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WILLINGNESS TO ACCEPT AND SATISFACTION OF COVID-19 VACCINE IN EAST JAVA CULTURAL AREAS

Kesediaan Menerima dan Kepuasan Terhadap Vaksin COVID-19 di Wilayah Kebudayaan Jawa Timur

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Abstract

Background: Vaccinations are considered to be most effective solution to end a pandemic. Various issues develop inclusively regarding doubts about vaccines, which can be formed by various factors, such as social and cultural environment.
Aims: This study aims to analyze factors that affect willingness to accept (WTA) COVID-19 vaccine in four dominant cultural areas in East Java (Arek, Madura, Mataraman and Pandalungan) and analyze what factors influence satisfaction of vaccination.
Methods: This is quantitative research which analyzes 825 participants (40% men; 60% women). By using primary data the probit regression method is applied. We use dummy variables of WTA and level of satisfaction as dependent variables, while the independent variables include economic, health, socio-demographic and internal-external factors of vaccination program.
Results: This research showed different results in each cultural area; WTA of vaccines was influenced by income, assets, employment, health, education, gender, and age, while satisfaction with vaccines is associated with side effects, type of vaccine, and time of service (AOR: 0.31 to 0.56, αlpha: 1%-10%).
Conclusion: This study concludes that people of Arek and Mataraman tend to be willing and satisfied with vaccination, while Madura and Pandalungan show an opposite result due to lower accessibility, welfare, and culture.

Keywords: COVID-19, East Java, cultural areas, satisfaction, vaccine, willingness to accept

Abstrak

Latar Belakang: *Program vaksinasi dianggap sebagai solusi paling efektif untuk mengakhiri pandemi. Berbagai isu berkembang secara inklusif terkait keraguan terhadap vaksin dapat terbentuk dari berbagai hal, seperti lingkungan sosial dan budaya masyarakat.*
Tujuan: *Penelitian ini bertujuan untuk menganalisis faktor yang mempengaruhi kesediaan menerima vaksin COVID-19 di empat wilayah budaya dominan di Jawa Timur yaitu Arek, Madura, Mataraman dan Pandalungan serta menganalisis faktor-faktor yang mempengaruhi tingkat kepuasan vaksinasi tersebut.*
Metode: *Jenis penelitian ini adalah kuantitatif yang menganalisis 825 partisipan (40% pria dan 60% wanita). Dengan menggunakan data primer, digunakan metode regresi probit. Penulis menggunakan variable dummy kesediaan menerima dan tingkat kepuasan sebagai variable dependen, sedangkan variabel independen meliputi faktor ekonomi, kesehatan, sosial-demografis dan internal-eksternal dari program vaksin.*
Hasil: *Penelitian menunjukkan hasil yang berbeda di setiap wilayah kebudayaan, kesediaan individu untuk menerima vaksin dipengaruhi oleh pendapatan, aset, pekerjaan, kesehatan, pendidikan, jenis kelamin, usia, dan tempat wilayah Arek, Madura, Pandalungan, dan Mataram, sedangkan kepuasan terhadap vaksin berhubungan dengan efek samping, jenis vaksin, dan waktu pelayanan (AOR: 0.31 to 0.56, αlpha: 1%-10%).*
Kesimpulan: *Studi ini menyimpulkan bahwa masyarakat Arek dan Mataraman cenderung bersedia dan puas dengan vaksinasi, sedangkan Madura dan Pandalungan menunjukkan hasil sebaliknya karena aksesibilitas, kesejahteraan, dan budaya yang lebih rendah.*

Kata kunci*: COVID-19, Jawa Timur, kepuasan, kesediaan untuk menerima, vaksin, wilayah kebudayaan*

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Introduction

The coronavirus pandemic, commonly referred to as COVID-19, has infected 223 countries. Meanwhile, in Indonesia, positive cases in 2021 reached 882,418 cases (KPCPEN, 2021). This condition has become a historical record as the largest global virus with negative impacts in various sectors (Perez and Abadi, 2020)

With various policy steps taken, vaccines are expected to be the most effective and efficient solution to end this health disaster/pandemic (Haynes *et al*., 2020). Therefore, not surprisingly, various research and development institutions collaborate globally to develop a COVID-19 vaccine (Akhtar *et al*., 2020).

However, the fact that vaccine issues are developing in the community and often make people curious and afraid becomes a challenge that must be addressed. For example, regarding the perception of Sinovac's COVID-19 vaccine, which is considered no better than Pfizer's (Smitha and Thomas, 2020), the public has doubts because the vaccine is debated about the manufacturing process and feasibility (Ophinni *et al*., 2020), safety level, efficacy level and post-vaccination effects (Su *et al*., 2020), and various other issues that occurred not only in Indonesia but also in other countries. Therefore, in the end, it was not enough for the government to urge but also "directly point out" the list of participants who must get the vaccine first.

Vaccine hesitancy exists among people, which could be a serious problem for efforts to control the current pandemic (Kruketi, 2022). About less than half of the respondents were unwilling to accept the COVID-19 vaccines when available mainly due to misconception about the vaccines (Abubakar, 2022). Consequently, eliminating public hesitancy and skepticism in the face of vaccination campaigns is a critical factor for policymakers concerned with addressing such threats (Tsutsumi, 2022). They must have a good understanding of the willingness of the population, especially those individuals who are likely to refuse or delay vaccination.

Various issues that developed in the era of inclusive media regarding "doubt" about vaccines can be formed by various things, for example, the social and cultural environment of society (Al-Mohaithef and Padhi, 2020; Harapan *et al*., 2020; Malik *et al*., 2020). This issue has happened in the context of public perception of doubts about the spread and danger of COVID-19 in the early days of entering East Java, Indonesia, which is quite diverse in culture.

Meanwhile, based on the research of Sutarto and Sudikan (2004), East Java has at least ten cultural areas, including Arek, Mataraman, Osing (Banyuwangi) cultures, Samin, Tengger, Pandalungan (East Java's horse-shoe areas assimilation of Mataraman and Madura Javanese), Panaragan (Ponorogo region and its surroundings), large Madura, small island Madura, and Bawean Madura. If the cultural plurality existed before the vaccination program (pre-vaccine), according to the team's observations in the Madura, Surabaya, and surrounding areas, it shows a different perspective on the COVID-19 preventive attitude (through 3M and 3T).

Data from the Ministry of Health of the Republic of Indonesia, as of January 2023 show that the coverage of COVID-19 vaccination in East Java has reached 85%, where Surabaya has contributed the most to achieving the vaccination target in East Java, which is 9.4%. If viewed based on cultural areas, the achievement of vaccine coverage in the Arek area reached 5%, Pandalungan 2.9%, Mataraman 2.3% while Madura 2%. As we observed, there is a gap of vaccination coverage among those areas. So, it is quite relevant and interesting when considering the approach of the cultural area in this social humanities research to see a comparison of the Willingness to Accept (WTA) COVID-19 vaccine in the East Java community.

The WTA concept can be found in environmental and economic studies, which show an individual's ability to accept the damage that occurs in the environment (Horowitz and McConnell, 2003; Wang *et*

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al., 2020). This concept means that there is an economic assessment of the compensation (e.g., from the factory) that the community (around the factory) is willing to accept as the environmental quality decline is equivalent to the cost of improving the environmental quality.

A simple example is if the community accepts CSR (Corporate Social Responsibility) from factories or similar assistance around their settlements, their WTA is high. In economics, WTA can also mean the minimum amount of money that a person is willing to accept to sell goods or services (producer/seller position (Skeva *et al*., 2016)) (consumer willingness to buy goods/services (Lanzini *et al*., 2016), or can be associated with a willingness to bear negative externalities, such as pollution (Sun *et al*., 2016), congestion (Jia *et al*., 2018) and others.

In association with the field of health economics or public health studies, in the context of this study, WTA is people's willingness to accept public health programs from the government in a pandemic emergency, namely the COVID-19 vaccine. This context is unique and interesting because psychologically, marketing people will generally pay attention to something free which is generally expensive, such as vaccines. However, because this vaccine is new and in the media, it shows a lot of debate and analysis of various perspectives on it. Therefore, it is not surprising that even though it is applied free of charge, the public's willingness to receive the vaccine, not necessarily acceptable. Even the policies seem to "encourage" certain parties (in order of priority) to be willing to be the first to receive the COVID-19 vaccine.

There are ten cultural areas consisting of Arek culture, Mataraman, Osing (Banyuwangi), Samin, Tengger, Pandalungan (East Java horseshoe area assimilated Java Mataraman and Madura), Panaragan (Ponorogo area and its surroundings assimilated with Mataram), Madura Besar, Madura small islands, and Madura Bawean (Sutarto and Sudikan, 2004). Such division of cultural areas is not meant to differentiate/separate but as an understanding of the characteristics of society. It is based on Kluckhohn's (2017) thinking about the seven elements of culture: religious systems, community organization systems, knowledge systems, livelihood systems, living equipment systems and technology, and language.

The previous study was carried out by Al-Mohaithef and Padhi (2020) to see the acceptance of the vaccine if the government gave it in Saudi Arabia. An online-based survey with a snowball sampling system of 1000 respondents in four cities (Riyadh, Dammam, Jeddah, and Abha) showed that 68 were willing to receive the vaccine. The chosen logistic regression model shows the dominance of those willing to receive the vaccine because of the age factor > 45 years, working in public institutions, having a minimum education of S1, and being married. Malik *et al*.'s (2020) research in the United States showed that an online survey included 674 participants, with 450 people (67%) saying they would receive the COVID-19 vaccine if it were recommended. Whereas adults who are already working permanently, male, over 55 years old, have higher education (minimum bachelor degree) and are not residents tend to be more accepting or have WTA on the COVID-19 vaccine if one is found. Meanwhile, Harapan *et al*. (2020) carried out a similar study in Indonesia, although the assumption used is WTP (Willingness to Pay). Their findings, using a simple dichotomous contingent assessment method and a linear regression model on online survey data, showed that 1,359 respondents completed the survey.

In addition, as terms of tracing previous studies on cultural pluralism, research so far tends to link the cultural area of East Java with social life/behavior, politics, livelihood, economic models, artistic styles, and the like (Setyaningsih and Rofi, 2014). Economic variables (income, asset, employment) were considered as the main factor influencing individuals' perception. Higher economic status is related to drive higher education and health which indirectly affects

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individuals' knowledge, awareness and willingness to accept vaccination. Other than that, in term of services and quality of the program these are assumed to determine individuals' satisfaction. The survey established by UNICEF (2020) found that community groups that have more information about vaccines are more likely to accept the vaccine. The same was true of respondents with health insurance, who said they were more likely to accept the vaccine. These findings indicate that accurate information is needed about the vaccine.

Tsutsumi el al. (2022) recorded characteristics that might influence individuals, including age, gender, household structure (living alone or with others), and job (employed or unemployed). Jabessa and Bekele (2022) stated that the factors that directly promoted vaccination behavior were a lack of vaccine hesitancy, recommendations from friends or family for vaccination and absence of perceived barriers to COVID-19 vaccination (Chen, 2021). Regarding the demographic factors, women were found to be less willing to accept the vaccine than men, while people under the age of 25 years and less well-educated respondents were marginally more willing to take the vaccine than educated (Bekele *et al*., 2021; Jabessa and Bekele, 2022). While Wang *et al*. (2021) stated that beside socioeconomic status, health condition of individuals also influences acceptance.

However, it is quite rare to find studies that lead to multicultural factors in East Java related to the health sphere, specifically referring to their willingness or volunteerism to use the new COVID-19 vaccine. It is a separate research gap that will be answered in this study.

Based on the background, this research aims to analyze what factors determine the willingness to accept and aspects that influence satisfaction after receiving COVID-19 vaccination. We anchored spatial approaches in four dominant cultural areas in East Java, Arek, Pandalungan, Mataraman and Madura, which appears as the novelty of this study. The authors' expectation that this research would be considered by any stakeholders or government in decision-making.

Method

This research is a quantitative research using primary survey data from four cultural areas in East Java. The authors use dummy variable to measure the level of willingness to accept and satisfaction after receiving the vaccine. According to the study of the literature, the willingness to accept is determined by several aspects including economics, health, and social demographics, while the level of satisfaction is influenced by internal and external factors from the vaccination program itself.

Data and scope

This study focused on four large and dominant cultural areas: (1) Madura, (2) Arek, (3) Pandalungan, and (4) Mataraman, where this survey was conducted from June – August 2021. The authors used primary data by creating and distributing online questionnaires with purposive random sampling.

Based on data from the Central Statistics Agency (2020), the population of East Java is 40 million people, where the proportion of distribution based on cultural areas in the Mataraman group is 34.62%, Arek at 30.86%, Pendalungan at 24.67%, and Madura 9.85%. In this survey, the number of individuals was 40% male and 60% female, with an age range of 16-50 years-old.

The Slovin method was used to obtain a sample to be representative of the entire population on that object. The minimum number of samples is 400 with a Mataraman distribution of 138 respondents, Arek 123 respondents, Pandalungan 99 respondents, and Madura 39 respondents. We consider Slovin due to its ability to map minimum adequate numbers of distribution sample in a given region. However, the distribution is experiencing data uniformity constraints, so estimates cannot be made. Thus, we increased the respondent number according to the East Java population

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distribution issued by BPS, so that the number of respondents is 825, with Arek as many as 250, Mataraman 271, Pandalungan 197, and Madura 107.

Table 1. Respondents' Characteristics

Variables	Percentage
Gender	Male: 40% Female: 60%
Education	SD (primary school): 2.7% SMP (secondary school): 2% SMA (high school): 70% D3/D4 (Diploma III/IV): 1.6% S1/S2 (bachelor/master degree): 23.7%
Age	18 – 20 y.o: 40% 21 – 25 y.o: 30% 26 – 30 y.o: 16% 31 – 50 y.o: 14%
Income	≤ IDR 1.000.000: 54.3% IDR 2.000.000 – IDR 4.000.000: 25% ≥ IDR 4.000.000: 20.7%

Estimation models

This study uses binary logistic regression to estimate the probability trend prediction of an independent variable. Qualitatively, both models produce almost the same output (Vasisht, 2000). The diversity that exists in the four cultural areas in East Java might have implications for differences in individual willingness and satisfaction of vaccines.

Prior to formulating the model, we studied many previous researches to determine possible variables that authors would use. We use two main models in this research, the first is the willingness to accept model to analyze what factors influence individuals to accept the vaccine, and the second model to discover individual satisfaction after being vaccinated using probit estimation. Where the model is formulated as follows:

$$WTA_i = \alpha + \beta_1 * economic_i + \beta_2 * health_i + \beta_3 * socio\_demographic_i + \beta_4 * cultural\_area_i + \varepsilon_i$$

Where WTA is the willingness to receive the vaccine, the economic consists of income, employment, vehicles, and work from home; health consists of comorbid, the number of neighbors affected by COVID-19, insurance, and paid vaccines; socio-demographic consists of age, gender, education, place of residence and number of families, while for the cultural area, authors use dummy variables for Arek, Mataraman, Madura and Pandalungan region, i is a representation of the individual. Authors also analyze individuals' satisfaction after receiving COVID-19 vaccination.

$$Satisfaction_i = \alpha + \beta_1 * internal_i + \beta_2 * external_i + \beta_3 * cultural\_area_i + \varepsilon_i$$

Satisfaction shows the level of individual satisfaction after receiving the vaccine, internal consisting of vaccine side effects, obstacles in activities, and pain obtained during the vaccine; *external* components consist of the Astra Zeneca vaccine, service time, and cost of accessing the vaccine.

Result and Discussion

Table 3 shows the results of the estimated probit related to the willingness to accept the COVID-19 vaccine. In our estimation, we use six models divided in the aggregate to East Java and the model per cultural area itself.

From an economic perspective, an increase of 1% in individual income tends to increase the probability of receiving vaccines, both in the aggregate in East Java and per region. It correlates with the findings of Wake (2020) and Lazarus *et al*. (2021), where income indicates an individual's economic status. The higher a person's economic status, the greater the probability value shown by Arek cultural areas, where the tendency of their willingness is 90 times greater than in other regions because most Arek tribes are in urban areas with higher economic activity.

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Table 2. Variables Description

No.	Variables	Description
Dependent variables		
1.	WTA	1 for individuals who are willing to accept, 0 otherwise
2.	Satisfaction	1 for individuals who are satisfied, 0 otherwise
Independent variables		
Economic		
3.	Income	The average amount of individual expenditure for one month in units of rupiah
4.	Employment	1 for individuals who have a job, 0 otherwise
5.	Vehicle Ownership	Number of transportation owned in units
6.	Work from Home	1 for individuals who do online working, 0 otherwise
Health		
7.	Comorbid	1 for individuals who have comorbid, 0 otherwise
8.	Infected Neighbors	Number of neighbors infected with COVID-19
9.	Vaccine Cost	The maximum amount price one is willing to pay for the vaccine
10.	Assurance	Amount of insurance owned by an individual
Social Demographic		
11.	Gender	1 for individuals who are male, 0 otherwise
12.	Age	Number of age
13.	Education	Individual education Elementary school: 6 years of school Middle school: 9 years of school High school: 12 years old school D3 (diploma): 15 years old school D4/S1 (bachelor): 16 years old school S2 (master): 18 years old school
14.	Number of Family	Number of core families living at home
15.	Residence	1 for individuals who live in the city, 0 otherwise
Cultural Area		
16.	Madura Area	1 for individuals who are from Madura cultural area, 0 otherwise
17.	Arek Area	1 for individuals who are from Arek cultural area, 0 otherwise
18.	Pandalungan Area	1 for individuals who are from Pandalungan cultural area, 0 otherwise
19.	Mataram Area	1 for individuals who are from Mataram cultural area, 0 otherwise
Internal		
20.	Sick After Being Vaccinated	1 for individuals who feel sick after being vaccinated, 0 otherwise
21.	Side Effect	Number of side effects experienced after vaccination
22.	Activity	1 for individuals whose activity is hampered after being vaccinated, 0 otherwise
External		
23.	AstraZeneca	1 for individuals who used the AstraZeneca vaccine, 0 otherwise
24.	Time of Service	Service time (minutes)
25.	Cost to Access	Costs incurred in accessing vaccines in rupiah

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Table 3. Estimation Result for Model I Willingness to Accept Determinants of Vaccine

Variables	Probit Models Estimation					
	Sub Model I.I	Sub Model I.2	Sub Model I. Madura	Sub Model I. Arek	Sub Model I. Pandalungan	Sub Model I. Mataraman
Economics						
Income	0.038**(0.019)	0.032***(0.145)	0.089**(0.033)	0.901***(0.281)	0.029***(0.013)	0.301***(0.001)
Employment	0.291** (0.016)	0.211* (0.102)	0.072(0.324)	0.081*** (0.004)	0.088(0.124)	0.021*** (0.002)
Vehicle Ownership	0.020***(0.101)	1.002***(0.212)	0.020**(0.001)	0.053**(0.021)	0.030(0.211)	0.253**(0.031)
Work from Home	0.122**(0.004)	0.423(0.344)	0.200(0.170)	0.212*(0.083)	0.321(0.201)	0.120*(0.003)
Health						
Comorbid	-0.901*** (0.101)	-1.121*** (0.211)	-0.821*** (0.211)	-0.077** (0.008)	-0.783***(0.204)	-0.047*** (0.000)
Infected Neighbor	0.071*(0.021)	0.094*(0.021)	0.130(0.229)	0.043*(0.003)	0.130**(0.009)	0.063**(0.010)
Paid Vaccine	0.932***(0.100)	1.211***(0.342)	0.822(0.227)	0.985***(0.289)	0.652(0.201)	0.211***(0.009)
Insurance	0.231(0.201)	0.481(0.321)	0.830(0.819)	0.301(0.289)	0.710(0.619)	0.172(0.102)
Social Demographic						
Gender	0.317*(0.108)	0.532*(0.345)	0.009(0.083)	0.532*(0.198)	0.032(0.012)	0.532*(0.198)
Age	-0.066**(0.017)	-0.076**(0.044)	-0.521*(0.351)	0.042*(0.201)	-0.321*(0.011)	0.122*(0.023)
Education	0.037*(0.217)	0.027(0.012)	0.037(0.021)	0.521*(0.218)	0.037(0.021)	0.022(0.010)
Number of Family	0.224(0.150)	0.331(0.087)	0.832(0.780)	0.792***(0.192)	0.211(0.087)	0.322**(0.092)
Residence	0.023***(0.100)	0.564*(0.212)	-0.048**(0.016)	0.281**(0.023)	-0.091(0.051)	0.322(0.180)
Cultural Areas						
Madura	-0.502*(0.308)	-	-	-	-	-
Arek	0.063*(0.013)	-	-	-	-	-
Pandalungan	-0.422*(0.297)	-	-	-	-	-
Mataraman	0.730**(0.109)	-	-	-	-	-
Statistics						
Constant	0.772	0.791	0.580	0.925	0,718	0.801
Number of obs	825	825	107	250	197	271
Minimal obs (Slovin method)	-	-	39	123	99	138
Pseudo r-squared	0.432	0.562	0.310	0.521	0.482	0.391
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses * p<0.10, ** p<0.05, *** p<0.01, errors: ()
Source: Author's calculation

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Dummy for employment showed significant results for the Arek and Mataraman areas. Individuals who have a job had a two times higher probability of being willing to receive the vaccine for the Mataraman area and eight times for the Arek area, while in aggregate, East Java it was 29 times (Sub Model I.1). As previously mentioned, Arek and Mataraman areas tend to have higher economic activity because they are categorized as urban areas, thus affecting the density of individual work in both the formal and informal sectors. This statement is supported by Al-Mohaithef and Padhi (2020), who state that individual workers tend to be willing to receive vaccines because of company recommendations and health precautions to support them in doing their work.

The vehicle variable refers to individual asset ownership, which is ultimately related to income or economic status, where the results show that it is significant both in the aggregate East Java (Sub Model I.1) and the region, an increase in the number of vehicles owned tends to increase the probability that individuals are willing to receive the vaccine

Furthermore, from the health aspect, individuals with comorbidities in all regions tend to have a lower probability of individual willingness to receive vaccines, even at the aggregate level of East Java, which is 112 times lower (Sub Model I.1). This result is in contrast to the findings of Wake (2021), where comorbid patients tend to be more receptive to vaccines, which may be due to concerns about their low immunity.

The 1% increase in neighboring cases infected with COVID-19 tends to increase the probability of individuals being willing to receive the vaccine in the Arek, Pandalungan, and Mataraman by four times, 13 times, and six times, respectively. This result is correlated with the findings of Zewude and Habtegiorgis (2021). More people around the environment are infected, encouraging the individual to vaccinate as a motive to protect health and contain the spread.

The variable related to paid vaccines shows a significant value for the Arek and Pandalungan. The probability of respondents in these areas tends to be willing to receive a vaccine even though the vaccine is paid for. In the Madura and Pandalungan areas, these variables do not influence an individual decision to accept the vaccine or not. However, at the aggregate level of East Java (Sub Model I.1), the opportunity increased by 93 times. That is probably due to the perception of some individuals that the more expensive the vaccine, the better the quality (Harapan *et al*., 2020).,

In the social aspect of the population, the gender variable shows an influence for the Arek and Mataraman, where if the individual is male, the probability of being willing to receive the vaccine is 52 times greater than that of female individuals. These results are associated with Malik *et al*. (2020), where male individuals tend to receive the vaccine more than women (Kaplan *et al*., 2021; Wake, 2021). That is due to the physical mobility of males more than females, especially for work.

The age variable in all regions showed significant and negative results in the aggregate for East Java (Sub Model I.1). It indicates that the older the individual, the lower the probability of being willing to receive the vaccine. That correlates with the findings of Kaplan *et al*. (2021) and. Wake (2021) It can be due to concerns regarding the low immunity of older individuals, lower physical mobility, and lack of literacy related to the importance of vaccines owned by the elderly. It is the exception for Arek and Mataraman areas, where increasing age tends to increase the probability of individuals being willing to receive the vaccine. That correlates with research by Al-Mohaithef and Padhi (2020), Malik *et al*. (2020), and Lazarus *et al*. (2021), where the older the individual, the easier it is to accept vaccine recommendations.

In the Arek area, education affects a person's WTA toward vaccines. A higher education level tends to increase the probability of being willing to receive. Education is also an individual determinant in receiving a lot of information and knowledge. These results are in line with

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Al-Mohaithef and Padhi (2020), Malik *et al*. (2020), Lazarus *et al*. (2021), and Wake (2021). This is because people with a higher level of education might have a better possibility of grasping and applying knowledge, thus, they will consciously accept the COVID-19 vaccine (Belayneh *et al*., 2022). However, this variable is not significant for other regions.

The larger the number of families, the higher the probability that individuals will be willing to receive the vaccine. The results of this study correlate with the findings of Kaplan *et al*. (2021). The probability that an individual is willing to receive the vaccine is 79 times for the Arek area and 32 times for the Mataraman area, and the reason is related to the motive to protect family because there is an assumption that there will be more chances of spreading the virus.

In aggregate (Sub Model I.1), individuals living in urban areas have a two times higher probability of being willing to receive the vaccine than individuals living in rural areas, while for the Arek area, the probability is 28 times greater. That is because the rate of virus spread is higher in urban areas than in rural areas (Wake, 2021). It is because the dissemination of information and vaccination socialization in urban areas is faster than in villages (Lazarus *et al*., 2021). It also might be influenced by accessibility to reach vaccination services. However, the Madura region shows the opposite result, where the probability of being willing to receive the vaccine is lower if the individual is in a rural area since we know that most individuals in Madura live more rural than Arek. Jabessa and Bekele (2022) stated that individuals who resided in rural areas were 0.85 times less likely to receive the vaccination than those who resided in urban areas.

In aggregate, individuals in the Arek and Mataram areas tend to be willing to receive the vaccine, while for the Madura and Pandalungan areas, it is the opposite. The high level of willingness in the Arek and Mataram regions was due to the high level of awareness related to education and individual economic status compared to other regions. The characteristics of receiving vaccines for the Madura and Pandalungan areas tend to be similar, and this is because the Pandalungan area is a horseshoe area of East Java where the majority of the population has a Madurese cultural background (Kemendikbud, 2014).

Table 4. Estimation Result for Model 2 Vaccination Satisfaction

Block	Variables	Sub Model II.1	Sub Model II.2
Internal	Sick After Vaccinated	-0.830 (0.819)	-0.423 (0.321)
	Side Effect	-0.391*** (0.003)	-0.412**(0.102)
	Activity	-0.364* (0.111)	-0.048*** (0.006)
External	AstraZeneca	-0.802*** (0.117)	-0.532** (0.119)
	Time of Service	-0.618* (0.271)	-0.361** (0.098)
	Cost to Access	-0.311** (0.021)	-0.231** (0.018)
Cultural Area	Madura Area	-0.312** (0.005)	-
	Arek Area	0.325* (0.003)	-
	Pandalungan Area	0.219 (0.114)	-
	Mataraman Area	0.719 (0.617)	-
Statistic	Constant	0.702	0.711
	Pseudo r-squared	0.401	0.380
	Prob > chi2	0.000	0.000

Standard errors in parentheses * p<0.10, ** p<0.05, *** p<0.01, errors: ()
Source: Author's calculation

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Table 4 shows the output of individual satisfaction, where the respondents surveyed are those who have been vaccinated. The results show that the higher the number of side effects felt after being vaccinated, the lower the individual satisfaction with the vaccine program (Zewuda and Habtegiorgis, 2021). Fear of side effects from a COVID-19 vaccine was the most common concern regarding COVID-19 vaccination (Govere-Hwenje *et al*., 2022). In addition, if these side effects cause problems for individuals in their activities, it will reduce the probability of satisfaction.

Furthermore, if an individual uses the AstraZeneca vaccine, the probability of an individual getting the vaccine is 80 times lower (Sub Model II.1) and 53 times (Sub Model II.2) compared to individuals using a vaccine other than AstraZeneca. That is because the side effects caused by the vaccine are higher than other vaccines.

The longer the vaccine service time, the lower the probability of individual satisfaction because most people are reluctant to queue. Furthermore, related to access costs, the more expensive it is to access the vaccine, the probability of satisfaction will be 31 times lower (Sub Model II.1). This finding correlates with Wake's (2021) findings. Some respondents even stated that they did not want to do the vaccine if it cost money to receive it.

In aggregate, individuals in the Madura area tend to be dissatisfied with the vaccine program, and Arek tends to be satisfied. It is due to the possibility that the Madura region has lower accessibility than Arek, and some areas in Madura are still categorized as inland, so satisfaction with the vaccine itself is lower.

This research was conducted at the beginning of the pandemic, where the vaccination program was not as wide as present, where the vaccination achievement in East Java for the first dose has reached 85% in January 2022, and this is a limitation of this research; further research could consider it for future study. Cultural spatial approach in growing studies on willingness to accept vaccines have not been greatly explored, which appears as the novelty of this study. We find several interesting findings in each observed cultural area. We believe that the result of this study would provide stakeholders or government in decision-making regarding vaccination program in East Java.

Conclusion

This research attempts to analyze several factors that influence individuals' willingness to accept and satisfaction regarding COVID-19 vaccination. The results of this study showed that the willingness of individuals to receive vaccines was influenced by income, assets, employment, health, education, gender, age, and place in Arek, Madura, Pandalungan, and Mataram areas. Meanwhile, vaccine satisfaction is associated with side effects, vaccine type, and service time. This study concludes that vaccine reception in each cultural area in East Java has a different attitude, which happens because the culture in the Arek, Madura, Mataraman, and Pandalungan areas is different. Therefore, suggestions given to policymakers are expected to give vaccine doses in the East Java region according to the culture in the region, given the large diversity of cultures in East Java.

Abbreviations

BPS: *Badan Pusat Statistik*; CSR: Corporate Social Responsibility; COVID-19: Coronavirus Disease 2019; KPCPEN: *Komite Penanganan COVID-19 dan Pemulihan Ekonomi Nasional*; UNICEF: United Nations International Children's Emergency Fund; WTA: willingness to accept.

Declarations

Ethics Approval and Consent Participant

The Faculty of Economics and Business have approved this research

Conflict of Interest

The authors declare that no conflict of interests might have affected the performance.

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Availability of Data and Materials
Data and materials are available based on demand from journals and readers.

Authors' Contribution
APD, HA, and AE conceptualized the study; APD and HA did the survey. KSA and AE created the methodology; KSA and AE wrote, reviewed, and edited the manuscript; ADP and HA wrote the original draft.

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References

Abubakar, A.A., Shehu, A.U., Umar, A.A., Babandi, Z., Sokomba, A., Sadiku, S., Esekhaigbe, C.E., Adagba, K.O., Belgore, S., Zakka, M. and Saulawa, F.A. (2022). Willingness to accept COVID 19 Vaccines in a Rural Community in Kaduna State, Northwestern Nigeria, *International Journal of Infectious Diseases*, 116(562).

Akhtar, S., Benter, I.F., Danjuma, M.I., Doi, S.A., Hasan, S.S. and Habib, A.M. (2020). Pharmacotherapy in COVID-19 patients: A review of ACE2-raising drugs and their clinical safety. *Journal of Drug Targeting*, 28(7-8).

Al-Mohaithef, M. and Padhi, B. K. (2020). Determinants of COVID-19 vaccine acceptance in Saudi Arabia: a web-based national survey. *Journal of Multidisciplinary Healthcare*, 13.

Bekele F., Fekadu G., Wolde T.F. and Bekelcho L.W. (2021). Patients' acceptance of COVID-19 vaccine: implications for patients with chronic disease in low-resource settings. *Patient Prefer Adherence*, 15(2519).

Belayneh, A., Temesgan, W.Z., Gessesse, D. N., Kassa, B.G., Tiguh, A.E., Kebede, A.A., Ayalew, M.D. and Yismaw, A.E. (2022). Willingness to Receive COVID-19 Vaccine and Associated Factors Among College Students in Gondar City, Northwest Ethiopia. *Frontiers in Education*, 7.

Chen H., Li X. and Gao J. (2021). Health belief model perspective on the control of COVID-19 vaccine hesitancy and the promotion of vaccination in China: web-based cross-sectional study. *Journal of Medical Internet Research,* 23(9).

Govere-Hwenje, S., Jarolimova, J. and Yan, J. (2022). Willingness to accept COVID-19 vaccination among people living with HIV in a high HIV prevalence community. *BMC Public Health*, 1239(22).

Harapan, H., Wagner, A.L., Yufika, A., Winardi, W., Anwar, S., Gan, A.K., Setiawan, A.M., Rajamoorthy, Y., Sofyan, H. and Mudatsir, M. (2020). Acceptance of a COVID-19 vaccine in southeast Asia: A cross-sectional study in Indonesia. *Frontiers in Public Health*, 8.

Haynes, B.F., Corey, L., Fernandes, P., Gilbert, P.B., Hotez, P.J., Rao, S. and Arvin, A. (2020). Prospects for a safe COVID-19 vaccine. *Science Translational Medicine*, 12(568).

Jabessa, D. and Bekele, F. (2022). Willingness to receive the COVID-19 vaccine and associated factors among residents of Southwestern Ethiopia: A cross-sectional study. *Patient Prefer Adherence*, 3(16), PP.1177-1185.

Jia, J.J., Xu, J.H., Fan, Y. and Ji, Q. (2018). Willingness to accept energy-saving measures and adoption barriers in the residential sector: An empirical analysis in Beijing, China. *Renewable and Sustainable Energy Reviews*, 95, pp. 56-73

Kaplan, A.K., Sahin, M.K., Parildar, H. and Adadan Guvenc, I. (2021). The willingness to accept the COVID-19 vaccine and affecting factors among healthcare professionals: A cross-sectional study in Turkey. *International Journal of Clinical Practice*., 75(7), e14226.

Indonesian Journal of Health Administration
(Jurnal Administrasi Kesehatan Indonesia)
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10.20473/jaki.v11i1.2023.36-47

KPCPEN (Komite Penanganan COVID-19 dan Pemulihan Ekonomi Nasional). (2021). *Situasi Virus COVID-19 di Indonesia*. Available at: https://COVID19.go.id/peta-sebaran (Accessed: 16 January 2021).

Kluckhohn, C. (2017). *Mirror for man: The relation of anthropology to modern life*. Routledge.

Kukreti, S., Ahmad, R., Sriyani, P., Chung-Ying, L., Tsung, Y., Wen-Chien, K., Po-Lin, C., Carol, S. and Nai-Ying, K. (2022). Willingness to Obtain COVID-19 Vaccination in General Population: A Systematic Review and Meta-Analysis. *Journal of Global Health,* 12.

Lazarus, J.V., Ratzan, S.C., Palayew, A., Gostin, L.O., Larson, H.J., Rabin, K. and El-Mohandes, A. (2021). A global survey of potential acceptance of a COVID- 19 vaccine. *Nature Medicine*, 27(2).

Lanzini, P., Testa, F. and Iraldo, F. (2016). Factors affecting drivers' willingness to pay for biofuels: the case of Italy. *Journal of Cleaner Production*, 112.

Malik, A.A., McFadden, S.M., Elharake, J. and Omer, S.B. (2020). Determinants of COVID-19 Vaccine Acceptance in the US. *EClinical Medicine,* 26, 100495.

Ophinni, Y., Hasibuan, A.S., Widhani, A., Maria, S., Koesnoe, S., Yunihastuti, E. and Djauzi, S. (2020). COVID-19 Vaccines: Current Status and Implication for Use in Indonesia. *Acta Medica Indonesia*, 52(4).

Perez, G.I.P. and Abadi, A.T.B. (2020). Ongoing Challenges Faced in the Global Control of COVID-19 Pandemic. *Archives of Medical Researc*h, 51(6).

Skevas, T., Hayden, N. J., Swinton, S.M. and Lupi, F. (2016). Landowner willingness to supply marginal land for bioenergy production. *Land Use Policy*, 50, pp.507- 517.

Smitha, T. and Thomas, A. (2020). A brief outlook on the current emerging trends of COVID 19 vaccines. *Journal of Oral and Maxillofacial Pathology*, 24(2).

Su, S., Du, L. and Jiang, S. (2020). Learning from the past: development of safe and effective COVID-19 vaccines. *Nature Reviews Microbiology*, 19(3), pp. 211–219.

Sun, C., Yuan, X. and Yao, X. (2016). Social acceptance towards the air pollution in China: evidence from public's willingness to pay for smog mitigation. *Energy Policy*, 92.

Sutarto, A. and Sudikan, S.Y. (2004). *Pendekatan kebudayaan dalam pembangunan provinsi Jawa Timur*. Kelompok Peduli Budaya dan Wisata Daerah Jawa Timur (Kompyawisda Jatim). Jember.

Tsutsumi, S., Maeda, N., Tashiro, T., Arima, S., Mizuta, R., Fukui, K., Naito, K., Komiya, M. and Urabe, Y. (2022). Willingness to Receive the COVID-19 Vaccination and the Psychological State of Japanese University Students: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, 19(3).

Vasisht, A.K. (2007). *Logit and probit analysis*. New Delhi: Technical report: I.A.S.R.I.

Wake, A.D. (2021). The willingness to receive COVID-19 vaccine and its associated factors: "vaccination refusal could prolong the war of this pandemic"–a systematic review. *Risk Management and Healthcare Policy*, 14.

Wang, Y., He, K., Zhang, J. and Chang, H., (2020). Environmental knowledge, risk attitude, and households' willingness to accept compensation for the application of degradable agricultural mulch film: Evidence from rural China. *Science of The Total Environment*, 744.

Wang, J., Beibei, Y., Xinran, L., Xiaoxue, L., Li, L., Shufan, G., Haijun, Z., Xiaozhen, L., Yun, L., Huangyufei, F., Rize, J., Jia, G., Yingzhe, H., Xun, L., Wenzhou, Y. and Hai, F. (2021). Willingness to accept COVID-19 vaccine among the elderly and the chronic disease population in China, *Human Vaccines and Immunotherapeutics*, 17(12).

Zewude, B. and Habtegiorgis, T. (2021). Willingness to Take COVID-19 Vaccine Among People Most at Risk of Exposure in Southern Ethiopia. *Pragmatic and Observational Research*, 12(37).