Original Article

Psychological Distress and Sociodemographic Predictors of COVID-19 Vaccine Hesitancy in Indonesia

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ABSTRACT

OBJECTIVE: To examine the association of sociodemographic characteristics and psychological distress (depression, anxiety, and stress) with being unvaccinated as a proxy of COVID-19 vaccine hesitancy in Indonesia.

METHODOLOGY: A case–control study was conducted between January and June 2022 in Aceh Province, Indonesia. A total of 600 adults were enrolled, comprising 400 vaccinated and 200 unvaccinated individuals. Data on sociodemographic characteristics, presence of non-communicable diseases (NCDs), and psychological distress were collected using the validated Depression, Anxiety, Stress Scale (DASS-21). Bivariate analyses compared groups, and multivariable logistic regression identified independent predictors of vaccine hesitancy.

RESULTS: Unvaccinated participants were significantly older (mean 46 vs 40 years, p = 0.001), more often male (37.5% vs. 26.7%, p = 0.007), had lower education (p = 0.001), and higher prevalence of NCDs (33.5% vs. 25.3%, p = 0.034). Median scores of depression (12 vs 8), anxiety (14 vs 8), and stress (18 vs. 10) were higher in the unvaccinated group (p < 0.001). In multivariable analysis, higher age (AOR 1.03, 95% CI 1.02–1.04), anxiety (AOR 1.06, 95% CI 1.02–1.11), and stress (AOR 1.03, 95% CI 1.00–1.07) were significant predictors of vaccine hesitancy, whereas depression and NCDs were not. In this study, unvaccinated status was used as a proxy indicator of vaccine hesitancy.

CONCLUSION: Sociodemographic factors and psychological distress, particularly anxiety and stress, were associated with COVID-19 vaccine hesitancy. Interventions to increase vaccine uptake should integrate mental health support and address psychological barriers alongside sociodemographic determinants.

KEYWORDS: COVID-19, vaccine hesitancy, psychological distress, anxiety, stress

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has underscored the critical importance of vaccination as a public health tool. Despite the widespread availability of effective vaccines, significant segments of the population remain vaccine-hesitant, refusing or delaying vaccination for various reasons[1]. Vaccine hesitancy threatens the achievement of herd immunity, prolongs pandemic burden, and increases morbidity and mortality from COVID-19. In Aceh Province, Indonesia, COVID-19 vaccine coverage has been among the lowest nationally. Surveys and reports attribute this hesitancy to religious concerns regarding vaccine halal status, mistrust toward central health authorities, and fear of adverse effects. Understanding these local sociocultural influences is critical to designing effective interventions.

A body of research has shown that sociodemographic attributes such as age, education, income, gender, and ethnicity are consistent predictors of vaccine hesitancy. For example, a study in the United States found that younger individuals, those with lower levels of education, and minority ethnic groups were more likely to be hesitant to accept COVID-19 vaccines (Sociodemographic predictors of COVID-19 vaccine acceptance: A nationwide US-based survey study, 2021). Similarly, studies in Oslo and Pakistan reported higher hesitancy among individuals with lower education and income, and residing in certain geographic or cultural groups[2].

Beyond sociodemographic factors, psychological distress such as anxiety, stress, and depression may influence vaccine decision-making. Elevated anxiety related to contracting COVID-19, perceived risk, fear of adverse effects, and intolerance of uncertainty are proposed mechanisms through which psychological distress may increase vaccine hesitancy[3]. In China, COVID-19 vaccine hesitancy was found to be associated with increased generalized anxiety, whereas risk perception partly mediated this relationship[4]. In another study, anxiety specifically about contracting COVID-19, rather than general anxiety, was positively associated with vaccine acceptance-highlighting that the type and focus of psychological distress matter[5].

In Indonesia, vaccine hesitancy has been the subject of both empirical and review studies. Literature has identified that concerns about vaccine safety, mistrust in government, misinformation, religious beliefs (including halal-concerns), and low perceived risk are among factors associated with reluctance to

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vaccinate[6]. However, psychological distress indicators such as depression, anxiety, and stress have not been sufficiently examined in combination with sociodemographic and health status variables in Indonesian settings.

Given that people experiencing psychological distress may perceive higher risk, have lower trust, or interpret information differently, it is plausible that distress plays a role in vaccine hesitancy independent of sociodemographic status and presence of non-communicable diseases. However, limited empirical data exist on how psychological distress interacts with sociodemographic variables to influence vaccine hesitancy in Indonesia. This study aimed to examine the association between sociodemographic characteristics and psychological distress (depression, anxiety, and stress) with COVID-19 vaccine hesitancy in Indonesia.

METHODOLOGY

Study Design

A case–control study was conducted between January and June 2022 in Banda Aceh and Bireuen, Aceh Province, Indonesia. The design was chosen to allow comparison between individuals who had received the COVID-19 vaccine (controls) and those who had not (cases), to identify sociodemographic and psychological factors associated with being unvaccinated, used as a proxy for vaccine hesitancy.

Population and Sample

A total of 600 adults aged 18 years and above were recruited, comprising 400 participants who had received at least one dose of the COVID-19 vaccine (control group) and 200 participants who had not received any COVID-19 vaccination (case group). A case-to-control ratio of 1:2 was used to increase statistical power while maintaining feasibility.

The minimum required sample size was estimated using the formula for unmatched case–control studies.[7] With an assumed prevalence of exposure (e.g., psychological distress) of 20% among controls, an odds ratio of at least 1.7 to be detected, 80% power, and 95% confidence level, the required sample size was 552 (184 cases and 368 controls). We recruited 600 participants (200 cases and 400 controls) to account for potential missing data and non -response.

Participants were selected purposively from community health centres (*puskesmas),* vaccination posts, and surrounding communities. Eligible participants were identified from vaccination registers maintained at community health centres and through outreach by village health volunteers. Eligibility criteria included being a resident of Banda Aceh or Bireuen during the study period and providing informed consent. Individuals with severe mental illness or cognitive impairment that prevented reliable completion of questionnaires were excluded.

Instrument

Data were collected through interviewer-administered questionnaires conducted by trained research assistants. Sociodemographic variables included age, sex, education, occupation, and income level. The presence of non-communicable diseases (NCDs) such as hypertension, diabetes, and cardiovascular disease was self-reported based on previous medical diagnoses.

Psychological distress was assessed using the Depression, Anxiety, and Stress Scale-21 (DASS-21), a widely validated tool consisting of 21 items divided into three subscales: depression, anxiety, and stress (7 items each) .[8] Respondents rated symptoms experienced over the past week on a 4-point Likert scale ranging from 0 (“did not apply to me at all”) to 3 (“applied to me most of the time”). Each subscale score was summed and multiplied by 2 to obtain comparable scores with the full DASS-42. Higher scores indicate greater levels of depression, anxiety, or stress. The DASS-21 has been validated in Indonesian populations, showing good reliability and construct validity[9,10].

Data Analysis

Data were entered and analyzed using Stata version 13. Descriptive statistics were calculated for all variables. Comparisons between vaccinated and unvaccinated groups were performed using chi-square tests for categorical variables and t-tests or Mann–Whitney U tests for continuous variables as appropriate. Logistic regression analysis was applied to estimate crude and adjusted odds ratios (ORs) with 95% confidence intervals (CIs) for predictors of vaccine hesitancy. Variables significant at $p < 0.05$ in bivariate analyses were included in the multivariable model. Model fit was assessed using likelihood ratio chi-square statistics and pseudo-R^2. Education and occupation variables were not included in the final multivariable model due to concerns of multicollinearity and to maintain model parsimony.

Ethical Statement

Ethical approval for this study was obtained from the Ethics Committee of the Faculty of Nursing, Universitas Syiah Kuala, Aceh, Indonesia (approval number: 111115081221). All participants provided written informed consent before enrolment. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Characteristics of Respondents

A total of 600 respondents were included in the analysis, comprising 400 individuals who had received at least 1 dose of a COVID-19 vaccine (controls) and 200 individuals who had not been vaccinated (cases). The mean age of unvaccinated participants was significantly higher than that of vaccinated participants (46 vs 40 years, $p = 0.001$). A greater proportion of unvaccinated individuals were male (37.5% vs. 26.7%, $p = 0.007$). Education level was strongly associated with vaccination status, with lower education more prevalent among the unvaccinated (38.5% vs 12.2%,

p = 0.001). Employment also differed significantly: 19.3% of vaccinated individuals were formal workers, compared with only 3% of the unvaccinated, whereas unemployment was more common among the unvaccinated (64.5% vs 50.5%, p = 0.001). No significant difference in household income was observed between the two groups (p = 0.152). The prevalence of non-communicable diseases (NCDs) was higher among the unvaccinated compared with the vaccinated group (33.5% vs. 25.3%, p = 0.034) (**Table I**).

Table I: Characteristics of respondents by vaccination status

Variable	Total (N=600)	Vaccinated (n=400)	Unvaccinated (n=200)
Age, mean ± SD	42 (13.6)	40 (12.2)	46 (15.3)
Male, n (%)	182 (30.3)	107 (26.7)	75 (37.5)
Education: Low, n(%)	126 (21.0)	49 (12.2)	77 (38.5)
Education: Medium, n(%)	253 (42.2)	171 (42.8)	82 (41.0)
Education: High, n(%)	221 (36.8)	180 (45.0)	41 (20.5)
Occupation: Formal, n(%)	83 (13.8)	77 (19.3)	6 (3.0)
Occupation: Informal, n(%)	186 (31.0)	121 (30.2)	65 (32.5)
Occupation: Unemployed, n (%)	331 (55.2)	202 (50.5)	129 (64.5)
Income above UMR, n (%)	412 (68.7)	267 (66.7)	145 (72.5)
Having NCD, n (%)	168 (28.0)	101 (25.3)	67 (33.5)

p-values reported in text

Psychological distress

Measures of psychological distress indicated that unvaccinated participants had significantly higher median scores across all three DASS-21 domains. The median depression score was 12 among the unvaccinated compared with 8 among the vaccinated (p < 0.001). Similarly, anxiety scores were higher among the unvaccinated (14 vs 8, p < 0.001), as were stress scores (18 vs. 10, p < 0.001). These results indicate a consistent pattern of greater psychological distress among individuals who remained unvaccinated (**Table II**).

Table II: Comparison of DASS-21 scores between vaccinated and unvaccinated groups

Domain	Vaccinated Median (IQR)	Unvaccinated Median (IQR)
Depression	8 (2–13)	12 (6–18)
Anxiety	8 (4–14)	14 (6–20)
Stress	10 (4–16)	18 (10–24)

Multivariable analysis

In the multivariable logistic regression model, age, anxiety, and stress were identified as independent predictors of being unvaccinated. Each one-year increase in age was associated with a 3% increase in the odds of vaccine hesitancy (AOR 1.03, 95% CI 1.02–1.04, p < 0.001). Anxiety was significantly associated with vaccine hesitancy, with each one-point increase in score raising the odds by 6% (AOR 1.06, 95% CI 1.02–1.11, p = 0.005). Stress was also significant, with each one-point increase in score raising the odds by 3% (AOR 1.03, 95% CI 1.00–1.07, p = 0.043). In contrast, depression scores (AOR 0.99, 95% CI 0.95–1.03, p = 0.738), male gender (AOR 1.42, 95% CI 0.96–2.12, p = 0.078), and NCDs (AOR 1.34, 95% CI 0.82–2.21, p = 0.237) were not significantly associated with vaccination status. The overall model was statistically significant (LR chi² = 96.35, p < 0.001) and explained 12.6% of the variance in vaccination status (Pseudo R² = 0.1261) (**Table III**).

Table III: Multivariable logistic regression of factors associated with being unvaccinated

Variable	Adjusted OR	95% CI	p-value
Age (per year)	1.03	1.02 – 1.04	<0.001
Male gender	1.42	0.96 – 2.12	0.078
Having NCD	1.34	0.82 – 2.21	0.237
Depression score	0.99	0.95 – 1.03	0.738
Anxiety score	1.06	1.02 – 1.11	0.005
Stress score	1.03	1.00 – 1.07	0.043

Model statistics: LR chi² = 96.35, p < 0.001; Pseudo R² = 0.1261

DISCUSSION

This study examined sociodemographic and psychological predictors of of being unvaccinated (as a proxy for COVID-19 vaccine hesitancy) in Aceh, Indonesia, using a case–control design. We found that older age, higher anxiety, and higher stress were independently associated with remaining unvaccinated, while depression and the presence of non-communicable diseases (NCDs) were not significant predictors. These findings add to the growing evidence that both social determinants and psychological distress contribute to vaccine hesitancy.

The association between older age and vaccine hesitancy is notable, as international evidence often indicates that younger adults are more hesitant[12,13]. In the Indonesian context, older adults may face unique barriers such as fear of vaccine side effects, comorbidities, or limited access to credible information. Previous studies in Southeast Asia have highlighted how misinformation and perceived contraindications contribute to hesitancy among older populations[14,15].

Psychological distress emerged as a critical factor, with anxiety and stress significantly predicting vaccine hesitancy. Elevated anxiety may lead to greater attention to potential risks and side effects, amplifying vaccine-related fears[16]. Similarly, stress can impair decision-making and increase susceptibility to misinformation, which in turn may reduce confidence in vaccination[17]. These findings align with research in China and Europe showing that individuals with higher levels of anxiety and stress reported greater

reluctance to accept COVID-19 vaccination[17]. However, depression was not significantly associated with hesitancy in our study, consistent with reports suggesting that no significant difference in vaccine hesitancy across diagnoses of major depressive disorder, bipolar disorder, and schizophrenia[18].

Sociodemographic differences between groups were also evident. Unvaccinated individuals were more likely to be male, less educated, and unemployed, mirroring global patterns of vaccine inequities[13]. Lower education and employment status may reduce access to reliable health information and contribute to mistrust in government vaccination campaigns, as noted in Indonesian surveys[6]. From a public-health perspective, interventions that integrate mental-health screening and psychoeducation into vaccination programs could help reduce anxiety and stress-related hesitancy, especially among older adults.

These findings highlight the importance of incorporating mental health support into vaccine promotion strategies. Addressing misinformation and providing clear, reassuring communication may help alleviate anxiety and stress. Integrating vaccination with community-based mental health programs could also improve uptake, particularly in regions where psychological distress is prevalent.

Strengths include the relatively large sample size, validated measurement of psychological distress, and multi-district recruitment. Limitations include the observational design, reliance on self-reported NCDs, and limited generalisability beyond Aceh. Reverse causality is also possible, whereby being unvaccinated may itself increase anxiety and stress.

This study has several limitations, including the use of purposive, non-random sampling, which limits generalisability; potential recall or social-desirability bias; and the inability of the case–control design to establish causality. Future research employing longitudinal or nationally representative designs is recommended to confirm these relationships and explore changes in vaccine attitudes over time.

CONCLUSION

Integrating mental-health screening and psychoeducation into vaccination campaigns may help reduce vaccine hesitancy, particularly among older adults experiencing anxiety or stress. Addressing both psychological and sociodemographic barriers can strengthen future pandemic vaccination strategies.

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AUTHOR CONTRIBUTION

Marthoenis M: Designed the study, conducted data analysis, and wrote the manuscript.

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