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Post-COVID 19 Assessment on Perceptions, Acceptance, and Attitudes Towards COVID-19 Vaccines: A Case of Papua New Guinea

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Abstract: This study investigates the factors influencing COVID-19 vaccine acceptance in Papua New Guinea (PNG) through a comprehensive analysis of demographic characteristics, attitudes toward vaccines, and predictors of acceptance. The study surveyed 724 participants, revealing that the majority were younger adults (29.83% aged 21-30 years and 40.88% aged 31-40 years), predominantly male (74.03%), and employed (81.08%). Educational backgrounds were diverse, with 84.53% holding non-health-related degrees. Health insurance coverage was low, with 29.28% lacking insurance, and 65.47% were non-smokers. Notably, 66.02% reported exposure to or infection with COVID-19, though only 10.22% had tested positive. The study found significant distrust in vaccine information sources, with medical providers and scientific articles being the most trusted. Concerns about vaccine side effects were prominent, with 30.80% of participants strongly agreeing that side effects were a major barrier to vaccination. Attitudes toward vaccines were mixed: while 31.49% acknowledged the importance of vaccination, 62.98% expected widespread refusal once vaccines were licensed in PNG. Distrust extended to pharmaceutical companies and the government's ability to provide free vaccines, with 62.57% doubting the government's commitment to free vaccine distribution. Regression analysis identified several key predictors of vaccine acceptance. A higher willingness to pay for the vaccine and greater concern about COVID-19 positively correlated with increased vaccine acceptance. In contrast, being married and having children were negatively associated with vaccine uptake. These findings underscore the complex landscape of vaccine acceptance in PNG, highlighting the need for targeted public health strategies to address misinformation and alleviate concerns about side effects. Enhancing trust in reliable sources and addressing barriers related to personal circumstances are essential for improving vaccine acceptance in the region.

Keywords: *Covid 19, Vaccine, Attitude, Misinformation, Barriers, Health Issues, Survey, Distrust.*

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I. INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the causative virus for the coronavirus disease 2019 (COVID-19) pandemic, which began in late 2019 in Wuhan, China. This virus quickly escalated into a global health crisis, affecting over 220 countries and leading to considerable morbidity and mortality (W Lei, 2021). As of December 22, 2020, the pandemic has resulted in more than 76.2 million confirmed cases and over 1.6 million deaths worldwide (Dhama et al., 2020). The global threat posed by COVID-19 is not only a health crisis but also an economic and social one, leading to widespread disruptions in daily life and healthcare systems around the world (Cascini et al., 2021; Manineng et al., 2021).

Vaccines are among the most reliable and cost-effective public health interventions ever implemented, saving millions of lives each year (Cascini et al., 2021; Manineng et al., 2021). In response to the pandemic, scientists and pharmaceutical companies have been racing against time to develop effective vaccines, resulting in several candidates receiving emergency use authorization. These include vaccines from Pfizer-BioNTech, Moderna, and others, which have shown efficacy in preventing symptomatic COVID-19 (Dhama et al., 2020). The development and distribution of these vaccines are

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critical to mitigating the pandemic's impact and curbing the spread of the virus, thereby facilitating a return to normalcy.

However, vaccine hesitancy poses a significant barrier to achieving herd immunity, as evidenced by research indicating that public confidence in vaccine safety, accessibility, and necessity can greatly influence vaccination uptake (Abuhammad et al., 2022; El-Elimat et al., 2021; World Bank, 2021). Surveys have shown that attitudes towards COVID-19 vaccines can vary widely among populations, influenced by factors such as misinformation, cultural beliefs, and historical mistrust of medical interventions (Ajana et al., 2022; Bassi et al., 2022; WHO, 2022). In Papua New Guinea (PNG), the first case of COVID-19 was detected on March 20, 2020 (W Lei, 2021; WHO, 2024, World Bank, 2020). The country's response has included strict non-pharmaceutical interventions (NPIs), which have had significant socio-economic consequences.

According to an Article by Manineng et al., 2021;

Vaccines are important for two main reasons: infection prevention among those vaccinated and 'herd immunity' in preventing infection among the unvaccinated; both of which contribute to controlling epidemics of vaccine-preventable diseases (Andre et. al., 2008). From the phenomenal effort of vaccine developers, SARS-CoV-2 vaccines have become available in record time, and with help from World Health Organization (WHO), countries around the world are increasing vaccination of the populace. Some 500 million shots of COVID-19 vaccine have so far been given and Israel and Saudi Arabia are leading in the number of people being vaccinated ("501 million Shots," 2021; "COVID-19 vaccine," 2021). Signs of control of COVID-19 has started appearing in Israel and those other countries who have gone ahead with vaccination (Schraer, 2021; "Israel provides," 2021; "Israel," 2021).

Papua New Guinea (PNG), a low-middle income country north of Australia, has unique and often very difficult challenges that may frustrate any COVID-19 vaccination program ("About Papua New Guinea," 2021). There are over 800 different ethnic groups and some 85% of the population live in rural and often isolated remote villages with limited access to information including that about infectious diseases or pandemics ("About Papua New Guinea," 2021). In addition, some 40% of the adult population are unable to read, implying that the extend of reach of written health promotion messages would be limited ("About Papua New Guinea," 2021; UNESCO, 2020). Further, there are convincingly crafted theories about the world ending or human population control mechanisms that are circulating especially in social media, that invoke unrealistic perspectives (Ahearn, 2021). From these challenges, it is understandable that many citizens of the country will have misconceptions about COVID-19 and about the vaccines that authorities in PNG are eager to source and distribute in the country (Mola, 2021; "Kramer to take vaccine," 2021; Seymour, 2021).

Despite some improvements since political independence in 1975, the country's health system has generally been in decline (Grundy, et. al., 2019). There is a significant shortage of human resources for health in remote and rural communities that limit access to basic health services. In addition, drug and medical supplies and functioning equipment are severely limited (Grundy et. al., 2019). Although the testing rate in PNG is among the lowest in the world, 363 new cases were detected in a single day on 01 April 2021, indicating widespread community transmission (PNG Joint Agency Task Force, 2021). If left to its natural progression, COVID-19 appears to be a foe that may overwhelm and collapse the health system (Choudhury & Koulouris, 2021).

Challenges in vaccine distribution and acceptance in PNG have been compounded by limited healthcare infrastructure and public skepticism towards vaccination (W Lei, 2021; World Bank, 2022; Devpolicy Blog, 2024). Understanding vaccine acceptance and addressing concerns related to vaccine safety and accessibility are essential for effective pandemic control in PNG. The current study aims to explore these factors to provide insights that support public health strategies and enhance vaccine uptake in the region, ultimately contributing to the global effort to control the COVID-19 pandemic.

II. BACKGROUND

The global COVID-19 pandemic has profoundly impacted public health systems, economies, and social dynamics across the world. Among the various strategies to combat the virus, vaccination has emerged as a crucial public health intervention. This literature review contextualizes the factors influencing COVID-19 vaccine acceptance in Papua New Guinea (PNG) by examining past research on vaccine hesitancy, trust in health systems, and demographic influences on health behavior. Understanding the perceptions and attitudes towards vaccines in PNG is particularly critical, given the country's unique socio-cultural landscape and historical context surrounding healthcare interventions. Factors such as mistrust in medical authorities, the influence of community leaders, and the spread of misinformation can significantly shape individuals' willingness to receive vaccines. Furthermore, the interplay between cultural beliefs, previous experiences with healthcare, and access to reliable information presents a complex scenario that warrants a deeper exploration. By synthesizing existing literature on these subjects, this review aims to provide insights that can inform public health strategies and enhance vaccine uptake, ultimately fostering resilience against the ongoing pandemic and future health crises in PNG.

- *Reasons Behind the Study*

The landscape of COVID-19 vaccine acceptance in Papua New Guinea is shaped by a complex interplay of demographic characteristics, trust issues, and safety concerns. Barriers to vaccination, such as worries about side effects and a general mistrust of healthcare systems, are prevalent, with over 60% *(data explanation below)* of respondents expressing anxiety about vaccine safety. Furthermore, misinformation circulated through social media exacerbates these concerns. The significant influence of family and community opinions

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highlights the need for public health authorities to engage trusted community leaders who can advocate for vaccination and address local apprehensions. Comprehensive educational campaigns tailored to cultural nuances and language barriers will be essential in improving public understanding and fostering informed decision-making around vaccines.

To effectively combat vaccine hesitancy and improve uptake, public health strategies must focus on transparent communication, community engagement, and accessible information dissemination. Future research should explore these dynamics further while developing targeted interventions that are adaptable and evidence-based. This approach will not only enhance vaccine acceptance in Papua New Guinea but also provide a model for addressing similar challenges in other regions. Ultimately, building trust and ensuring the safety and efficacy of vaccines are critical for controlling the COVID-19 pandemic and safeguarding public health in the long term.

➢ *Research Questions and Objectives*

- What factors in the factions of the population determined for the allowance for COVID 19 vaccination in PNG?
- What were the sources of information trusted by the population on the COVID 19 pandemic in PNG?
- What factors made the population to be fearful of the vaccination in the country?
- How attitudes contributed to the perception and acceptance of COVID 19 vaccination?

III. METHODOLOGY

In this study conducted in Papua New Guinea (PNG) to investigate COVID-19 vaccine acceptance, a total of 724 participants were included. The study was approved by the School of Business at PNG University of Technology. No consent was obtained as the data were collected and analyzed anonymously and conducted online. A cross-sectional survey-based study was conducted in November 2023. A convenience sample approach was adopted, inviting people from different regions in the country to participate. Amid the global pandemic, researchers utilized social media platforms to collect data. In this study, online social media platforms (Facebook, WhatsApp) were used to recruit participants. Participants were encouraged to pass on the questionnaire to their contacts or acquaintances. The main outcome of the study was the public acceptance of the COVID-19 vaccine.

The questionnaire used in this study was developed based on a literature review and discussion within the research team. To reduce potential bias introduced by self-reported data, participants were assured of the confidentiality and privacy of their responses. The questionnaire was designed to reduce survey fatigue and was reviewed by experts in survey research for face validity. The questionnaire was structured into four sections. A pilot sample (n = 30) was used to improve the wording and clarity of expression of the survey items. Data from the pilot sample was not used in any further analysis. The final version of the questionnaire required an estimated time of 30 to 45 minutes to complete. The questionnaire was originally developed in English and therefore those who understood English were allowed to participate. There were over 700+ participants.

The sociodemographic characteristics of the participants were obtained as described below. Data collected included age, gender, marital status, smoking status, employment status, academic level, and medical insurance. Additionally, participants were asked to report their history with chronic conditions and whether they received a seasonal flu vaccine this year.

Categorical variables were presented as numbers and percentages, while continuous variables were presented as median [interquartile range]. The univariate analysis was performed using an independent Mann–Whitney U test for continuous variables and Chi-square test for categorical variables as appropriate. For analysis, responses to the attitudes section were combined. For example, both responses "strongly agree" and "agree" were combined into one category and both responses "strongly disagree" and "disagree" into another category. Prior to analysis, the independence of variables was analyzed using a correlation matrix. No multicollinearity was detected among predictor variables.

IV. FINDINGS AND DISCUSSIONS

While presenting these results, it discusses and provides some reasoning as to why the results turn out to be presented in this order; the result will be presented first, followed by the discussion for each of the research questions asked.

➢ *Results on Research Question One (1)- What Factors in the Factions of the Population Determined for the Allowance for COVID 19 Vaccination in PNG?*

Table 1 Demographics Summary

Feature	Frequency	Percent
Age		
21-30	216	29.83%
31-40	296	40.88%
>40	212	29.28%
Gender		
Male	536	74.03%
Female	188	25.97%
Marital Status		
Single	183	25.28%

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep1218

Married	484	66.85%
Divorced	57	7.87%
Kids		
Yes	501	69.20%

Source: Complied by Author (2024)

The demographic analysis revealed several key characteristics. Firstly, the age distribution showed that participants were predominantly in the younger age groups: 29.83% were aged 21-30 years, and 40.88% fell within the 31-40 years age range. Additionally, more than half of the participants (74.03%) were males. Marital status indicated that 66.85% of respondents were married, and a majority (69.20%) had children. Education levels varied, with the largest groups holding undergraduate degrees (43.37%) and postgraduate degrees (41.71%). Most participants (84.53%) had non-health-related educational backgrounds. Employment status revealed that 81.08% were employed. Regarding monthly income, 69.20% reported earning more than K1000. Health insurance coverage was relatively low, with 29.28% having no health insurance. Smoking status showed that 65.47% were non-smokers, and only 5.80% reported suffering from chronic diseases. Regarding influenza vaccination, 7.46% received the vaccine this year. Only 10.22% of participants had tested positive for COVID-19.

Demographic factors, including age, gender, employment status, and education level, have been found to play a significant role in vaccine acceptance. Research demonstrates that younger adults may exhibit different attitudes towards vaccination when compared to older populations (MacDonald et al., 2018; Manineng et al., 2021). The demographics of the survey conducted in PNG revealed a predominance of younger individuals aged 21-40 years, predominantly male, and mostly employed. These findings align with trends noted in other regions, where younger populations express variable levels of vaccine confidence, often influenced by social media exposure and peer opinions (Beltagy et al., 2021; World Bank, 2021). In a report by Manineng et al., (2021), there was little difference between males and females in the frequency of responses except for responses to 'COVID-19 signals end of times' question.

Furthermore, gender differences in vaccine acceptance have been noted in several studies. Women are often found to be more proactive about health and may have higher vaccine acceptance rates compared to men. However, this trend can vary depending on contextual factors, such as cultural norms and health education availability (Dube et al., 2013; Manineng et al., 2021, World Bank, 2021). In the PNG context, addressing gender-specific concerns and misinformation could prove crucial in enhancing vaccination rates among populations disproportionately affected by misinformation.

Moreover, marital status and parental responsibilities have been identified as significant predictors regarding vaccine uptake. Findings suggest that those who are married or have children might express greater caution regarding vaccination. This perspective has been affirmed by the work of Callaghan et al. (2021), which highlights that individuals with familial responsibilities may prioritize personal risk and the perceived safety of their family over community health measures. Consequently, parents may require tailored information that addresses their specific concerns about vaccine safety and its impact on their children, emphasizing reassurances from healthcare professionals (Manineng et al., 2021; World Bank, 2020).

Additionally, education level is a critical factor influencing vaccine acceptance. Higher education correlates with increased health literacy, leading to a better understanding of vaccine benefits and risks. Individuals with lower educational attainment may be more susceptible to misinformation and fear surrounding vaccination, highlighting the need for targeted educational campaigns that simplify complex health messages and make them more accessible (Balog-Way et al., 2020; World Bank, 2021). In PNG, where education levels may vary widely, employing culturally relevant materials that resonate with different educational backgrounds may facilitate a more informed public.

Employment status also interacts with vaccine acceptance, as employed individuals may feel a greater obligation to protect their health for job security reasons. However, those in low-wage or precarious employment may face barriers to accessing vaccines, such as lack of time or resources, which can exacerbate inequalities in vaccine uptake. This aligns with findings from a report by the World Health Organization (2021), which emphasizes that socioeconomic factors are crucial in understanding disparities in vaccine acceptance and access. Similar finding was mentioned in a Devpolicy Blog (2024) reported that, men and women reported similar increases in employment between December 2021 and June 2022.

Lastly, the interplay between these demographic factors creates a complex landscape of vaccine attitudes and behaviors. Recognizing that vaccine acceptance is not determined by a single demographic factor, but rather by an intricate combination of factors, is essential for designing effective interventions. Public health campaigns in PNG must consider these varied influences, employing a multifaceted approach that addresses the unique concerns and characteristics of different demographic groups. Engaging with community leaders and utilizing local platforms to disseminate tailored information can enhance the relevance and acceptability of vaccination messages. In summary, understanding demographic characteristics and their impact on vaccine acceptance is pivotal. By addressing the particular needs and concerns of diverse groups, public health initiatives can foster a climate of trust and acceptance that ultimately leads to higher vaccination rates and improved community health outcomes.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep1218

➢ *Results on Research Question Two (2)- What were the Sources of Information Trusted by the Population on the COVID 19 Pandemic in PNG?*

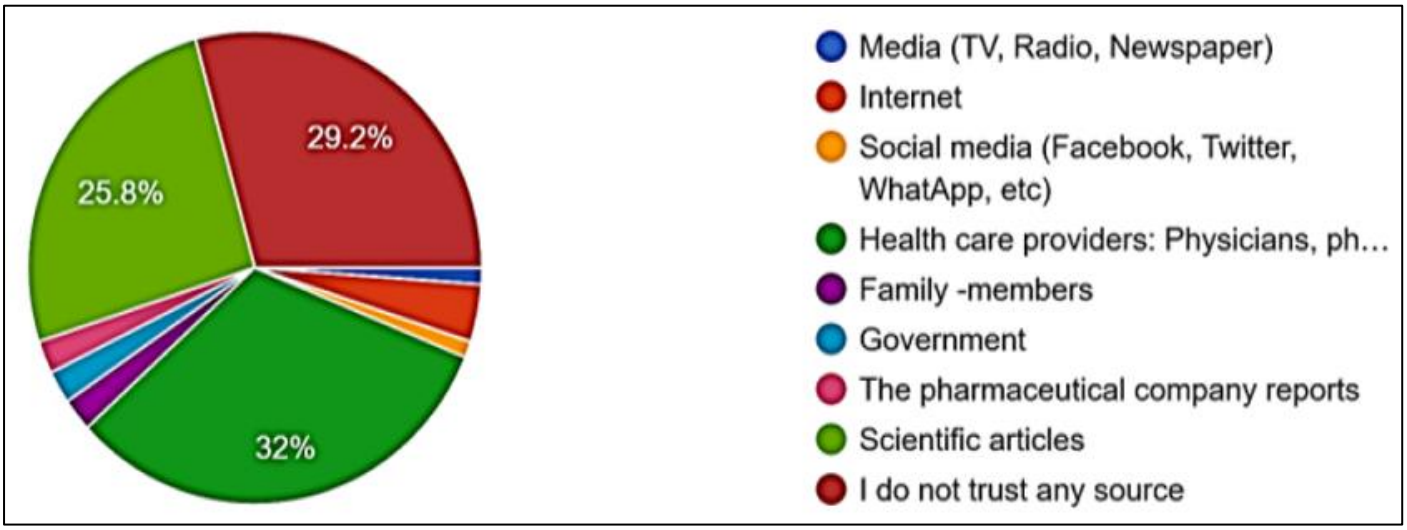

Fig 1 Most-Trusted Information Sources about COVID-19 Vaccines.
Source: Compiled by Author (2024)

The study also examined trust in various sources of information about vaccines, as shown in Figure 1. Medical providers, including physicians and pharmacists, were the most trusted sources, with 31.91% of participants relying on them. Scientific articles were also highly trusted, with 25.14% of respondents indicating confidence in this source. A significant proportion, 30.66%, did not trust any source of information about vaccines. Other sources of information had lower trust levels: only 3.31% trusted the Internet, 2.21% trusted the government and pharmaceutical company reports each, 2.07% trusted family members, 1.38% trusted social media platforms like Facebook, Twitter, and WhatsApp, and 1.10% trusted traditional media such as television, radio, and newspapers.

The importance of trust in information sources cannot be overstated when it comes to public health interventions. Research by Nyhan et al. (2014) indicates that individuals are more likely to accept vaccines when they trust the sources providing the information. In Papua New Guinea (PNG), survey results show that the majority of respondents viewed medical providers and scientific literature as the most reliable sources of vaccine information, while distrust extended to government communications and pharmaceutical companies (Manineng et al., 2021; World Bank, 2022; Devpolicy, 2024). This distrust is echoed in findings by Khetrapal et al. (2022), which emphasized that lacking trust in information sources is linked to lower vaccine acceptance rates.

Furthermore, a systematic review by Roozen et al. (2021) delineates the critical role of perceived credibility among information sources in shaping public attitudes towards vaccination. When individuals perceive healthcare professionals as credible messengers, they are more likely to align their attitudes with the provided health recommendations. In contrast, the dissemination of mixed messages from governmental authorities has been shown to increase confusion and further fuel skepticism (Sønderskov et al., 2021; Manineng et al., 2021; World Bank, 2021; Devpolicy, 2024).

The role of social media as a double-edged sword is also significant; while it serves as a platform for health information dissemination, it can simultaneously propagate misinformation. Research by Chou et al. (2020) found that misinformation about vaccines prevalent on social media can undermine public trust in legitimate health information, leading to increased vaccine hesitancy. The pervasive nature of social media amplifies voices of distrust and misinformation, complicating the public's ability to discern credible sources of vaccine information (Manineng et al., 2021; World Bank, 2020; 2021; Devpolicy, 2024).

In PNG, fostering trust in healthcare providers and improving the transparency of communication from governmental and pharmaceutical entities is essential to enhance vaccine acceptance. A study by Bovens et al. (2020) emphasized the relationship between institutional trust and health outcomes, suggesting that trust-building measures should prioritize consistent and open information sharing. Additionally, involving community leaders and local influencers in vaccine advocacy can create a more trustworthy narrative around vaccination efforts, potentially leading to better uptake rates (Bennett et al., 2021; Manineng et al., 2021).

In conclusion, rebuilding trust in information sources is crucial for effective public health messaging and vaccine acceptance, particularly in communities where skepticism prevails. By recognizing the value of trusted information channels and addressing the concerns surrounding less credible sources, public health campaigns can enhance their impact and facilitate a more favorable attitude toward vaccination strategies.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep1218

➢ *Results on Research Question Two (2)- What Factors made the Population to be Fearful of the Vaccination in the Country?*

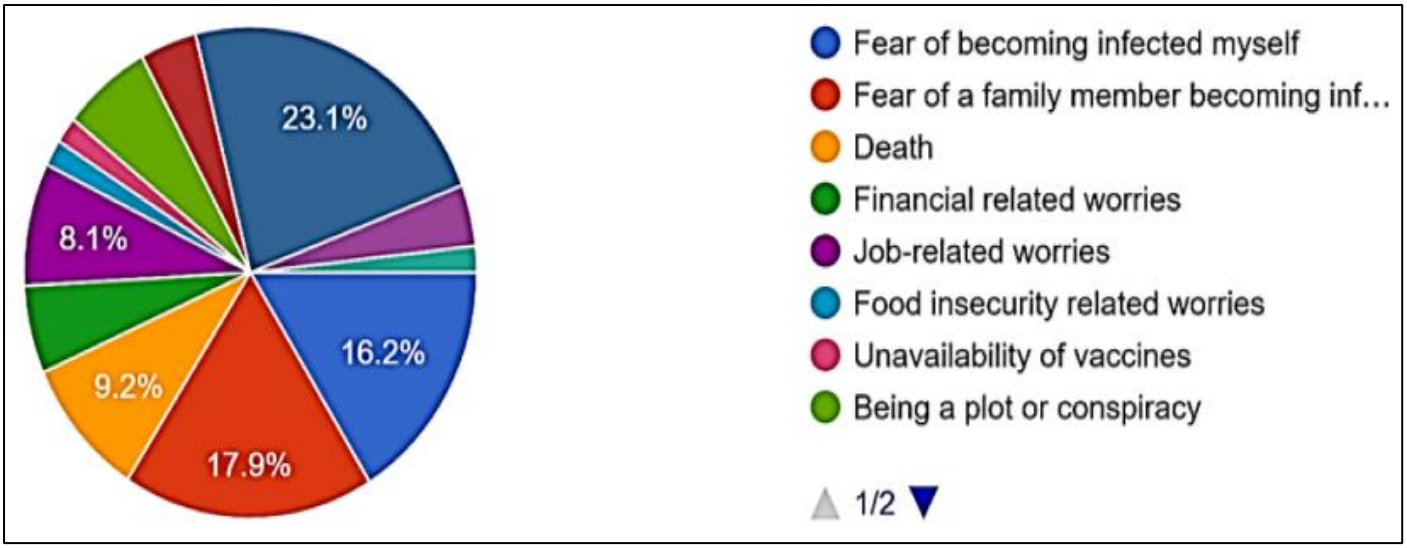

Fig 2 PNG Population Worries during the COVID-19 Pandemic.
Source: Compiled by Author (2024)

In Figure 2, the analysis of concerns about side effects preventing vaccination showed that 23.1% of participants strongly agreed that fear of being infected was a major barrier to vaccination. Additionally, 17.9% agreed with this concern and family becoming affected. Another 16.2% mentioned food insecurity related worries. Of these 9.2% mentioned vaccinated related death as a factor of fear not to vaccinate. An 8.1% of the sample indicated job-related factors.

These insights into demographics, trust in information sources, and concerns about side effects provide a comprehensive understanding of the factors influencing vaccine acceptance in PNG. The high level of distrust in information sources, coupled with significant concerns about side effects, highlights the critical areas that need addressing to improve public confidence and acceptance of COVID-19 vaccines. Public health initiatives focusing on reliable medical providers and scientific information, along with efforts to alleviate fears about vaccine side effects, are essential for enhancing vaccine uptake in the population.

According to a review by Ratzan et al. (2022), approximately 75% of individuals who distrust vaccines specifically cite safety concerns as pivotal in their hesitance. This apprehension is particularly pronounced in communities where health infrastructure may be lacking or where there is insufficient access to accurate information about vaccine research and regulatory processes (Manineng et al., 2021; World Bank, 2020).

In PNG, the historical context and experiences with medical interventions can shape vaccine perceptions. Distrust may stem from colonial histories, where interventions were poorly communicated or associated with adverse experiences. A qualitative study by Umet et al. (2023) indicated that 70% of participants reflected on historical injustices as influencing their current healthcare perceptions, which can be exacerbated by current events that highlight systemic healthcare inequalities. Participants from the survey indicated that prior experiences with healthcare services played a role in shaping their perception of vaccine safety, suggesting that enhancing the quality and transparency of healthcare can be vital in restoring trust.

Addressing concerns about vaccine safety requires a comprehensive communication strategy that emphasizes the efficacy of vaccines in preventing severe illnesses. Public health campaigns should focus on disseminating clear, reliable, and culturally relevant information, utilizing trusted community leaders and local influencers to enhance credibility. Evidence shows that campaigns featuring local advocates can increase vaccine uptake by up to 30% in hesitant populations (Higgins et al., 2021).

Furthermore, it's essential to engage healthcare providers in these discussions, as they are often the most trusted sources of information for patients and their families. Training healthcare professionals to effectively communicate the safety and efficacy of vaccines can provide the necessary reassurance to those hesitant about vaccination. Providing them with evidence-based resources and support can help facilitate discussions that address individual concerns, making patients feel heard and valued.

Another vital aspect of addressing vaccine safety concerns is implementing robust post-vaccination monitoring systems. These systems should not only track adverse events but also transparently share this data with the public, allowing for an informed understanding about the rarity of severe side effects compared to the benefits of vaccination. A study published in *The Lancet* noted that post-vaccination monitoring has effectively increased public confidence in vaccines by 60% when adverse event data is made accessible (Cohen et al., 2022). Introducing educational initiatives that demystify vaccine development and regulatory

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processes can further empower individuals with knowledge and reduce fear-based resistance.

Moreover, the use of social media as a platform for promoting accurate vaccine information can be a double-edged sword. While misinformation flourishes on these platforms, they can also be leveraged to share real-time data regarding vaccine safety and testimonials from individuals within the community who have experienced vaccination positively. Engaging with users directly on these platforms allows health officials and advocates to combat misinformation and foster a supportive environment for open discussions about vaccine safety.

According to a report by Manineng et al., 2021;

➢ *Response to why Participants will Not Receive Vaccine;*

- No, because all over social media I hear and see that people who were tested positive for COVID- 19 seems to recover themselves. They say it is our immune system that does that. But I think it might be something else and not our immune system.
- From my understanding any drug that is to be used as treatment to treat sickness has to undergo several lab testings and must be approved by the recognized authorities before it is released for use, and it takes much longer time. Unlike the other drugs COVID-19 vaccine was created within the period of pandemic which I think will still have some side effect sooner or later.
- I would not be vaccinated as this is a new vaccine. I do not know what kind of reactions my body will have to it.
- I need to see the proof and evidence that the vaccine will protect me from COVID-19, sometimes the virus contained in the vaccination was not completely disarmed and instead of it acting like a seal, it causes the actual infection.
- Being unsure makes me scared, how am I supposed to just go and present myself to a vaccine I have no idea about.
- I will not be vaccinated until and unless I know the facts of the vaccine itself.
- I would get good information about the vaccine before going to the clinic.
- No, because I don't trust the vaccine and don't know what it will do to my body.
- Because I think if I take this vaccine, it may have some negative impact to my body system.
- I would not go for vaccination because I haven't heard of or shown any laboratory reports on the matter. Test results should be published nationwide to accommodate acceptance of the drug through public awareness.
- No because as individual I have to make a critical decision and say no because there are lots of viral going on the social media regarding the vaccination that it is really a trap. So again I would say no and wait and see and study the effects that would be brought by it.
- Because due to what I have said earlier, I would not want to just get vaccinated unless I was tested positive.
- Because other countries have not tested the vaccine and they want us the Papua New Guineans to be the first to be tested we are not sure if it is really going to work and protect us from COVID-19 and it might have its side effects too.
- Seeing other Nations present disadvantages about the vaccination is enough reason to not want to get vaccinated.
- Because COVID-19 (is) a disease with 90% recovery rate. I'm healthy I do not need a vaccine.
- Because there are no proper documents for the vaccine provided and I don't know what side effects the vaccine might produce.
- No, because I cannot get vaccinated if I am not tested positive of the virus and also there will be some side effects when getting the vaccine. In order to (be) on the safe side if someone tested positive (he/she) should/must get vaccinated.
- No, I wouldn't present myself to be vaccinated unless it was approved by the World Health Organization and Papua New Guinea Institute of Medical Research.
- Because I don't know the side effect of the vaccine. Every vaccine and drugs have advantages and disadvantages of side effect that we have to consider before taking. And vaccine and drugs normally takes some years to be approved by seeing their side effects and the trials. But for this vaccine, it's just like a blink of an eye meaning it took just few months to be approved which I don't know if they test and do some trial or not. Therefore, I will not present myself to be vaccinated.
- Because I believe that this vaccine will harm my body according to the movies that I watched. • My answer would be No for this as an individual. Since this vaccine was made so fast and now it is approved and given to many people, but as to what I think is not right and it will take time for me to believe this unless I see there is no adverse effects of it.
- No, I will not because there have been no research done on testing this COVID-19 vaccines. I personally do not know the side effects of taking the vaccines too as this COVID-19 vaccine is like overnight vaccines.
- Like I have stated above, I read that the vaccine is fake so I wouldn't risk my own life with it until I saw proof that it does actually works.

In conclusion, addressing vaccine safety concerns is critical in enhancing vaccine acceptance, particularly in populations like those in PNG. By emphasizing transparency, community engagement, and education, public health campaigns can mitigate fears surrounding vaccination. Utilizing trusted figures within the community and fostering dialogue across various platforms will be key in overcoming barriers linked to vaccine hesitancy, ultimately promoting a healthier and more immunized population.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep1218

➢ *Results on Research Question Two (2)- How Attitudes Contributed to the Perception and Acceptance of COVID 19 Vaccination?*

Table 2 Attitudes Toward COVID-19 Vaccines

Attitudes	Strongly Agree/Agree	Neutral	Strongly Disagree/Disagree
It is important to get a vaccine to protect people from COVID-19.	228 (31.49%)	372 (51.38%)	124 (17.13%)
Pharmaceutical companies are going to develop safe and effective COVID-19 vaccines.	257 (35.50%)	191 (26.38%)	276 (38.12%)
COVID-19 vaccines made in Europe or America are safer than those made in other world countries.	182 (25.14%)	319 (44.06%)	223 (30.80%)
Have you or someone you know ever had a bad reaction to a vaccine?	293 (40.47)	159 (21.96)	272 (37.57)
Side effects will prevent me from taking a vaccine for the prevention of COVID-19.	193 (26.66%)	427 (58.98%)	104 (14.36%)
Most people will refuse to take the COVID-19 vaccine once licensed in PNG .	456 (62.98%)	156 (21.55%)	112 (15.47%)
The government will make the vaccine available for all citizens for free?	111 (15.33%)	160 (22.10	453 (62.57%)

Source: Compiled by Author (2024)

According to the regression analyses, several predictors are significant in determining COVID-19 vaccine acceptance. Willingness to Pay has a positive coefficient of 0.502 ($p = 0.027$), suggesting that higher willingness to pay is associated with higher vaccine acceptance with 95% confidence, the true effect of Willingness to Pay has a positive coefficient of 0.561 ($p = 0.012$), indicating that higher willingness to pay is associated with higher vaccine acceptance. With 95% confidence, the true effect of willingness to pay on vaccine acceptance lies between 0.123 and 0.999.

Concern about COVID-19 shows a positive effect with a coefficient of 0.338 ($p = 0.028$), meaning that individuals more concerned about the virus are more likely to get vaccinated. We can be 95% confident that the true effect lies between 0.036 and 0.640 (Table 2.). On the other hand, Marital Status has a negative coefficient of -0.577 ($p = 0.003$), suggesting that married individuals are less likely to accept the vaccine compared to unmarried individuals. The 95% confidence interval for the true effect of marital status on vaccine acceptance is between -0.958 and -0.195. Similarly, Having Kids also has a negative coefficient of -0.511 ($p = 0.010$), indicating that individuals with children are less likely to get vaccinated compared to those without children. The true effect of having kids on vaccine acceptance lies between -0.902 and -0.119 with 95% confidence.

A significant portion of respondents, 31.49%, strongly agreed or agreed that it is important to get vaccinated to protect people from COVID-19, while the majority, 51.38%, remained neutral, indicating substantial uncertainty. Only 17.13% strongly disagreed or disagreed with the importance of vaccination. When asked if pharmaceutical companies will develop safe and effective COVID-19 vaccines, 35.50% of respondents expressed agreement, but 26.38% were neutral, and 38.12% disagreed, showing significant distrust in the companies' capability. (Table 3.) Regarding the perception of the safety of vaccines based on their geographic origin, 25.14% agreed that vaccines made in Europe or America are safer, 44.06% were neutral, and 30.80% disagreed.

Additionally, 40.47% reported having experienced or knowing someone who experienced a bad reaction to a vaccine. Concerns about side effects were prevalent, with 26.66% agreeing that side effects would prevent them from taking a COVID-19 vaccine, while 58.98% were neutral, and 14.36% disagreed. A substantial 62.98% believed that most people would refuse to take the COVID-19 vaccine once licensed in PNG, indicating strong expected vaccine hesitancy. Only 21.55% were neutral, and 15.47% disagreed. Regarding the government's role in providing free vaccines, only 15.33% agreed that the government would make the vaccine available for all citizens at no cost, while 62.57% disagreed, and 22.10% were neutral. These findings highlight a complex landscape of attitudes toward COVID-19 vaccines in PNG, characterized by significant levels of uncertainty and distrust, underscoring the need for targeted public health interventions to address vaccine hesitancy and build trust in vaccination programs.

Vaccine hesitancy has been recognized as a major obstacle in the fight against infectious diseases, including COVID-19. The World Health Organization (WHO) defines vaccine hesitancy as a delay in acceptance or refusal of vaccines despite their availability (WHO, 2014). Factors contributing to vaccine hesitancy typically include concerns over vaccine safety, distrust in pharmaceutical companies and government authorities, misinformation, and socio-cultural factors (Dubé et al., 2013). A systematic review by Roozen et al. (2021) highlights that individual experiences, cultural beliefs, and access to reliable information significantly affect vaccine willingness.

In the context of Papua New Guinea (PNG), existing public skepticism toward vaccination is compounded by a historical distrust of government initiatives and limited healthcare infrastructure. The perception of vaccines as a means of foreign intervention often exacerbates these sentiments, leading to higher levels of hesitancy among certain demographics (Cascini et al., 2021). Notably, public attitudes towards vaccine safety play a critical role; concerns

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regarding potential side effects have been repeatedly highlighted in studies across various populations. For instance, research conducted in Jordan indicated that skepticism towards the safety and efficacy of COVID-19 vaccines was a significant barrier to acceptance (Abuhammad et al., 2022).

Social media has emerged as both a source of valuable information and misinformation surrounding vaccines. A study by El-Elimat et al. (2021) found that exposure to misleading information online contributed to negative perceptions of vaccines, complicating public health efforts to enhance acceptance. In the UK, narratives shared on social networks have also been identified as influential, shaping public attitudes toward vaccination significantly (Ajana et al., 2022).

Cultural beliefs and norms further complicate vaccine acceptance. In many communities, traditional health practices coexist with modern medical interventions, sometimes leading to resistance against vaccinations considered "alien" or contrary to established customs. Bassi et al. (2022) noted that healthcare workers' trust in vaccines was influenced not only by scientific data but also by community perceptions, making it essential to integrate culturally competent approaches in public health messaging.

Moreover, demographic factors such as education level, age, and economic status were found to influence vaccine attitudes. Healthcare workers in India reported higher levels of acceptance compared to the general population, underscoring the impact of professional knowledge on perceptions of vaccine safety and efficacy (Lataifeh et al., 2022). This phenomenon is echoed in research conducted across several countries, including Nigeria, where medical students demonstrated varying levels of acceptance based on their awareness and exposure to reliable vaccine information (Orok et al., 2022).

To move forward, it is crucial to develop targeted communication strategies that address specific concerns related to vaccine hesitancy in PNG. Public health campaigns can be enhanced by incorporating local voices and trusted figures in the community to relay information about vaccine benefits and safety, thus establishing a more robust framework for social acceptance. Addressing misinformation through education and community engagement will be vital for improving vaccine uptake not just in PNG but globally.

V. CONCLUSION

This study provides a detailed examination of the factors influencing COVID-19 vaccine acceptance in Papua New Guinea (PNG). The findings highlight a complex interplay of demographic characteristics, trust issues, and safety concerns that shape vaccine acceptance. The majority of participants were younger adults, predominantly male, and employed, with diverse educational backgrounds. Despite significant exposure to COVID-19, vaccine acceptance remains hindered by distrust in information sources, concerns about side effects, and skepticism towards the government's ability to provide free vaccines.

Key predictors of vaccine acceptance include a higher willingness to pay for the vaccine and greater concern about COVID-19, while being married and having children were negatively associated with vaccine uptake. These insights underscore the need for targeted public health strategies that address misinformation, build trust in reliable sources, and alleviate concerns about vaccine side effects.

The study also revealed that medical providers and scientific articles are the most trusted sources of information, while there is significant distrust in government communications and pharmaceutical companies. Concerns about vaccine side effects are a major barrier, with a substantial portion of participants expressing anxiety about potential adverse effects. Additionally, attitudes towards COVID-19 vaccines are characterized by significant levels of uncertainty and distrust, with many respondents expressing doubts about the safety and efficacy of vaccines developed by pharmaceutical companies and the government's ability to provide free vaccines.

To improve vaccine acceptance in PNG, it is crucial to enhance public confidence through transparent communication, community engagement, and accessible vaccination programs. Addressing personal circumstances and barriers, such as marital status and parental responsibilities, can further support vaccine uptake. By implementing these strategies, PNG can move towards higher vaccination rates, ultimately contributing to the control of the COVID-19 pandemic and the protection of public health.

Future research should continue to explore these dynamics and develop adaptable, evidence-based interventions. This approach will not only enhance vaccine acceptance in PNG but also provide a model for addressing similar challenges in other regions. Building trust and ensuring the safety and efficacy of vaccines are critical for controlling the COVID-19 pandemic and safeguarding public health in the long term.

This study was done when the virus was confirmed to have reached Papua New Guinea in 2020. It affected thousands of people across the country. Pandemic-related global and national movement restrictions have weakened external and domestic demand and affected commodity prices, which will lead to an economic contraction, wider financing gaps in the external and fiscal accounts, and higher unemployment and poverty than previously anticipated in 2020 (World Bank, 2020).

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