World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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Public perceptions of COVID-19 vaccination in the north Wakorumba health center: Demographic predictors, knowledge and family support

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World Journal of Advanced Research and Reviews, 2026, 29(01), 1790-1796

Publication history: Received on 18 December 2025; revised on 27 January 2026; accepted on 29 January 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.29.1.0245

Abstract

Public perception is one of the key determinants in the success of COVID-19 vaccination programs. Understanding the variables that influence perception can help guide effective public health strategies, especially in rural or underserved regions. This study aimed to examine the effect of demographic predictors, knowledge level, and family support on public perception of COVID-19 vaccination in the working area of the North Wakorumba Health Center, Indonesia. A cross-sectional analytical study was conducted involving 342 heads of households aged 18–59 years, selected through simple random sampling. Data were collected using structured questionnaires through home visits. Bivariate analysis was performed using the Chi-square test, and logistic regression was employed to identify significant predictors of perception at a 95% confidence level (α = 0.05). The results showed significant associations between perception and age (p = 0.012; OR = 5.186), education level (p = 0.031; OR = 1.870), and family support (p = 0.000; OR = 3.556). In contrast, knowledge, gender, and marital status did not show significant effects in multivariate analysis. Age, education, and family support were identified as significant factors influencing public perception of COVID-19 vaccination. Tailored health education and family-based interventions are essential to improve vaccine acceptance, especially among older adults and individuals with limited education or weak social support.

Keywords: COVID-19 Vaccination; Demographic Predictors; Family Support; Knowledge; Logistic Regression; Public Perception

1. Introduction

The COVID-19 pandemic, which began in late 2019, has posed an extraordinary global challenge, profoundly affecting health, economic, and social systems worldwide. In Indonesia, the spread of the virus prompted rapid mitigation measures by the government, including the implementation of health protocols and a national vaccination program aimed at establishing herd immunity and reducing morbidity and mortality caused by SARS-CoV-2 (1). The government initiated a vaccination program using various types of vaccines, such as Sinovac, AstraZeneca, Moderna, Pfizer, and Bio Farma, which has now expanded to include booster doses (2).

Nevertheless, vaccination coverage is determined not only by vaccine availability and infrastructure but also by the level of public acceptance. Public perception is a crucial element that can either support or hinder the success of vaccination programs. Studies indicate that vaccine acceptance is strongly influenced by perceptions of safety, effectiveness, and trust in health institutions and government authorities (3,4). These perceptions may be shaped by predisposing factors

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(such as age, education, and beliefs), enabling factors (such as access to information and healthcare workers), and reinforcing factors (such as family support and social motivation), as described in the Precede-Proceed model.

In the Indonesian context, various studies have examined public perceptions of the COVID-19 vaccine. In the working area of the North Wakorumba Public Health Center, vaccination participation remains low—40% for the first dose and 38% for the second dose out of a productive population of 3,166 individuals. Surveys show that public hesitancy is influenced by age, education level, knowledge, and family support (5). A study in West Kawangkoan, Minahasa, by Tiwow et al. in 2023 found that although 57.3% of respondents had a moderately good perception, only 1.5% of unvaccinated individuals expressed willingness to receive the vaccine(6). Similarly, a study by Tuloli et al. in 2023 in Gorontalo City revealed that high levels of knowledge (60%) correlated significantly with positive perceptions (62.1%) toward the COVID-19 vaccine, with a significance value of $p < 0.001$ (7).

Similar phenomena are reflected in international studies. Research by Gagneux-Brunon et al. in 2021 in France among healthcare workers found that prior vaccination (e.g., influenza) increased the intention to receive the COVID-19 vaccine (aOR = 4.69), while vaccine hesitancy reduced vaccination intention (aOR = 0.37) (4). In India, Baghani et al. in 2023 reported that factors such as religious beliefs, rumors about side effects, and scientific misconceptions contributed to negative perceptions within marginalized communities (8). In Indonesia, a qualitative study by Tinungki et al. in 2022 in the Sangihe Islands revealed that negative public perceptions included beliefs related to apocalyptic narratives, fear of side effects, and doubts about vaccine safety, although some participants also expressed positive views, such as supporting government measures and understanding the benefits of vaccines in breaking the chain of transmission (9).

North Wakorumba is one of the regencies located on the southeastern island of Sulawesi. Data shows that vaccination coverage was still low. Data on January 9, 2022, in contrast to health workers and civil servants, for general and vulnerable communities, the elderly, and aged 12 to 17 years old, around 16% have only achieved the first vaccination target, and 7% for the second vaccination. Trust and confidence in any COVID-19 vaccine will be crucial to its success. Efficacy is an important consideration, but so are the pragmatics of delivery, community acceptance, longevity of effect, whether a vaccine reduces infection and transmission as well as disease, efficacy in high-risk groups, and, of course, safety.

Based on these findings, it is clear that public perceptions of the COVID-19 vaccine are shaped by a complex interplay of cognitive, affective, social, and cultural dimensions. Therefore, health communication strategies and public education initiatives must be designed contextually, taking into account demographic characteristics and local values, to improve widespread and equitable vaccine acceptance. It is important to identify the factors that significantly influence public perceptions of COVID-19 vaccination. Therefore, this study aims to examine the influence of demographic predictors (such as age and education), knowledge level, and family support on public perceptions regarding COVID-19 vaccination in the working area of the North Wakorumba Public Health Center. A deeper understanding of these factors is expected to provide a scientific basis for more effective and targeted policy interventions to increase vaccination coverage and public acceptance of national immunization programs.

2. Material and methods

This study adopted a quantitative analytical design with a cross-sectional approach and was conducted in the working area of the North Wakorumba Health Center, Buton Utara Regency, Southeast Sulawesi Province, Indonesia. The target population included all heads of families aged 18–59 years residing within the health center's coverage area. The study used structured questionnaires developed by the research team to assess demographic variables, knowledge levels, family support, and public perception toward COVID-19 vaccination. Instruments included printed questionnaires and interview guides. All data were collected directly through home visits by trained enumerators. A simple random sampling method was employed to select 342 respondents from the population. Inclusion criteria included heads of families aged 18–59 years who resided permanently in the area and provided written informed consent. Exclusion criteria included individuals with communication difficulties or cognitive impairments preventing reliable responses. All collected data were coded and analyzed using SPSS (Statistical Package for the Social Sciences). The analysis was used by the chi-square and logistic regression tests. Statistical significance was set at a p-value < 0.05 with corresponding Odds Ratio (OR) and 95% Confidence Intervals (CI) reported for each predictor.

3. Results and discussion

In this study, perception is defined as an individual's view or judgment regarding COVID-19 vaccination, encompassing beliefs about the vaccine's effectiveness and benefits, compliance with government policies, the importance of

maintaining health protocols, and responses to circulating public information. Perception also reflects individual motivation to receive the vaccine—whether driven by personal awareness or external demands—and includes skepticism about the necessity of vaccination. Perception was measured through responses to a series of statements using a four-point Likert scale, representing both positive and negative views.

This approach is consistent with perception models found in recent research. Malik et al. in 2020 identified three main components of vaccine perception—cognitive (beliefs in efficacy and safety), affective (emotions such as fear or anxiety), and conative (intentions to act)—which collectively influence vaccine acceptance decisions (10). Similarly, Al-Amer et al. in 2022 emphasized the complexity of vaccine perceptions, highlighting the role of risk appraisal, misinformation, and institutional trust (11). Similarly, cross-national research has found that vaccine hesitancy is associated with risk perception, views of government response/transparency, and support for misinformation (12). COVID-19 vaccine perception in Indonesia is shaped by interactions between knowledge, social norms, institutional credibility, and exposure to false information (13). Together, these references affirm that the items used in this study provide a valid theoretical and empirical foundation for assessing public perception of vaccination.

Table 1 Association between Demographic Predictors, Knowledge, and Family Support with Perception of COVID-19 Vaccination

Variable	**Perception of covid-19 vaccination**						
	Positive		**Negative**		**Total**		***p-value***
	F	**%**	**F**	**%**	**F**	**%**	
Age							
Late Teen (18-25)	56	94.9	3	5.1	59	100	0.000*
Mature (26-45)	107	73.8	38	26.2	145	100	
Elderly (46+)	74	53.6	64	46.4	138	100	
Sex							
Man	133	67.9	63	32.1	196	100	0.554
Female	104	71.2	42	28.8	146	100	
Education							
Low	84	53.5	73	46.5	157	100	0.000*
High	153	82.7	32	17.3	185	100	
Marital Status							
Marry	148	61.2	94	38.8	242	100	0.000*
Unmarried	89	89.0	11	11.0	100	100	
Profession							
Working	151	68.6	69	31.4	220	100	0.807
No working	86	70.5	36	29.5	122	100	
History of NCDs							
Yes	58	62.4	35	37.6	93	100	0.113
No	179	71.9	70	28.1	249	100	
Knowledge							
Good	144	88.3	19	11.7	163	100	0.000*
Less	93	52.0	86	48.0	179	100	
Family Support							

Good	145	88.4	19	11.6	164	100	0.000*
Less	92	51.7	86	48.3	178	100	
Total	237	69.3	105	30.7	342	100	

NCD = Non-Communicable Diseases; * Chi-square test. Statistically significant at 95% confidence level (α = 0.05)

Associations between the response variable and each of the potential risk factors adjusted for other factors were studied by multivariate logistic regression. Variables at p-value < 0.25 in the univariate analysis were considered for further analysis. A stepwise selection procedure was applied to aid in the process of selecting variables for the final model. A p-value ≤ 0.05, within a 95% confidence interval, was considered the cutoff point for statistically significant effects. Odds ratios were used to determine the direction and strength of the relationship.

Table 2 Analysis of Factors Affecting Perception of COVID-19 Vaccination

Variabel	**95% Wald CI for Exp(B)**					
	B	SE	Exp(B)	Lower	Upper	p-value
Age						
Late Teen (18-25)	0	-	1	-	-	-
Mature (26-45)	1.135	0.651	3.111	0.868	11.156	0.081
Elderly (46+)	1.646	0.658	5.186	1.428	18.834	0.012*
Education						
Low	0.626	0.290	1.870	1.059	3.305	0.031*
High	0	-	1	-	-	-
Family Support						
Good	0	-	1	-	-	-
Less	1.268	0.330	3.556	1.862	6.790	0.000*
Marital Status						
Marry	0	-	1	-	-	-
Unmarried	-0.414	0.425	0.661	0.287	1.520	0.330
History of NCDs						
Yes	0.066	0.284	1.068	0.612	1.865	0.817
No	0	-	1	-	-	-
Knowledge						
Good	0	-	1	-	-	-
Less	0.162	1.178	1.176	0.117	11.836	0.891

* Logistic regression test. Statistically significant at 95% confidence level (α = 0.05)

3.1. Public Perception of COVID-19 Vaccination Based on Demographic Predictors

Age is the most important factor in shaping an individual's attitudes; therefore, under the conditions described above, respondents tend to display more positive behavior than those in younger age groups. Age is one variable that, substantively, is associated with the public's decision to receive the COVID-19 vaccine, because age influences how a person perceives situations and thinks. As people grow older, their behavior and ways of thinking develop further, which in turn affects their decision to undergo COVID-19 vaccination (14). Age refers to the length of time an individual has lived, calculated from birth until their most recent birthday. Age affects comprehension and patterns of thinking, as well as psychological and emotional changes, so that the knowledge acquired becomes better. As individuals reach a

more mature age, their maturity and capacity to think and work become more established. The older a person is, the more constructively they tend to apply coping strategies and utilize the knowledge they have obtained (15).

In Table 1, an analysis of 342 household heads aged 18–59 years in the service area of the North Wakorumba Health Center revealed a significant association between age and perceptions of COVID-19 vaccination (p-value = 0.000). While younger participants (aged 18–25) showed the highest rate of positive perception (94.9%), logistic regression results in Table 2 indicated that respondents aged ≥46 years were 5.19 times more likely to have a negative perception compared to the youngest age group (OR = 5.186; 95% CI: 1.428–18.834; p -value= 0.012). This result is consistent with global findings indicating that older adults are more prone to vaccine hesitancy (16). A systematic review by Al-Amer et al. in 2022 reported a pooled prevalence of vaccine hesitancy among older adults at 27.7% (95% CI: 23.8–31.6%), largely influenced by concerns over vaccine safety, low perceived susceptibility, and exposure to misinformation (11). Similarly, A study of community-dwelling elderly in Hong Kong found that participants aged 80 and over had significantly lower vaccine acceptance rates. The main reasons for vaccine refusal or hesitancy were poor health and concerns about vaccine side effects causing complications (17).

3.2. Educational Level and Perception of Vaccination

Table 1 presents that participants with a higher level of education reported a positive perception at 82.7%, compared with only 53.5% among those with lower education, indicating a significant association with vaccination perception (p-value = 0.000). Although this study found that education is related to public perception of vaccination, some respondents with lower education still had a good perception of the COVID-19 vaccine (53.3%). This may be influenced by several factors, such as having good knowledge that enables them to distinguish accurate and reliable information, thereby shaping a positive perception. Conversely, some respondents with higher education had a less favorable perception of the COVID-19 vaccine (17.3%). This may be due to factors such as exposure to circulating hoaxes or misinformation about the COVID-19 vaccine, which can negatively influence perceptions.

Further multivariable analysis confirmed that participants with lower education were 1.87 times more likely to have a negative perception (OR = 1.870; 95% CI: 1.059–3.305; p-value = 0.031). These findings support previous studies highlighting the influence of education on health literacy and vaccine acceptance. According to Gagneux-Brunon et al. in 2021, individuals with higher educational attainment tend to better understand the benefits of immunization and rely on trustworthy information sources (4). Research by Siani and Green in 2023 also confirms a positive association between education level and trust in COVID-19 preventive measures, and a negative association between education level and belief in false information related to COVID-19 (18).

3.3. Family Support and Its Influence on Perception of Vaccination

Family support is one of the key factors in promoting healthy behaviors. Families who believe in the benefits of immunization for infants and who trust health institutions are more likely to encourage family members to make optimal use of the health facilities available in their local community (19,20). Family support exhibited a strong and statistically significant relationship with vaccination perception (p-value = 0.000). Of those who received strong family support, 88.4% reported positive perceptions, compared to only 51.7% among those with weak support (Table 1). Adjusted regression analysis indicated that respondents with poor family support were 3.56 times more likely to exhibit negative perceptions (OR = 3.556; 95% CI: 1.862–6.790; p-value = 0.000). These results are consistent with previous research emphasizing the important role of family in health-related decision-making. Family members' influence plays a key role in shaping vaccine acceptance in Indonesia (13). Additionally, Manandhar et al. in 2024 reported that negative social judgment from family and community is generally low, indicating that strong social support can reinforce positive perceptions of vaccination(16). When individuals do not expect to be judged, they are more likely to view vaccination as a reasonable, beneficial, and safe action.

The findings of this study highlight the importance of targeted public health strategies that consider demographic and psychosocial factors. Specific recommendations include designing customized health communication strategies for older adults (≥46 years), addressing their specific concerns and using age-appropriate messages. Enhancing access to reliable and comprehensible information for individuals with lower education levels. Promoting family- and community-based health promotion efforts, particularly in rural and underserved populations. Strengthening vaccine literacy through the involvement of trusted local figures and culturally adapted education campaigns. By addressing these key factors, health authorities can improve vaccination coverage and reduce hesitancy across diverse population groups.

4. Conclusion

The study demonstrated that public perception of COVID-19 vaccination is significantly affected by age, educational level, and family support. Individuals aged 46 years and above, those with lower educational attainment, and those lacking strong family support were more likely to hold negative perceptions. Although knowledge appeared influential in bivariate analysis, it was not statistically significant in the multivariate model. These findings highlight the need for targeted public health interventions focusing on vulnerable demographic groups. Promoting accurate information, strengthening social support networks, and improving community engagement are crucial strategies to enhance public trust and participation in vaccination efforts.

Compliance with ethical standards

Disclosure of conflict of interest

We have no conflicts of interest to declare.

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