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Exploring key determinants of COVID-19 vaccine hesitancy among individuals: An exploratory study globally.

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Abstract

SARS-CoV-2 virus gave rise to COVID-19 in late 2019 in Wuhan, China, and it quickly spread over the world to become a pandemic. The virus, which is mostly carried by respiratory droplets, spread at an unprecedented rate, causing a large number of deaths and extensive illness, necessitating lockdowns, travel bans, and social distancing policies by governments across the globe in an attempt to stop the spread, which severely disrupted daily life, the healthcare system, and economies.COVID-19 vaccines are biological materials designed to offer protection against the organism that causes the COVID-19 pandemic, SARS-CoV-2 virus, played a crucial role in stopping the virus's spread and lowering the burden on healthcare systems around the globe. Although Covid-19 vaccines offers benefits which includes the prevention of severe illness and death through the reduction of the chance of COVID-19-related serious illness, hospital stays, and death, it was met with hesitancy by some population on the basis of a complex web of interrelated causes, such as political division, misinformation, socioeconomic inequities, and past mistrust of healthcare systems.Vaccine hesitancy contributed to lower-than-expected vaccination coverage in many regions, preventing the achievement of herd immunity and allowing the virus to continue spreading. Exploring this key determinants of Covid-19 vaccine hesitancy among individuals all over the world and possible solutions, is the focus of this research.

Keywords: COVID-19; Determinant; Vaccine hesitancy; Exploration; Global

1. Introduction

The SARS-CoV-2 virus gave rise to COVID-19 in late 2019 in Wuhan, China, and it quickly spread over the world to become a pandemic [1, 2]. The virus, which is mostly carried by respiratory droplets, spread at an unprecedented rate, causing a large number of deaths and extensive illness [3, 4]. Lockdowns, travel bans, and social distancing policies were imposed by governments across the globe in an attempt to stop the spread, which severely disrupted daily life, the healthcare system, and economies [5, 6].

As a result of quick access to vaccines and treatment by developed nations more than underdeveloped and developing countries, the epidemic brought attention to global inequities [7]. A major turning point was the rapid production and distribution of vaccines, particularly those based on mRNA technology, which allowed several nations to start reopening [8, 9]. Even among highly vaccinated individuals, there were increases in cases due to persistent problems posed by the introduction of novel variations like Omicron and Delta [10, 11]. Additionally, COVID-19 hastened improvements in healthcare delivery, including telemedicine, digitalization, and remote work [12, 13, 14]. In 2024, the virus is still a major public health problem even if vaccination and innate immunity have reduced the pandemic's immediate threat [15]. The world saw a significant transformation as a result of its enduring effects on global economy, healthcare, and

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society. This study is aimed at exploring the key determinants of Covid-19 vaccine hesitancy among individuals all over the world.

1.1. Covid-19 Vaccines

According to the Centers for Disease Control and Prevention (CDC) [16], COVID-19 vaccines are biological materials designed to offer protection against the organism that causes the COVID-19 pandemic, SARS-CoV-2 virus. Vaccines function by igniting the immune system to identify and fight the virus, averting serious disease, hospital stays, and even death [17]. These vaccines have played a crucial role in stopping the virus's spread and lowering the burden on healthcare systems around the globe.

1.1.1. Types of COVID-19 Vaccines

Different technologies have been employed in the development of multiple COVID-19 vaccine types [18]. Some of the known vaccines includes: mRNA Vaccinessuch as Pfizer-BioNTech (Comirnaty) and Moderna (Spikevax) [19].Messenger RNA is used in mRNA vaccines to direct cells to make a protein that resembles the spike protein on the surface of the SARS-CoV-2 virus [17,20]. By inducing an immunological response, this protein gets the body ready to combat the virus itself.Viral vector vaccines such as Johnson & Johnson (Janssen) and AstraZeneca (Vaxzevria) is yet another COVID-19 vaccine [21]. For viral vector vaccines, the genetic material of the SARS-CoV-2 virus is delivered into cells by these vaccinations using a modified version of a different virus, not SARS-CoV-2 [21]. This substance gives cells the go-ahead to make the spike protein, which starts an immunological reaction. There is also vaccines with protein subunits such as Novavax (Nuvaxovid) [22]. Novavax functions by utilizing inert fragments of the SARS-CoV-2 virus, typically the spike protein - protein subunit vaccines elicit an immune response without utilizing the virus's active components [23]. Finally, there is inactivated or live-attenuated vaccines which includes; Sinopharm and Sinovac (CoronaVac) [24]. In this type of vaccines, the viruses used are made incapable of causing illness by being destroyed or rendered weaker. These inactivated or weakened viruses elicit the same immunological response from the body as they would from a live virus.

1.1.2. Benefits of COVID-19 Vaccine

The COVID-19 vaccines hold numerous benefits. Some of the advantages Covid-19 vaccines offers includes the prevention of severe illness and death through the reduction of the chance of COVID-19-related serious illness, hospital stays, and death [26]. According to the World Health Organization (WHO) [27, 28], vaccines create what is known as herd immunity by limiting the virus's overall spread and shielding individuals who cannot receive vaccinations. Furthermore, vaccination initiatives have played a pivotal role in permitting the secure resumption of economic activities, so enabling enterprises to function and communities to revert to a reasonably normal state [29].

1.1.3. Limitations of COVID-19 Vaccination

Despite the advantages COVID-19 vaccinations provide, they without exception have some drawbacks also. Some of the drawbacks that have been noted are side effects of the vaccines, immunization performance against variants, booster specifications, vaccine hesitation, population-specific efficacy, duration of protection, access and equity, and exclusion criteria [30, 31, 32].Although severe reactions are uncommon, some people report mild side effects like as fever, exhaustion, and discomfort at the injection site, as well as more serious ones like myocarditis and anaphylaxis. Also, variants like as Delta and Omicron have emerged, indicating that vaccine efficacy against some strains may be compromised, especially when it comes to preventing mild to moderate disease [33].Booster doses may be required to maintain protection, particularly against novel variations, as the immunity that the vaccinations offer may fade with time [34, 35]. Furthermore, in certain communities, vaccine hesitation has been caused by misinformation and mistrust, which has reduced the efficacy of immunization initiatives [36].

1.1.4. Global Distribution of COVID-19 Vaccines

The distribution of COVID-19 vaccinations has brought to light important disparities around the world [37].According to several reports, early in the epidemic; high-income nations were able to obtain a lot of vaccines, frequently at the expense of low- and middle-income nations. Global immunization rates are uneven as a result of this discrepancy [38,39].To address the disparity challenge guarantee that all nations have equitable access to vaccines, the COVAX Initiative the COVAX program was created [40, 41]. Problems with distribution and shortages in supplies have remained in spite of these attempts [42].Cold chain specifications was yet another barrier which hampered even distribution of vaccines across the globe. Certain vaccinations, especially those containing mRNA, necessitate extremely cold storage, which makes distribution challenging in areas with inadequate infrastructure [43]. Logistical difficulties such as

manufacturing snags, transportation problems, and political obstacles have all been implicated as barriers in the distribution of vaccines [44].

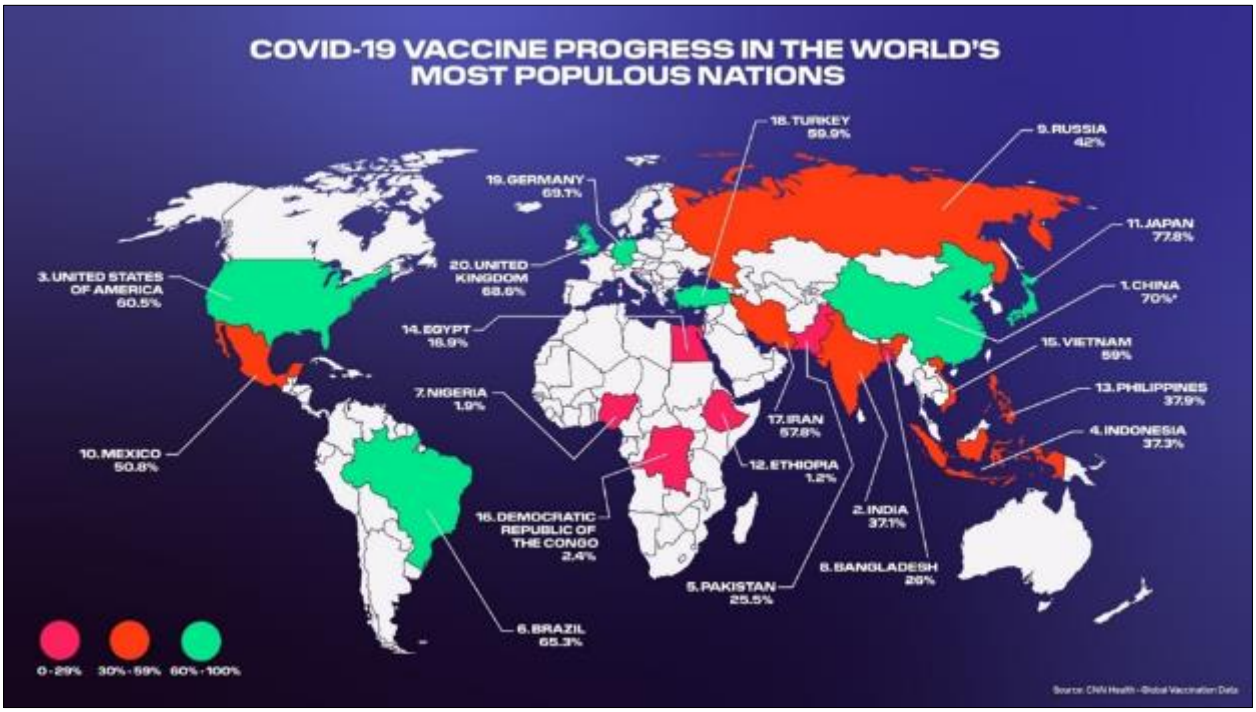

Figure 1 Covid-19 vaccine tracking among most populous nations of the world as of 2021 [67]

1.2. Global Vaccine Hesitancy

According to the CDC [45], one of the biggest obstacles in the fight against the COVID-19 pandemic is the reluctance of people globally to get the COVID-19 vaccine. Hesitancy to accept these vaccines has hindered efforts to obtain broad immunity, prolonging the epidemic and complicated public health efforts, despite the unparalleled speed and success in creating effective vaccines. A complex web of interrelated causes, such as political division, misinformation, socioeconomic inequities, and past mistrust of healthcare systems, all contribute to COVID-19 vaccination reluctance [46, 47]. In order to increase vaccination rates and eventually stop the virus from spreading, it is essential to recognize and take action against these variables.

1.2.1. The Scale of COVID-19 Vaccine Hesitancy

The degree of vaccine reluctance for COVID-19 varies greatly throughout cultures, nations, and geographical areas. Whereas some nations have succeeded in attaining high vaccination rates, others have had difficulties due to sizable segments of their populace refusing or postponing immunization. Studies and surveys have revealed that vaccine acceptance rates vary greatly, depending on a range of characteristics including socioeconomic position, political affiliations, cultural beliefs, and geographic location [48]. For instance, in nations like the United States, communities with a history of mistrusting the government and medical institutions, as well as some political and religious organizations, have shown a particularly marked reluctance to receive vaccinations [46, 49]. On the other hand, vaccine hesitation has been reported in several Asian and African nations because of disinformation propagated via social media, logistical issues with vaccine distribution, and worries about vaccine safety [50].

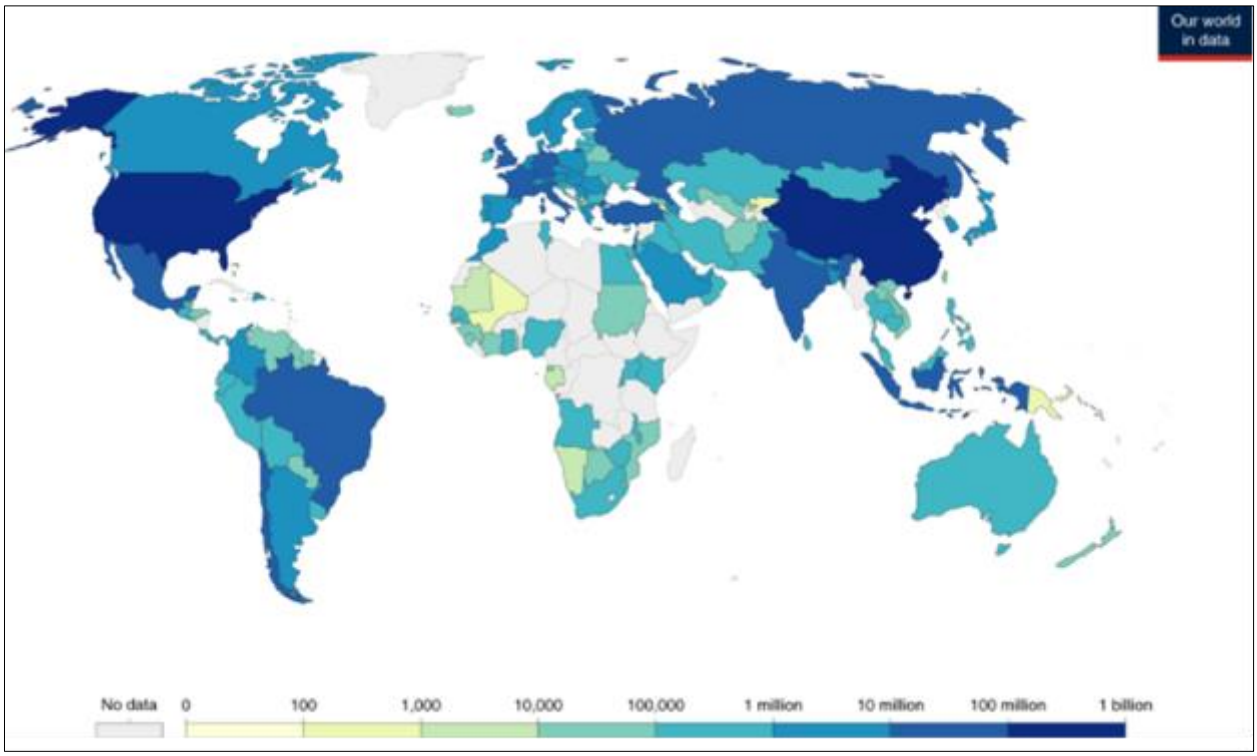

Figure 2 Estimated doses of the COVID-19 vaccine given as of April 7, 2021 based on countries [68]

1.3. Factors Contributing to Global COVID-19 Vaccine Hesitancy

1.3.1. Misinformation and Disinformation

The public's impression of COVID-19 vaccinations has been significantly shaped by misinformation and disinformation. There are growing concerns regarding the safety, effectiveness, and possible side effects of vaccines due to the quick dissemination of misleading information on social media and other digital platforms. According to Benoit & Mauldin [51], myths that are frequently spread include the ideas that COVID-19 vaccinations change DNA, induce infertility, or incorporate microchips for government monitoring. Widespread vaccine hesitation has been worsened by these lies, which are frequently promoted by conspiracy theorists and anti-vaccine organizations.

1.3.2. Mistrust in Government and Healthcare Institutions

Vaccine reluctance was also made worse by past mistrust of the government and medical establishments, especially in underprivileged and minority populations [52]. This suspicion can occasionally have its origins in prior instances of medical exploitation, prejudice, and neglect. For instance, the Tuskegee Syphilis Study's legacy, in which African American males were not treated for syphilis without giving their informed consent, continues to shape Black community perceptions against vaccinations in the United States [47]. Indigenous communities around the globe have also shown reluctance because of a protracted history of marginalization and abuse at the hands of the state and medical establishments.

1.3.3. Political Polarization

A study by Dolman et al. [53] showed that COVID-19 vaccine hesitation has been significantly influenced by political polarization, especially in nations where political identification and vaccine uptake have become entwined. In the United States, for example, vaccination rates have frequently been lower among Republicans and in states with a conservative bent [53]. Political leaders and media personalities who have downplayed the significance of vaccines, questioned the severity of the epidemic, or supported experimental cures have all contributed to this divide.

1.3.4. Cultural and Religious Beliefs

Hesitancy to the COVID-19 vaccine has also been impacted by cultural and religious views. According to Fieselmann et al., [46], vaccines are viewed in some societies as unnatural or unneeded interventions that go against religion or traditional health beliefs. Furthermore, Zimmerman [54] noted that, certain religious organizations have expressed

reluctance due to worries about the chemicals in vaccinations, such as the use of fetal cell lines in vaccine research or the presence of gelatin derived from pig. In an attempt to address these issues, vaccination formulations that comply with religious dietary requirements have been developed, as well as outreach to religious leaders.

1.3.5. Concerns about Vaccine Safety and Efficacy

According to the research by Roy et al. [49], one of the main causes of vaccine reluctance has been worries regarding the effectiveness and safety of COVID-19 vaccinations. Though a scientific victory, the COVID-19 vaccine's quick development and approval for emergency use have raised concerns among some people about the vaccine's level of testing. Despite the vaccinations' general safety record, reports of uncommon side effects, like blood clots linked to the AstraZeneca and Johnson & Johnson vaccines, have spiked anxieties [55, 56]. A major factor in reluctance has been the general lack of knowledge about risk-benefit analysis and vaccine science among the public.

1.3.6. Socioeconomic and Logistical Barriers

COVID-19 vaccination reluctance has also been influenced by logistical and socioeconomic obstacles, especially in low- and middle-income nations [42]. Lower vaccination rates have been caused in part by underserved or distant communities, limited availability to vaccines, and infrastructure problems in the healthcare system. Sometimes there are obstacles in the way of people getting the vaccine, like having to take time off work, traveling large distances, or vaccine shortages, even though the people are willing to get it.

1.3.7. Impact of COVID-19 Vaccine Hesitancy

With respect to public health and broader response from the society, the impact of COVID-19 vaccine hesitancy has been profound. Some of the notable effects includes; prolonged pandemic and continued spread of the virus, burden on healthcare systems, economic and social disruptions, and widening inequalities.

Vaccine hesitancy has contributed to lower-than-expected vaccination coverage in many regions, preventing the achievement of herd immunity and allowing the virus to continue spreading. This has led to prolonged waves of infection, the emergence of new variants, and ongoing pressure on healthcare systems. Research by Gerreten et al. [57] reveals that in some cases, vaccine hesitancy has directly contributed to outbreaks of COVID-19 in communities where vaccination rates are low. Additionally, the continued spread of COVID-19 due to vaccine hesitancy has placed a significant strain on healthcare systems worldwide. Hospitals and healthcare workers have been overwhelmed by repeated surges in cases, particularly in regions with low vaccination coverage [58]. This strain has had broader consequences, including delays in routine medical care, increased burnout among healthcare workers, and shortages of medical supplies and equipment. Vaccine hesitancy has also contributed to ongoing economic and social disruptions caused by the pandemic. In regions where vaccination rates are low, governments have been forced to implement or maintain public health measures such as lockdowns, travel restrictions, and social distancing, which have had significant economic and social costs [5, 6]. Immunization disparities and reluctance have made the world economy's weak recovery even worse, resulting in extended joblessness, company closures, and interruptions to social services and education. Also, COVID-19 vaccine hesitancy has equally highlighted existing inequities, both within and between countries [7]. In some cases, vaccine hesitancy has been higher among marginalized or vulnerable populations, who are also more likely to suffer the severe consequences of COVID-19 [59]. Additionally, vaccine hesitancy in high-income countries has led to hoarding of vaccine supplies, delaying access to vaccines in low- and middle-income countries and perpetuating global disparities in vaccination coverage.

1.3.8. Addressing COVID-19 Vaccine Hesitancy

Multifaceted strategies are needed in addressing COVID-19 vaccine hesitancy. This approach may include public education, community engagement, policy interventions, and efforts to address broader social and economic barriers.

1.3.9. Public Education and Combating Misinformation

Campaigns for public education are crucial for refuting myths and fostering confidence in COVID-19 vaccinations. These initiatives ought to be transparent, grounded in research, and adapted to the unique requirements and concerns of various groups. A report by the CDC [60] and Berg [61] suggests using straightforward language, giving correct information about the advantages and disadvantages of vaccinations, and dispelling frequent myths and misconceptions are all examples of effective communication techniques. In order to combat the spread of false information, digital methods such as social media platforms can be used to provide reliable data.

1.3.10. Interaction with Reputable Leaders and Communities

Overcoming vaccination reluctance also requires interacting with communities and reliable leaders, especially in groups where there has historically been suspicion of the government and medical establishments. According to Howley [62], healthcare providers, community organizers, and religious leaders can all be very helpful in resolving vaccination-related issues and promoting immunization in their respective areas. Collaborating with local groups and stakeholders through community-based initiatives helps guarantee that vaccination campaigns are tailored to the requirements and needs of various communities.

1.3.11. Interventions and Incentives in Policy

For situations or places where vaccine hesitation is sponsored by complacency or political considerations, policy initiatives, such as vaccination mandates or incentives, can be successful in raising immunization rates. For instance, although some nations have made vaccination requirements for students, healthcare professionals, and other high-risk populations mandatory, others have rewarded vaccination with cash or other benefits [63]. To avoid escalating opposition or fostering anti-vaccine views, these steps must be properly planned and executed.

1.3.12. Overcoming Logistical and Socioeconomic Obstacles

In order to lower vaccine hesitancy and provide fair access to COVID-19 vaccinations, measures to overcome logistical and financial obstacles are also essential. Based on the report of Haeder [64] and Kuehn et al. [65], this approached requires infrastructural investments in the healthcare system, which will in turn make vaccinations inexpensive or free, and ensure that immunization services are accessible and convenient. Outreach initiatives to reach underprivileged or rural communities, such as community-based immunization drives or mobile clinics can be adopted to see that no one is left behind.

1.3.13. Increasing Trust in Government and Healthcare Organizations

Finally, to tackle the underlying causes of vaccination hesitancy, it is imperative that confidence be established in government and healthcare organizations. This necessitates a sustained dedication to accountability, equity, and transparency in public health and healthcare initiatives [66]. Rebuilding trust and promoting broader vaccine acceptability can be accomplished by initiatives to include communities in decision-making processes, rectify historical injustices, and enhance the standard and availability of healthcare services.

Figure 3: Using the five Cs to address vaccine reluctance for COVID-19 [69]

2. Conclusion

Hesitancy towards COVID-19 vaccination has been established to truly exist in this study alongside the underlying causes. It is noteworthy also that solutions and strategies that have been outlined requires the involvement of all stakeholders to bridge the wall of reluctance towards COVID-19 vaccination and to increase the number of those who are vaccinated globally particularly through the dissemination of accurate information that debunk the myths and misinformation being circulated across various media platforms against COVID-19 vaccines.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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