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Authors' Affiliation:
1. Health Policy Research Centre, Institute of Health, shiraz University of Medical Sciences, Shiraz - Iran.
2. Student Research Committee, Lorestan University of Medical Sciences, Khorramabad - Iran.
3. Student Research Committee, Hamadan University of Medical Sciences, Hamadan - Iran
4. Student Research Committee, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran - Iran
5. Assistant professor, Department of health economic, school of medicine, Shahed university, Tehran - Iran

***Corresponding Author:**
Ahmad Hajiloo
Email: ahmadhajiloo.pb@gmail.com

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Public COVID-19 vaccination acceptance: A narrative review of correlated factors

Amirali Hatami[1,2], Ahmad Hajiloo[2]*, Romina Bayati[2], Peyman Kakavand[1,3], Amir Hossein Nasrollahi[4], Amir Hossein Yarahmadi[2], Mohammad Javad Nourmohammadi[2], Heshmatollah Asadi[5]

Abstract

Following the discovery of the first instances of COVID-19 in nations and the subsequent announcement of a "pandemic" by WHO, worldwide efforts to identify efficient methods to combat COVID-19 began. One of the most effective solutions is to carry out widespread vaccination against the virus. Despite this, some members of the community refuse to be vaccinated. The present paper reviews the potential causes and factors correlating with people's hesitation to receive COVID-19 vaccines. This article is a narrative review paper. We searched PubMed, Scopus, and Web of Science databases using COVID-19, Vaccine, Acceptance, and Hesitancy keywords. Qualitative content analysis was performed and associated predictors with public vaccination acceptance were identified. According to the study, hesitation in receiving COVID-19 vaccines, regardless of the countries, is significant among females, lower ages, lower education level, doubt about efficacy, and concerns about the safety of the vaccines, history of not receiving vaccines, especially the influenza vaccine, distrust of regional or national health officials, low level of health literacy and lack of information, fear of side effects and other complications, doubt of pharmaceutical companies and fear of lobbying, presence of chronic underlying diseases and comorbidities, lower socioeconomic status and racial or religious minorities. According to the results, several factors can influence individuals' uncertainty about COVID-19 vaccines. Given the importance of vaccinating the majority of the community to achieve mass immunity, healthcare systems should consider the vaccine acceptance rate to be a vital and substantial factor.

Introduction

COVID-19 is a viral infection caused by SARS-CoV-2 [1]. After the official announcement of first cases of the COVID-19, in December 2019 in Wuhan, China, and then the worldwide spread of the virus [2] due to its high contagiousness [3], the WHO officially announced the COVID-19 outbreak a pandemic on March 11, 2020 [4]. Countries' health systems have adopted various strategies to control this pandemic. Widespread vaccination has been one of the most well-known interventions [5], which experts believe can play an influential role to end the pandemic. Thus, healthcare systems must prepare safe and effective vaccines for the public as soon as possible [6]. By the development of the first vaccines and their approval by the WHO or other regulators, mass vaccination started with the priority for people at high-risk occupations (such as medical staff) and vulnerable people (such as the elderly or immunocompromised patients) [7], and gradually the other population groups prioritized. Still, the important point about vaccination is that in some communities, despite the availability of sufficient and free vaccines, still, significant parts of the target population avoid vaccination [8,9]. The most severe consequence could be not-attaining mass immunity in those countries [10]. The public's rejection of vaccines is not limited to the COVID-19 pandemic; this has always been one of the main concerns of healthcare systems to control or eradicate diseases. For example, the measles outbreak occurred in New York City in 2018-2019 following reluctance to accept routine pediatric vaccination programs [11,12]. This reluctance can have several reasons; identifying the objects is crucial. By clarifying these objects, the healthcare system can persuade this community group to receive vaccines to achieve mass immunity.

This article is a narrative review that evaluates factors influencing the acceptance of COVID-19 vaccination in the general population. We categorized the results in 4 themes. We hope that the findings of this study help healthcare systems provide better solutions to increase COVID-19 vaccination acceptance. And help design plans for a better confrontation with similar conditions in the future, since the COVID-19 pandemic will not be the last, as it was not the first in history.

Methods

Literature survey and selection criteria

This article is a narrative review carried out in October and November 2021. The authors performed a search on three English databases (PubMed, Scopus, and Web of Science) using following keywords: SARS-CoV-2, Novel coronavirus, Acceptance, Public trust, Hesitancy, Epidemic, and Outbreak. Search records screened by Title / Abstract.

Also, PubMed database searched for following MeSH terms: COVID-19, Vaccines, Patient Acceptance of Health Care, and Pandemic. The keywords were then combined using the Boolean OR and AND operators. Inclusion criteria were as follows: Access to the full text, English language papers, papers published after December 2019. We excluded reports, letters, conference papers, theses, editorial papers, commentary papers, correspondence papers and studies that did not considered the factors influencing the vaccine acceptance rate. 584 papers were obtained, and 246 records were excluded due to duplication. The authors reviewed the titles and abstracts of the remaining papers, and 186 studies were excluded due to lack of relevance; finally, 60 relevant articles were chosen. Then the full text of each paper was reviewed separately by two of researchers. Ultimately, 37 peer-reviewed studies considered eligible. Given the nature of the study, extracted data was analyzed through the qualitative content analysis method, and the results of the data extraction process, which were, in fact, the same correlated factors, were categorized into four themes (Table 1).

Data extraction: The eligible papers were exported to Mendeley version 1.19.8 software and Google Sheets to perform the data extraction process. We extracted the following information from the papers: Title, Publication date, Country, first author, Study design, Sample size, Participants, and Results and then all predictors of vaccination acceptance rate reported in the eligible studies were extracted.

Discussion

After consulting with an experienced healthcare administration professional, the factors correlated with the COVID-19 vaccination acceptance was classified into four categories: First, socioeconomic factors. Second, factors associated with individuals' knowledge about COVID-19, its vaccines, how they work and the overall perception of disease. Third, factors related to the role of healthcare professionals and healthcare organizations in persuading individuals to get vaccinated. And at last contextual factors. The following factors in each category are listed in order of repetition in the articles.

A: Socioeconomic

1. Demographic:

- Age: One of the issues more addressed by studies is the differences in vaccine acceptance at different age groups. The majority of studies show that increasing age is associated with an increased desire to receive the vaccine [8,13–

27]; however, some studies have also reported that the tendency to receive the vaccine is higher at a young age [28,29].

- Gender: Vaccine acceptance rates vary between men and women. Most studies show that men are more likely than women to receive the vaccine [15–19,25–27,30–40]; however, some studies also show the opposite [21,41–43].
- Race: Racial-religious minorities in different societies of North and South America, Europe, and Southeast Asia have shown less willingness to be vaccinated [8,14,17,20,23,24,39–41]. In particular, blacks in the United States and the United Kingdom [8,14,17,20,23,39] were less likely to receive the vaccine than the majority of the population.
- Level of education: Another issue that has received much attention is the relationship between vaccination acceptance and the level of education. According to most studies, higher education is associated with an increased desire to receive the vaccine [8,13,14,17,19,28,34,36,39,41,42,44,45]. However, some studies have shown that respondents with lower levels of education were more likely to get vaccinated [32,42].
- Marital status: There is no single conclusion in this case. Some studies have evaluated the willingness to receive the vaccine in married respondents [30,34]; however, some studies also emphasize the increased desire to receive the vaccine in single respondents [29,32].
- Residence area: Rural and small towns' residents are less likely to receive the vaccine [13,15].

2. Economic:

- Income: People with higher monthly income and better socioeconomic status have shown more acceptance of the COVID-19 vaccine [13,16,19,36,45].

3. Orientations:

- Sexual orientation: Sexual minorities (SGMs) were less likely to receive the vaccine [39].

B: Knowledge and perceptions

1. Health literacy:

- Source of information: The choice of news sources is one of the most important factors influencing the vaccine acceptance. Individuals who follow the news from official sources have a higher vaccine acceptance than individuals who receive the information through social media [36,40,42,44].
- Level of information: One of the most influential factors in vaccine acceptance is having accurate details about COVID-19 disease and its vaccines. The higher level of information about COVID-19 is associated with an increased vaccine acceptance [19,21,29,38,40,43,45]. In all papers, having more information about the mechanism of Immunogenicity of vaccines had a positive effect on acceptance [35,43,45,46], and incorrect information about the vaccines harmed the acceptance [33,47]. Students in health-related disciplines are more likely to receive the vaccine than students in non-health disciplines [40].
- Personal beliefs: Misconceptions about the importance of universal vaccination are a barrier to vaccine acceptance. The false hope of finding a cure is a factor for vaccine hesitancy [41]. Negative view of vaccination in total [40,41,47], having doubts about vaccine efficacy, and believing in conspiracy theories [27,36,41,45], along with feeling in traditional medicine, include factors reducing the desire to receive COVID-19 vaccine [21,43].
- Immunity misconceptions: Misconceptions such as that only individuals that are at high risk of death from COVID-19 should get the vaccine has reduced the desire to get the vaccine [13] if pregnant women get vaccinated, they may transmit the virus to the fetus [21,40] or that women may get pregnant by vaccination [25] or that "only individuals at serious risk of COVID-19 should receive the vaccine" has reduced the COVID-19 vaccine acceptance.
- Risk perception: The desire to get the COVID-19 vaccine is higher in people who have a better understanding of the risk of the disease and see the vaccine as a way to protect themselves and their families [19,25,46]. Most of the studies showed that Acceptance was higher in individuals with a higher rate of risk perception [17,25,27,35,46] although some showed the opposite [39,42].
- Concerns: There are various concerns and doubts about COVID-19 vaccines. Such as Concerns about vaccine efficacy [19,21,25,28,30,31,33,37,41,43,46], Vaccine safety [14,21,30,33,35,40,41,43,45,47], Complications of the vaccine [19,21,25,31,33,43,46,48], concerns about the rapid production of the vaccine, which in some cases resulted earlier than the expected dates

[40,43,46] and Concerns about mRNA vaccines [28].

C: Stewardship of healthcare system

1. Service delivery:

- Type of vaccine: Participants who had previously chosen a particular vaccine were more likely to be vaccinated. Among the available COVID-19 vaccines, respondents were more likely to receive Chinese and American-German vaccines [45].
- Availability of vaccine: One of the factors that had a positive effect on the willingness to receive the vaccine was adequate stockpiling of the vaccine in that region [24,40].

2. Funding:

- Medical insurance: According to a study in Hong Kong, respondents who did not have health insurance are more likely to receive the COVID-19 vaccine [31].
- Vaccine cost: Concern about the cost of the COVID-19 vaccine is one factor that has reduced respondents' desire to receive it [13,30].

3. Trust:

- Healthcare authorities: distrust in higher officials or regional health system officials has reduced the desire to get vaccinated [18,20,21,24,35,36,45,47].
- Pharmaceutical companies: concerns about the honesty of pharmaceutical companies and the fear of their lobbying have reduced the desire to get vaccinated [18,24,35,36,40,45].
- Healthcare providers: The data from respondents that had been recommended to get vaccinated by healthcare professionals or had more trust in the health care system showed an increase in the desire for vaccination [28,30,36,40].

D: Contextual

1. Work related:

- Employment status: Some studies have found a correlation between unemployment and increased vaccine acceptance [35,46]; however, some have also linked unemployment to a decrease in the willingness to receive the vaccine [17,41].
- Job type: The most critical factor among job factors was the degree of risk that was associated with that job. Individuals working in high-risk jobs such as dentists, medical staff, etc., are more likely to receive the vaccine [13,18,21,25,29,30,46]. Individuals that are working in non-healthcare occupations are less likely to receive the vaccine [18,21]. Among the various occupations, physicians are even more willing to receive the vaccine than other members of the medical staff [18,25,37]. A study showed that Acceptance was higher in primary school principals rather than junior high school principals [38].

2. Health status history:

- Comorbidities: Most studies show a decrease in vaccine acceptance in people with chronic conditions [16,19,25,43,45], like primarily mental disorders such as depression [16,31]. On the other hand, some studies indicate that people with underlying conditions may find themselves at higher risk and, therefore, more accepting of the COVID-19 vaccine [13,21,36].
- History of other vaccines: In all but one study in the United States [42], respondents who have had a vaccine in the past, especially the influenza vaccine, were more likely to get the COVID-19 vaccine [8,13,14,18,22,25,26,30,35,44,46].
- Medical fears: Given that the COVID-19 vaccines are only available for injection, Trypanophobia (fear of injection) is one of the factors contributing to reducing vaccine acceptance [21,23].
- History of COVID-19: People who have suffered from the disease themselves, even those that experienced severe symptoms, are less likely to receive the corona vaccine [16,22,25,39,40]. People who knew someone who died of COVID-19 were more afraid of the disease were more likely to get the vaccine [25,27,40,42,46], although a study in Turkey stated those who have lost relatives or friends to COVID-19 are less likely to get the vaccine [27]. However, in general, those who considered themselves more susceptible to COVID-19 were more likely to receive the vaccine [42].

3. Healthcare system experiences:

- Experience of discrimination: A history of discriminatory behavior in healthcare facilities in patients with a particular race, gender, religion, or sexual orientation reduces the desire for the COVID-19 vaccine [39,43].

The current review aims to investigate a wide range of factors influencing the acceptance of COVID-19 vaccines by people with diverse geographical and cultural backgrounds. Due to the worldwide prevalence of the COVID-19, vaccination is one of the most efficient approaches currently available to stop the COVID-19 pandemic. However, we witness a rate of hesitancy

toward vaccines among different populations, which may pose challenges for managing and controlling the COVID-19 pandemic. Hence, understanding the barriers and motivators of vaccination is vital in implementing effective interventions.

Among socio-economic factors, male gender [15–19,25–27,30–32,34–41,44], older age [8,13–18,20–27], higher level of education [8,13,14,17,19,21,28,34,36,41,44,45] and being married [16,30,34] were included as the main factors influencing the increase in vaccine acceptance.

Contrary to the common finding that men were more likely to get vaccinated than women, some studies have shown that women were more likely than their male counterparts to show cautious optimism or willingness to use the vaccine at some point in time [42,43].

Also, potential pregnancy was among the reasons associated with vaccine hesitancy [25] which may be due to concerns about the safety of the vaccine during pregnancy. Inclusion of pregnant women in vaccine trials and adjustments to the vaccination guidelines regarding pregnancy may lead to higher willingness to get vaccinated in some women too [21, 25].

Antithetical to the major results, it is noteworthy that in some studies, vaccine hesitancy was more common in individuals aged 60 years and older [28]. Death reports in the elderly who received a COVID-19 vaccine made headlines worldwide, perhaps raising concerns about the vaccines that are risky and unsafe, resulting in uncertainty among them. This is worrying because older individuals are particularly at high risk of severe infection with COVID-19 [16]. Therefore, carefully targeted strategies must be executed to decrease preventable deaths in this population.

Compared to respondents with a high school or university degree, those with a college or university degree are more likely to get the COVID-19 vaccine [44]. Probably because those with a higher level of education would have a better chance of accessing knowledge and comprehending it, allowing them to accept the COVID-19 vaccine more willingly. However, it should be noted that in some studies, individuals with postgraduate education showed lower rates of acceptance [32,42].

Also, in most studies, the history of influenza vaccination was associated with a higher desire to receive the vaccine [8,14,18,22,25,30,35,40,46]. Compared to individuals who did not receive any vaccines as a child, those who received vaccines during childhood were more likely to get vaccinated, provided the COVID-19 vaccine was available. One plausible explanation is that people with a history of vaccination have gained more experience and knowledge about the advantages of vaccination, enabling them to accept the COVID-19 vaccine more readily [13,44]. Accordingly, acceptance was lower in individuals who had a negative attitude towards vaccination [40,41,47].

Those with more information about COVID-19 [19,21,29,38,40,43,45] and how the vaccines work [35,43,45,46] showed a higher tendency to get vaccinated. Acceptance was lower in respondents with incorrect information about the vaccine [33,47]. Misunderstandings such as the belief that "only people at serious risk of COVID-19 should receive the vaccine" [13] and false hopes for other treatments of COVID-19 such as the use of hydroxychloroquine [41,43] as well as natural or traditional therapies as an alternative to vaccination [21,43], reflect the importance of how raising awareness and debunking such misconceptions can help improve the vaccine acceptance rate.

Moreover, individuals with higher monthly incomes and socioeconomic status were more likely to be vaccinated [13,16,19,36,45]. Studies in Bangladesh have shown that as most Bangladeshi participants were experiencing a financial crisis and lost their jobs during COVID-19, people in the low-income range may lack interest in the COVID-19 vaccine. It was also a common finding across many countries [13]. This is especially problematic since low-income groups are at an increased risk of contracting COVID-19 due to crowded living standards, reliance on public transportation, and increased likelihood of continuing to work outside the home [13,19].

The findings also demonstrated that factors such as higher confidence in health care providers or their recommendation to get vaccinated were motivators to receive the COVID-19 vaccine [28,30,36,40]. Those who valued doctor's recommendations tended to get vaccinated immediately, while those who considered vaccination convenience or vaccine price in decision-making tended to choose delayed vaccination [30].

In addition, having family members or friends who have been diagnosed with or died of COVID-19 was linked to a higher vaccine acceptance rate [13,40,42,44]. Individuals with a higher perceived risk and fear of developing COVID-19 are more likely to seek vaccination to prevent the disease [25,27,46]. Accordingly, acceptance was higher among people who tried to protect themselves and their families [19,25,46].

On the other hand, the main obstacles that have repeatedly led to doubts about vaccination in the studies include concerns about the efficacy and effectiveness of the vaccine [19,21,25,28,30,31,33,37,41,43,46], vaccine safety [14,21,30,33,35,40,41,43,45,47], side effects of the vaccine [19,21,25,31,33,43,46,48] and rapidity of vaccine development compared to other vaccines [43,46]. Therefore, efforts should build trust in the safety and efficacy of vaccines offered to the general population within all countries [28].

Next, individuals with a personal history of COVID-19 infection [16,22,25,39,40] and skeptical of the vaccine and believed in conspiracy theories, were less likely to receive the vaccine [27,36,41,45].

Furthermore, acceptance was also lower in individuals with chronic diseases and comorbidities [16,19,25,43,45]. In a study on vaccination acceptance in cancer patients in Hong Kong, it was observed that there was a greater degree of hesitancy in these patients [31], and this is worrying as these patients are more prone to severe complications of COVID-19 and have higher mortality rates than the general population. Also, according to studies, acceptance was lower in respondents with depression and other psychological conditions [16,31].

In addition, distrust of state or local health authorities [18,20,21,24,35,36,45,47] and pharmaceutical companies [18,24,35,36,40,45] has made people less willing to receive the vaccination. Therefore, building trust between the general public and those who have previously had bad experiences with medical providers and government agencies can be helpful.

Acceptance was also lower in individuals who got their information about the vaccine from social media platforms instead of official references [36,40]. And this increase in skepticism against the COVID-19 vaccine may be due to the vulnerability of social media channels to misinformation [42].

Among different racial groups, African American populations were more skeptical of vaccination against COVID-19. One of the reasons is the experience of racial discrimination and unfair treatment in this group [39,43]. This puts them at a higher risk for complications from conditions such as COVID-19 due to the higher incidence rates of many chronic diseases in black people [8,14,20,23,39].

Our study had several limitations. First, although this article included studies from several countries, it may not be representative of all communities' opinions on COVID-19 vaccines. Second, the representability of samples was uncertain in most articles. Therefore, the selection of sample bias needs to be considered. Third, attitudes to vaccination are influenced by numerous factors, including insurance and price, which might vary across countries, and healthcare systems. At last, the effects of some predictors were not explored due to limitations of the data. Greater efforts to report data on a finer scale are needed in future studies. Vaccination is one of the most successful strategies for controlling pandemics, but its acceptance must be high enough to achieve herd immunity. Consequently, it is crucial to understand the factors associated with vaccine acceptance so that appropriate interventions can be taken to enhance the approval of the COVID-19 vaccine in the future. New drug systems, nanoparticles and vaccines [49-51] can be used to treat diseases (especially infectious diseases). The Covid-19 pandemic is one of the most dangerous challenges of the present century, killing millions [51-56]. More than two years after the onset of the Covid-19 pandemic, vaccination is now the best way to control the disease [57-68].

Conclusion

The SARS-CoV-2 outbreak soon became a pandemic after identifying its first cases in China and had numerous devastating effects on human life. Vaccination against the virus is now one of the most efficient ways to end the pandemic. However, the rate of vaccination acceptance needs more attention. The most notable concern of healthcare systems is achieving mass immunity. This paper aimed to review the correlated factors with vaccination acceptance so that healthcare systems can provide interventions at the individual and social levels to decrease the COVID-19 vaccine hesitancy. Age, gender, education level, health literacy, and history of influenza vaccination are among the most decisive factors correlated with the acceptance by the people. Meanwhile, the healthcare system managers should consider increasing public health literacy as an efficient solution to the vaccine hesitancy and enhance it in various ways.

Competing interest

The author declares that there is no conflict of interest regarding the publication of this paper.

Authors' Contribution

Amirali Hatami conceived the idea, designed the methodology, reviewed papers and prepared original draft. Ahmad Hajiloo reported the results, reviewed papers and prepared original draft. Romina Bayati composed the discussion, reviewed papers and prepared original draft. Peyman Kakavand collected data, wrote the conclusion and prepared the original draft. Amirhossein Nasrollahi conducted the search strategy and collected data. Amirhossein Yarahmadi collected data and provided technical supervision. Mohammadjavad Nourmohammadi conducted the search strategy and collected data. Heshmatollah Asadi revised and corrected the manuscript.

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