ORIGINAL ARTICLE

EXPLORING KNOWLEDGE, ATTITUDES, AND PROPENSITY REGARDING COVID-19 VACCINATION AMONG INDONESIAN YOUTH IN A SUBURBAN AREA

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ABSTRACT

As nations strive to increase COVID-19 vaccination rates, the perspective of the youth is crucial. This study explores their attitude, knowledge, and propensity concerning COVID-19 vaccination in Indonesia's sub-urban area. Utilizing a cross-sectional design, middle school to bachelor/diploma program students in the Pandeglang District-Banten Province Indonesia, an area with low vaccination uptake, were surveyed. A self-administered questionnaire, covering demographics, attitude, knowledge, risk perception, and propensity toward vaccination, was distributed, yielding a final data set of 936 responses. The relationship between two variables were analyzed using Chi-Square, Mann-Whitney, or Kruskal-Wallis tests, depending on the nature of variables. The majority of our participants were female (56.5%), aged 12-15 (72.2.%) with 72.4% being junior high school students. Most of the participants had positive attitudes toward a COVID-19 vaccine, 78% had adequate knowledge, 53.1% expressed high perceived risks of contracting COVID-19 without vaccination, and over 80% of participants displayed a strong inclination to receive the vaccine. Gender and age group did not significantly impact the measured variables while those in higher educational levels showed more hesitancy and reduced risk perception regarding severe COVID-19 outcomes. Our findings highlight the need for health-centric community outreach, especially in educational settings. With adolescents and young adults actively using social media, it becomes important for authoritative institutions to control these platforms for accurate public health messaging. Notwithstanding the limitations, this study offers valuable insights into young individuals' vaccination views in developing, sub-urban contexts.

Keywords: adolescents, covid-19, vaccination, sub-urban, young adults.

INTRODUCTION

The COVID-19 pandemic has had profound impacts, both globally and locally, on health, social dynamic, and economics[1]. By April 2022, the World Health Organization (WHO), reported over 500 million confirmed COVID-19 cases and over six million deaths had been reported globally[2]. Within Indonesia, there were 6 million confirmed cases and 155,000 reported fatalities by this time[3]. Vaccination has been identified as a crucial tool for diminishing the disease's burden and reducing morbidity, mortality, and related healthcare costs[4]. The global outbreak of COVID-19 has led to a widespread search for a safe and effective vaccine to mitigate the virus's effects and control its spread[5].

Vaccination serves as an important strategy to prevent and control infectious diseases, mainly operating through the stimulation of the host's immune system to generate antibodies, thus enhancing immunity against diseases and broadly safeguarding vaccinated individuals[4]. In the context of the COVID-19 pandemic, there is a need to accelerate vaccination rates to sustain its efficacy[6].

Boosting COVID-19 vaccination rates can be achieved, in part, by formulating targeted policy measures. This includes the development of evidence-based vaccination strategies for the children and adolescent population. Furthermore, the active involvement of parents in promoting vaccination among their children is also crucial[7].

Rahmani et al.[8] found that COVID-19 vaccination would significantly reduce the number of COVID-19 cases; however, the extent of this reduction varies across regions/countries. Non-pharmacological interventions, such as social distancing and mask use, have a major influence on COVID-19 cases, regardless of vaccine capacity, effectiveness, or areas. Moreover, if adherence to mask-wearing and social distancing hits 80%, the vaccination's impact on decreasing COVID-19 cases will be further amplified[9].

Indonesia continues striving towards its COVID-19 vaccination objectives. While the majority of regions have initiated vaccination, areas like Pandeglang District, a suburban locale and the second most impoverished in the Banten province,

lag behind. As of September 2021, the vaccination rate in Pandeglang District was below 20%. This places the district amongst the lowest in the Banten Province, despite the Indonesian government's mandate requiring vaccination for various travel modes as well as entry to public facilities[10].

The low vaccination coverage in this district may stem from a limited number of vaccinators, and a lack of public vaccination awareness and education, especially regarding school-aged children and adolescents[10,11]. It is crucial to coordinate with local health departments, the community, and relevant institutions to understand COVID-19 vaccination and promote its importance in schools. This approach can potentially elevate the vaccination rates among school-aged children (10-17 years) and young adults (18-26 years) in the district. One strategy to achieve this is by evaluating the attitude toward vaccinations among adolescents and young adults in this district.

Adolescents and young adults, given their extensive engagement within their social circles, present unique considerations regarding vaccine safety and efficacy perceptions, especially if they perceive themselves as low risk for COVID-19[12]. Both groups' social nature and tendency to loosely adhere to public health guidelines increase their potential to spread the virus. Understanding their vaccination attitude can help predict and control transmission dynamics within communities. As vaccines become available for these demographic, public health strategies tailored to these groups could significantly improve vaccine uptake. Furthermore, since they make up a significant portion of the global population, their attitudes and propensity developed during this phase can influence health behaviors in adulthood[12,13].

Globally, 25% of the population has shown hesitancy towards the COVID-19 vaccine. This hesitancy has been influenced by factors such as age, income, religion, comorbidities, and economic conditions, particularly in Asian, African, and South American countries[14]. While in European countries, vaccine hesitancy has been associated with factors such as gender, age, employment status, educational levels, vaccine skepticism, risk perception, and adherence to public health measures[15]. Moreover, studies focus on those under 18 years and young adults still limited, rather than examining parental intentions[16]. The impact of demographics and other relevant factors on adolescents and young adults remains unclear, suggesting that attitudes, knowledge, and propensities regarding the COVID-19 vaccination in these cohorts may not align with patterns observed in adult populations. Adolescents are defined as individuals aged 10 to 17 years, whereas young adults are those aged 18 to 26[17]. This latter group,

in a transitional phase from adolescence to full adulthood, often receives inadequate attention in research and policy discussions[17]. Emphasizes the importance of involving adolescents and young adults in medical decision-making, citing a US study that found a preference among them to take charge of their health choices[18]. Despite a decline in COVID-19 cases early in 2022, Indonesia still encounter face a significant threat from a third wave, triggered by the Omicron variant. The government maintained its pandemic status until it was officially revoked on June 23, 2023[19].

Therefore, this study aims to explore attitudes, knowledge, and propensity related to COVID-19 vaccination in adolescents and young adults in suburban areas. As individuals within these age groups take on greater responsibility for their healthcare and shape their long-term perspectives on personal and public health measures, their Knowledge, Attitude, and Propensity (KAP) become significant[16]. Assessing the KAP of this demographic can offer insights into their behavioral reactions to COVID-19 vaccination within the school community. This, in turn, can guide the design of targeted interventions, educational campaigns, or incentive structures tailored for this demographic.

METHODS

Study Design and Participants
This study aimed to assess knowledge and attitudes toward vaccinations among students in the Pandeglang District, Banten, Indonesia. Conducted from January to April 2022 using a cross-sectional design, the target population consisted of adolescents and young adults typically enrolled in junior and high school, as well as university undergraduates, accounting for approximately 261,00 individuals[20,21]. The inclusion criteria were students aged 12 to 26 years, spanning middle school, high school, and bachelor/diploma programs within the district.

Data were collected through an online Google Forms questionnaire. The link was distributed through email and social media platforms including WhatsApp, Instagram, and Facebook to ensure widespread access while maintaining social distancing guidelines. This approach, known as convenience sampling, was chosen due to social and physical restrictions, although it is acknowledged that this method can introduce selection bias, as it depends on the students' digital platform access and usage[22]. The questionnaire was designed to capture relevant demographic information, as well as measure the respondents' knowledge and attitudes toward the COVID-19 vaccination. Out of 963 received responses, 936 were considered valid after excluding incomplete responses and those not meeting the age and student status criteria.

The survey, administered in Bahasa Indonesia, was adapted from the original knowledge tests developed by Zingg & Siegrist, and and Ricco' et al[23]. It encompassed five areas of inquiry:
1) *Demographic data*. This section age, gender, and education level; 2) *Attitudes toward vaccinations*. Participants' attitudes toward vaccination practices were measured using a five-point Likert scale, ranging from 1 (strongly opposed to vaccinations) to 5 (strongly favorable towards vaccinations). Subsequently, participants were asked to explain their main reasons for vaccination acceptance (e.g., "to avoid contracting COVID-19", "to prevent COVID-19 transmission", "to avoid Covid-19 complications", and "to protect individuals who cannot be vaccinated"). Conversely, reasons for neutrality, vaccine refusal, or vaccine hesitancy included concerns such as "to avoid side effects of vaccinations", "distrust in vaccines", "fear of shots", "preference for alternative countermeasures", and "perceived ineffectiveness of vaccines (i.e., vaccines do not enhance natural immunity)"; 3) *General Knowledge*. This section consisted of 12 True/False/I don't know statements concerning COVID-19 (e.g., "COVID-19 vaccines increase the occurrence of allergies"). Scoring was determined by totaling the number of correctly answered statements, with each correct response contributing a point (+1) to the total score. For further statistical analysis, the percentage of total correct answers was calculated; 4) *Risk perception*. We asked the risk perception by asking students to rate, on a five-point Likert scale (0, "almost zero"; 1, "low"; 2 "moderate"; 3 "high"; 4 "very high"), the perceived severity of signs and symptoms of COVID-19 in unvaccinated individuals; 5) *Propensity toward vaccinations*. Participants were asked to express their propensity towards receiving the COVID-19 vaccine, rating their agreement on a scale from 1 (strongly disagree) to 5 (strongly agree)[4,24].

Statistical Analysis
Descriptive statistics were used for categorical variables to characterize the distribution of attitude toward vaccine, risk perception, and propensity towards COVID-19 vaccination, with outcomes presented as frequencies and percentages. The specific reason for attitudes toward vaccination were reported in terms of occurrences and their respective percentages. Given the non-normal distribution of scores related to knowledge of COVID-19 vaccines, risk perception, and propensity, these scores were detailed as medians with associated interquartile ranges (IQRs).

The study's independent variables comprised gender, age, current educational status, and sources of information. The dependent variables included attitudes towards vaccination, knowledge, risk perception, and willingness to receive a vaccine.

The Chi-squared tests evaluated the differences in vaccination attitudes in connection with demographic factors and information sources. Non-parametric tests like Mann-Whitney or Kruskal-Wallis tests, were employed to compare the percentage of correct knowledge responses, risk perception, and propensity towards vaccination among two or more groups. The correlation between general knowledge, risk perception, and propensity towards COVID-19 vaccination was examined through the Spearman rank test. Data were analyzed using SPSS 25 while the significance level was set at α = .05.

Ethics Statement
This study received approval from the Ethical Committee of Faculty Medicine, Universitas Sultan Ageng Tirtayasa, Serang, Banten, Indonesia. For participants under 18, consent was provided by parents or guardians, while participants aged 18 and above gave their own consent. Participants' anonymity and confidentiality were guaranteed, and their participation was entirely voluntary without any monetary incentives. Participants had the freedom to withdraw their data from the study at any time.

RESULTS

Demographic Characteristics
Table 1 presents a descriptive summary of the demographic details and outcome variables of the 936 valid respondents. Of these, 56.5% were female. The 12-15 years age category was predominant, accounting for 72.2% of the sample, and a majority, 72.4%, were junior high school students.

In terms of vaccine information sources, new media avenues such as social media, wikis, and blogs were most cited by 49.1% of respondents. This was followed by input from friends, family members, or relatives at 24.8%. Only 8% of participants received vaccine-related information from health professionals.

Regarding vaccination attitudes, 75.2% of participants demonstrated a positive stance, while 17.9% were neutral or did not specify their views. A minority, 6.9%, expressed disagreement or strong disagreement with vaccinations. As illustrated in Table 2, of the pro-vaccination group, 47.4% primarily were motivated to avoid contracting COVID-19. Only 11.6% expressed the intention of preventing the transmission of COVID-19 who cannot be vaccinated. In contrast, for those who were neutral, hesitant, or opposed to vaccination, the predominant concern was to avoid vaccine side effects (61.4%), followed by the fear of injections (14.8%) and lack of trust in COVID-19 (3.6%).

Table 1: Descriptive statistics of Demographics of Sample and Outcome Variables

Variable	Category	*n*	%
Gender	Male	407	43.5
	Female	529	56.5
Age (years)	12-15	676	72.2
	16-20	154	16.5
	21-26	106	11.3
Current Education	Junior High School	678	72.4
	High School	158	16.9
	Diploma or University	100	10.7
Information sources	TV/Radio/Newspaper	169	18.1
	New Media (e.g., social media, wiki, blogs)	460	49.1
	Friends, Parents, Relatives	232	24.8
	Health Professionals	75	8.0
Attitude toward vaccine	Strongly Disagree	27	2.9
	Disagree	37	4.0
	Neutral / No Opinion	168	17.9
	Agree	224	23.9
	Strongly Agree	480	51.3
Knowledge about Covid-19 vaccination			
% of Correct answers to knowledge statements per individual	Mean = 54.05, SD = 24.90	Median = 58.33, IQR = 41.67	
Risk Perception		Median = 4, IQR = 2	
	Almost zero	107	11.4
	Low	109	11.6
	Moderate	223	23.8
	High	243	26
	Very High	254	27.1
Propensity COVID-19 vaccine		Median = 5, IQR = 1	
	Strongly Disagree	23	2.5
	Disagree	47	5
	Neutral / No Opinion	116	12.4
	Agree	240	25.6
	Strongly Agree	510	54.5

In terms of knowledge, respondents correctly answered approximately half of the 12 items (Median 58.33%, IQR 41.67). Figure 1 displays the distribution of respondents' answers – whether correct, incorrect, or unsure – for each statement. The statement, "COVID-19 will persist even if we have been immunized," received the highest rate at 80.7%. This was followed by "If we have been vaccinated then we have better protection against COVID-19" (77.5%), and "Vaccine effectiveness will decline gradually" (72.3%). In contrast, the majority of respondents incorrectly answered the statements "The immune system is unable to adapt to vaccines" (72.8%), "The body will develop antibodies to fight infection even its unvaccinated" (62.7%), and "Vaccinations increase the occurrence of auto-immune diseases (62.3%)". While individual knowledge statements received correct answers ranging from 37.3% to 80.7% of participants, only 2.9% answered all questions correctly. This is slightly similar to the percentage of who provided all questions wrong (see Table 1).

Regarding risk perception, more than half of the respondents (53.1%) expressed high to very high perceived risks of contracting COVID-19 without vaccination. Meanwhile, approximately 23% estimated their risk as almost zero to low (see Table 1). Additionally, over 80% of participants, displayed a strong inclination to receive the Covid-19 vaccine. In contrast, 12.4% were neutral or did not have a particular opinion, and only 3% opposed vaccination.

Table 2: Reasons for attitude toward vaccination

Why do you get COVID-19 vaccinations	n	%
To avoid getting COVID-19	334	47.4
To avoid Covid-19's complication	110	15.6
To avoid Covid-19's transmission	178	25.3
To protect individuals who cannot be vaccinated	82	11.7
Reasons to neutral or refuse a vaccine or hesitate towards COVID-19 vaccinations	n	%
To avoid side effects of vaccinations	137	61.4
Distrust in vaccines	8	3.6
Fear of shots	33	14.8
Preference for alternative countermeasures	25	11.2
Perceived ineffectiveness of vaccines	20	9.0

The association between demographic characteristics, information sources, and all measured variables are presented in Table 3. There were no significant differences in attitude toward COVID-19 vaccination or percentage of correct answers across gender, age, and educational status. However, participants aged 21-26 showed the least inclination towards Covid-19 vaccination (Kruskal-Wallis H (2) = 30.80, $p<0.001$), when compared to their counterparts. Additionally, individuals pursuing a diploma or bachelor's degree had the lowest risk perception and propensity toward COVID-19 vaccination.

Interestingly, the source of information was significantly associated with all measured variables.

While a small portion of participants sourced their information from healthcare professionals (n = 75 or 10.7% of total respondents), this group was more likely to have a positive view towards vaccination and be more inclined to get vaccinated (89.3% of 75 responses). This group also displayed higher knowledge about vaccinations (Median = 66.67, IQR = 41.67). Spearman correlation coefficients, shown in Table 4, indicate significant positive associations between all variables, namely attitude, knowledge, risk perception, and propensity toward COVID-19 vaccination, with magnitude ranging from moderate to strong ($0.26 < \rho < 0.590$). Figure 1 indicate Results of the knowledge test among the study respondents (N = 936).

Table 3: Differences between all measured variables by demographic data and information sources.

Variable	Category	Attitudes toward vaccination			Knowledge (% correct)		Risk Perception		Propensity	
		Somehow favorable (n = 704)	Neutral or somehow against (n = 232)	x^2	Median (IQR)	Z / H	Median (IQR)	Z / H	Median (IQR)	Z / H
Gender	Male	295	112	2.88	58.3 (41.83)	-0.87	4.0 (2)	-0.69	5.0 (1)	-0.14
	Female	409	120		50.0 (37.50)		4.0 (2)		5.0 (1)	
Age (years)	12-15 (1)	501	175		58.3 (41.67)		4.0 (3)		5.0 (1)	30.80*** (1 vs 3, 2 vs 3)
	16-20 (2)	119	35	1.71	50.0 (25.00)	2.69	4.0 (2)	2.67	5.0 (1)	
	21-26 (3)	84	22		50.0 (35.42)		4.0 (1)		4.0 (0)	
Current Education	Junior High School (1)	498	180	4.40	58.3 (41.67)		4.0 (3)	9.70*** (1 vs 2, 2 vs 3)	5.0 (1)	28.62*** (1 vs 3, 2 vs 3)
	High School (2)	128	30		50.0 (25.00)	2.92	4.0 (2)		4.0 (2)	
	Diploma or University (3)	78	22		50.0 (33.33)		3.0 (1)		4.0 (0)	
Information sources	TV/Radio/Newspaper (1)	121	48	10.61*	58.3 (50.00)		4.0 (2)		5.0 (1)	
	New Media (social media) (2)	349	111		58.3 (33.33)	10.45* (2 vs 4, 3 vs 4)	4.0 (2)	10.82* (1 vs 3, 3 vs 4)	5.0 (1)	11.27* (3 vs 4)
	Friends, Parents, Relatives (3)	167	65		50.0 (33.33)		3.0 (2)		5.0 (1)	
	Health Professionals (4)	67	8		66.67 (41.67)		4.0 (3)		5.0 (1)	

Note. IQR: Interquartile Range. Z: Mann-Whitney statistics reported as Z statistics, *H*=Kruskal-Wallis statistics *p<0.05, **p<0.001.

Table 4: Spearman Correlation Coefficient (ρ)

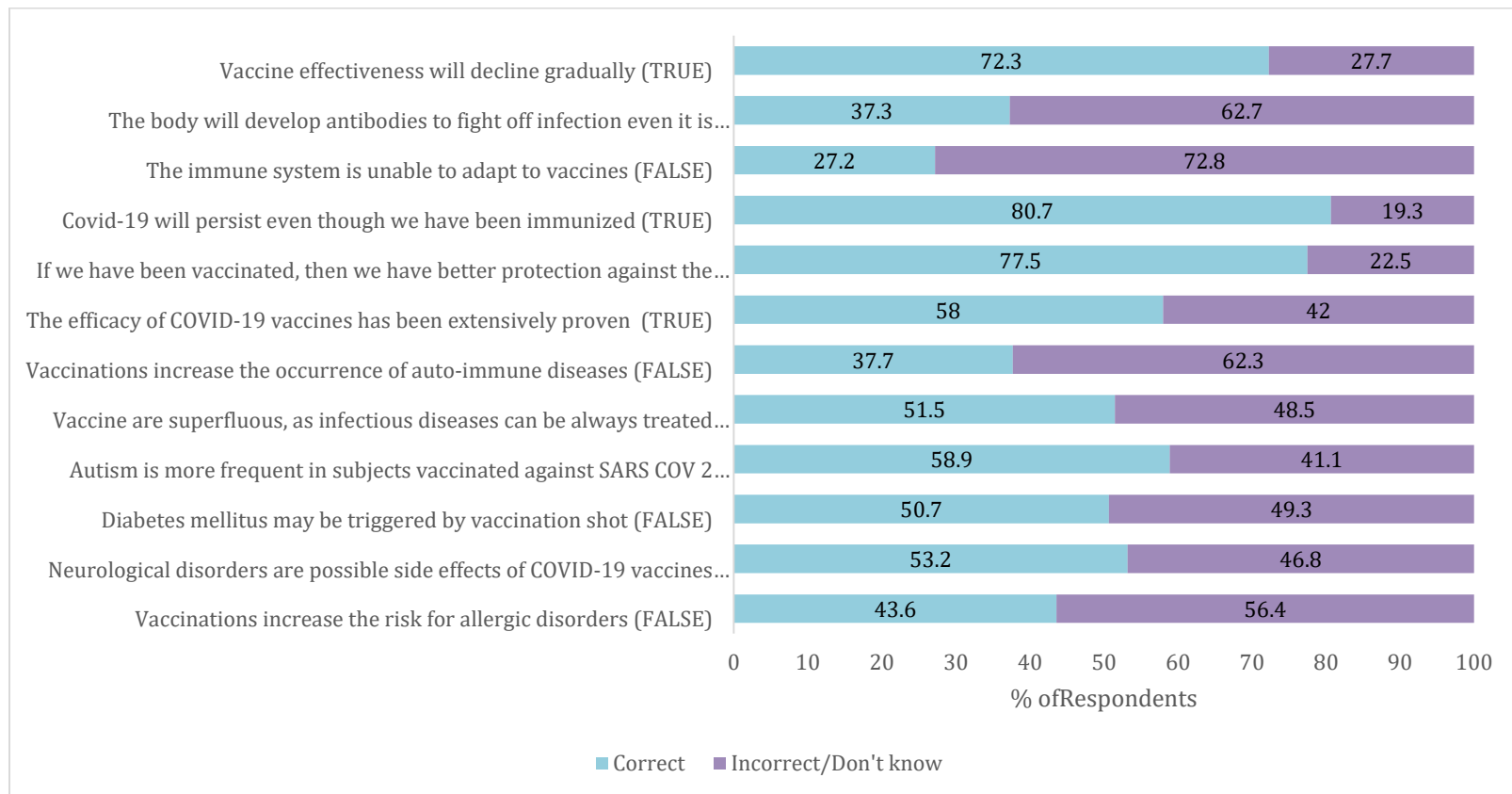|	Attitude	Knowledge	Risk Perception	Propensity
Attitude	1			
Knowledge	0.265***	1		
Risk Perception	0.246***	0.258***	1	
Propensity	0.594***	0.330***	0.284***	1

*Note: Significant at ***p<0.001*

Figure 1. Results of the Knowledge Test among the study Respondents (*n* = 936)

DISCUSSION

In this study, we observed that 75.2% of participants agreed to be vaccinated as per the national COVID-19 vaccination program. Predominantly, these participants were females aged 12-15 years and enrolled in middle school. A meta-analysis estimates the global prevalence of COVID-19 vaccine hesitancy at 25%[24]. Interestingly, our results show higher willingness compared to a study in England by Fazel et al, who expressed intention to be vaccinated, with younger students exhibiting lower inclination[16]. This hesitancy was particularly noticeable among students from socioeconomically disadvantaged backgrounds. A study of German secondary school students also found that 68.3% of students reported an intention to receive COVID-19 vaccination[25]. Children below 16 years of age and those with parents having lower education levels exhibited significantly higher vaccine hesitancy. In contrast, a study from a developing country found an 86% acceptance rate among Bangladesh's university students. These variations across studies highlight the potential influence of diverse cultural, social, economic, and political factors in shaping public attitudes toward health interventions[26].

In previous research, including studies by Ganem et al, Gao et al, Hossain et al, Humer et al, concerns about vaccine safety and efficacy were commonly reported as the primary cause for vaccine hesitancy among adolescents and/or young adults. However, in our study, such concerns accounted for a mere 9% of hesitancy. The most prevalent reason for hesitancy to vaccination in our study was the potential side effects of the COVID-19 vaccines, followed by a fear of injections[26-29]. In addition to cultural variances, one plausible explanation for these findings could be the abundance of information on platforms like social media, where side effects are emphasized more than vaccine efficacy, leading to disproportionate perceptions. While fear of injections is typically underreported in most studies a study from the UK reveals that fears related to blood, injections, and injury might account for approximately 10% of COVID-19 vaccine hesitancy in adults[12,30,31]. This proportion could be even higher among adolescents[31].

Sources of Information

The primary source of COVID-19 vaccine information for participants was new media channels, including social media, wikis, and blogs. Only 8% of participants reported receiving vaccine information from healthcare professionals. This could result from insufficient communication from healthcare workers at community health centers, hospitals, and health departments towards school communities. Such patterns corroborate previous research conducted among adolescents and young adults in other countries. For example, 41.1% of university students in Bangladesh identified social media as their primary source for vaccine-related information, whereas in China, a combination of medical and non-medical sources accounted for 72.9%[28] [27]. Despite the heavy reliance on social media, highlighted that 78% of their respondents trusted government sources, 63.2% trusted the medical profession, and only 7% placed trust in social media[32]. The tendency towards the internet for health information existed even before the pandemic. In the U.S., while doctors remain the most trusted sources of health information, found that 69% of U.S. adults turn to the Internet first for health inquiries, with just 15% consulting healthcare providers as their primary source when faced with a medical issue[33].

KNOWLEDGEMENT

Overall, the participants had adequate knowledge, with 51% correctly answering more than half of the 12 knowledge statements. his result is slightly lower compared to prior findings[26,32]. In our research, only 3% of participants answered all the vaccine-related statements correctly, whereas Kecojevich et al[32] reported a much higher rate of 20.8%. However, it is essential to acknowledge that earlier studies[26,32] employed varying sets of questions and primarily focused on college or university students. There were specific questions that a majority of our respondents answered incorrectly. To enhance knowledge and potentially improve vaccine acceptance, educational efforts could target misconceptions like "immune system is unable to adapt to vaccines" and "the body will develop antibodies to fight infection even its unvaccinated".

The source of information plays an important role in shaping perceptions, as evidenced in our study. Participants who received information from healthcare professionals exhibited a more favorable attitude toward vaccinations and generally answered more statements correctly. This emphasizes the influence of accurate and authoritative information sources. Additionally, these individuals showed a higher propensity to get vaccinated. This finding is consistent with prior research suggesting that doctors, experts, recommendations from doctors, experts, and other authoritative profiles are among the most influential factors driving public vaccine acceptance[34].

Moreover, in their systematic review, Cascini et al[35], highlighted an association between reliance on social media and decreased vaccine acceptance among adolescents. While our study did not find the lowest knowledge scores, attitudes, or propensity among those heavily relying on social media, it is

evident that information from healthcare professionals is typically more reliable and less prone to misconceptions. Among healthcare workers, social media was considered a prime source for COVID-19 vaccine information (53.4%), surpassing even government websites (19.0%)[36]. Despite the potential for misinformation on these platforms, reputable agencies like the Centers for Disease Control (CDC) utilize social media to disseminate critical pandemic-related information[37]. Such institutions have initiated campaigns to educate the public about the pandemic, effective health practices, and vaccines. It is beneficial to utilize social media for public health campaigns in conjunction with disseminating knowledge from government departments through mainstream media[35].

Risk Perception and Propensity
Regarding risk perception, 53.1% of participants perceived a high severity of signs and symptoms of COVID-19 in unvaccinated individuals. Concurrently, a significant proportion exhibited a high propensity for vaccination, with 80.1% expressing inclination and only 7.5% showing disagreement. Taken together, there was a significant correlation between attitude, knowledge, risk perception, and propensity, as also demonstrated in prior studies[13,30]. Specifically, a more positive attitude was linked to increased knowledge and heightened risk perception of the severe signs and symptoms of COVID-19 in unvaccinated individuals, ultimately leading to a greater inclination to get vaccinated.

However, positive attitudes and high intentions do not always translate into actual vaccination[32,38]. It is a recognized phenomenon in various health behaviors where there is a gap between one's intention and the actual action[39]. For example, the vaccination coverage rate in the district we studied stood at 62.5%, which is below the national average of 66.71% as of October 2022[11]. Such discrepancies might arise from external influences, such as the attitudes of parents and family members towards vaccination. Their concerns could impact the actual vaccination uptake. Future research is warranted to understand whether these discrepancies are attributed to factors like accessibility issues, perceived urgency, logistical concerns, or other underlying reasons.

Relationship Demographic and KAP
In general, most demographic factors showed no significant correlation with attitude, knowledge, risk perception, and propensity toward vaccinations. This lack of association, especially with gender, aligns with findings from prior studies[26,27,30,32]. However, other studies reported contrasting results[13,18].

Interestingly, those college and university students had lower risk perception for severe outcomes from COVID-19 in unvaccinated individuals and showed hesitancy towards getting vaccinated. This finding contrasts with Scharff et al[25] who suggested that younger age and lower education level influenced vaccine hesitancy.

It may seem counterintuitive, given that higher education should correlate with better knowledge and thus a higher propensity for vaccination. One possible reason is the noticeable sense of autonomy among university students. They frequently value their independence, leading them to make decisions that might not always align with mainstream or authoritative recommendations[40]. Conversely, secondary school students might be more influenced by their parents' views and decisions[18,41]. Additionally, the lower propensity among college and university students might be that our study predominantly covered junior high school students. In the district we studied, there are fewer university students, which might have skewed the results.

Insights and Implications
Our study highlights the need to maximize outreach efforts from community health centers, health professionals, and agencies directly to school communities in promoting the importance of the COVID-19 vaccine. Our data reveals that a prominent 17.9% of participants remained neutral in their attitude towards the vaccine, while 12.4% are uncertain about taking it. These individuals emerge as the focus group for public information campaigns which should prioritize addressing concerns over vaccine side effects and potential misconceptions surrounding vaccine distribution.
Moreover, with adolescents and young adults frequently turning to social media for information, governments and health institutions should control these platforms for disseminating accurate vaccine information, countering hesitancy, and emphasizing efficacy.

Drawing from our findings, authorities can gain a clearer understanding of adolescents' and young adults' attitudes, aiding in the development of effective vaccination policies not just for Pandeglang District but for regions with similar contexts. As the world adapts to the transition of COVID-19 from a pandemic to an endemic, this study provides insights and strategies vital for navigating upcoming public health challenges.

Limitations and Further Studies
While our study provides valuable insights into the knowledge, attitude, and propensity among adolescents and young adults in suburban areas, several limitations must be acknowledged. Firstly,

our study's cross-sectional design, concentrated within a single district restricts its generalizability to broader populations. Secondly, the reliance on self-reported data might introduce bias, as respondents may consciously misrepresent their perspectives or behaviors. The use of online data collection also raises concern about respondents' authenticity as it cannot be confirmed if the individuals completing the questionnaire are indeed the targeted participants. Future studies could incorporate methods to verify respondent identity, such as using secure login systems. Additionally, a mixed-methods approach combining online surveys with face-to-face interviews could enhance the reliability of respondent identification. An additional limitation is our inability to control for parental influences; we did not delve into the complex interplay between knowledge, attitude, propensity, and vaccine uptake concerning parents' socioeconomic and educational backgrounds.

CONCLUSION

In conclusion, our study found a positive attitude, adequate knowledge of the COVID-19 vaccine, a high perception of contracting COVID-19 among unvaccinated individuals, and a large propensity toward COVID-19 vaccination among adolescents and young adults in a suburban setting. Despite no significant role of most demographic factors, the importance of direct outreach from health institutions and professionals to school communities is evident. The prevalent use of social media by this demographic further emphasizes the necessity for governments and institutions to leverage these platforms for accurate public health interventions, given their dual potential to disseminate both accurate information and misinformation. Notwithstanding our study's limitations, it provides a foundational understanding of adolescents' and young adults' attitudes toward the vaccine, particularly in contexts like sub-urban areas in a developing country.

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