Article

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# Social and Emotional Determinants of COVID-19 Vaccination Attitudes among the Elderly at Health Center Manatuto, Timor-Leste

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This study aimed to identify the key factors influencing COVID-19 vaccine acceptance among the elderly at Manatuto Villa Health Center, Kota Manatuto, Timor-Leste, with a focus on knowledge, social influence, personal experiences, emotional factors, and access to health information. A cross-sectional design was used, involving 278 respondents aged 60 years and above who completed the structured questionnaires. Data analysis was conducted using univariate, bivariate, and logistic regression to identify the main determinants of vaccine acceptance. The results revealed that 72% of respondents lacked sufficient knowledge about the benefits of COVID-19 vaccination, which was attributed to low education levels and limited access to information ($p < 0.05$). Additionally, 12% of the respondents reported negative experiences related to vaccine side effects, such as dizziness and nausea, which increased their hesitancy to receive subsequent doses. Social and family influences were also significant, with 71% of respondents following the advice of religious and community leaders in making vaccination decisions. Emotional factors, such as anxiety and fear of declining health due to old age, affected 67% of the respondents, becoming a barrier to vaccine acceptance. This study concludes that improving knowledge through community-based outreach programs, addressing anxiety, and involving trusted local leaders are essential strategies for enhancing vaccine acceptance among the elderly. The practical implications of these findings highlight the need for policies that focus on community education and outreach approaches to increase vaccination coverage in areas with limited access to healthcare.

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## Public Interest Statement

This study underscores the need to understand the factors influencing COVID-19 vaccine acceptance among the elderly, particularly in areas with limited information access, such as the Health Center Manatuto and Timor-Leste. The elderly face higher risks of COVID-19, yet barriers such as low knowledge, anxiety, and social influence hinder vaccine uptake. Improving knowledge, community education, and engaging in religious and community leadership can boost acceptance. These findings are crucial for governments and policymakers in designing effective vaccination programs in resource-limited areas.

## Introduction

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, first emerged in Wuhan, China, at the end of 2019 and has since rapidly spread across the globe. This virus has caused significant disruptions in the health, economic, and social sectors worldwide (Zhu et al., 2020). 728). The World Health Organization (WHO) has recorded millions of positive cases and deaths from COVID-19 globally, making it one of the deadliest pandemics in modern history (WHO, 2021). Vaccination has emerged as a crucial strategy in controlling the pandemic by reducing transmission rates, preventing severe symptoms, and lowering mortality (Davila et al., 2021, p. 103137). However, vaccine acceptance varies widely across different demographics and regions, and is often influenced by cultural, social, and

economic factors. Understanding the specific attitudes and determinants influencing vaccine acceptance is essential, especially in regions with unique sociocultural contexts, such as Timor-Leste.

Timor-Leste faces distinct public health challenges owing to its underdeveloped healthcare infrastructure, limited access to medical resources, and high reliance on traditional beliefs. The elderly population in this country represents a particularly vulnerable group, due to age-related health issues and limited exposure to formal education and health information. Governments worldwide, including Timor-Leste, have taken various measures to curb the spread of the virus, including introducing mass vaccination programs, implementing social restrictions, and strengthening health protocols. Vaccination is a key strategy in controlling this pandemic because vaccines can reduce transmission rates, prevent severe symptoms, and lower the death toll from COVID-19 (Polack et al., 2020). 2603). Comprehensive vaccination is also essential for achieving herd immunity, which is expected to slow the spread of the virus within communities (Ma et al., 2022, p. 395)

Research on vaccine acceptance has predominantly focused on countries with well-developed healthcare systems, leaving a critical gap in understanding how sociocultural influences affect health behavior in less developed settings. In Timor-Leste, the vaccination program began in 2021, with the target of vaccinating over 80% of the population to achieve herd immunity (Kellyvan Dellen, 2024). However, the success of this program largely depends on public acceptance, particularly among the elderly, who are one of the groups most vulnerable to the adverse effects of COVID-19. Older adults in Timor-Leste have experienced higher mortality rates due to the disease, making it crucial for them to receive the vaccine (UNICEF, 2021). In Timor-Leste, religious and community leaders hold significant authority in shaping public attitudes, and emotional factors, such as anxiety about declining health and fear of side effects, are likely to affect decision-making among the elderly.

The impact of the COVID-19 pandemic on Timor-Leste has been particularly severe, especially in Vera Cruz, one of the areas with the highest mortality rates. According to data from the Sentru Integradu Jestaun Krize (SIJK) of Timor-Leste, there were 22, 945 confirmed cases and 133 deaths by the end of 2021, the majority of which occurred among the elderly (Yanto et al., 2022). 361). In response to this crisis, the government of Timor-Leste implemented various measures to curb the spread of the virus, including social restrictions, such as Large-Scale Social Restrictions (PSBB) and Community Activity Restrictions (PPKM).

The country's vaccination program began in 2021 with the goal of vaccinating 85% of the population to achieve herd immunity. However, a survey conducted in November 2020 by the Ministry of Health, in collaboration with the WHO and UNICEF, revealed that only 55.8% of respondents were willing to be vaccinated, with significant resistance observed among the elderly. This resistance is due to several factors, including lack of knowledge, distrust in vaccines, and the influence of social and cultural norms. These factors present significant obstacles to achieving a country's vaccination targets. Therefore, it is essential to understand the determinants of elderly attitudes toward COVID-19 vaccination to develop more effective vaccination strategies tailored to the timor-Leste context.

Previous studies have largely focused on countries with more advanced healthcare systems and have not sufficiently addressed the unique sociocultural and infrastructural challenges faced by countries such as Timor-Leste. This study fills this gap by examining the specific factors affecting vaccine acceptance in a low-resource setting where cultural beliefs and limited access to information play a critical role in shaping health behaviors. Understanding the attitudes of the elderly is particularly important, as this group is the most vulnerable to severe COVID-19 complications. Data from Vera Cruz and Timor-Leste indicate that the majority of COVID-19-related deaths occur among the elderly, with a mortality rate of 15.3% in this group (Soares et al., 2021). 300). This alarming statistic underscores the importance of prioritizing elderly vaccination to mitigate the impact of the pandemic on Timor-Leste (Nicholls et al., 2021, p. 3521).

While previous research has identified knowledge gaps and hesitancy related to vaccine safety in other contexts, this study emphasizes the unique cultural influences of Timor-Leste, where traditional beliefs and social norms may either support or hinder vaccine acceptance. Elderly individuals often base their decisions on religious, cultural, or social influences, which can either strengthen or weaken their willingness to get vaccinated (Utami et al., 2022, p. 1559). Additionally, negative experiences with healthcare services or misinformation about vaccine side effects may reinforce negative attitudes toward vaccination programs(Chan et al., 2022). 296).

This study examines the determinants of vaccine attitudes in a developing country, where cultural and social dynamics, along with limited access to reliable health information, play a critical role. Focusing on elderly attitudes toward COVID-19 vaccination at Health Center Manatuto, Timor-Leste, this study addresses gaps in the understanding of how knowledge, cultural beliefs, and healthcare access interact in resource-constrained environments. The findings offer insights into the barriers and drivers of vaccine acceptance, inform targeted health policies and interventions in Timor-Leste, and contribute to a broader understanding of vaccine hesitancy in developing countries.

## Literature Review

Mona Ariestia (2021) examines the participation of the elderly in COVID-19 vaccination at Health Center Andalas, Padang, Indonesia. This observational cross-sectional study involved 150 elderly participants and found significant relationships between factors such as gender, age, education, occupation, knowledge, family support, accessibility, and participation in vaccination (Ariestia, 2021, p. 8)

This study builds on Ariestia's (2021) findings by focusing on a less-studied region, Timor-Leste, where distinct challenges, such as limited infrastructure, traditional beliefs, and the influence of religious leaders play a significant role in shaping public health outcomes. Previous research in developing nations, such as Kyprianidou et al. (2023), has demonstrated that sociocultural factors, including the involvement of religious figures, often have a heightened influence on health-related decision-making. This study contributes to the existing body of literature by exploring how these sociocultural influences affect elderly attitudes toward COVID-19 vaccination in Timor-Leste, where healthcare systems and information dissemination may not align with the global trends observed in other regions.

When compared to studies conducted in other developing countries, a clearer picture emerges of the shared and unique challenges related to vaccine acceptance in the elderly. For instance, research in Nigeria and India demonstrated that family support and community leadership significantly affect vaccine participation, similar to Ariestia's (2021) findings in Padang. In both regions, social influence—particularly from respected community figures—was found to be a major driver of health decisions. This suggests that across developing nations, social structures often outweigh individual knowledge as a key determinant of health behaviors, a factor that is especially important in communal cultures. In rural areas, information gaps are far more pronounced than those in regions such as Padang, and logistical challenges often make vaccination campaigns less effective.

Timor-Leste presents different dynamics. While family and community support are crucial, the level of healthcare accessibility and educational background of the elderly in Timor-Leste poses greater barriers. Studies conducted in Timor-Leste indicate that access to healthcare facilities and education are even more critical to vaccine acceptance, given the country's limited infrastructure and the isolated nature of many communities

Galagali's findings in rural African communities highlighted that vaccine hesitancy is often exacerbated by misinformation and limited access to formal health education. Similarly, in Timor-Leste, where access to information is restricted, elderly attitudes toward vaccination are influenced by these factors. Larson's study further supports this by showing that family dynamics and community leaders play critical roles in reinforcing or mitigating vaccine hesitancy. These similarities across regions underscore the need to understand how access to information and social structures shape health behaviors in underdeveloped areas (Galagali et al., 2022, p. 241).

While the Health Belief Model (HBM) helps explain vaccine behavior, it assumes access to formal healthcare and reliable information—conditions not always present in Timor-Leste. The Theory of Planned Behavior (TPB) adds value by emphasizing subjective norms and perceived control (Ajzen, 2020, p. 314). In Timor-Leste, the influence of religious and cultural leaders may outweigh that of individual knowledge. This gap in the literature highlights the need to understand how subjective norms in traditional societies impact health decisions, particularly among the elderly, who rely more on trusted figures than formal healthcare.

The limitations of the HBM are evident in its inability to account for cultural contexts in which collective decision-making and community influence dominate. In Timor-Leste, especially among the elderly, health decisions are shaped more by community norms and trusted figures than by formal health care providers. This study addresses this gap by examining how subjective norms interact with individual knowledge and control. Understanding these dynamics is essential for creating culturally sensitive health interventions in low-resource, high-trust settings, such as Timor-Leste.

Emotional factors, such as vaccine anxiety and fear, especially among the elderly owing to their vulnerability, are key barriers to vaccine acceptance (Stasiuk et al., 2021). In other developing countries, these fears are often intertwined with sociocultural beliefs. Gunter's study in rural Jordan found that fear of side effects, combined with traditional beliefs, created resistance to vaccination, even with improved healthcare access (Gunter, 2022, p. 123). Similar emotional barriers exist in Timor-Leste, where fear of adverse effects and declining health contributes to vaccine hesitancy.

This study distinguishes itself by examining the interplay between emotional, social, and informational factors in developing countries with unique sociocultural conditions. Through multivariate analysis, this study explores how knowledge, social influence, and emotional barriers collectively impact vaccine acceptance among the elderly. Applying the HBM and TPB frameworks, this study addresses the gap in understanding how these factors shape attitudes in Timor-Leste, offering insights for healthcare workers and policymakers to improve vaccine coverage in similar settings.

Fitri Mailani et al. (2022, p. 346) explored elderly perceptions of the COVID-19 vaccination in Ward Pasie Nan Tigo, Kota Padang, revealing limited knowledge, unpreparedness to participate, and lack of family support. These findings align with those of studies in other developing countries, such as Kenya and Uganda, where limited knowledge, misinformation, and lack of family support contribute to vaccine hesitancy. In both regions, elderly individuals often express concerns about vaccine safety owing to low health literacy and misinformation.

The Health Belief Model (HBM) is relevant for understanding how beliefs about susceptibility and perceived severity influence vaccination attitudes. However, the HBM's focus on individual decision-making overlooks the collective decision-making processes and social constraints that are common in low-resource settings. Structural barriers such as poor healthcare access and misinformation limit individual autonomy in health decisions. The Theory of Planned Behavior (TPB), which accounts for social pressure and perceived control, may provide a more comprehensive framework by incorporating the influence of respected figures and societal norms on health behavior. This highlights the need for models that integrate both individual cognition and social dynamics to address vaccine hesitancy in such contexts.

Family support also fits within the Health Belief Model's framework, as it aligns with the concept of "cues to action" external factors that trigger health-promoting behaviors (Glanz et al., 2015). This study's finding that family influence affects vaccination participation highlights the role of social networks, especially in communal cultures. This is echoed by Betsch et al. (2015), who found that individuals are more likely to follow health recommendations when supported by family members. 67). Ernawati et al. (2022. 634) found that limited knowledge, unpreparedness, and lack of family support were key barriers to vaccination in Kota Padang's elderly population.

A comparison of these findings with those of other developing countries reveals similarities. In sub-Saharan Africa, studies in Kenya and Tanzania also identify limited knowledge and family support as major factors, although logistical barriers, such as healthcare access, are more prominent. In South Asia, socioeconomic conditions, such as poverty and illiteracy, complicate vaccine acceptance, whereas Ernawati's study focuses on informational and familial influences. In contrast, Timor-Leste faces challenges, such as geographical isolation and reliance on religious leaders in health decisions, which differ from the urban context of Padang.

This study expands on Mailani's findings by exploring these issues in Timor-Leste, where sociocultural dynamics and healthcare infrastructure present unique challenges to vaccine acceptance, particularly the influence of religious and traditional leaders.

A comparison of developing countries reveals similar patterns of limited access to accurate health information and reliance on the family and community for health decisions. Larson et al. (2018) ound that vaccine acceptance in rural sub-Saharan Africa was shaped by family and community leaders, alongside misinformation. This aligns with Mailani et al. (2022, p. 346), highlighting that, in regions with underdeveloped healthcare, knowledge gaps are compounded by reliance on informal networks.

The Health Belief Model (HBM) offers a useful framework for understanding vaccine hesitancy, focusing on perceived barriers and benefits (Kirscht, 1974, 389). However, it overlooks collective decision-making in traditional societies, such as Timor-Leste, where social and religious norms often shape health attitudes. In such contexts, the Theory of Planned Behavior (TPB), with its emphasis on subjective norms and perceived control, may be more appropriate for understanding how community leaders influence health behaviors. This study builds on both models by exploring how subjective norms and emotional factors, such as fear of side effects, shape vaccine hesitancy in timor-Leste.

Further research, such as Stasiuk et al. (2021), shows that emotional and social factors, such as fear and community norms, play significant roles in vaccine decision-making, especially among the elderly. This study extends this understanding by examining how fear and anxiety affect vaccine acceptance in Timor-Leste, where the healthcare infrastructure and information dissemination are limited.

Pratiwi et al. (2022, p. 166) examined the determinants of elderly compliance with COVID-19 vaccination in the Health Center Suela area, East Lombok Regency, Indonesia. Using a cross-sectional design and an observational analytic approach, this study found that education, employment status, and age were significant predictors of vaccination compliance among the elderly. Elderly individuals with higher education levels and those who were employed were more likely to comply with vaccination because of their better understanding of the benefits of the vaccine and their greater exposure to social environments where protection from the virus was perceived as necessary.

When comparing these studies with those conducted in other developing countries, both similarities and regional variations emerge. For instance, research in Nigeria and Ghana has also demonstrated that higher education levels and employment status significantly affect compliance with vaccination programs among the elderly. In these contexts, better-educated individuals tend to have more trust in public health initiatives as well as better access to

information about the benefits of vaccination. This mirrors Pratiwi's (2022) finding that higher education fosters better understanding of the COVID-19 vaccine. However, in many sub-Saharan African contexts, vaccine compliance is further influenced by trust in government and international health organizations, which are key determinants in shaping public perceptions of vaccines, a factor less emphasized in Pratiwi's (2022) study, but highly relevant in other regions where government distrust plays a role in vaccine hesitancy.

In South Asian countries, such as India and Pakistan, studies have highlighted the impact of social exposure and community dynamics on vaccine compliance in the elderly. However, in this context, gender and patriarchal family structures can also play a significant role in influencing elderly vaccination decisions. Elderly women, especially those without formal employment, often rely on male family members for decision making, which complicates individual agency in vaccine compliance. This contrasts with the findings in East Lombok, where Pratiwi et al. (2022) found that employment status, regardless of gender, was a major predictor of compliance, showing a more individualistic decision-making process than family centric models in parts of South Asia.

Pratiwi et al. (2022) also found that gender and proximity to healthcare facilities did not have a significant relationship with vaccine compliance, which suggests that certain demographic factors may not be as influential as education and social engagement in determining health behaviors.In many developing countries, including Timor-Leste, social dynamics—particularly the influence of family and community leaders—exert a stronger influence over personal health decisions than individual knowledge or healthcare access. Religious or cultural leaders in rural or closely knit communities often hold sway over public health matters, meaning that subjective norms can override personal perceptions of risk or benefit. This creates tension that models such as the Health Belief Model (HBM) fail to fully capture. The focus of the HBM on individual perceptions and cognitive processes does not account for the heavy influence of social expectations and norms, especially in environments where healthcare resources are scarce and trusted community figures have a significant voice in decision-making.

While the HBM is useful in understanding individual-level vaccine hesitancy, its assumptions are more aligned with societies in which people have access to healthcare and make decisions based on personal beliefs and risk assessments. However, in Timor-Leste, where access to formal healthcare is limited and social norms carry significant weight, the Theory of Planned Behavior (TPB) offers a more applicable framework. The TPB's emphasis on subjective norms and perceived behavioral control is particularly relevant in contexts such as Timor-Leste, where community leaders often dictate health behavior and individuals may feel they have little control over their health choices due to external pressures.

The critique here lies in the limited applicability of models, such as the HBM, in regions where collective social norms outweigh individual reasoning. The current study builds on this critique by incorporating both the HBM and TPB to explore how knowledge, social influence, emotional responses, and educational background collectively influence attitudes and behaviors toward COVID-19 vaccination among the elderly. Unlike Pratiwi et al. (2022), which mainly focuses on individual determinants, this research adopts a broader sociocultural lens, examining how community and family influence shape vaccine compliance in Timor-Leste.

While Pratiwi et al.'s (2022) study provides a comprehensive view of vaccine compliance in Lombok, it does not fully examine how social structures such as family support and cultural norms affect vaccine decisions. Studies conducted in developing nations have provided valuable insights. Many developing countries, including Timor-Leste, family, and community leaders, have a strong influence on personal health decisions, particularly in rural or tight-knit communities. The social pressure to comply with or reject vaccination may outweigh personal beliefs or knowledge, particularly when influential community members such as religious or cultural leaders hold strong views about vaccination. While Pratiwi et al.'s (2022) study provides valuable insights into how education and employment drive vaccine compliance in the elderly in East Lombok, comparisons with studies from other developing countries reveal that cultural, religious, and socioeconomic factors play varying roles in shaping vaccination behavior. This study's focus on individual predictors, such as education and employment, contrasts with the more communal and trust-based determinants found in countries such as Timor-Leste and sub-Saharan Africa, where social influence and trust in health authorities are more prominent factors. Understanding these regional differences is crucial for developing tailored public health strategies that account for the unique sociocultural landscapes of each country.

The current study builds on these findings by focusing on a lesser-explored region, Timor-Leste, where sociocultural factors, combined with limited healthcare access, create unique challenges for public health initiatives. By applying both the HBM and TPB, this study explored how knowledge, social influence, emotional responses, and educational background collectively influence elderly attitudes and behaviors toward COVID-19 vaccination. Unlike Pratiwi et al.'s (2022) study, which primarily focuses on individual determinants, this research incorporates a broader sociocultural lens to examine how community and familial influences shape vaccine compliance in Timor-Leste.

This study also aims to fill a gap in the literature by critically comparing the determinants of vaccine compliance in Timor-Leste with findings from other developing nations. Using a cross-sectional design and multivariate analysis, this research offers a more comprehensive understanding of the factors influencing vaccine hesitancy, providing valuable insights for health policymakers and practitioners working to improve vaccine uptake among elderly populations in similar contexts. This approach provides a more nuanced understanding of how educational interventions, community engagement, and social support networks can be leveraged to increase compliance with vaccination programs, particularly in underdeveloped regions with complex social structures.

## Materials and Methods

This study employed a quantitative analytical approach, with a cross-sectional design. A cross-sectional design was selected because it allows for the simultaneous observation of several variables at a single point in time, enabling the exploration of relationships between the variables under study ( Hidayat, 2011, p. 21). This design is particularly advantageous for research that requires rapid data collection from a broad population as it is necessary to examine the factors influencing COVID-19 vaccine acceptance among the elderly. While the cross-sectional approach offers valuable insights, it has certain limitations, most notably, its inability to establish causal relationships due to the snapshot nature of data collection. Causality can only be inferred cautiously, and future studies with longitudinal designs are necessary to establish stronger causal links.

Logistic regression was chosen as the primary method to analyze the relationships between variables. Logistic regression is well-suited for this study as it allows for the identification of significant predictors of binary outcome vaccine acceptance or refusal while controlling for various independent variables such as knowledge, social influence, and personal experiences. This method enables a nuanced understanding of how these factors interact to influence vaccine behavior. Alternatives such as linear regression were considered but found to be less appropriate, given that the dependent variable (vaccine acceptance) is categorical rather than continuous. Another potential option could have been Cox proportional hazards regression, which is useful in survival analysis but less relevant in studies such as this, where the time to an event (vaccination) was not the primary focus. Hence, logistic regression was deemed the most effective choice for addressing the study's research questions.

The population in this study consisted of all individuals aged ≥ 60 years in the working area of the Health Center Manatuto Villa, Kota Manatuto, Timor-Leste in 2023. Based on the data from COVID-19 vaccine recipients at the health center, the total population meeting the criteria was 1,012 people. Purposive sampling was used, taking into account inclusion criteria, namely elderly individuals aged ≥ 60 years who were willing to participate as respondents. The sample size was calculated using the Slovin formula with a 5% margin of error to ensure that the sample was representative of the population under study.

Data were collected using closed-ended questionnaires, which were tested for validity and reliability. It is important to note that the questionnaire was specifically designed in the context of Timor-Leste, considering the cultural and social characteristics of the elderly in this region. Questionnaire validity was tested using factor analysis to ensure that the questions accurately measured the intended variables, whereas reliability was tested using Cronbach's alpha to ensure consistency in the results. The questionnaire included questions about variables such as knowledge level about the vaccine, attitudes toward vaccination, demographic factors (age, sex, education, occupation, and distance from health facilities), and the dependent variable, which was COVID-19 vaccine acceptance. Each question had closed-ended response options to facilitate structured data collection and make it easier for respondents to answer.

Data analysis techniques used in this study included univariate, bivariate, and multivariate analyses. A univariate analysis was used to describe the frequency distribution and proportion of each research variable, providing a general overview of the sample characteristics. Next, bivariate analysis was conducted to test the relationship between independent variables, such as knowledge, attitude, age, gender, education, occupation, and distance from health facilities, and the dependent variable, vaccine acceptance, using the chi-square test. To analyze the influence of several independent variables on the dependent variable simultaneously, a multivariate analysis was conducted using logistic regression to identify the most influential factors in vaccine acceptance (Hosmer Jr et al., 2013). 18). The significance level was set at $p < 0.05$, which is the standard in statistical analysis to determine the significance of the results. The data were processed using SPSS software, chosen for its capability to handle large and complex datasets and its provision of various statistical analysis methods.

## Results

In this chapter, the researcher presents the results of the data analysis conducted to answer the research question regarding the factors influencing the attitudes of the elderly toward COVID-19 vaccine acceptance in the working areas of Health Center Manatuto Villa, Kota Manatuto, and Timor-Leste. The data obtained through the questionnaire were analyzed using univariate, bivariate, and multivariate analyses.

The results of this study are presented in several sub-chapters, covering respondent characteristics, descriptions of the research variables, analysis of relationships between variables, and identification of the determining factors influencing vaccine acceptance. Each result will be accompanied by tables and graphs to facilitate interpretation of the findings.

### *4.1 Characteristics (Univariate Analysis)*

Table 1 show Respondent data collected in 2023, the majority of respondents were in the 71-80 age category, with 123 people or 44%. The group of respondents aged 81 years and above ranked second, with 99 people or 36% of the total respondents. Meanwhile, respondents aged 60-70 years totaled 56 (20 %). This distribution highlights a significant representation of the elderly in the 71-80 age range, indicating that they are the primary target for vaccination, given their heightened vulnerability to illness. Respondents aged 81 years and above, accounting for 36% of the sample, also represent a critical demographic in terms of COVID-19 vaccine outreach, as this group is highly susceptible to severe complications from the virus.

Table 1. Distribution of Respondents by Age

| Age Category | Number of Respondents | Percentage (%) |
|---|---|---|
| 60-70 Ages | 56 | 20 |
| 71-80 Ages | 123 | 44 |
| 81 years and above | 99 | 36 |

This suggests that while the 71-80 age group constitutes the majority, the smaller proportion of respondents aged 60-70 could reflect lower participation rates, potentially due to their perception of lower vulnerability compared to the older age groups. Alternatively, this could indicate a smaller overall population within this age bracket in the region or even a degree of hesitancy among younger elderly populations regarding vaccination programs. This pattern is consistent with findings from previous studies conducted in similar contexts, which indicate that the highest vaccine uptake tends to occur in those who perceive the greatest personal risk, such as those in the older and more vulnerable categories.

Meanwhile, respondents aged 81 and above comprised 36%, underscoring the importance of targeted interventions for this highly vulnerable population. In this age group, underlying health conditions and declining physical resilience often increased the perceived risks associated with contracting COVID-19, making vaccination a critical protective measure.

Table 2. Gender Distribution of Respondents

| Gender | Number of Respondents | Percentage (%) |
|---|---|---|
| Male | 102 | 36.7 |
| Female | 176 | 63.3 |
| Total | 278 | 100 |

Table 2 shows the Gender Distribution of the respondents, which also offers key insights. Among the 278 respondents, 63.3% (176 respondents) were female, while 36.7% (102 respondents) were male. This skewed sex distribution is common in studies focused on elderly populations, as women generally have a higher life expectancy, especially in developing regions such as Timor-Leste.

These findings corroborate earlier studies suggesting that older women are more likely to engage in health interventions, potentially due to higher health-seeking behaviors and stronger social networks compared to men. Culturally, in Timor-Leste, women often assume caregiving roles, which may heighten their awareness of health interventions, such as vaccination. The predominance of female respondents might also reflect men's challenges in accessing healthcare or their lower willingness to participate in health-related studies.

The results indicated significant gender and age disparities in vaccine acceptance and participation in health initiatives. While the data provided clear numerical insights, these findings should be understood within the sociocultural context of Timor-Leste. For instance, a higher number of older female respondents may highlight gender roles in caregiving and health decision-making as well as differences in life expectancy. Additionally, the notable representation of respondents aged 71-80 years may suggest that vaccine campaigns have effectively reached those deemed at the highest risk.

### *4.2 Description of Research Variables (Univariate Analysis)*

This study involved 278 elderly respondents at the Health Center of Manatuto Villa, Kota Manatuto, and Timor-Leste in 2023. The variables studied included knowledge, experience, social and environmental influence, anxiety, and access to information about COVID-19 vaccination.

1. Knowledge about COVID-19 Vaccination

   Of the 278 respondents, 72% (200 respondents) lacked sufficient knowledge about the benefits of COVID-19 vaccination for the elderly during the pandemic, while only 21% considered it important to be vaccinated. This highlights a significant gap in awareness, which may impede the effectiveness of vaccination campaigns. In a region where access to formal education is limited and health information is scarce, this finding aligns with previous studies indicating that a lack of knowledge often contributes to vaccine hesitancy.

2. Experience with COVID-19 Vaccination

   A total of 12% of respondents reported negative experiences or trauma related to vaccination side effects, including dizziness, headache, vomiting, nausea, and localized pain at the injection site. In contrast, most patients experienced minimal or no side effects. These findings suggest that while adverse reactions are relatively rare, the perception of risk is amplified by personal experience, which plays a critical role in shaping attitudes toward future vaccinations. Stasiuk et al. (2021) demonstrated that even mild side effects can significantly deter individuals from continuing vaccination, especially in older populations who are more physically vulnerable.

3. Social Influence and Family Support

   Social influence plays a major role in decision making for the elderly, with 71% of respondents relying on advice from religious or community leaders in deciding whether to receive the vaccine. Additionally, over 50% consulted family members before making a decision and 20% relied on information from relatives or neighbors. This highlights the entrenched role of sociocultural dynamics in health-related decisions, where trust in traditional authority figures surpasses reliance on health professionals. In Timor-Leste, a society deeply rooted in communal and familial structures, it is unsurprising that the opinions of religious or community leaders carry considerable weight. Previous research has shown that leveraging these trusted figures in public health campaigns can significantly boost the acceptance rates.

4. Anxiety about Vaccination

   Anxiety was a significant factor influencing the elderly's attitudes toward vaccination, with 67% of respondents expressing anxiety and 72% stating that fear of adverse health effects due to declining age and health influenced their reluctance to be vaccinated. This finding correlates with global research indicating that older adults are more likely to feel anxious about medical interventions, particularly when compounded by preexisting health conditions.

5. Perception of COVID-19

   Interestingly, 19% of the respondents believed that COVID-19 was a divine curse, reflecting the continued influence of religious and cultural beliefs in shaping health perceptions. However, the majority (61%) considered COVID-19 to be an ordinary illness that would eventually disappear, thus reducing the perceived urgency of vaccination. This widespread perception presents a considerable challenge for public health efforts as it diminishes the perceived severity of the pandemic.

6. Access to Information about COVID-19 and Vaccination

   Only 16% of the respondents had access to information about COVID-19 and the vaccination program through the mass media. The remaining respondents either relied on family members for information or had no access to vaccine-related information. This indicates a critical shortcoming in communication strategies within the region, where poor infrastructure and limited media penetration hinder the dissemination of accurate health information. In rural areas, such as Manatuto, traditional communication methods often outweigh modern mass media.

7. Factors Influencing Elderly Attitudes

   This study identified several key factors influencing the attitude of the elderly toward COVID-19 vaccination. 72% of respondents demonstrated low knowledge about COVID-19, 12% were influenced by personal negative experiences, 71% were swayed by social influences, 67% by emotional factors, 61% by sociocultural dynamics, and 16% by access to information through mass media. These results suggest a complex interplay between personal, social, and emotional factors in shaping vaccine acceptance. In comparison to other studies

in similar contexts, the dominance of socio-cultural influences is not unexpected but emphasizes the need for culturally sensitive health campaigns that address the specific concerns of the elderly population.

### *4.3 Relationship Between Variables (Bivariate Analysis)*

In this section, a bivariate analysis was conducted to examine the relationship between the independent variables (knowledge, attitude, age, gender, education, occupation, and distance from home) and the dependent variable (COVID-19 vaccine acceptance). The Chi-Square test was used to assess the significance of these relationships, with a p-value < 0.05 indicating statistical significance.

Table 3. Relationship Between Demographic Variables and COVID-19 Vaccine Acceptance

| Variable | Kategori | Received Vaccine | Did Not Receive Vaccine | *Total* | *Pvalue* |
|---|---|---|---|---|---|
| Knowledge | Good | 150 (75%) | 50 (25%) | 200 | 0.001 |
| | Low | 50 (35%) | 92 (65%) | 142 | |
| Attitude | Positive | 130 (78%) | 37 (22%) | 167 | 0.002 |
| | Negative | 20 (49%) | 21 (51%) | 41 | |
| Age | 60-70 years | 40 (71%) | 16 (29%) | 56 | 0.089 |
| | 71-80 years | 85 (69%) | 38 (31%) | 123 | |
| Gender | Male | 78 (76%) | 24 (24%) | 102 | 0.112 |
| | Female | 122 (69%) | 54 (31%) | 176 | |
| Education | High | 100 (80%) | 25 (20%) | 125 | 0.003 |
| | Low | 50 (63%) | 30 (37%) | 80 | |
| Occupation | Employed | 60 (74%) | 21 (26%) | 81 | 0.072 |
| | Unemployed | 60 (65%) | 35 (35%) | 95 | |
| Distance for | Near | 50 (72%) | 20 (28%) | 70 | 0.0140 |
| | Far | 100 (65%) | 54 (35%) | 154 | |

The results, presented in Table 3, show that knowledge ($p = 0.001$), attitude ($p = 0.002$), and education ($p = 0.003$) have a significant relationship with vaccine acceptance, indicating that respondents who are more knowledgeable, have a positive attitude, and possess a higher level of education are more likely to accept the COVID-19 vaccine. Conversely, age ($p = 0.089$), gender ($p = 0.112$), occupation ($p = 0.072$), and distance from home ($p = 0.140$) did not exhibit a significant relationship with vaccine acceptance. This finding suggests that these demographic factors are not key determinants in the decision-making process for receiving the vaccine in this context.

These findings emphasize the importance of knowledge, attitude, and education in shaping vaccine acceptance among the elderly. Those with higher knowledge levels are likely to have a better understanding of the benefits of vaccination, which will encourage acceptance. This is consistent with health behavior models such as the Health Belief Model (HBM), which posits that individuals with higher knowledge of health risks and interventions are more likely to take preventive actions. The significant role of education reinforces this, as higher education often leads to greater access to accurate health information and better understanding of vaccine safety and efficacy.

A positive attitude toward vaccination plays a crucial role in acceptance. Respondents with a more favorable view of vaccines were significantly more likely to receive the COVID-19 vaccine. This underscores the impact of psychological factors, such as trust in health authorities and confidence in vaccine effectiveness, as major influencers in health decision-making.

These findings align with previous studies conducted in other countries with similar sociocultural contexts, such as Indonesia, where knowledge, education, and attitude have been shown to be key determinants of vaccine acceptance (Pratiwi et al., 2022). The alignment with the global vaccine hesitancy literature further validates the importance of targeting education and awareness campaigns to boost vaccine acceptance in Timor-Leste.

Although not directly measured in this table, the importance of social and familial influence has been highlighted in other sections of this study, particularly in the context of attitude formation. The strong influence of community leaders and religious figures in shaping attitudes toward vaccination in Timor-Leste reflects the deeply rooted communal values of society. While the table does not show significant relationships for demographic factors such as distance and occupation, this could be explained by collective decision-making processes in families and communities, where individual factors such as employment status or proximity to health facilities may have less influence than social dynamics.

Compared to global studies on vaccine hesitancy, these findings are in line with research from other developing nations where education and knowledge are often the strongest predictors of health behavior. However, the non-significant impact of factors such as age and gender may differ from the trends observed in other regions, such as Europe or North America, where these variables have a more pronounced influence on vaccine uptake.

The analysis revealed several important factors influencing COVID-19 vaccine acceptance among the elderly in the Health Center Manatuto Villa area, Kota Manatuto, and Timor-Leste. The key determinants are knowledge, attitude, and educational level, all of which show a significant relationship with vaccine acceptance. Respondents who possessed better knowledge about the COVID-19 vaccine were more likely to accept vaccination, as evidenced by the strong relationship between knowledge and acceptance ($p = 0.001$). This finding aligns with existing health behavior models, such as the Health Belief Model (HBM), which suggests that individuals with more knowledge about health risks and preventive measures are more likely to engage in protective behaviors. In this case, knowledge about the benefits of vaccination reduces uncertainty and fear, and drives acceptance.

A positive attitude toward vaccination also plays a critical role in increasing acceptance. The majority of respondents with positive attitudes accepted the vaccine ($p = 0.002$), highlighting the importance of emotional and psychological factors in health decision-making. This finding is consistent with prior research that emphasizes the role of trust in health authorities and perceived effectiveness of vaccines. Positive attitudes are often shaped by trusted community figures and health professionals, indicating that confidence-building measures such as transparent communication and endorsement by local leaders could enhance vaccine uptake.

Education level is another significant factor, with respondents who have higher levels of education being more likely to accept the vaccine than those with lower education levels ($p = 0.003$). This finding reflects the broader role of education in providing access to accurate health information, critical thinking skills, and greater engagement with public health messages. Higher education levels often correlate with improved health literacy, making it easier for individuals to understand the necessity of vaccination and filter out misinformation.

However, age, gender, occupation, and distance from healthcare facilities did not show a significant relationship with vaccine acceptance. This lack of significance suggests that demographic factors such as age and sex are not substantial barriers to vaccine uptake in this context, which differs from global trends where older age groups or women may show more vaccine hesitancy. In Timor-Leste, the relatively uniform perception of vulnerability among the elderly could explain why age did not emerge as a significant factor.

Similarly, distance from healthcare facilities and employment status did not act as barriers to vaccine acceptance, indicating that social support, access to information, and trust in the vaccine are more influential than physical or logistical constraints. This may reflect the communal decision-making processes common in the region, where family and community influences outweigh individual logistical considerations. Social factors, particularly the roles of trusted leaders and family members, are critical in shaping vaccine acceptance.

These findings align with those of studies conducted in other developing regions where knowledge, education, and attitude are key drivers of vaccine uptake. However, the non-significant impact of age and sex contrasts with global patterns observed in countries such as the United States or European nations, where older individuals and women tend to exhibit more caution toward vaccination. This difference may be due to sociocultural factors in Timor-Leste, where collective decision-making and community-based health interventions play a more central role in influencing health behavior.

## Discussion

This study aims to provide a deeper understanding of the factors influencing COVID-19 vaccine acceptance among the elderly in the working areas of health centers in Manatuto Villa, Kota Manatuto, and Timor-Leste. Each result will be analyzed based on the relevant literature and examined in the context of ongoing vaccination policies and programs.

### *5.1 The Influence of Knowledge on Vaccine Acceptance*

The results of this study show that the knowledge of the elderly about COVID-19 vaccination has a significant impact on vaccine acceptance. A total of 72% of the respondents did not have adequate knowledge about the benefits of COVID-19 vaccination, which contributed to the low positive attitude towards vaccine acceptance among the elderly. This lack of knowledge is likely influenced by low educational levels and limited access to relevant information. These findings align with Notoatmodjo's theory ( 2003, p. 22), which states that knowledge is acquired after an individual perceives an object, and this knowledge serves as the primary foundation for shaping attitudes and behavior. Inadequate knowledge can lead individuals to make incorrect decisions such as refusing vaccination.

Other studies have also supported this finding. For example, Larson et al. (2011, p. 527) showed that a lack of knowledge about vaccines often leads to hesitation, ultimately resulting in low acceptance rates in the community. Those with a better understanding of the benefits and safety of vaccination are more open to receiving vaccines, whereas those with limited knowledge are more vulnerable to misinformation and unfounded fears. In this context, education level becomes an important factor, as elderly individuals who have never received formal education tend to have limited awareness of the importance of vaccination, as was also found in this study.

Furthermore, limited access to information is a barrier for the elderly to gain a good understanding of vaccination. Only 16% of the respondents had access to mass media related to COVID-19 and vaccination, while most received information from family or had no access to information at all. This strengthens the argument that widespread information dissemination through mass media can increase public awareness of the importance of vaccination, as highlighted by Wilson and Jungner (2021) in their study of the role of mass media in health campaigns.

Adequate knowledge not only affects individuals' understanding of vaccines but also influences how they assess the risks and benefits of vaccination. Elderly individuals with better knowledge of vaccination tend to be more aware of the importance of health protection, especially in the context of the COVID-19 pandemic, where they are the most vulnerable group to severe complications. This is also evidenced by Moritzky et al. (2023, p. 388), who found that good knowledge about vaccines can increase trust in vaccination and strengthen positive attitudes towards national vaccination programs.

The role of knowledge in this setting must be considered within Timor-Leste's broader social and cultural dynamics. While knowledge is a key factor, it is noteworthy that social influence played a less significant role in this study than in research from other regions. In settings with strong community or family ties, social approval often determines health behaviors. However, cultural norms and trust in formal health authorities may dilute the influence of family and religious leaders. This finding challenges some assumptions of the Health Belief Model, which suggests that social influence is a dominant driver of health behavior. Instead, it may suggest that individual knowledge, particularly when disseminated through trusted health sources, has a more direct impact on decision making in Timor-Leste than previously thought.

In conclusion, this study's findings suggest that while social factors and education are important, the unique cultural context of Timor-Leste requires a tailored approach that places greater emphasis on individual knowledge building and direct health interventions than traditional forms of social influence. Further research should explore how these dynamics play out in other regions with similar sociocultural frameworks.

### *5.2 The Influence of Personal Experience*

The study results showed that 12% of the elderly respondents had negative experiences related to COVID-19 vaccination side effects, such as dizziness, headaches, vomiting, nausea, and pain at the injection site. These negative experiences significantly influenced their attitudes toward further vaccination rejection. According to Notoatmodjo ( 2003, p. 24), personal experience is a cognitive component that can influence the formation of an individual's attitude. If someone has experienced a negative event, that experience often becomes a reference for future decision making. In this case, the negative experiences of some elderly individuals influenced their perception of vaccination as risky or unfavorable.

Middlebrook's theory (Schuman & Johnson, 1976, p. 166) supports this view by explaining that personal experiences and stories heard from others are key determinants in shaping individual beliefs and attitudes. For the elderly, personal experience plays a significant role in shaping their attitudes toward vaccination, especially if they feel that vaccination causes side effects that disrupt their health. Physical side effects, although often temporary and mild, can reinforce negative attitudes toward vaccination, particularly among the elderly, who may already have declining health conditions. These experiences can also be exacerbated by stories or reports from family, friends, or neighbors who have experienced similar issues, further strengthening their negative beliefs about vaccines.

Other studies have also shown that negative experiences with vaccination can affect acceptance. For example, Stasiuk et al. (2021, p. e6526) found that people who experienced side effects after vaccination tended to be more skeptical about future vaccinations and were more likely to refuse them in the future. This was related to the fear of repeating negative experiences. Elderly people, who are physically more vulnerable, tend to evaluate vaccination based on their previous experiences, which ultimately influences their attitudes towards government-run vaccination programs.

These negative experiences are not only individual, but can also be reinforced by their social environment. Middlebrook states that stories from others, especially from trusted individuals such as family members or community leaders, further reinforce their negative perceptions. If people around them also have had bad experiences related to vaccination, this will collectively influence their attitudes.

However, it is important to note that not all elderly individuals with negative experiences reject vaccinations. Some studies have found that proper education and accurate information can help alleviate the fear caused by negative experiences. For example, Betsch (2018, p. e0208601) showed that providing clear information about mild and temporary side effects of vaccines can reduce anxiety and increase vaccine acceptance, even among individuals who have previously experienced side effects.

While the study shows that personal experiences are crucial in shaping vaccine attitudes, it is interesting to note that social influence, which is often heavily emphasized in health behavior theories, plays a less pronounced role here than

in other regions. For example, while collective storytelling can reinforce negative attitudes, the individualized fear of physical discomfort seems to outweigh peer or community encouragement to vaccinate. This divergence from traditional social norms-based models, such as the Health Belief Model, may reflect a unique cultural context in Timor-Leste, where individual health perceptions and personal experiences of risk weigh more heavily than broader societal norms do.

In conclusion, addressing personal experiences with side effects through targeted education may hold the key to improving vaccine uptake among the elderly in Timor-Leste more so than leveraging social influence alone. Tailoring communication to acknowledge and address these fears within a culturally appropriate framework is essential for effective vaccination programmes.

### *5.3 The Influence of Social and Family Factors*

It was found that 71% of the elderly at the Health Center Manatuto Villa tended to follow the opinions of religious, cultural, or family figures when deciding whether to accept or reject vaccination. This indicates that social and family factors play crucial roles in shaping the attitudes of the elderly toward vaccination. According to the social theory presented by Locke ( 1987, p. 169), individual behavior is often influenced by the social environment, including people with authority or who are considered important in their lives. In societies with strong sociocultural ties, such as Timor-Leste, religious and cultural figures have a significant influence in shaping attitudes toward health programs, including vaccination.

The attitudes of the elderly toward vaccination are heavily influenced by the norms and values of their community. Religious figures often serve as the primary source of information and guidance for moral decisions, including vaccination, because they are regarded as having greater trust and authority. Additionally, the family plays an important role, especially in communal-based societies, where decisions are often discussed within the extended family. This finding is consistent with research by Betsch et al. (2018), who showed that health decisions, such as vaccination, are heavily influenced by family members and influential figures in the community.

However, this strong sociocultural impact can become a barrier if respected figures or family members hold negative views on vaccination. In such cases, the elderly tend to follow their opinions rather than information from the official health authorities. This finding highlights the importance of involving community and religious leaders in health campaigns to increase vaccine acceptance among the elderly. Interventions involving religious leaders and community leaders have proven effective in increasing vaccination coverage in various countries with strong social structures (Abba-Aji et al., 2022, p. 100086)

While these findings echo global research on the role of social influence in health behavior, it is important to note the unique cultural dynamics of Timor-Leste. Unlike in some regions where social media or governmental campaigns dominate public health messaging, traditional authorities, including religious and community leaders, have a considerable influence over health decisions. This reliance on interpersonal, trust-based networks may explain why mass media campaigns and official public health communications have limited reach. Therefore, leveraging these trusted local figures in public health initiatives may be more impactful in Timor-Leste than in urbanized or individualistic societies.

This interpretation challenges traditional health behavior models, such as the Health Belief Model, which places greater emphasis on individual perceptions of risks and benefits. In contexts such as Timor-Leste, these individual perceptions are more likely to be shaped by collective and social influences. This cultural insight is essential for designing interventions that are not only informative, but also resonate with the elderly and their key influencers.

### *5.4 Emotional Factors and Anxiety Regarding Vaccine Acceptance*

The study results showed that 67% of the elderly felt anxious about vaccination, and 72% feared receiving the COVID-19 vaccine due to aging and declining health conditions. These findings indicate that emotional factors such as fear and anxiety significantly contribute to vaccine rejection. According to Notoatmodjo's theory (2003, p. 31), emotion is one of the components that influences a person's knowledge and attitude toward health actions. Fear of side effects of vaccination, especially among the elderly with fragile health conditions, often hinders vaccine acceptance. Elderly people tend to view vaccination as an additional risk to their health, rather than the protective benefits it offers.

Emotional theory from *Smartpsikologi* (2007) also supports the notion that anxiety can be a major obstacle in health decision-making. Individuals with more emotions, particularly women, are more susceptible to excessive fear and anxiety, which ultimately hinders vaccine acceptance. Elderly people often have poor past health experiences, and memories of vaccine side effects or other healthcare treatments may reinforce these fears. This is in line with the study by Karafillakis et al. (2016, p. 5013), which found that health-related anxiety and old age were major factors in hesitancy and refusal of the COVID-19 vaccine.

Moreover, misinformation or myths about vaccine side effects in the community also contributes to increased anxiety among the elderly. The belief that vaccination can worsen health is a major barrier to vaccine acceptance. To address this, interventions focusing on personal education, especially for more emotional groups, such as women and elderly individuals with declining health, are needed.

While fear and anxiety are commonly cited as barriers to vaccine acceptance globally, the cultural and social context of Timor-Leste may amplify these emotional reactions. In societies with limited access to healthcare, the elderly often rely on traditional beliefs and informal community information sources, which may not always align with scientific understanding. As a result, efforts to combat misinformation and build trust in modern healthcare interventions must be sensitive to local beliefs and be delivered by trusted community figures. This nuanced approach is critical for ensuring that emotional and psychological barriers do not outweigh the tangible health benefits of vaccination.

### *5.5 The Influence of Socio-Cultural Factors*

The research findings showed that only 19% of respondents viewed COVID-19 as a curse from the Almighty, while the majority (61%) considered it a common illness related to weather changes. These findings indicate that cultural factors, although still present, do not play a major role in vaccine refusal in the Health Center Manatuto Villa area, Kota Manatuto. In the sociocultural context, traditional beliefs linking illness to spiritual or mythological factors appear to be diminishing. Instead, most people are beginning to see COVID-19 as a general health issue, although with a limited understanding.

Cultural factors usually have a significant influence on attitudes toward health, particularly in communities that are strongly connected to traditional beliefs. However, in this region, access to modern healthcare services seems to have a greater impact on shaping attitudes toward vaccination. This is supported by the fact that the community in Manatuto, despite maintaining strong cultural beliefs, prefers modern healthcare services provided by clinics and health centers over traditional approaches. According to Notoatmodjo's Social Health Theory, community attitudes toward health programs, such as vaccination, tend to be influenced more by the availability and quality of healthcare services than by cultural beliefs, especially if those healthcare services have proven to be effective.

Other studies support this finding; for example, Larson et al. (2018, p. 1599) found that better access to healthcare facilities and more accurate information about vaccination play a key role in reducing belief in myths or misinformation. In societies transitioning to modern healthcare systems, the understanding that diseases can be addressed through medical interventions, including vaccination, tends to be more dominant than the previous cultural beliefs that influence health decisions.

### *5.6 The Role of Mass Media in Information Dissemination*

The study results showed that only 16% of the elderly in the Health Center Manatuto Villa had access to information about COVID-19 and vaccination through mass media. This limited access suggests that the mass media, which should be an effective tool in health campaigns, has not had a significant impact on increasing vaccine acceptance in this region. This is due to several key factors, including limited communication infrastructure, lack of access to electricity, and the limited distribution of media such as television, radio, newspapers, and the Internet in the rural areas of Timor-Leste.

The lack of access to information through the mass media hinders the rapid and accurate dissemination of knowledge about vaccination. In this context, Rogers (2014, p. 433) stated that mass media can be an effective tool for promoting health behavior if the infrastructure is adequate and the audience has sufficient access to the media. However, in underdeveloped regions, such as Manatuto, infrastructural limitations are the main barriers to optimizing the role of mass media as a reliable source of information. As a result, the elderly in this region rely more on information from family or local community leaders who often disseminate information orally, which may not always be accurate or may contain myths about vaccination.

Abuhashesh et al. (2021, p. 80) also found that limited access to media in rural areas affects the effectiveness of health campaigns, as people in those areas are more reliant on direct information from healthcare workers or influential local figures. In such situations, mass media, although effective in urban areas, do not have the same impact in regions with underdeveloped infrastructure.

The role of mass media in Timor-Leste's rural context is far less influential than that in urban or more developed regions. The limited penetration of mass media channels in rural areas restricts rapid information dissemination, which is crucial for promoting health interventions, such as vaccination. This finding supports the idea that contextual factors such as geographical location and infrastructure significantly influence how health campaigns are received. In Manatuto, the limited role of mass media underscores the need for more localized interpersonal communication strategies to reach the elderly population effectively. This contrasts with studies in more developed settings, where mass media is a primary driver of vaccine acceptance, and highlights the need for tailored approaches that address specific infrastructural and social challenges.

### *5.7 The Influence of Religious Leaders on Vaccine Acceptance in Timor-Leste*

In Timor-Leste, religious and cultural leaders hold a significant position within the community and their influence often surpasses that of formal healthcare providers, especially in rural areas. This phenomenon is rooted in the deep-seated cultural and religious norms of the country, where traditional leaders, including priests, immigrants, and village elders, are regarded as figures of trust and moral authority. In the context of COVID-19 vaccine acceptance, the role of these leaders is crucial in shaping public perception, particularly among the elderly who tend to rely heavily on the guidance of religious figures for important decisions.

The findings from this study indicate that 71% of respondents sought the opinions of religious and community leaders before deciding whether to accept the COVID-19 vaccine. This suggests that the social and cultural fabric of Timor-Leste is deeply interwoven with religious beliefs, and that these leaders have a significant impact on health-related decisions. Trust in religious figures stems from their long-standing roles in offering spiritual guidance, mediating social conflicts, and providing counsel on everyday matters. As such, their opinions are often viewed as an extension of divine or cultural wisdom, which holds considerable sway over individual behavior.

This influence aligns with the Theory of Planned Behavior (TPB), which emphasizes the role of subjective norms—beliefs about what others think one should do in shaping behavior. In a traditional society such as Timor-Leste, these subjective norms are heavily dictated by the guidance of respected community figures. For many elderly individuals, the decision to vaccinate is not solely based on personal health knowledge or perceived susceptibility to illness, as posited by the Health Belief Model (HBM), but also on the social acceptability of the action within their community.

The significant effect of religious leaders on vaccine acceptance in Timor-Leste can be attributed to several factors.

1. High Levels of Trust: Religious figures often embody the moral and ethical standards of the community. In a country where formal education and healthcare access are limited, people turn to these trusted figures for advice on complex issues, such as vaccination. Thus, their endorsement or rejection of the vaccine can have a direct effect on their willingness to participate in vaccination programs.
2. Community-centered decision-making: In Timor-Leste, decisions, especially those related to health, are often made collectively rather than individually. The guidance provided by religious and cultural leaders can sway entire families or communities toward or away from vaccine acceptance. This collective decision-making process is particularly influential in rural areas where access to formal healthcare and reliable information is limited.
3. Religious Framing of Health Issues: In many instances, health issues are framed in a religious context. Religious leaders may interpret the vaccine through spiritual or cultural perspectives, which can either encourage or discourage its acceptance. For example, if a religious leader frames the vaccine as a tool to protect the community, acceptance rates can be greatly enhanced. Conversely, if skepticism or caution is expressed, this may lead to hesitancy or outright rejection.

Studies from other developing countries with similar sociocultural structures, such as Pakistan and Nigeria, have demonstrated comparable trends, where religious leaders play a decisive role in shaping public attitudes toward vaccination. In this context, health campaigns that engaged religious leaders and aligned public health messages with religious values were more successful in overcoming vaccine hesitancy. This finding highlights the importance of incorporating religious figures into health communication strategies, particularly in countries such as Timor-Leste where their influence is paramount.

Given the significant influence of religious leaders on Timor-Leste, health campaigns aiming to increase vaccine uptake must prioritize the involvement of these trusted figures. Public health authorities should engage religious leaders early in the process to provide them with accurate and culturally sensitive information about the benefits of vaccination. By empowering these leaders with the necessary knowledge, they can reassure their communities about the safety and efficacy of vaccines.

Religious leaders can act as intermediaries, bridging the gap between health care providers and the local population. Their involvement can help counteract misinformation and dispel myths, particularly in rural areas where formal healthcare infrastructure may be weak and reliance on traditional sources of information is strong. Thus, leveraging the influence of religious figures could enhance public trust in vaccination campaigns and improve overall public health outcomes in Timor-Leste.

The findings of this study underscore the profound impact of religious leaders on vaccine acceptance among the elderly in Timor-Leste. Their significant role as trusted community figures means that their support is critical in shaping public attitudes toward vaccination. For future public health initiatives, particularly those aimed at increasing

vaccine coverage, it is essential to collaborate closely with these leaders to ensure that accurate information reaches the population in culturally and socially resonant ways.

When comparing the findings from this study with those from other developing countries, it becomes evident that the significant influence of religious leaders on vaccine acceptance in Timor-Leste is consistent with trends observed in similar sociocultural contexts. For example, research in Pakistan and Nigeria underscores the pivotal role of religious and community leaders in shaping public health decisions, particularly in rural areas where formal education levels are lower and access to healthcare is limited. These studies revealed that in communities where trust in religious figures is high, involving these leaders in health campaigns can significantly enhance public compliance with vaccination programs.

Similarly, studies conducted in Bangladesh and Afghanistan have shown that religious leaders can either facilitate or hinder vaccine uptake, depending on their stance toward the vaccination campaign (Niu et al., 2024, p. 4). In these countries, public health interventions that strategically engaged religious leaders in promoting vaccines experienced greater success in reaching the target population, particularly among elderly individuals who tended to rely more on community norms and trusted figures than on formal healthcare providers.

However, some studies from other regions, such as Latin America, have shown that religious leaders have less influence on vaccine acceptance. In countries like Brazil and Mexico, formal education and public health messaging from governmental bodies play a more dominant role in shaping public attitudes toward vaccination (Alarcón-Braga et al., 2022, p. 102369). This contrast highlights the unique sociocultural dynamics at play in countries like Timor-Leste, where traditional and religious leaders wield significant power over community decisions, especially in rural areas.

Despite the consistency of findings with studies from other developing nations, what remains particularly unique to Timor-Leste is the extent to which community leaders, particularly religious figures, shape health behaviors across generations. Elderly people, who are often the most vulnerable and resistant to vaccination, tend to place disproportionate trust in these figures, reflecting the deeply traditional nature of Timor-Leste's social fabric. In this context, health knowledge, while important, is often secondary to the perceived approval or disapproval of trusted community figures.

This research indicates that while religious and community leaders significantly influence vaccine acceptance in many developing nations, this impact is particularly pronounced in Timor-Leste. In traditional societies, norms advocated by respected community figures often outweigh personal health knowledge and healthcare access. Consequently, public health campaigns should not only educate the population but also involve religious and cultural leaders to endorse vaccination benefits. Engaging these trusted figures can enhance vaccine uptake, counter misinformation, and overcome sociocultural barriers affecting vaccine acceptance in the elderly.

## Conclusion

Based on the research findings regarding the factors influencing COVID-19 vaccine acceptance among the elderly at Health Center Manatuto Villa, Kota Manatuto, and Timor-Leste, it is evident that limited knowledge about the benefits of vaccination is a significant driver of vaccine hesitancy among the elderly. Those with lower education levels and restricted access to information are more likely to reject vaccination because of inadequate understanding of its importance. Additionally, negative personal experiences with vaccine side effects, such as dizziness and nausea, contribute to reluctance to receive future vaccinations, as those who have experienced side effects are more inclined to refuse further doses. The influence of social networks, particularly religious, cultural, and family figures, is a powerful determinant in shaping the attitudes of the elderly, with many deferring the opinions of key influencers in their communities. Emotional factors, including anxiety and fear related to aging and declining health, also serve as substantial barriers to acceptance of the vaccine. In conclusion, efforts to enhance vaccine acceptance among the elderly must prioritize increasing knowledge and education through trusted community leaders and addressing emotional concerns surrounding vaccination. Healthcare providers and policymakers should focus on community-based educational initiatives and personalized approaches to reduce anxiety and encourage informed decision-making. Specifically, vaccination campaigns in Timor-Leste should actively involve religious leaders and community figures in the education process, as they hold a significant sway over community attitudes and decisions. Furthermore, mobile health units and local healthcare workers can be deployed to provide accurate information, counter misinformation, and address fears directly within communities. This research highlights the importance of context-specific interventions and suggests that similar strategies can be applied to other regions with similar sociocultural and infrastructural challenges.

A longitudinal study in the future could be used to observe changes in public attitudes toward vaccination as access to information and health interventions increases. This approach allows researchers to track how improved knowledge, positive vaccination experiences, and social interactions influence vaccine acceptance. Additionally,

qualitative exploratory studies can delve deeper into the sociocultural factors affecting public attitudes toward vaccination in Timor-Leste, focusing on the role of religious and cultural leaders in supporting or hindering vaccine acceptance. These studies could use in-depth interviews or focus groups to gain detailed insights into the social dynamics that influence health decisions.

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