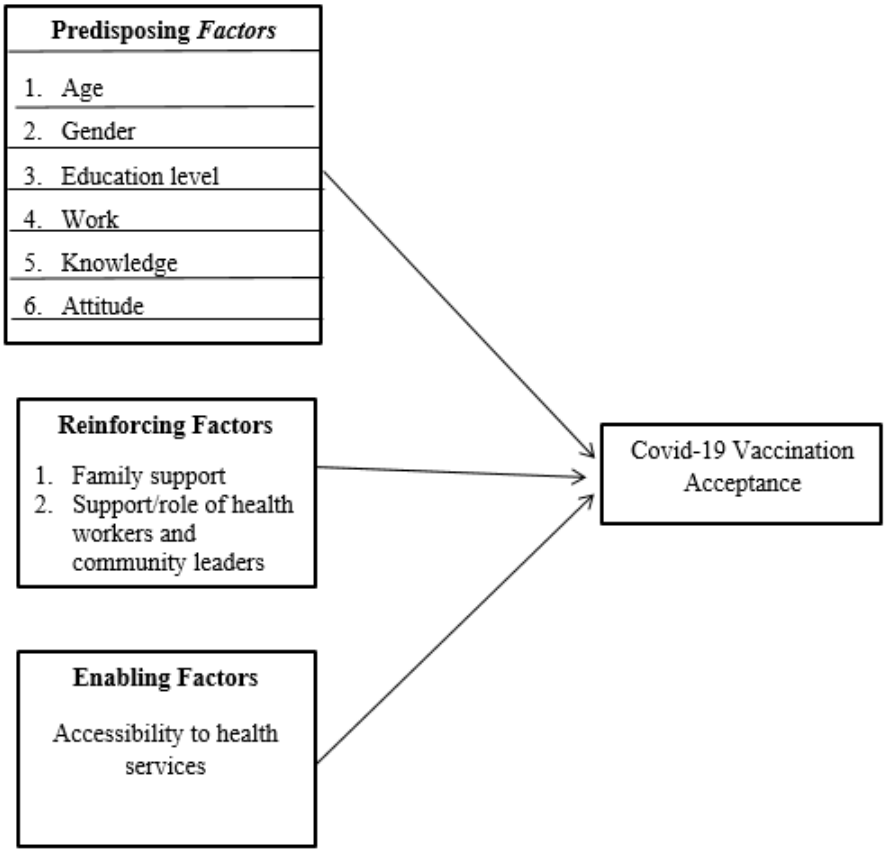
Research conducted by Vebrielna on factors related to vaccine acceptance in communities in Padang City found that knowledge, perceptions of vulnerability, severity of benefits, barriers and cues to action had an influence on the acceptance of the Covid-19 vaccine in the community (Vebrielna 2021). Research from Mohammad et al states that beliefs, conspiracies, and myths about vaccines decrease vaccine uptake. Therefore, intervention education campaigns are increasingly needed to address misinformation and prevent low vaccination acceptance rates (Mohamad et al 2021).

Based on the results of initial observations found during the implementation of vaccine activities in several places in North Sulawesi, it was found that there were still people who were reluctant to participate in the vaccination program, there was a group of people who had a wrong understanding of the Covid-19 vaccine which resulted in these groups of people not wanting to be vaccinated. In addition, it was also found that people who had received the first dose of vaccination but had not received the 2nd dose of vaccine, this was due to a sense of trauma in the community caused by the side effects of the first dose of vaccination. These conditions will have an impact on vaccination activities to reduce or reduce the harmful impact of Covid-19. The research purpose was to analyzed the prevalence and risk factor of Covid-19 vaccination for North Sulawesi community.

LITERATURE REVIEW

Coronavirus Disease 2019 (Covid-19) is a condition caused by the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV)-2 virus. Initial infections by the SARS-CoV-2 virus primarily result in lower respiratory tract infections, which can advance to severe acute respiratory syndrome, organ dysfunction, and, in critical instances, fatality. The intensity of the illness is exacerbated in older individuals and those with pre-existing congenital conditions (comorbidities) (Satgas Covid-19, 2021).

According to Green and Kreuter's Precede-Proceed theory, three factors contribute to the occurrence of Covid-19: Predisposing Factor, Enabling Factor, and Reinforcing Factor. Predisposing factors, encompassing age, gender, education, occupation, beliefs, knowledge, and attitudes, facilitate or predispose individuals to certain behaviors (Pakpahan, 2021). Wulandari et al. (2021) conducted research on factors influencing the acceptance of the Covid-19 vaccine and found that age, gender, and occupation play a role in community vaccine acceptance. Vebrielna's study (2021) in Padang City identified knowledge, perceptions of vulnerability, severity, benefits, barriers, and cues to action as factors influencing Covid-19 vaccine acceptance. Another study by Susanti et al. (2022) on public perceptions of Covid-19 vaccination in Malalayang District, Manado City, revealed a segment of the population with limited understanding of vaccination. The researchers attributed this to low community acceptance of vaccination, emphasizing the need for educational efforts on Covid-19 vaccination.



Picture 1. Conceptual Framework

METHODOLOGY

This research constitutes an observational study employing a cross-sectional approach, conducted in North Sulawesi Province from February to July 2022. The study included 400 respondents aged over 17 years residing in North Sulawesi, selected through the accidental sampling method. Independent variables encompassed education level, occupation, knowledge, and attitude, while the dependent variable focused on the acceptance of Covid-19 vaccination. The research utilized a questionnaire as its instrument, with questions related to knowledge and attitudes undergoing validity and reliability tests. The validity test employed a correlation test, and the reliability test, using the Cronbach Alpha method, yielded an r value of 0.717 for the knowledge variable and 0.726 for the attitude variable. Data analysis comprised univariate and bivariate analyses employing chi-square tests, as well as multivariate analysis utilizing multiple logistic regression tests. The study received ethical approval from the Health Research Ethics Commission of RSUP Prof. Dr. R.D. Kandou Manado with the certificate number 141/EC/KEPK-KANDOU/IX/2022.

RESULTS

1. Analysis Univariate

This section describes the frequency distribution of respondents by age, gender, education, and occupation. This can be seen in Table 1.

Table 1. Distribution of Categories of Characteristics of Respondents

Category		n	%
Age group	18-59 years old	313	78,2
	60 years and older	87	21,8
	Total	400	100,0
Sex	Man	153	38,2
	Woman	247	61,8
	Total	400	100,0
Education level	Low (no school, elementary, junior high)	133	33,2
	High School (SMA and PT)	267	66,8
	Total	400	100,0

Table 1 illustrates that the majority of respondents fall within the age bracket of 18-59 years, totaling 313 individuals (78.2%). Females make up 247 respondents (61.8%), and a significant portion possess a higher level of education (high school and above) with 267 respondents (66.8%). For a more detailed breakdown of respondents' distribution concerning knowledge, attitudes, and acceptance of the Covid-19 vaccine, refer to Table 2.

Table 2. Distribution of Frequency of Knowledge, Attitudes And Acceptance of Vaccination

Category		n	%
Knowledge	Not good	161	40,2
	Good	239	59,8
	Total	400	100,0
Attitude	Not good	231	57,8
	Good	169	42,2
	Total	400	100,0
Acceptance of the Covid-19 vaccine	Incomplete (0-1 vaccine)	71	17,8
	Complete (2-3 vaccines)	329	82,2
	Total	400	100,0

Table 2 above reveals that a substantial number of respondents, specifically 239 individuals (59.8%), possess good knowledge. However, there are 231 respondents (57.8%) with unfavorable attitudes. On a positive note, 329 respondents (82.2%) have completed the Covid-19 vaccination.

2. Bivariate Analysis

This section explains the relationship between predisposing factors and the acceptance of the Covid-19 vaccine. This can be seen in Table 3.

Table 3. Results of Bivariate Analysis

			Covid-19 Vaccination Acceptance		Total	Sign. PR (CI 95%)
			Incomplete	Complete		
Education level	Low	n	33	100	133	**0,014***
		%	24,8%	75,2%	100,0%	
	Tall	n	38	229	267	**1,989 (1,180-3,352)**
		%	14,2%	85,8%	100,0%	
Total		n	71	329	400	
		%	17,8%	82,3%	100,0%	
Work	Does not work	n	17	103	120	0,278
		%	14,2%	85,8%	100,0%	
	Work	n	54	226	280	0,691 (0,382-1,250)
		%	19,3%	80,7%	100,0%	
Total		n	71	329	400	
		%	17,8%	82,3%	100,0%	
Knowledge	Not good	n	32	129	161	0,435
		%	19,9%	80,1%	100,0%	
	Good	n	39	200	239	1,272 (1,758-2,134)
		%	16,3%	83,7%	100,0%	
Total		n	71	329	400	
		%	17,8%	82,3%	100,0%	
Attitude	Not good	n	51	180	231	**0,012***
		%	22,1%	77,9%	100,0%	
	Good	n	20	149	169	**2,111 (1,205-3,698)**
		%	11,8%	88,2%	100,0%	
Total		n	71	329	400	
		%	17,8%	82,3%	100,0%	

a. The examination demonstrated a noteworthy association between the level of education and acceptance of vaccination, presenting a p value of 0.014 ($p < 0.05$). The calculated PR score of 1.989 suggests that individuals with lower educational levels face a 1,989 times higher risk of not completing their vaccination.

b. The evaluation of the relationship between employment and vaccination acceptance resulted in a p value of 0.278 ($p > 0.05$), indicating a lack of significant association between work and vaccine acceptance. Nevertheless, it is worth

noting that individuals employed in the health sector may have a better comprehension of the advantages of Covid-19 vaccination compared to those in other professions.

c. The analysis identified an insignificant correlation between knowledge and vaccination acceptance, with a p value of 0.435 ($p > 0.05$).

d. A significant correlation between attitudes and vaccination acceptance was identified, with a p value of 0.012 ($p < 0.05$). Additionally, the PR score of 2,111 implies that respondents with unfavorable attitudes are at a 2,111 times higher risk of not completing their vaccination.

3. Multivariate Analysis

A multivariate analysis was undertaken to examine the collective impact of education level, employment, knowledge, and attitudes on vaccination acceptance within the community. Detailed results of this analysis are presented in Table 4.

Table 4. Results of Multivariate Analysis

Variable	Sig.	Exp(B)	95% C.I.for EXP(B)	
			Lower	Upper
Education level	**0,045***	**1,743**	0,966	3,144
Work	0,274	0,673	0,330	1,369
Knowledge	0,669	1,129	0,647	1,972
Attitude	**0,011***	**2,106**	1,188	3,734
Constant	0,646	1,757		
Nagelkerke R Square	**= 0.143**			

Table 4 shows that only the variables of education level and attitude obtained a value of < 0.05 so that education level and attitude have a significant effect on vaccination acceptance by the community. Furthermore, the largest Exp(B) value was obtained by the attitude variable of 2.106 and followed by the education level variable of 1.743. This value means that the attitude variable is the variable that has the most dominant influence (most influential) on vaccination acceptance where respondents with unfavorable attitudes are 2,106 times at risk of having incomplete vaccination. The magnitude of influence together with predisposing factors on vaccination acceptance. This can be seen based on the Nagelkerke value of R2. The value obtained was 0.143 which means that the predisposing factors studied, namely age, sex, education level, occupation, knowledge and attitudes influenced 14.3% of vaccination acceptance where 85.7% (100-14.3 = 85.7) were influenced by other variables that were not studied in this study.

DISCUSSION

1. Analysis univariate

The research findings indicate that a majority of respondents fall within the 18-59 years age group, are female, and possess higher education levels (high school and above). Age is associated with changes in psychological aspects, where maturity and constructive thinking increase with age. Acceptance of the Covid-19 vaccine is observed to rise with age, with only 34% of respondents in the 18-30 age group willing to receive the vaccine, compared to 47% in the >70 age group (Shekhar, R., Sheikh, A. B., Upadhyay, S., Singh, M., Kottewar, S., Mir, H., Barrett, E., & Pal, S. 2021).

The influence on a person's perception is not direct but can impact one of its components, particularly the affective or emotional aspect, where an individual's emotions can shape perception. Additionally, variations in attention and perspectives exist between men and women, which can be linked to specific behaviors, roles, activities, or cultural aspects, ultimately influencing perception. Research conducted by Putri, K. E. (2021), reveals a relationship between gender and vaccine acceptance in the community in Jember Regency (ρ value < 0.028). Similarly, a study by Wulandari, D., Heryana, A., Silviana, I., Puspita, E., Rini, H., &; Deasy, F. (2021) also confirms this relationship, showing that women exhibit higher vaccine uptake (80.7%), along with those in single relationship status (71.9%) (Shekhar, R., Sheikh, A. B., Upadhyay, S., Singh, M., Kottewar, S., Mir, H., Barrett, E., & Pal, S. 2021).

As an individual's level of education increases, their knowledge broadens, fostering greater motivation to embrace new changes. Varied education levels contribute to differences in knowledge and result in distinct responses to problems. A separate investigation carried out by Ayu Ardiningsih and Kardiwinata, (2021) within the Karangasem district community identified a correlation between the highest level of education achieved and the acceptance of vaccines (ρ value < 0.010).

The research findings indicate that respondents possess a high level of knowledge, exhibit unfavorable attitudes, and have completed Covid-19 vaccination. Knowledge, as the result of sensory perception, is predominantly acquired through seeing and hearing, encompassing both formal and non-formal education. Behaviors rooted in knowledge are considered more effective than those lacking a knowledge foundation. Individuals with knowledge can successfully apply it in their daily lives, as emphasized by Notoatmodjo, who posits that knowledge, resulting from sensory perception, is a crucial factor in altering health beliefs and prompting changes in individual health behaviors (Nelwan, 2021). Attitude, defined as an individual's opinion or assessment of the environment in relation to health, plays a vital role in behavioral change. (Notoatmodjo, 2007) outlines a sequential process individuals undergo before adopting a new behavior, including awareness (consciousness), interest (curiosity), evaluation (considering the positive and negative effects of the stimulus), trial (experimenting with new behaviors), and adoption (adapting to

the new behavior based on knowledge, awareness, and attitude toward the stimulus).

2. Bivariate Analysis

The correlation analysis between predisposing factors and the acceptance of the Covid-19 vaccine reveals the following:

a. Education level exhibits a significant correlation with vaccination acceptance, as evidenced by a PR score of 1,989. This indicates that respondents with lower education levels are at a risk 1,989 times higher of receiving incomplete vaccination. Differences in education levels impact knowledge and contribute to variations in responses to problems. This corresponds with findings from research conducted by Lasmita, et al (2021), indicating a correlation between the highest level of education achieved and vaccine acceptance in the Pejuang Kota Bekasi village community (ρ-value < 0.029). Furthermore, Ayu Ardiningsih and Kardiwinata's study (2021) within the community in the Karangasem district affirms a connection between the final education level and vaccine acceptance (ρ-value < 0.010).

The findings of this study align with the research conducted by Lasmita et al. (2021), indicating that respondents with higher education levels exhibited the highest vaccination rate (46.1%). Similar trends were observed in studies conducted in the United States by Malik (2021), where a higher educational attainment correlated with increased acceptance of the Covid-19 vaccination program. In Saudi Arabia, research by Al-Mohaithef revealed that respondents with the highest levels of education expressed a greater interest in receiving the Covid-19 vaccine, with a rate of 68.84%. Furthermore, consistent results were reported by Jagdish Khubchandani et al., where individuals with a bachelor's degree demonstrated a higher participation rate in the Covid-19 vaccination program, reaching 77%.

b. The analysis indicates that work is not significantly correlated with vaccination acceptance. It is worth noting that individuals employed in the health sector are likely to possess a better understanding of the benefits of Covid-19 vaccination compared to those in other fields. This finding aligns with research by Pattinasarany et al., (2021) in the community in the city of Ambon, which revealed no significant relationship between occupation and community readiness to receive the Covid-19 vaccine. Additionally, a study conducted by the World Health Organization (WHO) in 2020 showed that respondents working as civil servants, soldiers, police officers, State-Owned Enterprises (SOE) staff members, or BUMD staff members were more knowledgeable about COVID-19 vaccination (80%). This group exhibited the highest vaccine acceptance rate (70%) and the highest willingness to pay rate (43%). In contrast, those with the lowest levels of willingness to pay were day laborers, drivers, and domestic helpers (12%), even though 60% of them expressed willingness to be vaccinated (WHO, 2020).

c. The analysis indicates that knowledge is insignificantly correlated with vaccination acceptance. Knowledge, as one of the predisposing factors, is crucial in facilitating an individual's actions. This aligns with the theory that emphasizes the significance of knowledge in shaping a person's behavior, with behaviors

grounded in knowledge being more enduring (Notoatmodjo, 2012). However, this finding contrasts with research conducted by Argista (2021) in South Sumatra communities, revealing a significant relationship between knowledge and vaccine acceptance (ρ value < 0.000). Another study by Daughter et al., (2021) also found a significant relationship between knowledge and acceptance of the Covid-19 vaccine in the community (ρ value < 0.018). Nevertheless, this study aligns with research on nursing professional students at the University of Indonesia, which reported no significant relationship between knowledge levels and infection prevention measures. The research clarified that infection prevention behavior can be influenced by factors beyond knowledge. Likewise, the findings of the present study indicate that community vaccine acceptance is influenced by factors beyond knowledge. As a result, the acceptance of Covid-19 vaccination is shaped not solely by knowledge but also by other predisposing, supporting, and motivating factors, as highlighted by Notoatmodjo (2012).

d. The analysis reveals a notable correlation between attitude and vaccination acceptance, as evidenced by a PR score of 2,111. This implies that respondents with a negative attitude are at a risk 2,111 times higher of receiving incomplete vaccination. Attitude, as an individual factor, can exert a considerable impact on behavior. When behavior is adopted based on a positive attitude, it tends to be enduring (Notoatmodjo, 2012). This finding is consistent with research conducted by Widjaja et al., (2022) at Immanuel Hospital Bandung, where a relationship was observed between attitudes and vaccine acceptance among health workers and the community (ρ value < 0.05). Likewise, research conducted by Isnaini (2021) in Banjarmasin identified a relationship between attitudes and the acceptance of the Covid-19 vaccine (ρ = 0.000). The findings of the study are in accordance with Notoatmodjo's theory (2012), which suggests that behavior is influenced by predisposing factors, including individual attitudes According to this theory, individual attitudes serve as the starting point for the realization of actions or behaviors. Hence, individuals' attitudes towards receiving the Covid-19 vaccine can indeed impact the community's acceptance of the vaccine. This discovery aligns with previous research on Covid-19 in health workers in Pakistan conducted by Saqlain et al. (2020), which identified a significant relationship between attitude and behavior. A positive attitude serves as motivation or awareness for individuals to actively participate in activities, resulting in favorable behavior.

Based on these results, the researchers posit that individuals in this study with a positive attitude are likely to exhibit favorable behavior. A positive attitude tends to instill confidence and optimism, encouraging active participation in addressing the Covid-19 pandemic in Indonesia. This active engagement is expected to align with the knowledge acquired and applied through experience and responsibility. Individuals with a positive attitude are anticipated to proactively protect themselves, their families, and others from exposure to the Covid-19 virus without feeling burdened by challenges, demonstrating a continuous effort to contribute to the collective effort against the pandemic.

3. Multivariate Analysis

A multivariate analysis shows that only the variables of education level and attitude obtained a value of < 0.05 so that education level and attitude have a significant effect on vaccination acceptance by the community. Furthermore, the attitude variable is the variable that has the most dominant influence (most influential) on vaccination acceptance where respondents with unfavorable attitudes are 2,106 times at risk of having incomplete vaccination. The the predisposing factors studied, namely age, sex, education level, occupation, knowledge and attitudes influenced 14.3% of vaccination acceptance where 85.7% (100-14.3 = 85.7) were influenced by other variables that were not studied in this study.

A high level of education where higher education will make it easier for someone to get information. Age affects the mindset and comprehension of a person with increasing age, the mindset and comprehension of a person will develop so that the knowledge gained will be more and more. Knowledge affects the process of forming behavior, someone who has knowledge and poor health can affect a person's actions to maintain their health and in this study shows that most respondents have less knowledge about receiving covid-19 vaccination.

Attitude is a reaction to accepting or rejecting the message of information received by reason, so if the information received is understood not necessarily the information is carried out. This is because attitude itself is a predisposing factor for behavior to occur because attitude is still a closed response to an object or stimulus (Notoatmodjo, 2012). Research conducted by (Susanti et al., 2022) about public attitudes about Covid-19 vaccination in Malalayang District, Manado City, it was found that there were people who had a lack of perception about vaccination, researchers stated that this condition was caused by low acceptance of vaccination by the community, so they needed to get education about Covid-19 vaccination.

This study found that the predisposing factors studied, namely age, sex, education level, occupation, knowledge and attitudes influenced 14.3% of vaccination acceptance where 85.7% (100-14.3= 85.7) were influenced by other variables that were not studied in this study. The theory of Glanz and Bishop explains the factors that influence a person to get vaccinated against COVID-19. This theory is known as the Health Belief Model (HBM) theory. HBM is a theory to know or reveal the reasons for individuals to want or not to do healthy behaviors. HBM theory posits that six constructs predict health behavior: risk susceptibility, risk severity, action benefits, action barriers, efficacy, and cues to action.

Lawrance Green's PRECEDE theory states that there are several factors that influence people's behavior, namely facilitative, supportive and encouraging factors. Predisposing factors are evident in knowledge, attitudes, beliefs, values, social norms, culture, and sociodemographic elements. Enabling factors, facilitating a behavior, take the form of facilities, infrastructure, and service amenities. Reinforcing factors, which encourage or strengthen a behavior, are manifested in the attitudes and behaviors of health workers or other authorities serving as reference groups for community behavior (Pakpahan, 2021).

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, it can be affirmed that both the level of education and attitude significantly impact vaccination acceptance among the people of North Sulawesi. The collective influence of factors such as education, occupation, knowledge, and attitudes contributes to 14.3% of the overall acceptance of Covid-19 vaccination. The study suggests that the Regional Health Office and all stakeholders should engage in health promotion initiatives aimed at encouraging all segments of the community to embrace Covid-19 vaccination and participate in preventive measures against the virus.

FURTHER STUDY

Further research can examine other factors that affect the acceptance of Covid-19 vaccination in the community such as government policies and supervision, family support, the role of health workers and others.

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