

Covid-19 Infodemic and Egyptian Women Vaccine Acceptance

A Study on the Health Belief Model

Dr. Eman M. Soliman

Lecturer, Faculty of Mass Communication,
Cairo University & Galala University

Introduction

The initial outbreak of Covid-19 was reported in Wuhan, China, in late December 2019; however, the disease spread throughout china and traveled to other countries around the world (Wu et al., 2020). WHO announced Covid-19 as a global pandemic in March 2020 after the death of 4,291 people worldwide (World Health Organization, 2020).

On February 14th, 2020, Egypt announced the first case of Covid-19, while a curfew was imposed in March 2020. Different campaigns on social networks to raise awareness about Covid-19 among the public (Saied et al., 2021).

The effect of the Covid-19 pandemic on women was severe, as they were at the forefront of the battle as healthcare workers, wives, mothers, and caregivers. According to the Egyptian National Council for Women, women with health conditions (pregnant/lactating women) or at reproductive age are more prone to Covid -19 threats (The National Council for Women, 2020).

With the ongoing call for social distance protocol, curfew, and lockdown, social media usage has increased as people keep posting about their worries and achievements (Anwar et al., 2020). In the meantime, social media played a vital role during the lockdown in disseminating information, education, and keeping people connected.

Still, at the same time, it raised panic and anxiety due to the massive amount of online news. The rapid dissemination of enormous false news on social media platforms created a so-called “Infodemic” where during a disease outbreak a huge amount of online information is spread. (World Health Organization, n.d.) In the case of Egypt, social media networks are described as gendered as 38% of their users are women. Among the characteristics of social media in Egypt is that Facebook ranks first among other social media platforms. (Social & Hootsuite, 2022).

Infodemic surrounding Covid-19 and vaccines posed a grave threat to global health as it led to rising in vaccine hesitancy and acceptance, especially among women, regarding the vaccine’s safety, effectiveness, and long-term impact on women’s health

Studies show that women are more vaccine reluctant than men; while women’s primary concerns are adverse reactions and safety, and women of reproductive age are concerned more with their future fertility, current pregnancy, and breastfeeding (Saitoh et al., 2022) (Murewanhema, 2021) (Khan et al., 2021).

Problem Statement

This study seeks to determine the factors that affect Egyptian Women’s decision to accept Covid-19 vaccines. It focuses on understanding the perceived barriers, benefits, susceptibility, and severity influencing their vaccine decision and the influence of social media usage on women’s decisions regarding vaccine acceptance.

This study depends on the Health Belief Model. It is one of the most commonly used theories in understanding health behaviours. Regarding vaccine acceptance, the model aims to understand individual’s beliefs about the vaccine, and the perceived barriers (Wong et al., 2020).

Literature Review

Vaccine Acceptance and Women's Health

Previous research on COVID-19 vaccine acceptance lacks a gender perspective, but (Morales et al., 2022) stated that American women had a higher vaccine hesitancy rate than men. In China, (Hu et al., 2017) noted that the main reason behind the acceptance of the seasonal influenza vaccine among pregnant women is the absence of knowledge about the vaccine and its effect.

(Qiu et al., 2021) added that safety concerns and the lack of confidence of pregnant women in health care people to discuss vaccination were the primary reasons for vaccine hesitancy. Along the same line, the lack of data on vaccine safety for the mother and the fetus is the most common reason for the refusal of the Covid-19 vaccine among pregnant women (Ayhan et al., 2021).

A study of 16 countries concluded the reasons behind vaccine acceptance from 16 countries and found that the country is a solid predictor of vaccine acceptance (Skjefte et al., 2021). Vaccine acceptance was generally high in India, the Philippines, and some countries in Latin America, while it was the lowest in Russia, the United States, and Australia. Furthermore, other predictors of vaccine acceptance included confidence in the vaccine's effectiveness.

(Otieno et al., 2020) Studied pregnant women's drivers and barriers to accepting the vaccine in Kenya. This study shows that more than 95% agreed that maternal vaccines are essential for disease prevention; however, the main barrier was the fear of the side effects on the mother/baby.

(Tao et al., 2021) Covid-19 vaccine acceptance tends not only to decrease with age but also with a high level of knowledge about vaccines and a low level of perceived barriers. However, (Hailemariam et al., 2021) indicated that increased education levels and living in urban areas expose pregnant women to different media and knowledge sources more than non-educated.

(Wiley et al., 2015) explained the factors influencing pregnant women's views on vaccination. They stated that trust in the system and the advice given by healthcare professionals play a crucial role in their acceptance. In addition, information sources were necessary. (Nganga et al., 2019) Analyse how patient-provider relationships impact vaccine uptake among pregnant women in Kenya. They found that patient trust in healthcare providers is vital to vaccine acceptance; health education fosters this trust.

Infodemic and Vaccine Acceptance

Research indicated an overabundance of Covid-19 vaccine misinformation on social media. This high exposure to information on social media is associated with negative perceptions and higher levels of mistrust among people (Demuyakor et al., 2021)

(Farah, 2021) seeks to analyse the rumours on Twitter in Saudi Arabia from March to July 2020; results show that the main kind of rumours were intimidation rumours, which aim to spread fear and misinformation regarding covid-19.

(Hernandez et al., 2021) Analysed one million tweets related to Covid-19 vaccine conversations. Results show highly polarised anti-vaccine discussions. This misinformation on social media led to a significant percentage of vaccine refusal; Social media played an essential role in the birth of the Covid-19 Infodemic by distributing knowledge rapidly without checks for accuracy (Gisondi et al., 2022).

In Algeria (Yasaad, 2022) analysed the spread of fake news during the coronavirus on social media from the viewpoint of users and 78% of the respondents stated that social media, especially Facebook, is the primary source for spreading fake news.

In their study, (Al Naam et al., 2022) stated that the participants who depended on official sources were more likely to accept the vaccine than those who received their information from social media platforms. In agreement with the previous study, (Demuyakor et al., 2021) indicated that exposure to COVID-19 vaccine news on social media causes a high level of panic and distrust.

On another side, (Al-Regaiey et al., 2022) indicated no significant association between social media exposure and vaccine acceptance; however, vaccine hesitancy was more predominant among people who obtained more information about vaccinations from social media. As (Pulido et al., 2020) explain in their study, false data was more likely to be tweeted during the COVID-19 outbreak. (Chen et al., 2022) revealed that respondents were distracted by an overwhelming number of information, which affected vaccine acceptance and uptake.

(AlHasan et al., 2021) Stated that entertainment-based social media (Instagram and YouTube) negatively impact vaccine intention compared to information-based social media platforms (Twitter and LinkedIn). In another study that compared Twitter and Facebook as sources of information, results showed that low-credibility content prevails more on social networks. Facebook is more effective in fighting Infodemic as the ratio of low credibility information is lower than on Twitter (Yang et al., 2021).

(Luo et al., 2020) indicate that text is the main Infodemic during the Covid-19 outbreak on Chinese social media. The false information is mainly on medical topics, es-

pecially by frequently using medical terms, which is hard for the public to understand.

Theoretical Framework

In the early 1950s, Hochbaum, Rosenstock, and others developed the Health Belief Model (HBM) to understand people's desire to avoid diseases, the perceived expectations about any positive action to prevent illness, and the barriers that influence their decisions (Boslaugh, 2008). Later the model focused more on social influences, particularly cues to action, which contribute to health perceptions and behaviours (Thompson, 2014).

The HBM contains these primary constructs: susceptibility, severity, benefits and barriers to a behavior, cues to action, and most recently, self-efficacy.

1- Perceived susceptibility: the belief about the likelihood of getting a disease or a condition.

2- Perceived severity: the feeling about the significance of contracting an illness or of leaving it untreated.

3- Perceived Benefits are a person's beliefs regarding the perceived benefits of several available actions for decreasing the disease threat.

4- Perceived Barriers: these are the possible negative aspects of specific health behavior, like cost-benefit analysis, when individuals evaluate the action's potential benefits with perceived barriers.

5- Cues to Action: what can generate actions, either inside, such as thoughts, emotions, or outside as media coverage.

6- Self-efficacy: is the belief that one can effectively implement the required behavior to produce results" (Rimer, 2008) (Boslaugh, 2008)

Health Belief Model & Vaccine Acceptance

Several studies examined the relationship between the Health Belief Model (HBM) and people's attitudes and behaviour toward vaccines and illness.

Regarding the demographic variables, age is considered one of the main factors affecting vaccine acceptance. (Wong et al. (2021) confirmed that age is an essential factor in vaccine acceptance, as older age groups are related to high vaccine acceptance. Adam et al. (2014) reached through their research that older age increases the odds of getting some vaccines. In addition, the level of education, late pregnancy, and high expertise, especially among 1392 pregnant women in five provinces of mainland China (Tao et al., 2021).

In contrast, the previous study (Khalafalla et al., 2022) found that the level of approval of the Vaccine among University students was high. In addition (Patwary et al., 2021) added that the fear of the unknown effect of the vaccine on health and lack of knowledge about the vaccine was the main reason for not taking the vaccine.

Some other factors that affect vaccine acceptance were stated in the literature. Wijesinghe et al. (2021) found that the vaccine brand, side effects, and allergies were the essential factors in determining vaccine acceptance. (Cheney & John, 2013) found that the main barriers to the approval of the vaccine were the availability of access and the mistrust of the vaccine manufacturers. (Lin et al., 2020) found through their study in china that the vaccine manufacturer country impacts the vaccine behavior as most of the sample (Chinese) were confident in a domestic-made vaccine.

Most studies confirmed that the HBM construct helps understand vaccine behavior. Wijesinghe et al. (2021) revealed that the HBM constructs related to the perceived risk and benefits were mainly associated with the rate of Covid-19 vaccine acceptance. In the same line (Lin et al., 2020) found that the perception that the vaccine decreases the chances of Covid-19 is the primary factor affecting people's decision to vaccinate.

While Wong et al. (2021) found HBM constructs related to the Severity of Covid-19, benefits, and barriers were significantly associated with vaccine acceptance. (Khalafalla et al., 2022) indicated that all HBM Constructs were significant predictors of vaccination behavior except for the "perceived susceptibility".

(Qin et al., 2022) stated that individuals with a low level of perceived susceptibility, perceived benefit, and high level of perceived barriers are old age, insufficient knowledge of Covid-19, and low educational level and household income. (Mercadante & Law, 2021) Confirmed the role of perceived usefulness and perceived barriers on the vaccine intention for Covid-19 vaccines.

(Al-Metwali et al., 2021) Assessed the perceptions of healthcare workers and the population regarding the acceptance of Covid-19 vaccines that healthcare workers were significantly more likely than the general population to receive the Covid-19 vaccine. Their primary barrier to vaccine acceptance was the proper storage.

Research Questions

This research seeks to understand the perceived beliefs of Egyptian women regarding Covid-19 vaccine acceptance and to identify the factors, benefits, and barriers leading to the decision to accept or refuse the vaccine. This study combines HBM's central constructs with socio-demographic variables and infodemic factors.

RQ 1 - What is the link between HBM Constructs and Covid-19 vaccine acceptance among Egyptian Women?

1.1 What is the link between Perceived susceptibility and Covid-19 vaccine acceptance among Egyptian Women?

1.2 What is the link between Perceived Severity and Covid-19 vaccine acceptance among Egyptian Women?

1.3 What is the connection between Perceived Barriers and Covid-19 vaccine acceptance among Egyptian Women?

1.4 What is the link between Perceived benefits and Covid-19 vaccine acceptance among Egyptian Women?

RQ 2 - What is the link between Infodemic and Covid-19 vaccine acceptance among Egyptian Women?

Methodology

This study depends on a questionnaire, face-to-face data collection, and online surveys. The online questionnaire was created through a web-based form (Google Forms); it was publicized through social networks (LinkedIn & Facebook) and shared via Email and WhatsApp groups linked to the researcher.

The study sample is purposive as the researcher intentionally chose the interviewees according to specific characteristics and skills. All the interviewees were women and had to have access to social media networks. (Encyclopedia 2014) The questionnaire was online for one week (23-07-2022 - 30-07-2022) and was filled in by 151 participants.

The following figure represents the conceptual framework of the study:

1- Perception, attitudes, and acceptance of the Covid-19 vaccine according to HBM constructs

a- Perceived Susceptibility

b- Perceived Severity

c- Perceived Benefits

d- Perceived Barriers

2- Socio-demographic variables (age, marital status, educational level, job status, and household income)

3- Infodemic-related concepts: social media behavior, Source of Information, media representation of the importance of the Covid-19 vaccine, and exposure to fake or false news.

This study depends on the following conceptual framework that represents the main concepts of HBM, Socio-demographic characteristics, and Infodemic.

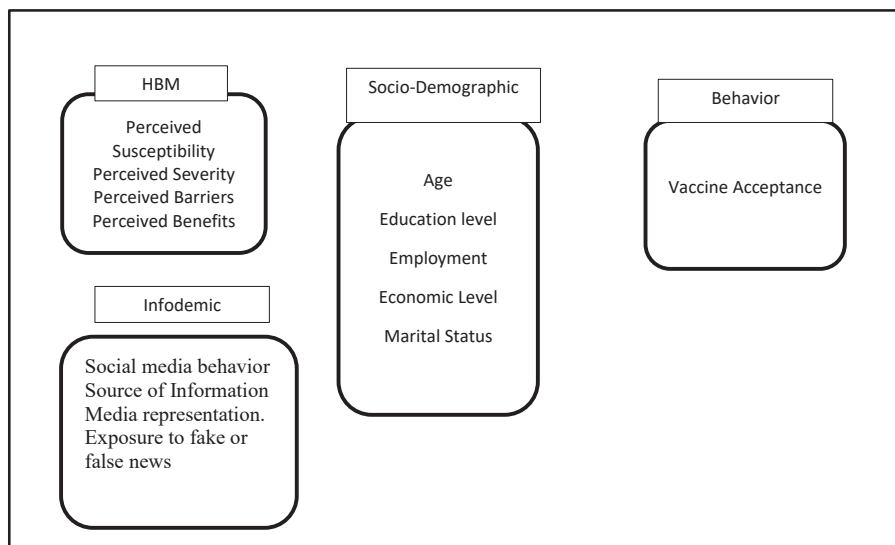


Figure 1: Conceptual Framework

The Health Belief Model describes people's behaviour facing a disease or the risk of infection (Costa, 2020). The current study seeks to implement the HBM as an explanatory framework for understanding the factors that affect Egyptian women's vaccine acceptance. Also, this study focuses on the link between Infodemic and women's vaccine acceptance.

Results

This study seeks to understand the factors related to Egyptian women's vaccine acceptance. It focuses on how the HBM constructs (Perceived susceptibility, severity, barriers, and benefits) and Infodemic are linked to Egyptian women's vaccine acceptance.

It depends on an online and offline survey of a purposive sample of Egyptian Women (N=151). Table (1) shows the study's sample and its socio-demographic characteristics.

Table 1. Sample of the Study and its Socio-Demographic Characteristics

Socio-demographic Characteristics	Frequency	Percentage	
Age	21-30	47	31%
	31-40	65	43%
	41-50	15	9.9%
	51-60	14	9.3%
	Above 60	10	6.6
Marital Status	Married	85	56%
	Not Married	66	43%
Educational Level	High School	3	2%
	Bachelor Degree	74	49%
	Master Degree	33	21.9%
	Ph.D. Degree	41	27.2%
Work Status	Working	136	90%
	Not Working	15	9.9%
Family Household Income Per Month	Below 5000	11	7.3%
	5000-10000	42	27.8%
	10000-15000	36	23.8%
	Above 15000	62	41.1%

Covid-19 knowledge and Vaccine Acceptance

This study aims to understand sample knowledge about Covid-19 and whether they got vaccinated. The Results show that (N107) out of 151 replied that they did get Covid-19 before, while (N 23) were not infected, and (N 21) stated that they did not know if they had caught it before or not.

Furthermore, findings stated that 86% (N 129) of the sample got vaccinated, while 14% (N 21) didn't. The unvaccinated respondents declared different reasons for not getting vaccinated as follows:

The respondents stated that they did not get vaccinated because of being pregnant or planning to be. Second, women didn't believe in the importance of the vaccine as it won't prevent them from getting sick. Third, some replies stated that the vaccine was only approved for emergencies, and they won't inject themselves with something that had not been appropriately tested yet. Finally, others had a health problem that prevented them from getting it.

Regarding their belief in the effectiveness of the vaccine, results show that both vaccinated women (65%) and unvaccinated (57%) didn't believe in the efficacy of the vaccine in preventing them from getting ill.

Vaccine Acceptance & Demographic Factors

Marital status is one of the main factors of vaccine unacceptance. Results show that (76%) of the married women in the sample indicated that they didn't take the vaccine compared to (53%).

As for education level, differences were not significant, as (67%) of highly educated women (who got their Master's and PhD. degrees) indicated they didn't take the vaccine compared to (45%) in the same category.

Regarding women's age, (57%) of the women aged (31-40 years) are unvaccinated as opposed to (41%) who were vaccinated.

On the other side, family house income is one of the factors related to vaccine acceptance, (45%) of the sample whose family monthly income is above 15000 were vaccinated compared to (19%) in the same category.

HBM Constructs & Vaccine Acceptance

The following section explains the link between the HBM constructs and vaccine acceptance according to the research questions:

Concerning the link between HBM Concepts and Covid 19 vaccine acceptance among Egyptian Women, I discuss here the connection between Perceived susceptibility and Covid 19 vaccine acceptance among Egyptian Women:

About 86% of the sample got vaccinated, and these women indicated moderate perceived susceptibility; as 58% stated that Covid-19 is a risk to their health, 24% agreed that the Covid-19 vaccine affects married women, although 34% of the vaccinated women specified that women and men are the same in terms of getting infected with Covid-19. On the other side, 14% of the sample did not get vaccinated, and more than 50% indicated that they agreed that Covid -19 is a risk to their life. Around 38% stated that women, compared to men, are at high risk of getting infected with Covid-19, but at the same time, the vaccination is not a healthy choice for married women.

Concerning the link between Perceived severity and Covid 19 vaccine acceptance among Egyptian Women:

Results show that (70%) of the vaccinated women agreed that Covid-19 is a severe disease and highly contagious. Meanwhile (80%) stated that vaccine side effects harm pregnant women and breastfeeding. In comparison, all the unvaccinated women in the sample were more concerned about the side effects of the vaccination if they were pregnant or breastfeeding. However, 90% stated that Covid-19 was an extremely contagious and severe disease.

Concerning The link between Perceived barriers and Covid 19 vaccine acceptance among Egyptian Women:

Findings revealed that the main barriers to not getting the vaccine earlier were its impact on their usual activities (46%) then its long side effect on their health (35%). Finally, that vaccine will harm their hormones in the future.

While the unvaccinated women stated that the main barrier to not getting the vaccine was its long-term side effect (62%), then its impact on their usual activities (56%), and finally, the vaccine will harm their hormones in the future (42%).

Concerning the link between Perceived benefits and Covid 19 vaccine acceptance among Egyptian Women:

The analysis shows that women's significant benefit from being vaccinated enables them to work and travel. More than (80%) of the vaccinated women stated the previous in comparison to the unvaccinated women (43%)

The main difference between vaccinated and unvaccinated women was regarding the ability of the vaccine to safeguard them from getting infected in the future. (80%) vaccinated women confirmed that getting the vaccine would protect them from getting infected, while more than (57%) of the unvaccinated women indicated that the vaccine wouldn't safeguard them.

Infodemic & Vaccine Acceptance

Concerning the link between Infodemic and Covid-19 vaccine acceptance among Egyptian Women:

Social media behavior regarding Covid-19 vaccine news

Findings show no difference between vaccinated and unvaccinated women regarding their behavior on social media. Both vaccinated and unvaccinated women "Never" share, like, or post information related to the Covid-19 Vaccine (51.5%) (and 52.4%), respectively. Also, both always check their information before posting online (58%) (57.1), respectively.

Sources of Information

Results show that vaccinated women depend on official sources such as the ministry of health (90%); in second place came the T.V.as, the primary source of information (80%), and in third place (75%) came friends and family. Facebook came in 4th place (70%).

Compared to unvaccinated women, (50%) depend on Facebook as the primary source of information about the vaccine. In second place with 30 % come the opinions of family and friends, then the ministry of Health and Health websites and Twitter, respectively.

The media representation of the importance of the Covid-19 Vaccine

Findings revealed that half the sample agreed that the media exaggerated the significance of the Covid-19 vaccine. 48.5% of the vaccinated and 57% of the unvaccinated women agreed with the previous.

False or Fake News

The results indicated no significant difference between vaccinated and unvaccinated women regarding exposure to fake or false news. Furthermore, Fig.3. The only difference was that (7.7%) of the vaccinated women had never been exposed to fake news compared to (14.3%) of the unvaccinated women. The vaccinated and unvaccinated women are sometimes exposed to fake news (57%) (and 52.4%), respectively.

Also, the results show agreement between vaccinated and unvaccinated regarding the source of fake news. Both stated that Facebook is the primary source of fake news (43.2%) (50%), as shown in table 2, followed by Friends and Family.

Table.2. False or Fake news

		Vaccinated	Unvaccinated
Receiving False or Fake News about Covid-19 Vaccine	Sometime	57%	52.4%
	Often	16.2%	9.5%
	Rarely	19.2%	23.8
	Never	7.7%	14.3%
Source of the Fake News	Facebook	43.2%	50%
	Friends and Family	31%	30%
	Ministry of Health	5.9%	7.7%
	Twitter	4.9%	3.8%

Conclusion

This study seeks to understand the factors linked to Egyptian women's acceptance of the Covid-19 vaccine in terms of the HBM constructs and the impact of the infodemic on social media platforms. Studies indicated the importance of connecting gender to health problems as Women are more likely to perceive pandemics as severe and comply with preventive measures (Galasso et al., 2020), and studies show that the most common factor that is related to COVID-19 vaccine hesitancy was gender (Limbu et al., 2022)

Results show that most Egyptian women in the sample got the vaccine compared to 14 % of the sample who didn't. It indicated no significant difference between the vaccinated and the unvaccinated women; both believed in the severity and susceptibility

of Covid-19 as a disease.

In the same line with the previous results, (Hossain et al., 2021) indicated that HBM constructs, perceived susceptibility, severity, benefits and barriers were the most important predictors of Covid-19 vaccine hesitancy. (Guidry et al., 2021) stated that high perceived susceptibility to Covid-19 and high perceived benefits of the vaccine are indicators of the willingness to take a Covid-19 vaccine. (Mohammed et al., 2022) An article on Egyptian society stated that the vital factor for adopting protective measures against Covid-19 is the Egyptian worries about the pandemic.

Regarding the barriers, vaccinated and unvaccinated women believed in the harmful impact of the Covid-19 Vaccine on married women. They stated that the side effect of the vaccine in the long term is more dangerous than the disease itself, especially for pregnant and breastfeeding women.

(Murewanhema, 2021) indicated that future fertility, current pregnancy, and breastfeeding are essential factors determining women's vaccination decisions. In the same line (Khan et al., 2021) stated that vaccine hesitancy was considerably higher among younger women than younger men because they have concerns about the vaccine's side effects on their health.

The vaccinated women stated the main benefit of being vaccinated was enabling them to work and travel without restriction, which wasn't the same with the unvaccinated women. The unvaccinated women stated that the main barrier to not taking the vaccine is that it won't protect them from getting infected in the future.

This study explained how Infodemic is linked to vaccine acceptance in terms of sources of information and exposure to false or fake news. The results indicated that the primary source of information for the unvaccinated women was social media _ Facebook_ compared to the vaccinated women, who depended mainly on official sources.

(Basdeo et al., 2021) concluded that the most trusted sources of information were the official sources as the health worker and the Ministry of Health. Although (Mohammed et al., 2022) conducted a study on Egyptians' perception of the governmental response to the Covid-19 pandemic, the results show that the role played by the official was insufficient, and the numbers of affected people and death cases declared were inaccurate. Along the same line (Ibrahim, 2021) stated that most Egyptian depends mostly on social media platform as a source of information due to the lack of trust in the official channels.

Facebook is the primary social media platform in Egypt, and Egyptian depends on social media platforms as the primary sources of information (Abdelhafiz et al., 2020).

Data confirmed that Facebook is the primary source of fake news, which agrees with the results of (Shehata & Eldakar, 2021), who stated that there are different types of misinformation on social media. On top of this is the false claims about the virus or treatment of the virus.

In conclusion, this study raises several questions: Why do women not accept the vaccine, although some are highly educated and working women with a high family household income? Does it rely on their attitudes and beliefs toward the vaccine? Are they afraid to take the vaccination? Is there a relationship between their level of education and maybe their accessibility to different sources of information and direct contact with health providers and decision-makers that make them hesitant to be vaccinated? How can the government and the health sector attract women to vaccinate and avoid misinformation and fake news?

Other questions remain open and seek further clarification. Among these questions are: Who's responsibility is to help educate women about the importance of the vaccine? Is it the role of the government, NGOs, media platforms, SNSs, peers, and the socio-cultural aspects? Is there a historical and socio-cultural phenomenon of mistrust among some women in the health system in Egypt and doubt about the efficiency of vaccines in general? How come most women who do not accept the vaccine have seen someone die or suffer from Covid-19 but refuse to be vaccinated to protect themselves? Most of them also know several people in their close circles who have taken the vaccine but refuse to take it themselves.

Future recommendations

Some of the findings of this study remain unanswered and seek more explanation and elaboration. It is suggested that in-depth interviews and focus group discussions could be conducted with some women. The aim is to discover the hidden reasons for vaccine acceptance and the different factors that could shape their attitudes, beliefs, and opinions.

Further studies could analyze the content of the media outlets related to Covid-19 and the Vaccine in Egyptian and Arab media. which will enable a better understanding of the media coverage and how it could be linked to vaccine tolerance.

In addition, these studies could expand to be conducted on Social Media Platforms such as Facebook and Twitter being the primary two sources of information about health in general and Covid-19 in specific. An interesting study could focus on Facebook as a source of fake news related to the vaccine, as this research has been one of the most

exciting findings.

Another set of studies could be conducted with media practitioners such as journalists and TV presenters to understand the dynamics of creating health communication content primarily related to COVID-19 and its vaccination. Through in-depth interviews, the media practitioners will be asked to identify the factors determining their news selection and its possible effects on the targeted audiences.

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