

Determinants of compliance with contribution payment of JKN mandiri participants in the bantimurung health center working area

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ABSTRACT

Introduction: Premium payment compliance is essential for maintaining the financial sustainability and continuity of Indonesia's National Health Insurance (JKN), particularly among self-employed participants who are responsible for paying contributions independently. Non-compliance may lead to inactive membership and disrupted access to healthcare. This study aimed to identify factors associated with premium payment compliance among active independent JKN participants in the working area of Bantimurung Community Health Center.

Methods: An observational analytic study with a cross-sectional design was conducted among 93 Non-Wage Recipient Workers (PBPU) selected from a population of 1,288 participants using purposive sampling. Data were collected using a structured questionnaire. Descriptive analysis was used to summarize participant characteristics, while bivariate associations were examined using the Chi-square test at a significance level of $\alpha = 0.05$. Crude odds ratios (ORs) and 95% confidence intervals (CIs) were calculated from the reported 2×2 contingency tables.

Results: Overall, 72 respondents (77.4%) were compliant with JKN premium payments. Participants with good knowledge had higher odds of payment compliance than those with poorer knowledge (OR = 3.76; 95% CI: 1.34–10.52; $p = 0.009$). High-income participants were more likely to comply with premium payments than low-income participants (OR = 4.75; 95% CI: 1.02–22.10; $p = 0.032$). Participants with fewer family dependents also had higher odds of compliance compared with those with more dependents (OR = 2.88; 95% CI: 1.05–7.84; $p = 0.035$).

Conclusion: Knowledge, income, and family dependency burden were significantly associated with JKN premium payment compliance. Strengthening participant education, payment reminders, and socioeconomic-sensitive payment strategies may improve contribution continuity and support JKN sustainability.

Keywords: health insurance; income; knowledge; patient compliance; social security.

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Highlight:

- Knowledge was significantly associated with JKN premium payment compliance.
- Higher income was associated with better payment compliance among independent JKN participants.
- Fewer family dependents were associated with higher odds of regular premium payment.
- Most respondents were compliant with JKN premium payments, reaching 77.4%.
- Strengthening participant education and socioeconomic-sensitive payment strategies may support JKN financing sustainability.

INTRODUCTION

The sustainability of Indonesia's National Health Insurance (*Jaminan Kesehatan Nasional*, JKN) depends not only on enrollment expansion but also on the continuity of premium contributions, particularly among Non-Wage Recipient Workers (*Pekerja Bukan Penerima Upah*, PBPU) who pay their contributions independently. Unlike salaried workers whose premiums can be deducted through employment mechanisms, independent participants bear direct responsibility for maintaining regular payments^{1,2}. Failure to pay contributions may result in inactive membership and disrupt access to healthcare when services are needed. The manuscript identifies payment arrears among independent participants as an ongoing challenge to the continuity of JKN financing and effective insurance protection. This makes payment compliance more than an administrative issue; it represents an important interface between household behavior, economic capacity, and the sustainability of a national health-financing system³.

Payment compliance among independent JKN participants is unlikely to be explained by a single determinant. The conceptual framework presented in the manuscript emphasizes knowledge, income, and family dependency burden as factors that may shape participants' ability and willingness to maintain regular contributions^{4,5}. Knowledge is particularly relevant because insurance contributions require participants to understand not only payment procedures but also the principle of risk pooling and the consequences of interrupted membership^{6,7}. Participants with adequate knowledge may be more likely to perceive monthly contributions as a continuing health-protection obligation rather than an expenditure that becomes necessary only when illness occurs. Conversely, limited understanding may encourage delayed payment, especially when participants are currently healthy and perceive no immediate benefit from maintaining active membership.

Economic capacity adds another layer to this behavioral mechanism. For PBPU households, premium payments compete with food, housing, education, transportation, and other routine expenditures. Income therefore determines the financial space available to prioritize health-insurance contributions. However, income should not be interpreted independently of household structure⁸. The number of dependents may alter the relationship between available resources and payment behavior because the same level of household income can represent substantially different purchasing capacity depending on the number of family members supported⁹. The manuscript describes this interaction by noting that a greater dependency burden can increase economic pressure and contribute to delayed premium payments, particularly among lower-income households. Thus, JKN contribution compliance can be conceptualized as the product of both cognitive readiness and household financial constraints.

Previous evidence discussed in the manuscript generally supports relationships between socioeconomic and individual factors and JKN payment compliance, yet the evidence does not justify reducing non-compliance to an income problem alone. The manuscript argues that family dependency, knowledge, financial capacity, and household financial management interact in shaping payment behavior¹⁰. This perspective is important for policy because interventions focused exclusively on information may have limited effects when participants understand their obligations but lack sufficient disposable income¹¹. Conversely, financial capacity may not guarantee regular contributions when knowledge of insurance obligations, payment discipline, or perceived long-term benefits remains weak¹². Payment compliance therefore reflects a multidimensional problem situated at the intersection of health literacy, socioeconomic resources, and household expenditure priorities.

Despite these conceptual relationships, an important empirical gap remains at the primary healthcare level. The source manuscript identifies a specific need to determine whether

knowledge, income, and number of family dependents are associated with premium payment compliance among active independent JKN participants in the working area of Bantimurung Community Health Center. Evidence generated in other populations cannot necessarily explain local compliance patterns because the relative importance of these factors may differ according to socioeconomic composition, household characteristics, and participants' understanding of JKN. Local evidence is therefore necessary to determine whether payment non-compliance primarily reflects an information deficit, financial constraint, household dependency burden, or a combination of these conditions.

The novelty of this study lies in examining knowledge, income, and family dependency burden within a single analytical framework of JKN premium payment compliance among active PBPU participants at the primary healthcare level in Bantimurung. Rather than viewing compliance solely as an individual payment behavior, the study positions it within the broader relationship between participant understanding and household socioeconomic capacity. This approach has practical relevance because each determinant implies a different intervention pathway: knowledge deficits may require targeted education, economic constraints may require payment strategies sensitive to participants' financial circumstances, while a high dependency burden may require greater attention to household-level affordability and expenditure pressures.

Accordingly, this study aimed to determine the factors associated with premium payment compliance among active independent JKN participants in the working area of Bantimurung Community Health Center in 2026, specifically by examining the associations of knowledge, income, and number of family dependents with payment compliance. By identifying these relationships, the study is expected to provide locally grounded evidence for BPJS Kesehatan and primary healthcare providers in developing more targeted strategies that combine participant education, payment facilitation, and consideration of household socioeconomic conditions. Such an approach may strengthen contribution continuity while supporting the broader sustainability of JKN financing.

RESEARCH METHODOLOGY

Study Design

This study employed a quantitative analytical observational design with a cross-sectional approach to examine factors associated with premium payment compliance among active independent National Health Insurance (*Jaminan Kesehatan Nasional*, JKN) participants. The cross-sectional design was selected because the exposure variables knowledge, income, and number of family dependents and the outcome variable, premium payment compliance, were assessed within the same study period. This design was appropriate for identifying statistical associations between participant-level and household socioeconomic characteristics and payment compliance; however, it does not establish temporal or causal relationships.

Setting and Participants

The study was conducted in 2026 in the working area of Bantimurung Community Health Center. The target population consisted of 1,288 Non-Wage Recipient Workers (*Pekerja Bukan Penerima Upah*, PBPU) registered as independent JKN participants. A total of 93 respondents were included using purposive sampling, whereby participants were selected according to predetermined eligibility considerations relevant to the study objectives. The retrieved manuscript confirms the population, sample size, and sampling technique but does not provide sufficient information in the available section to reproduce a formal sample-size calculation or to specify complete inclusion and exclusion criteria. These details should therefore be reported from the original research protocol rather than reconstructed retrospectively.

Variables and Measurement

The dependent variable was JKN premium payment compliance, categorized as compliant or non-compliant according to the operational criteria established in the study. Of the 93 participants, 72 (77.4%) were classified as compliant and 21 (22.6%) as non-compliant. The independent variables were knowledge, income, and number of family dependents. Knowledge represented participants' understanding of JKN and their premium-payment obligations and was categorized as good or poor. Income represented household economic capacity and was classified as high or low according to the study's operational criteria. Family dependency burden represented the number of household members financially supported by the participant and was categorized as fewer or more dependents.

Data were obtained primarily from respondents using a structured questionnaire. The available manuscript confirms questionnaire-based data collection. However, numerical evidence regarding instrument validity and reliability such as item validity coefficients, Cronbach's alpha, or test-retest reliability is not sufficiently documented in the retrieved material. Such values should not be added unless they can be verified from the original instrument-testing records.

Data Collection and Quality Control

Primary data were collected directly from eligible PBPU participants using the study questionnaire. Participants were assessed for their knowledge of JKN, household income, number of dependents, and premium payment compliance. Data collection followed standardized questionnaire administration to maintain consistency across respondents. For quality assurance, completed questionnaires should be checked for completeness and internal consistency before data entry. Data processing should include editing, coding, entry, and cleaning, followed by verification of categorical coding before statistical analysis. Where these procedures were not explicitly documented in the original protocol, they should be presented only if they accurately reflect the procedures actually undertaken by the research team.

Data Analysis

Data were analyzed using descriptive and inferential statistical procedures. Descriptive analysis summarized categorical variables using frequencies and percentages. Payment compliance was observed in 72 of 93 respondents (77.4%). Bivariate associations between each independent variable and payment compliance were examined using the Chi-square test, with statistical significance defined at $\alpha = 0.05$. Knowledge was significantly associated with payment compliance ($p = 0.009$), as were income ($p = 0.032$) and number of family dependents ($p = 0.035$).

For effect-size reporting, crude odds ratios (cORs) with 95% confidence intervals (CIs) can be calculated from the reported 2×2 contingency tables. Because the outcome was binary, binary logistic regression would ordinarily be appropriate for estimating adjusted associations. However, the original study explicitly states that multivariable analysis was not performed. Consequently, adjusted odds ratios (aORs) or claims regarding an independently dominant predictor should not be reported as original findings. The retrieved sections do not provide sufficiently verifiable information regarding the statistical software and version used. This information should be inserted only after confirmation from the original analysis records.

Ethical Approval

The available sections of the manuscript do not provide sufficient documentation to verify the name of the Research Ethics Committee, ethical approval number, or detailed informed-consent procedure. These details should not be fabricated or inferred.

RESULT

A total of 93 active independent National Health Insurance (JKN) participants were included in the study. Most respondents were aged 17–35 years (62.4%), female (69.9%), and had completed senior high school (60.2%). Self-employment was the most common occupation (40.9%), followed by farming (24.7%) and unemployment (22.6%). Regarding the main study variables, 58.1% had good knowledge, 72.0% were categorized as having low income, and 58.1% had fewer family dependents. Overall, 72 respondents (77.4%) were compliant with JKN premium payments.

Table 1. Characteristics of Study Participants (n = 93)

Characteristics	Category	n	%
Age (years)	17–35	58	62.4
	36–45	19	20.4
	>46	16	17.2
Sex	Male	28	30.1
	Female	65	69.9
Education	No formal education	3	3.2
	Primary school	6	6.5
	Junior high school	8	8.6
	Senior high school	56	60.2
	Higher education	20	21.5
Occupation	Unemployed	21	22.6
	Farmer	23	24.7
	Self-employed	38	40.9
	Employee	8	8.6
	Driver	1	1.1
	Laborer	2	2.2
Knowledge	Good	54	58.1
	Poor	39	41.9
Income	High	26	28.0
	Low	67	72.0
Family dependents	Fewer	54	58.1
	More	39	41.9
Premium payment	Compliant	72	77.4
	Non-compliant	21	22.6

The demographic profile indicates that the study population was predominantly young to middle-aged, female, and educated to senior high-school level. Although more than half demonstrated good knowledge, nearly three-quarters were classified as having low income, indicating that favorable knowledge did not necessarily coincide with stronger household financial capacity.

Bivariate analysis showed statistically significant associations between all three independent variables and JKN premium payment compliance. Among respondents with good knowledge, 47 of 54 (87.0%) were compliant, compared with 25 of 39 (64.1%) respondents with poor knowledge. Based on the reported 2×2 frequencies, respondents with good knowledge had 3.76 times the crude odds of payment compliance compared with those with poor knowledge (cOR = 3.76; 95% CI: 1.34–10.52; p = 0.009).

Table 2. Bivariate associations with jkn premium payment compliance

Predictor	Category	Compliant n (%)	Non-compliant n (%)	OR	95% CI	P-value
Knowledge	Poor	25 (64.1)	14 (35.9)	1.00	Reference	0.009
	Good	47 (87.0)	7 (13.0)	3.76	1.34–10.52	
Income	Low	48 (71.6)	19 (28.4)	1.00	Reference	0.032
	High	24 (92.3)	2 (7.7)†	4.75	1.02–22.10	
Family dependents	More	26 (66.7)	13 (33.3)	1.00	Reference	0.035
	Fewer	46 (85.2)	8 (14.8)	2.88	1.05–7.84	

Note: cOR = crude odds ratio; CI = confidence interval. OR and 95% CI were calculated from the 2×2 frequencies reported in the source manuscript and are therefore unadjusted estimates.

There is an internal typographical inconsistency in the original income table: it reports 24/26 as 92.3% but 2/26 as 17.7%. Based on the reported counts, 2/26 corresponds to 7.7%. The OR above was calculated from the original counts (24, 2, 48, and 19), not from the inconsistent percentage. The original counts and reported p = 0.032 are documented in the manuscript.

The strongest crude association was observed for income. Respondents with high income had 4.75 times the odds of being compliant compared with low-income respondents. However, the wide 95% CI (1.02–22.10) indicates considerable uncertainty in the magnitude of this association. Knowledge also showed a substantial association, while respondents with fewer family dependents had approximately 2.88 times the odds of compliance compared with those supporting more dependents. The original Chi-square tests confirmed statistical significance for knowledge ($p = 0.009$), income ($p = 0.032$), and number of dependents ($p = 0.035$). The findings suggest that JKN premium payment compliance among independent participants reflects an interaction between health-insurance literacy and household economic capacity, rather than a purely administrative payment behavior. Good knowledge was associated with higher compliance, indicating that understanding JKN obligations and the importance of maintaining active membership may support regular contribution behavior. However, the stronger crude association observed for income suggests that knowledge alone may be insufficient when households face financial constraints. Participants may understand the importance of maintaining JKN membership yet still prioritize immediate household expenditures when disposable income is limited.

The association with family dependency burden further reinforces this interpretation. Supporting more household members may increase competition between insurance premiums and essential expenditures, thereby reducing payment flexibility. Consequently, interventions should not rely exclusively on conventional health education. BPJS Kesehatan and primary healthcare providers could combine targeted JKN literacy programs with accessible payment reminders, simplified payment channels, and strategies responsive to household socioeconomic constraints. Nevertheless, these implications should remain cautious because the cross-sectional design establishes association rather than causality, and the absence of multivariable adjustment means that the independent contribution of knowledge, income, and family dependency cannot yet be determined. Future studies using adequately powered multivariable logistic regression are required to clarify these independent relationships.

DISCUSSION

The findings of this study suggest that compliance with National Health Insurance (*jaminan kesehatan nasional*, JKN) premium payments among active Non-Wage Recipient Workers (*pekerja bukan penerima Upah*, PBPU) is shaped by the intersection of cognitive and household economic factors. Knowledge, income, and number of family dependents were each significantly associated with payment compliance. Respondents with good knowledge demonstrated higher compliance than those with poorer knowledge, while higher-income participants and those with fewer dependents were also more likely to maintain regular premium payments. Rather than treating these variables as isolated determinants, the pattern points to a broader conceptual explanation: contribution compliance reflects the capacity of households to translate an understanding of health-insurance obligations into sustained financial behavior^{13,14}.

Knowledge appears to represent an important cognitive component of this process. In the present study, 87.0% of respondents with good knowledge were compliant with premium payments, compared with 64.1% among those with poorer knowledge. Knowledge may influence how participants perceive the function of JKN, the consequences of payment arrears, and the value of maintaining continuous insurance protection even when healthcare is not immediately required. This distinction is important because insurance is based on prospective risk protection rather than payment only when illness occurs. Participants who understand this principle may be more willing to allocate household resources regularly for contributions. Nevertheless, knowledge should not be interpreted as a sufficient condition for compliance. A participant may understand the benefits and obligations of JKN but remain unable to pay regularly when household resources are constrained^{15,16}.

This tension between willingness and ability to pay becomes clearer in the income findings. Most participants in the study were classified in the low-income category, accounting for 72.0%

of the sample. Although overall payment compliance reached 77.4%, high-income participants showed a greater proportion of compliance than low-income participants. Income can therefore be interpreted as a measure of the household's financial capacity to convert intention into regular contribution behavior. For PBPU participants, JKN premiums are paid directly rather than automatically deducted through an employer. Consequently, contribution payments compete with food, housing, transportation, education, utilities, and other immediate household expenditures. Under financial pressure, health-insurance premiums may be postponed despite participants recognizing their importance¹⁷.

The association involving family dependents adds a household-allocation dimension to this interpretation. Participants with fewer dependents had higher payment compliance than those with more dependents; 85.2% of participants with fewer dependents were compliant compared with 66.7% among those with more dependents. A larger dependency burden does not necessarily imply unwillingness to participate in JKN. Instead, it can increase the number of competing demands placed on finite household resources. The manuscript similarly interprets payment compliance as the result of interaction among dependency burden, knowledge, and economic capacity, noting that additional dependents may intensify financial pressure particularly among lower-income households¹⁸. This distinction has practical significance because labeling non-compliance simply as individual indiscipline could overlook the structural affordability constraints faced by PBPU households.

Taken together, these findings support a conceptual distinction between capacity, comprehension, and household burden. Knowledge reflects comprehension of JKN and contribution obligations; income reflects financial capacity; and family dependents approximate competing household resource demands. Compliance may emerge when these dimensions are sufficiently aligned. Good knowledge may promote willingness to pay, but its behavioral effect can be weakened by limited income^{19,20}. Likewise, adequate income may facilitate payment, but competing obligations associated with a larger household can reduce available resources. This integrated interpretation moves beyond a single-factor explanation of payment behavior and provides a stronger basis for designing interventions.

The study findings are also consistent with the discussion of previous research presented in the source manuscript. Prior evidence reviewed there suggests that knowledge is associated with JKN contribution compliance because participants who understand program benefits, payment obligations, and the consequences of arrears tend to demonstrate more favorable payment behavior. The present findings extend that interpretation within the Bantimurung context. However, knowledge should not be equated with a dominant determinant. Although the descriptive difference in compliance according to knowledge was substantial, the original study explicitly states that no multivariable analysis was conducted and therefore does not establish knowledge as the most dominant independent predictor^{21,22}.

The income finding likewise reinforces the socioeconomic interpretation developed in the manuscript. Respondents with higher income showed substantially greater compliance, whereas low-income households experienced a higher proportion of non-compliance²³. This relationship is plausible within the PBPU financing mechanism because independent participants directly experience the opportunity cost of monthly contributions. The result should therefore be viewed in relation to household purchasing power rather than income as an isolated demographic characteristic. When resources are constrained, contribution payment becomes one component of a wider household budgeting process²⁴.

The relationship between dependency burden and compliance further supports this interpretation. The manuscript discusses how an increasing number of dependents can intensify household expenditure and make regular contribution payments more difficult²⁵. Importantly, it also notes that a high number of dependents does not automatically produce non-compliance when households retain sufficient economic capacity and understanding of JKN. This observation strengthens the argument that the three study variables may interact conceptually. A household with many dependents but adequate income may remain compliant, whereas the same dependency burden could become consequential under conditions of low income. Similarly, greater

knowledge could strengthen prioritization of JKN payments but may not completely overcome severe financial constraints.

This interpretation has implications for the JKN system. Strategies aimed at increasing PBPU compliance should not rely exclusively on generalized education campaigns. Education remains important, particularly for explaining contribution obligations, membership continuity, and the protective logic of health insurance²⁶. However, educational interventions may have diminishing effects when non-compliance originates primarily from affordability constraints. The source manuscript accordingly suggests that financial planning, easier payment mechanisms, and communication regarding the long-term benefits of JKN should operate together rather than separately²⁷. At the primary healthcare level, Puskesmas can contribute through participant education and communication, while payment-related interventions require coordination with BPJS Kesehatan and relevant stakeholders.

Several limitations must temper interpretation of these findings. First, the cross-sectional design measures exposures and payment compliance within the same observational framework. The study can therefore identify associations but cannot establish temporal or causal relationships²⁸. For example, although better knowledge may facilitate compliance, the reverse pathway is also plausible: participants who consistently interact with JKN services may acquire greater knowledge through their experience with the program. Causal language such as “knowledge increases compliance” should consequently be avoided.

Second, the study relied on 93 respondents selected using purposive sampling. Although this sample provides useful local evidence, non-probability selection limits population-level generalizability. The findings should primarily be interpreted within the working area of Bantimurung Community Health Center rather than automatically extrapolated to all PBPU participants in Maros Regency or Indonesia. Local socioeconomic structures, access to payment facilities, experiences with healthcare, and participant characteristics may differ substantially between settings.

Third, the study did not conduct multivariable analysis. This is a particularly important limitation because knowledge, income, and family dependency are unlikely to operate independently. The source manuscript explicitly recognizes that descriptive differences cannot establish which factor is most dominant and recommends multivariable logistic regression in subsequent research. The crude odds ratios should therefore be interpreted as unadjusted associations. Potential confounding by education, occupation, age, household structure, access to payment channels, healthcare utilization, and other factors remains possible.

Measurement also warrants caution. Knowledge and socioeconomic variables were categorized for analysis, which facilitates interpretation but can reduce information contained in the original measurements. Income categories, for example, may not fully represent disposable household resources, financial instability, debt, or irregular earnings. Similarly, number of dependents is only an approximate indicator of economic burden because household expenditure varies according to age, employment status, health needs, and other characteristics of family members. Payment compliance itself may also be dynamic; a binary classification does not necessarily distinguish occasional late payment from persistent arrears.

Future research should therefore examine JKN contribution compliance using larger probability-based samples and analytical models capable of controlling for confounding. Binary logistic regression would be appropriate when compliance is classified as a dichotomous outcome, allowing adjusted odds ratios to be estimated for knowledge, income, and dependency burden while controlling for relevant participant characteristics. Interaction terms could provide additional insight into whether the association between knowledge and compliance differs by income or whether dependency burden becomes particularly important among economically disadvantaged households.

Longitudinal research would offer an additional advantage by observing payment behavior over time. Rather than relying solely on self-reported compliance, future studies could integrate administrative contribution histories where ethically and institutionally permissible. This would allow differentiation between consistently compliant participants, intermittent payers, and

participants with persistent arrears. Future research could also incorporate variables identified in the manuscript as potentially relevant, including perceived service quality, motivation, ability to pay, family support, and access to payment facilities.

From a policy perspective, the present findings indicate that improving PBP contribution continuity requires a differentiated rather than uniform strategy. Participants with inadequate knowledge may benefit most from targeted JKN literacy and clearer communication regarding contribution obligations and membership continuity. Participants facing economic constraints may require easier payment processes and interventions sensitive to household cash-flow patterns. Households with greater dependency burdens may require approaches that recognize the cumulative pressure of family expenditure. The broader contribution of this study is therefore to position JKN premium compliance not merely as an individual decision to pay, but as a behavior produced by the interaction between what participants understand, what households can afford, and how limited resources are distributed among competing needs. This perspective can help shift policy responses from generalized reminders toward more targeted, context-sensitive strategies for sustaining participation among independent JKN members.

CONCLUSION

This study found that knowledge, income, and the number of family dependents were significantly associated with premium payment compliance among active independent National Health Insurance (JKN) participants in the working area of Bantimurung Community Health Center. Respondents with better knowledge, higher income, and fewer family dependents showed higher levels of payment compliance. These findings indicate that compliance is influenced not only by participants' understanding of JKN obligations but also by household economic capacity and competing financial responsibilities. From a policy perspective, efforts to improve premium payment compliance should combine targeted JKN education with strategies that address financial barriers. BPJS Kesehatan and primary healthcare providers should strengthen participant counseling, optimize payment reminders, expand convenient payment channels, and develop communication strategies that are sensitive to household socioeconomic conditions. Because the study used a cross-sectional design and did not conduct multivariable analysis, the findings should be interpreted as associations rather than causal effects. Future studies should apply larger probability-based samples and multivariable logistic regression to identify the independent determinants of premium payment compliance.

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Conflict of Interest

The author declares no conflict of interest related to the conduct, analysis, interpretation, or publication of this study. The manuscript does not report any competing interests; therefore, this declaration should also be confirmed by the author before journal submission.

Authors' Contributions

Annisa: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Visualization, and Writing – Original Draft.

Darmi Arda: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Visualization, and Writing – Original Draft.

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Declaration of Generative AI Use

During the preparation of this manuscript, generative artificial intelligence tools were used solely to assist with language refinement, academic organization, and improvement of manuscript readability. The research design, data collection, statistical results, interpretation of findings, and scientific conclusions remained under the responsibility of the author. All AI-assisted content was critically reviewed, verified, and revised by the author, who assumes full responsibility for the final manuscript. This declaration is preferable to stating that AI was not used when AI-assisted language editing has in fact been undertaken.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Data sharing will be subject to participant confidentiality, ethical considerations, and applicable institutional requirements.

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