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Mutah University
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**Knowledge, Attitude and Barriers towards
Covid-19 vaccine in Irbid Governorate,
Hashemite Kingdom of Jordan**

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**This Thesis is submitted in Partial Fulfilment of the
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ABSTRACT

Knowledge, Attitude and Barriers towards Covid-19 vaccine in Irbid Governorate, Hashemite Kingdom of Jordan

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Background: The vaccination programme can curb the coronavirus pandemic. In this study, people were asked about their knowledge, attitudes, and barriers to the Covid-19 vaccine to determine if there was a relationship between socio- demographic factors and their vaccination knowledge, attitudes, and barriers. To understand possible barriers to acceptance and rejection of the Covid-19 vaccine.

Methods: A cross-sectional study was conducted, self-administered questionnaire was used. The information was gathered from February to May 2022. 900 adults (aged 18 and above) from Irbid Governorate in Jordan in the chosen three districts that's (Qasabah Irbid, Al-Ramtha and Bani Obeid participated in the survey. Used a questionnaire containing four parts with 32 items.

Results: The results of the study showed that overall, 53.0% of the respondents have good knowledge, 58.3% of the respondents have a negative attitude, and 77.6% have good perceptions of perceived barriers to COVID-19 vaccination. The results show that no significant difference was found between current knowledge, attitude, and barriers to the COVID-19 vaccine.

Conclusion: This study found that there are good knowledge, a negative attitude and good understand of perceived barriers to COVID-19 vaccination.

Keywords: COVID-19 vaccines, knowledge, attitudes, and barriers, Jordan.

الملخص

المعرفة و المواقف تجاه التطعيم بلقاح كوفيد-19

في محافظة اربد، المملكة الاردنية الهاشمية

أحمد العريان

جامعة مؤتة 2023

خلفيه الدراسة : يمكن لبرنامج التطعيم كبح جائحة فيروس كورونا. في هذه الدراسة سئل الأشخاص عن معارفهم و مواقفهم و العوائق تجاه لقاح كوفيد-19 لتحديد ما اذا كانت هناك علاقة بين العوامل الاجتماعية و الديموغرافية و بين المعرفة و المواقف و الحواجز و لفهم العوائق المحتملة لقبول و رفض لقاح كوفيد-19.

منهجية الدراسة : تم اجراء دراسة مقطعية و استبيان ذاتي . تم جمع المعلومات من فبراير الى مايو 2022. شارك 900 شخص بالغ (من عمر 18 عاما فأكثر) من محافظة اربد في ثلاثة الوية مختارة و هي قصبة اربد الرمثا و بني عبيد في الاردن في هذا المسح. تم استخدام استبيان يحتوي على أربعة أجزاء مكونة من 32 فقرة .

نتائج الدراسة : تظهر نتائج هذه الدراسة ان 53.0% من المستجيبين لديهم معرفة جيدة بشكل عام، و 58.3% لديهم موقف سلبي، 77.6% لديهم تصورات جيدة عن العوائق المتصورة التي تحول دون تلقي لقاح COVID-19. أظهرت النتائج أنه لم يتم العثور على فرق كبير بين المعرفة الحالية ، و الموقف، و الحواجز التي تحول دون تلقي لقاح كوفيد-19.

خلاصة الدراسة : و جدت هذه الدراسة ان هناك معرفة جيدة ، و موقفا سلبيا و فهما جيدا للعوائق المتصورة أمام التطعيم ضد COVID-19.

الكلمات المفتاحية: لقاحات COVID-19 ، المعرفة ، المواقف، والعوائق ، الاردن.

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CHAPTER ONE

THE RESEARCH BACKGROUND

1.1 Introduction

The Coronavirus Disease 2019 (COVID-19) has triggered a global crisis unprecedented in history due to its emergence and spread in 2019. Although COVID-19 was declared a global pandemic more than two years ago, survivors are still battling active outbreaks of acute respiratory syndrome coronavirus 2 (SARS-CoV2) that continue to cause active illness (Woolley et al., 2020). According to Sotgiu and Dobler (2020) , there has never been a pandemic like this before. The SARS-CoV-2 virus was responsible for an unprecedented global pandemic in 2020. Billions of people were affected as the virus spread across the world. Also, Moti and Ter Goon (2020) also claimed that the epidemic was not just a medical problem, but became a social problem because of its speed and scale.

Since the World Health Organization (WHO) declared COVID-19 a public health emergency on 11 March 2020, many measures have been taken to combat the disease, including lockdowns, quarantines, travel restrictions and social isolation (Jebril, 2020). Whenever participants came into contact with the outside world, fear and psychological effects increased. Vaccination is the most effective way to protect people and boost their immunity during the pandemic, and medical professionals are proposing many strategies to combat the disease (Chauhan, 2020). Since there was no cure, vaccination against COVID-19 was the best way to stop the pandemic (Cheng, 2021). Nusair et al. (2022) report that following the approval of the –BNT162b2 (Comirnaty, Pfizer-BioNTech) and BBIBP- CorV (Sinopharm, Beijing CNBG) vaccines by the Jordan Food and Drug Authority (JFDA) in December 2020, the introduction of COVID-19 began in Jordan. In March 2021, the JFDA approved the use of three other emergency vaccines, "AZD1222, "Oxford-AstraZeneca," "JNJ-78436735," Johnson & Johnson," and "Gam- COVID -Vac, "Sputnik V."

The first vaccines COVID-19 were produced and delivered within a year of the outbreak of the pandemic. The real challenge was just beginning, but it was a major scientific achievement (Harapan et al., 2020). What is the quickest and most effective way to vaccinate billions of people? Growing skepticism about vaccines has led to the reversal of decades of success in combating infectious diseases, not only for logistical but also for social reasons (Ventura et al., 2020). Moreover, Raveendran and Bazzul (2021) said that vaccination has long been controversial, especially in Western societies.

According to McIntosh et al. (2020), It is becoming increasingly clear that the COVID-19 vaccination not only confers immunity to the disease, but can also cause it. The background to the current epidemic also needs to be considered. Sallam et al. (2021) explain that many countries, including Jordan, have started to implement measures that distinguish between vaccinated and unvaccinated people. On the other hand, Daoudi (2020) clarifies that vaccination remains compulsory, with the government deciding whether or not to provide the vaccine. In some cases, people may have felt vulnerable, in others they wanted to protect their loved ones, in still others they longed for independence, and in still others they may have been driven.

As social media and other online platforms continue to propagate rumours , it is critical to understand how these factors influence vaccine acceptance COVID-19 (Feemster & Immunotherapeutics, 2020). As a result of misinformation, people may be reluctant to get vaccinated, which undermines government and international community an effort is being made to prevent the disease from spreading (Wilson et al., 2021). Furthermore, Abaidoo (2022) argues that in addition to conducting education campaigns and administering the COVID-19 vaccine, doctors, pharmacists and the media can also play an important role in increasing vaccination rates by actively engaging in these activities. Despite the availability of vaccines, vaccination fatigue is a growing problem worldwide (Abu-Hammad et al., 2021).

Like other countries affected by the global epidemic, Jordan has registered over one million COVID-19 cases. The government has set up an online portal for residents to register for vaccination and evaluate the effectiveness of the vaccine (Almuhur et al., 2022). While El-Elimat et al. (2021) reported that fewer than 3.5 million people signed up for vaccination in the first two months, but the number has steadily increased, where most of the registrations took place between March and April 2021, when there are 8,000 new cases of COVID-19 each day.

Previous research (Abu-Hammad et al., 2021; Abu Farha et al., 2021; Ahmead et al., 2022) has shown that a variety of factors, including medical personnel, social media, lack of trust and, most importantly, the safety of vaccination, play a role in vaccination hesitancy. According to a survey conducted by Lefrant et al. (2020) in France, before the release of the vaccine, 25% of those who refused to be vaccinated were concerned about its safety due to the rapid development of the vaccine. In addition, several studies have been published on vaccine acceptance around the world, with Jordan having a low acceptance rate of 28.4%. The aim of this study is therefore to shed light on the level of knowledge and attitudes towards COVID-19 vaccination, as well as to explore the barriers associated with people's desire to be vaccinated with the COVID-19 vaccine in Irbid Governorate.

1.2 Background of the Study

According to World Health Organization (2020) COVID -19, which

first appeared in November 2019 and spread rapidly across the world, has caused disease worldwide. A pandemic was declared by the World Health Organization in March 2020. By May 2022, more than 6.3 million deaths had been documented as a result of the epidemic. Since 2020, a pandemic has been declared by the World Health Organization (WHO). Since May 2022, more than 6.3 million people have died as a result of the pandemic, leading to significant global health costs. Jordan, a high-growth country in the Middle East, is home to about 11 million people. In this country, which is one of the most affected by COVID -19, an estimated 14,000 people have died from direct infection.

One of the most widely used methods to contain the epidemic was the development of vaccines against –SARS-CoV-2, which produces COVID-19 (Chanda, 2021). However, Deigin and Segreto (2021) report that most countries have licensed several antiviral vaccines for human use in the first quarter of 2021. These include BNT162b2, Spikevax, AZD1222, Sputnik V and CoronaVac, among others. Despite the availability of vaccines, a significant proportion of the world's population has resisted or refused to receive them.

The Jordanian government has made vaccination programs available to the public for COVID-19. A green passport is another government- supported travel method. In addition to government buildings, shopping malls, schools, hotels, restaurants and gyms, the green pass was required to enter certain facilities. Despite government efforts to increase vaccination rates, only 46.6% of the population had received the full vaccine by May 2022, and vaccination fatigue remains a serious problem (Abutarbush et al., 2022).

The enormous impact that COVID-19 has on society is why companies have been forced to develop a vaccine against it. Infectious diseases can be prevented by reducing contact and transmission through hand washing, covering and social distancing (McCreary & Pogue, 2020). A long-term solution to the pandemic COVID-19 may be possible with vaccines produced against SARS-CoV-2 (Pogue et al., 2020). Over the last century, vaccines have helped to contain and eliminate or nearly eliminate some viral infections (Rauseo & O'Halloran, 2021). Nevertheless, Deigin and Segreto (2021) emphasize that vaccines not only directly protect those who are vaccinated from disease, but also reduce infections in those who are not protected by them through herd immunity. To illustrate, Fontanet and Cauchemez (2020) clarify that herd immunity is described as an indirect form of protection for the whole population and is an example of indirect protection.

COVID -19 vaccine acceptance has been extensively studied the phenomenon of vaccine aversion has been studied, and reviews and meta-analyses have been conducted to better describe the phenomenon of vaccine aversion (Dula et al., 2021; Reiter et al., 2020; Sherman et al., 2021). Several previous studies in Jordan (Abuhammad et al., 2022; El- Elimat et al., 2021; Sallam et al., 2021) have found varying acceptance rates for COVID-19

vaccination. The percentage of acceptance ranged from 17% to 72%. The current study seeks to identify challenges to the uptake of COVID-19 vaccination in Jordan. The study will provide suggestions to government officials on how to overcome the fear of vaccination and increase vaccination rates in the country.

1.3 Jordan's Covid-19 Epidemic

From March 2020 to the present,, there have been varying degrees of COVID-19 transmission in Jordan, ranging from limited to widespread transmission (Talafta et al., 2022). The first COVID-19 case was reported in Wuhan in 2019 (Okada et al., 2020). Thereafter, cases increased more slowly than in most other countries. The number of cases in Jordan dropped to less than 2000 by the end of August, and 25 people died as a result. Subsequently, the number of confirmed cases increased exponentially (Khabour, 2022).

During the pandemic COVID-19 Jordan took a proactive approach. The Jordanian government took prophylactic measures to limit the transmission of the virus from March to August 2020, which contributed significantly to the low number of cases (Sallam et al., 2021). There were a number of measures Jordan took to combat the deadly pandemic, including movement restrictions, a curfew, reduced working hours, working from home, distance learning, banning gatherings of more than 20 people, suspending international flights and imposing a total lockdown that began on 14 March and lasted for several weeks. However, these restrictions caused human misery as they severely affected the Kingdom's weak economy (Qaqish et al., 2022).

1.3.1 Viral Spread First Wave: September 2020 to January 2021

Qaqish et al. (2022) report that when the first wave of COVID-19 reached the country, 170 000 cases and 2000 deaths were the result of the unstoppable spread of the virus in September or before. Border crossings between neighbouring countries were opened to trucks transporting goods in early September. In the absence of quarantine measures, lorry drivers can mingle with the population. According to Abdelhafez et al. (2021), the number of confirmed cases and deaths has increased dramatically. In the meantime, universities have started accepting registrations for the "learning in class" school year. Social segregation and face hiding have become less important and certain beliefs about COVID-19 have disappeared.

1.3.2 Viral Spread Second Wave: January to May 2021

COVID-19 Transmission has likely become more aggressive after spreading rapidly in the UK in late January and peaking in mid-March 2021, due to the rapidly spreading variant. Since the end of March, this wave has gradually declined. During the peak days, there were more than 9500 cases per day, but by June 2021 there were only about 500 cases per day (Figure 1) (Qaqish et al., 2022).

Source: Centre for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

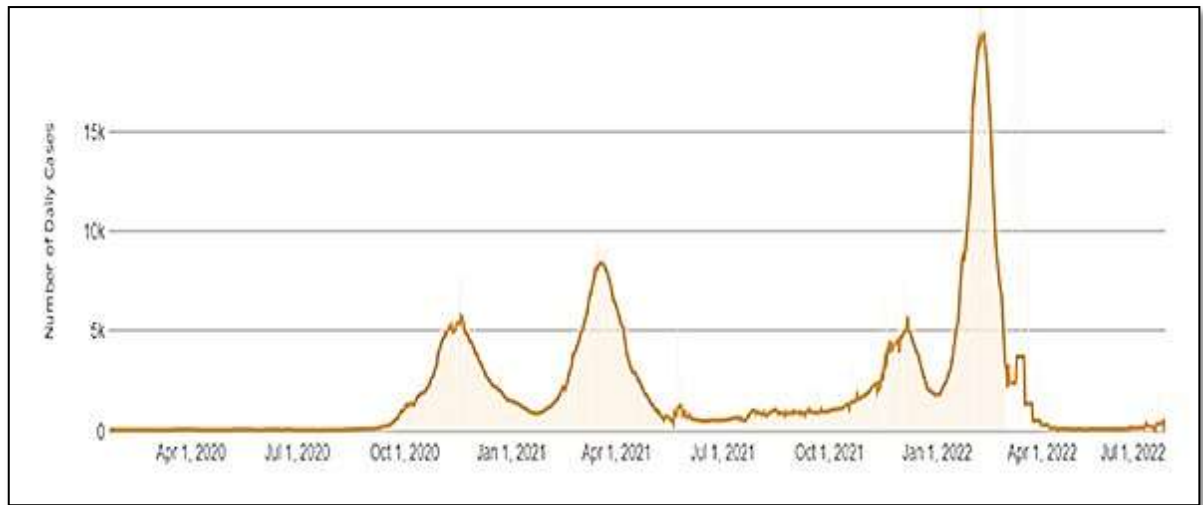


Figure 1.1
A timeline of COVID-19 in Jordan

Abdelhafez et al. (2021) report that infections with the Indian Delta strain were first reported on 1 May 2021. The Jordanians were non- travellers. A new COVID-19 strain, known as Delta Plus, was found in 170 of the 211 infected people by 23 June 2021. By 6 July 2021, 222 Delta Plus cases had been registered in Amman, with the remainder in –Mafraq, Zarqa and Karakll. Despite the rapid spread of the Delta strain, the epidemiological curve remained stable. This flattening of the epidemiological curve is thought to be due to either natural immunity to the virus or vaccine-induced immunity.

In response to the country's economic crisis, curfews and restrictions were lifted in all areas, while hooding, social segregation, and vaccination were monitored. September 1 marked the beginning of the school year (Mukattash et al., 2022). Vaccinations were mandatory for all teachers and staff. All students were required to wear masks, and segregation was observed in seating arrangements. The Ministry of Culture and Tourism organized several festivals and singing events at the same time. After the universities reopened in mid-October, students and staff had to show proof of full vaccination or a negative Polymerase Chain Reaction test (PCR) report every three days. Positive results have been obtained for schoolchildren. Childhood and early adolescence are particularly vulnerable to asymptomatic infections. In mid-October 2021, the country was hit by a third wave as a result of these cases (Qaqish et al., 2022).

1.3.3 Viral Spread Third Wave: October 2021 to January 2022

From mid-October 2021, there were three waves of viral spread. A peak of more than 6000 cases was reported daily on 8 December; thereafter the number gradually declined. There is a marked difference between the third wave and the second wave. One possible explanation could be the Ministry of

Health's continued efforts to promote active COVID-19 vaccination. On 9 December 2021, Jordan reported that two people had been infected with the Omicron variant. Jordanians were the first to return from South Africa, while Jordanians were the second. Fears were then raised that Omicron had spread to the entire population. The variant was discovered after a week in five locations in the kingdom, all of which were from abroad, and all were quarantined. There have been more than 300 cases of Omicron since the end of 2021 (Hussein et al., 2022; Qaqish et al., 2022).

1.3.4 Viral Spread Fourth Wave: January to March 2022

The fourth wave of COVID-19 began in early January 2022. Apparently, this wave is embedded in the previous one. A total of 55% of new infections were caused by the omicron mutant on 20 January. By mid- February, a peak of 30,000 infections per day was recorded, representing about 30% of the samples tested. After that, the number of cases began to decline. Omicron spreads rapidly but causes few upper respiratory symptoms, so fewer hospitalizations are required (Hussein et al., 2022).

The government has made numerous announcements for the period after mid-February 2020 to gradually relax COVID-19 administrative regulations to boost the economy. For those who tested positive for PCR, a five-day isolation period was imposed, starting on the day of the test. After the isolation period, no further testing was required. In addition, the government decided to lift the isolation period for people in contact with the affected individuals. PCR tests are also no longer required for visitors entering Jordan. PCR tests will no longer be required to attend events if proof of full immunization is provided. Schools and classrooms will stop online classes when an infection rate of 10% is reached. From 1 March 2022, COVID-19 infections and deaths will no longer be reported daily by the Ministry of Health. Instead, a report will appear in the news every Sunday. As of 12 July 2022, there are 1,702,661 confirmed cases and 14,069 confirmed deaths (Qaqish et al., 2022; Sheikh Ali et al., 2022). The total number of confirmed cases of COVID-19 infection in Jordan at the end of each wave and the total number of fully vaccinated people are shown in (Table 1.1).

Table 1.1
Jordan's cumulative number of COVID-19 cases

Wave Number	Number Of Confirmed Cases	Number Of Confirmed Deaths	Number Of Fully Vaccinated Personnel
First wave November 19, 2020	169,395	2,053	
Second wave March 15, 2021	486,470	5,428	48,379
Third wave January 16, 2022	1,100,967	12,986	4,109,437
Fourth wave March 18, 2022	1,689,314	14,003	4,425,683
Total number July 12, 2022	1,702,661	14,069	4,544,593

Source : COVID-19 pandemic in Jordan (Qaqish et al., 2022)

1.4 COVID-19 Vaccination: Knowledge, Attitudes, and Barriers

To effectively combat disease epidemics and ensure adherence, effectiveness and success of vaccination programs, vaccine knowledge and attitudes COVID-19 are critical. Despite this, vaccines remain a barrier to immunization due to lack of knowledge and negative attitudes towards them. Although people's attitudes and information about COVID-19 prevention, as well as barriers related to their willingness to receive the COVID-19 vaccine, are critical to limiting disease transmission. COVID-

19 the risk of infection is lower when the vaccine barrier is in place (Saqlain et al., 2020).

1.5 Knowledge

While the pandemic paralyzed the globe, it also offered new opportunities for study on the other side. Many researchers working on the pandemic COVID -19 addressed important focus areas such as technological, biological, social, economic and psychological issues, as well as a variety of other transdisciplinary topics (Abebe et al., 2021). Several studies have been conducted (Al-Marshoudi et al., 2021; Mahmud et al., 2021; Mannan et al., 2020) in different countries to better understand the relationship between knowledge attitude, and barriers and vaccination coverage. The importance of behavioural therapies for the general population and the redesign of health policy components as a result of inequalities Researchers from many countries have captured knowledge, attitudes and behaviours to suggest specific campaigns that influence the decision to vaccinate. In Jordan, proper information about the COVID-19 disease influenced the decision to vaccinate.

According to (Abebe et al., 2021; Elhadi et al., 2021) various sources of

information, including electronic media, print media, social media and other debates, have contributed to a better understanding of COVID-19 infection, its severity and the effectiveness of vaccination. Many studies have shown that social media can encourage people to get vaccinated, reducing the likelihood of infection. In addition, Hatmal et al. (2021) emphasize that vaccinated people are less likely to get sick. Vaccination is advocated by doctors and government organizations, and it is assumed that a pandemic can only be managed through vaccination measures. It is therefore to be expected that the current information about the COVID-19 vaccine will have a significant impact on the willingness to vaccinate.

1.5.1 Attitude

A person's attitude towards a particular issue, which reflects their behaviour, is commonly referred to as 'attitude' (Abebe et al., 2021). Research shows that attitudes towards vaccination are related to the success of vaccination campaigns. There is research on the negative variables that lead to doubts and rejection to vaccinate related to COVID-19 attitudes and intentions to vaccinate (Al-Marshoudi et al., 2021). Minority and vulnerable populations need tailored information, they stressed. Outcome-based assessment is essential for an effective COVID-19 immunization program. Women and others need additional security through group tactics, the Jordanian researchers said (Abuhammad et al., 2022). Attitude plays an important role in vaccination readiness, therefore, individualized treatments that target trust, restraint, efficacy, availability and transparency are critical for promoting positive attitudes towards vaccination. Personalized healthcare tailored to the Jordanian population must include structured interventions that highlight the benefits of vaccination (El-Elimat et al., 2021).

1.5.2 Barriers

A significant threat to the success of vaccination programs is the presence of barriers to vaccination, such as procrastination, delay, or rejection to vaccinate despite its availability. The COVID-19 vaccination causes great public concern and division (Kumari et al., 2021). Despite the positive results of the COVID-19 vaccine trials, many people are still unsure whether they would be willing to be vaccinated (Saied et al., 2021). A study by Kilic et al. (2021), conducted simultaneously in Turkey and the UK, shows that 3% of people in both countries who refused the COVID-19 vaccine expressed doubts about vaccination. Acceptance of the vaccine was boosted by previous influenza vaccination, a high probability of infection with COVID-19 and trust in the government. A global vaccination program is essential to overcome the current COVID-19 epidemic. However, some people are concerned about the safety and effectiveness of the vaccination program. Therefore, vaccination knowledge, attitudes and reservations need to be explored.

Feng and Qin (2021) report that a vaccination program can only be effective if it is reputable. It is equally important to improve the competence of officials responsible for procuring vaccine doses, distributing vaccines wisely, managing the process effectively, educating the public about vaccine safety and effectiveness, and promoting immunization. The demand for COVID-19 vaccine is increasing worldwide, which ultimately leads to the question of how to produce or procure a sufficient supply and distribute the vaccine doses.

1.6 Research Problem

Global approval and distribution of COVID-19 vaccines are expected in 2021. To slow the spread of COVID-19 and perhaps restore social habits and public life to what they were before COVID-19, vaccination of COVID-19 is a critical health strategy for all countries. As a result of vaccination, economies around the world have opened up and health care infrastructure has been reduced. However, Jordanians are reluctant to get vaccinated against COVID-19 because they have doubts about the effectiveness and safety of the vaccine.

As Figure 1.3 shows, vaccination readiness in Jordan is low compared to other countries, and Jordanians are sceptical that the vaccine will be effective in preventing the spread of COVID-19. One of the barriers to vaccination is the lack of rigorous evaluation of vaccines and the potential long-term health risks associated with them, as well as their safety and effectiveness. As a result, opponents of vaccination have been the most vocal. Many have expressed anger and frustration about the issue, either about the vaccine itself or the government's plans.

While there is a school of thought that claims the vaccination does not reliably protect against infection with COVID-19, other Some Jordanians are concerned about the possible negative consequences of the vaccination, with many believing that these consequences could be fatal. Some people have doubts about the components that make up the vaccination. In addition, they do not have confidence in the company that produced the vaccination or in the sources of the vaccine itself. When it comes to warding off the virus, some people believe that other preventive measures such as wearing masks and social isolation are more effective. Others believe that the virus is not of enough concern to warrant the development of a vaccine. On the other hand, there are many who do not believe in the existence of the virus and assume that natural immunity will eventually take over. The aim of this study is therefore to investigate the level of knowledge, attitudes, and barriers that exist in Irbid Governorate regarding vaccination against COVID-19.

Source: Ipsos | Jordanians' Attitudes on Covid-19 Vaccine

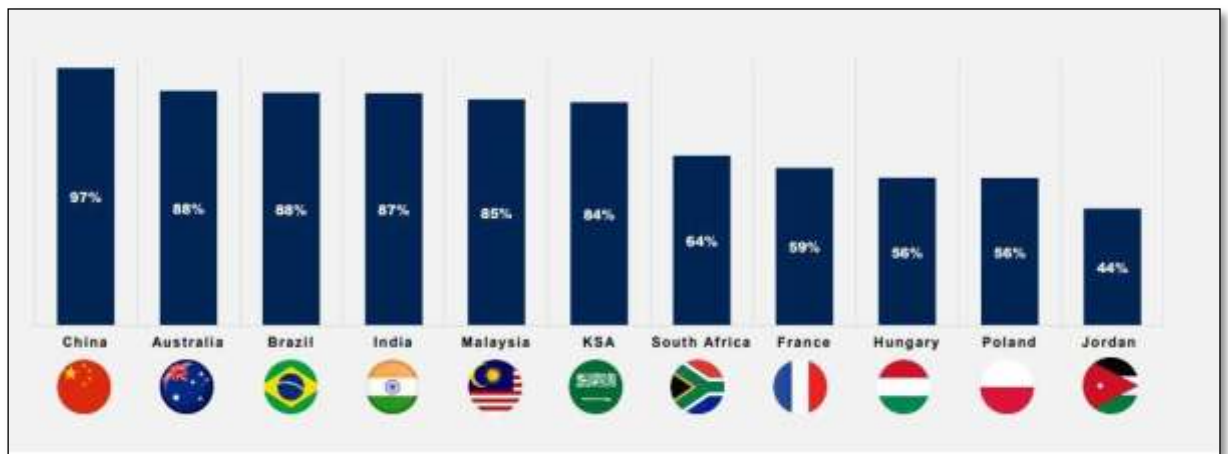


Figure 1.2
Willingness to Take Vaccine By Country

1.7 Research Objectives

1.7.2 General Objective

The aim of the study was to assess knowledge, attitudes and perceived barriers towards the Covid-19 vaccination among the people of Irbid governorate.

1.7.3 Specific Objectives

To assess the association between socio-demographic factors and knowledge, attitudes and perceived barriers towards the vaccination Covid-19.

To determine the factors that may act as barriers to take the Covid-19 vaccine among residents in Irbid Governorate in Hashemite Kingdom of Jordan.

1.8 Significance and Contributions

1.8.1 Theoretical Significance

This study will be important to understand the relationship between socio-demographic characteristics and knowledge, attitudes and perceived barriers to COVID-19 vaccination. This knowledge can be used in public education at local and national levels to limit disease transmission. It can also serve as a basis for future research to develop strategies to educate people to prevent the spread of new diseases in the future.

1.8.2 Practical Significance

To better understand the research problem and improve knowledge and attitudes, future studies in Jordan and other countries can use these results as baseline data, and accurately identify barriers to vaccine uptake COVID-19. In addition, public health professionals need to use these data in developing educational programs to increase public confidence in the value and benefits of vaccination COVID -19.

1.9 Explanation of Pandemic Variables

The terms infectious disease and contagious disease are not synonyms, even though they are often used interchangeably (Brady et al., 2015). In light of the fact that the definitions of these terms change over time as diseases become more prevalent or less prevalent, even medical professionals have difficulty distinguishing between the terms "pandemic", "epidemic", "endemic" and "outbreak". For entertainment, it is not necessary to know the difference between the terms, but in the medical and scientific field it is important for a better understanding of public health and appropriate health interventions. According to Grennan (2019) the basic definitions for the terms are as follows:

Epidemic: is an epidemic which affects a significant population in a region, community, or population.

A Pandemic: is an epidemic and infectious disease that spreads across continents or nations.

Endemic: refers to a phenomenon that only occurs in a certain region or country.

Outbreak: refers to the number of endemic cases increasing faster than expected. The case could possibly be confined to a new location. If an outbreak is not contained as quickly as possible, it may become an epidemic.

1.10 Definition of the Variables

Pandemic: "epidemic that has spread across numerous nations or continents and typically affects large numbers of people." (Aristovnik et al., 2020)

COVID-19 pandemic: "is a worldwide coronavirus epidemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus." (Acter et al., 2020)

Vaccines: "are injections (shots), liquids, tablets or nasal sprays that train the immune system to recognize and protect against dangerous infections." (Forni et al., 2021).

Knowledge: The deficiency or insufficiency of cognitive knowledge related to a particular subject is defined. Three broad domains or domains are identified for measuring knowledge deficits, setting goals, and planning and implementing patient education: cognitive, emotional, and psychomotor domains. These were established by Benjamin S. Bloom and colleagues as part of a taxonomy of educational goals with the intention of categorizing and better identifying specific goals for teaching, learning and assessment of process outcomes (Bloom et al., 1964).

Attitude: a mental state relating to a fact or condition a helpful behaviour a reaction or emotion to a fact or condition a pessimistic outlook a positive outlook. (N. Sun et al., 2021)

Barriers: obstacles that prevent a person, population or community from accessing health services and/or achieving optimal health. Health barriers are sometimes also recognized as systems (i.e., structural factors) that benefit health. Structural barriers are structural difficulties that may prevent a person

from accessing immunization services (Alcaraz et al., 2020).

1.11 The Research Plan

In the first chapter of the study, the researcher introduces the research question and topic as well as the research questions, purpose, objectives, scope, and significance of the study. People's knowledge, attitudes, and perceived barriers towards the COVID-19 vaccination are discussed in the second chapter. The third chapter addresses the methodology of the study as well as the design factors, including the research strategy, data collection, and other aspects of the design. As part of Chapter 4, we present the results and interpret them. As an overview of the study's findings, limitations, suggestions, conclusions and future directions, Chapter Five summarizes its results and conclusions.

1.12 Chapter Summary

This chapter describes the research topic as an investigation into the factors that influence vaccine acceptance in order to increase vaccine acceptance COVID -19, especially in light of the rumours circulating on social media and other online platforms.

Research will provide answers to the question of how to effectively combat disease epidemics, as people's knowledge and attitudes towards vaccines are crucial. Because vaccines remain a barrier to immunization due to lack of knowledge and negative attitudes towards them. This also shows that an immunization program can only be effective if it is reputable and officials are competent in procuring vaccine doses, distributing vaccines wisely and managing the process effectively.

The study aims to assess knowledge and attitudes and perceived barriers towards the Covid-19 vaccination among the people of Irbid Governorate. In addition, the study will make an important contribution to understanding how socio-demographic characteristics influence immunization knowledge, attitudes, and perceived barriers to COVID-19. Based on this study, further research can be conducted.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The focus of this chapter is on COVID-19 immunization knowledge, attitudes and perceived barriers in Irbid, Jordan. The chapter looks at the many concepts of COVID-19 vaccination, the history of vaccination and the different types of vaccines.

2.2 History of Vaccination

In the late 18th century, Edward Jenner discovered smallpox vaccination, which marked a turning point in vaccine history. This important breakthrough led to significant successes in the prevention of infectious diseases through the use of inactivated vaccines for a variety of infectious diseases, including typhoid, plague and cholera. Each of these advances led to a significant decline in infection-related morbidity and mortality and transformed our modern civilizations (Brig, 2021). Equally important, as Correa et al. (2021) point out, advances in microbiology and immunology in the twentieth century also developed techniques for culturing viral cells. This enabled rapid advances in the prevention of diseases such as polio, chickenpox, influenza and others. According to Meenambigai et al. (2021).

According to Mackenzie and Smith (2020), on 30 January 2020, the Director-General of WHO declared the 2019 outbreak of the new COVID- 19 (SARS-CoV-2) a public health emergency of concern. On 11 March, it was confirmed by the World Health Organization that COVID-19 is a pandemic. Unprecedented efforts were made to develop, produce and deliver COVID-19 vaccines, some of which used novel mRNA technology. Chaisson et al. (2022) also report that one year after the first COVID-19 case was reported, the first doses of COVID-19 vaccine were administered in December 2020.

A global rollout of the COVID-19 vaccine was planned for 2021, with doses transported and administered around the world. However, there have been discrepancies in vaccination coverage that have hampered efforts to contain the pandemic. By July 2021, 85% of vaccinations had been administered in high- and middle-income countries and 75% in ten countries.

2.2.1 What is a Vaccine?

According to Jahanafrooz et al. (2020) , the difference between vaccines and other medicines lies in two factors. Firstly, they are for prevention rather than treatment of disease. Through training, bacterial, viral and other pathogens are recognized by the body's immune system. This "memory" can last for years - in some cases even a lifetime. For this reason, vaccines can protect against disease rather than waiting for it to break out. Moreover, vaccines are by definition biological products and not chemical products like most medicines. Moreover, Rosa et al. (2021) clarify that their manufacturing

processes are complex and costly, and their stability and temperature fluctuations are less predictable than for chemical products. Therefore, vaccines need to be refrigerated to keep them at a certain temperature. Vaccines should be stored at a certain temperature depending on their type. However, intranasal vaccines are increasingly being produced that can be stored at room temperature instead of being refrigerated or frozen (Golan et al., 2021).

2.2.2 Overview of COVID-19 Vaccines

Achieving acquired immunity to the COVID-19 virus was a priority following the Pandemic. Before the COVID-19 vaccine was developed and licensed, there was sound information on how Coronaviruses work and how they are structured, which facilitated vaccine development (Ndwandwe & Wiysonge, 2021). COVID-19 has been heavily contested by the global pharmaceutical industry following the sharing of genetic sequencing data (Abu Farha et al., 2021). Several COVID-19 vaccines have been shown to protect against symptomatic infections in large-scale phase III trials. Several steps were evaluated in the vaccine development process, including "vaccine safety, acceptable toxicity, duration of protective immunity, vaccine stability properties, temperature stability, and storage conditions outside the required temperature range, COVID-19 vaccine administration methods (injection, oral, or nasal), vaccine doses (single dose or multiple divided doses), and side effects" (Dula et al., 2021).

Many countries have pre-ordered billions of doses of vaccine so far, including industrialized nations with great wealth (Mahmud et al., 2021). Those suffering from chronic diseases such as diabetes, cancer, and heart disease, as well as the elderly and health professionals, have been vaccinated first (Russo et al., 2021). According to Eroglu et al. (2021), COVID-19 can be more effectively prevented with two doses of different vaccines and immune responses may be higher. Pfizer, BioNTech and AstraZeneca combine two doses of their COVID-19 vaccines to produce a robust immune response against COVID-19. Previously, it was recommended that adolescents 18 years and older receive these vaccines, but a new study by Pfizer has shown that the vaccine is safe for adolescents 12 to 15 years and older and does not cause side effects. The FDA has approved Pfizer-BioNTech's COVID-19 vaccine for this age group (Pitts et al., 2021).

According to Eroglu et al. (2021), a vaccine or vaccine candidate for COVID -19 can be classified into four types depending on the technology used in its development. COVID -19 Vaccines are developed using both classical approaches, with a variety of vaccines available including both inactivated and live attenuated vaccines, and innovative approaches, including nucleic acid vaccines and viral vector vaccines. In Figure 2.2 we summarize the types of vaccines.

Source : —A Narrative Review of COVID-19 Vaccines (Eroglu et al., 2021)¶

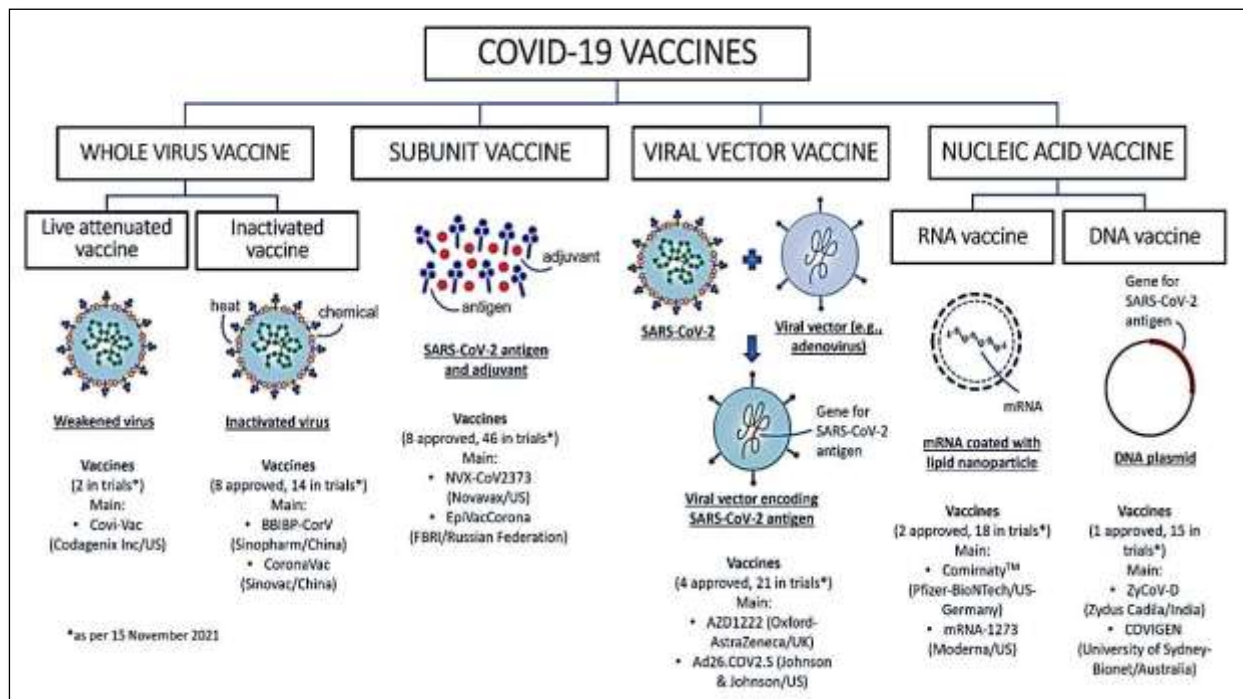


Figure: 2.1
Schematic summary of the four broad groups of COVID-19 vaccines with examples of current COVID-19 vaccines

2.3 COVID-19 Vaccine Types

As of December 2020, there were an estimated 19 vaccine candidates in development and more than 200 in total. At least 52 human trials have been conducted for these potential vaccines. There were many more participants in phases I, II and III. The safety and efficacy of the vaccine candidates is under constant review. In laboratories and in laboratory animals, about 7 out of 100 vaccines have been deemed suitable for human trials (Swan et al., 2021). Furthermore, Mellet and Pepper (2021) note on clinical trials that only one out of five vaccines was successful. Many vaccines have already been developed, increasing the chances of finding a vaccine that is both safe and effective for priority target groups. Vaccines can be developed in one of three ways. They differ, among other things, in that they use the whole virus or bacterium, only the parts of the germ that stimulate the immune system, or only the genetic information that instructs the organism to produce certain proteins.

2.4 COVID-19 Pandemic: Vaccination as a Control Measure

Vaccines produced against the –CARS-CoV-2 virus were one of the first effective weapons against COVID-19 (McCreary & Pogue, 2020). Many nations have been devastated by COVID-19, people, and economies, The COVID-19 vaccines have been around for a long time, but many people believe they were only developed in response to the pandemic's outbreak

(Gates, 2020). In the early twentieth century, Edward Jenner proposed the use of cowpox to immunise against smallpox, which quickly spread around the world (Esparza, 2020). The advancement of science and technology has enhanced the possibilities in vaccines and in vaccine technology for pandemic preparedness (Forni et al., 2021). More recently, the pandemic COVID-19 highlighted ensuring high and consistent vaccination coverage as a possible strategy to prevent disease transmission and end the pandemic (Al-Azzam et al., 2021).(Loomba et al., 2021).

To prevent disease and promote public health, vaccines and immunization programmers work in two ways. Vaccines provide direct immunity to those who receive them and prevent disease, which is the first and most obvious consequence. As a secondary benefit of vaccines, herd immunity reduces the spread of infections among unvaccinated individuals and groups (Zhou et al., 2020). Herd immunity can be built either naturally (after infection with a real disease) or through vaccination (Randolph & Barreiro, 2020). Similarly, Kadkhoda (2021) emphasizes that the licensed vaccine is the recommended method to achieve herd immunity for COVID-19 because the period of natural immunity that develops after infection with the virus has not been adequately demonstrated and the infection is so fatal in many groups. In addition, Chauhan (2020) shows that as many people as possible should be vaccinated even if herd immunity cannot be achieved. It is estimated that a 5% improvement in influenza vaccination coverage could have prevented 4,000-11,000 hospital admissions during the 2017-2018 influenza season. COVID-19 can provide these benefits of higher vaccination coverage.

2.5 Vaccine Knowledge and Attitudes

According to the Abebe et al. (2021) vaccination knowledge refers to the level of knowledge and accuracy of vaccine knowledge. several studies (Daniel et al., 2021; Pelullo et al., 2019; Sandler et al., 2020) surveys carried out in various nations throughout the world show that the factors most strongly associated with intention to use the COVID-19 vaccine are age, parity, occupation, gender, marital status, education, income, perception of risk of infection, health workers' attitudes towards the disease, knowledge of COVID -19, having had an illness with the virus and having a chronic illness. COVID-19 Vaccine acceptance may also be influenced by a variety of myths, according to Abaidoo (2022). Several factors determine the acceptability of a COVID -19 vaccine, including government performance, health status, level of recovery, effectiveness and the speed with which the vaccine is developed. COVID-19 Vaccination could be a global problem due to low levels of knowledge, attitudes and desire. In addition to preventing the spread of COVID-19 infection, it is also critical that those most at risk are vaccinated as soon as possible (Elhadi et al., 2021; Mahmud et al., 2021).

An important factor in vaccination hesitancy is attitudes towards the

safety of vaccination (Yufika et al., 2020). According to a study conducted in Finland by Pivetti et al. (2021), COVID-19 vaccination was most likely to be predicted by the perceived safety of the vaccine. Nevertheless, the long-term effects of vaccination have not been thoroughly studied due to the rushed vaccination trials (Chastin et al., 2021). Researchers (Altamimi & Care, 2020; Puspitasari et al., 2020) have found that in the absence of knowledge about the safety of a new vaccine, people's past experiences with and views of existing vaccines strongly influence their current vaccination decisions. Several studies, including a three-country study by Vecchi et al. (2022) and an Australian study by Kochuvilayil et al. (2021), have shown that seasonal influenza vaccine uptake is an important predictor of pandemic vaccine uptake. COVID-19 Vaccines may have been rejected by the public because they were associated with an increased risk of narcolepsy, which may have exacerbated existing aversion to vaccines.

Furthermore, Kempuraj et al. (2020) have shown that psychological stress is another component that determines people's perception of vaccine safety. Due to stress, the immune system responds less effectively to vaccination after injection, and as a result, the effectiveness of vaccination is lower. For individuals who have psychological doubts about vaccination due to fear of negative consequences, the worry leads to immunization-induced anxiety reactions after vaccination, which reduces vaccination readiness (Crasta et al., 2020). The psychological mechanisms influencing vaccination hesitancy have also been discovered in the UK and are consistent with the basic 'attitudinal root' model of scientific refusal (Butter et al., 2022).

Al-Qerem et al. (2021) conducted a survey in Jordan on the opinions of a sample of Jordanian young adults on various COVID-19 vaccinations; the results show that 1897 participants took part in the survey. One fifth of the individuals (19.9%) agreed to be vaccinated against COVID-19. Acceptance and knowledge of the Pfizer/BioNTech vaccine differed significantly from all other vaccines. Gender, assessment of disease severity, COVID-19 knowledge value, practice value and individual knowledge value of the vaccine were all predictors of vaccination uptake.

In another study in Jordan by Hammour et al. (2022) on factors influencing population knowledge of COVID-19 vaccines and the influence of knowledge on the decision to get vaccinated, only 45.9% of the 468 participants reported that they were willing to get vaccinated, and only 38.5% had registered on the Ministry of Health platform to get vaccinated. The vaccination had also only been administered to a relatively small percentage of them. With 4 out of 8 points on the knowledge scale, the individuals showed a lack of knowledge. A linear regression analysis showed that people over 45 years of age, with a bachelor's or university degree and a medical degree knew more about the COVID-19 vaccine. Participants who were willing to be vaccinated, registered for the vaccination and were vaccinated scored higher on knowledge than others.

In a study by Talafha et al. (2022) on vaccine acceptance COVID-19 among vulnerable groups, Syrian refugees showed a high vaccine acceptance rate of 89.6%, with 89.6% eager to receive the vaccine. They also showed a high level of understanding of the vaccine, the disease, and the virus. Our findings highlight the need to increase the uptake of the COVID-19 vaccine through knowledge and awareness. This is crucial, as refugees are a population sensitive to infections and their consequences and need regular monitoring, especially given the high number of refugees in Jordan and the limited capacity to provide appropriate vaccines in their camps.

In Alzoubi et al. (2020) survey, 99.7% of students agreed that handwashing was necessary to prevent infections, while 68.4% agreed that wearing a mask would prevent illness. Another 10% of the students believed that physical immunity and religious beliefs would protect them from diseases. Respectively 20.6% and 19.2% believed that antibiotics and smoking would protect students from diseases. In addition, 96.8% of respondents avoid shaking hands, 98.8% wash their hands and 93.3% rub alcohol on their hands, 95.8% cough into a handkerchief and dispose of it, 51% drink ginger with honey, and 42.7% consume garlic to prevent infection. The information came mainly from social media, the internet, and television. There was no discernible difference between medical and non-medical colleges. The study found that more targeted approaches and awareness campaigns are needed to improve knowledge, attitudes, and practices regarding several essential elements of virus containment.

Abu-Farha et al. (2020) investigated the opinions and concerns of the public regarding COVID -19 vaccinations in Jordan. According to two- thirds of respondents (67%), scientists currently have the resources to develop a vaccine against COVID -19, however, two-thirds of respondents reported not knowing about its benefits (n = 665, 52%). Most study participants (64%) avoided vaccination because they preferred to develop natural immunity during the study, while 61% reported possible side effects. In summary, COVID -19 vaccination was generally well received by the selected subjects. In addition to mass vaccination against COVID - 19, the study suggests a "herd immunity" strategy to control the current epidemic.

Understanding people's attitudes towards vaccination is critical to managing pandemics, and vaccination can be an important COVID-19 preventive measure (Pogue et al., 2020). In addition, knowing people's attitudes towards vaccination and their desire to be vaccinated is critical to increasing vaccination rates (Akarsu et al., 2021). In this regard, a recent study (Al-Hanawi et al., 2020; Ferdous et al., 2020; Rahman et al., 2020) found that higher levels of education, access to mass media and urban residence were strongly associated with COVID-19 knowledge about vaccination. In addition, Butter et al. (2022) strongly advise countries to provide accurate and reliable COVID-19 vaccination information. In order to implement Jordan's most successful immunization schedule, we need to

understand Jordanians' attitudes, knowledge and perceptions about COVID-19 vaccination. To date, there has been no research on the knowledge, attitudes and perceptions of the population regarding COVID-19 vaccination in Jordan.

2.6 Vaccine Barriers

The deadly disease is being tirelessly researched by scientists and researchers around the globe. It is believed that the immune systems created by vaccination are effective in fighting communicable diseases (Callaway, 2021). According to Ratzan et al. (2019) approximately 2-3 million deaths are prevented by vaccination each year. In addition, Akarsu et al. (2021) report that pandemic outbreaks such as those of 1957, 1968, 1976 and 1977, the H5N1 outbreak (1997-1998) and the 2009 H1N1 outbreak have produced numerous vaccines. Several vaccines have already been approved for mass vaccination against the COVID-19 pandemic, and about 100 vaccines were in preclinical or clinical trials. The approval of the COVID-19 vaccines contributed to the containment of the pandemic (Feldman et al., 2019).

Abebe et al. (2021) concluded that the only way to eliminate the widespread and deadly virus is to develop a vaccine. Therefore, politicians and scientists are reminded by vaccine hesitant and adoption researchers that an effective vaccine is only the beginning. Based on recent experience with pandemic vaccination, a well-researched plan for introduction and adoption is needed for each country (Lefrant et al., 2020). In recent disease epidemics, such as the H1N1 pandemic in 2009, vaccination rates among adults were low. 26% did not believe in the vaccine and 17% had concerns about safety (Ayers et al., 2021). It turns out that the COVID-19 vaccine is safe and effective, despite concerns about side effects and efficacy (Subbaraman, 2020). In a comprehensive study by Li et al. (2021).

conducted in 19 countries, 72% of respondents said they were likely or very likely to be vaccinated, ranging from 89% in China to only 55% in Russia.

Researchers (Abaidoo, 2022; Abuhammad et al., 2022; Ratzan et al., 2019) have studied the factors that influence vaccination acceptance to find out why people are reluctant to get vaccinated against deadly diseases. There is a strong correlation between attitudes towards vaccines and the belief that one should be vaccinated and intention to vaccinate, which is a strong predictor of willingness to vaccinate. According to El-Elimat et al. (2021), vaccination intention was higher when people believed that COVID-19 would last much longer, while vaccination intention was lower when people believed that media reports exaggerated the threat of COVID-19. Another key point Al-Amer et al. (2022) highlights that vaccination intentions were associated with sociodemographic factors, including younger age and minorities. Nevertheless, geography, culture and socioeconomic status can significantly influence vaccination intentions and uptake.

Dwindling public confidence in vaccination worldwide as a result of

urban legends and misinformation is a major problem for public health workers and policy makers. Doubts, rumours and misinformation can influence public opinion and discourage people from getting vaccinated (Wilson et al., 2021). Therefore, in resource-poor settings, it is particularly important to have social support and try to allay fears about the COVID -19 vaccine. This will lead to better control of the pandemic and fewer deaths (Al- Metwali et al., 2021). This will be achieved by increasing vaccination rates and building confidence among the public, health authorities and legislators Equally important, according to Nusair et al. (2022) , , it is crucial to address COVID -19 and general health concerns and minimise the acute burden of the pandemic by first determining the level of vaccination acceptance and scepticism among the public and health workers.

It is important to remember that false information and rumours about COVID-19 vaccines were widespread and frequently posted on social media platforms long before they were refuted by scientific evidence (Hammour et al., 2022). In addition, Rosa et al. (2021) note, some have exaggerated concerns that the mRNA genetic material used in numerous vaccines could cause permanent changes to human DNA. Even among medical professionals, there are reports of concern about the safety and long-term effects of the rapid development of COVID -19 vaccines. Surveys of medical professionals have yielded worrying results; a small percentage of doctors and nurses are unwilling to be vaccinated against COVID -19 (Rubin & Longo, 2022).

The study by Al-Mistarehi et al. (2021) on the factors influencing the population's willingness to be vaccinated against COVID -19 in a developing country is to assess the acceptability of vaccination COVID-19 among Jordanians and to investigate the factors that may influence this acceptability. Vaccination rates COVID -19 were highest among young people, men, unmarried people and people with a bachelor's degree or higher, as well as health professionals, students and people who had already been vaccinated against influenza. Both the perceived risk of COVID -19 and the perceived benefit of vaccination had a major influence on vaccination intentions. People's fears about the possible dangers and side effects of the COVID -19 vaccine were the most important factors in their reluctance or refusal to vaccinate.

The only way to stop the spread of the virus and put an end to the pandemic is to vaccinate the entire population (Puspitasari et al., 2020). For this to work, the mood must be generally positive and resistance minimal. In order to make policy changes and help public health professionals develop a conceptual framework and an educational campaign aimed at improving the population's knowledge about the importance of vaccination, it is crucial to understand the characteristics associated with vaccination acceptance and hesitation, as well as vaccination behaviour.

2.6.1 Vaccination Behaviour

The effectiveness of a vaccine is determined by the coverage rate (the number of people vaccinated) and the effectiveness of the vaccine in that population (Al-Dmour et al., 2020). A COVID-19 vaccine cannot effectively control an existing disease within a community if a high percentage of members refuse to receive it (Abu Farha et al., 2021). However, Bhagavathula et al. (2020) stated that COVID-19 is a new pandemic and therefore extrapolation of past vaccination behaviour is not sufficient to predict vaccination coverage. Similarly, Farhud and Zokaei (2021) stated that due to the unexpected and unique nature of the COVID-19 pandemic, vaccination rates could also be exceptional and unpredictable.

According to Sallam et al. (2021), vaccination faces enormous obstacles in terms of public acceptance due to the behaviour of Jordanians. In relation to El-Elimat et al. (2021), it is argued that there are rumours that vaccination can cause infertility, and widespread anti-vaccination attitudes, all of which contribute to the fear of vaccination. COVID-19 Vaccinations were accepted by 29.4% of the Jordanian population. Abu Farha et al. (2021) pointed out that social media platforms are the main source of hesitancy towards vaccination, rather than medical experts or scientists. Older generations were more receptive to vaccination than younger ones, although acceptance has increased across all segments of the population. Figure 2.7 shows the willingness to vaccinate by demographic characteristics.

Source: Ipsos | Jordanians' Attitudes on Covid-19 Vaccine

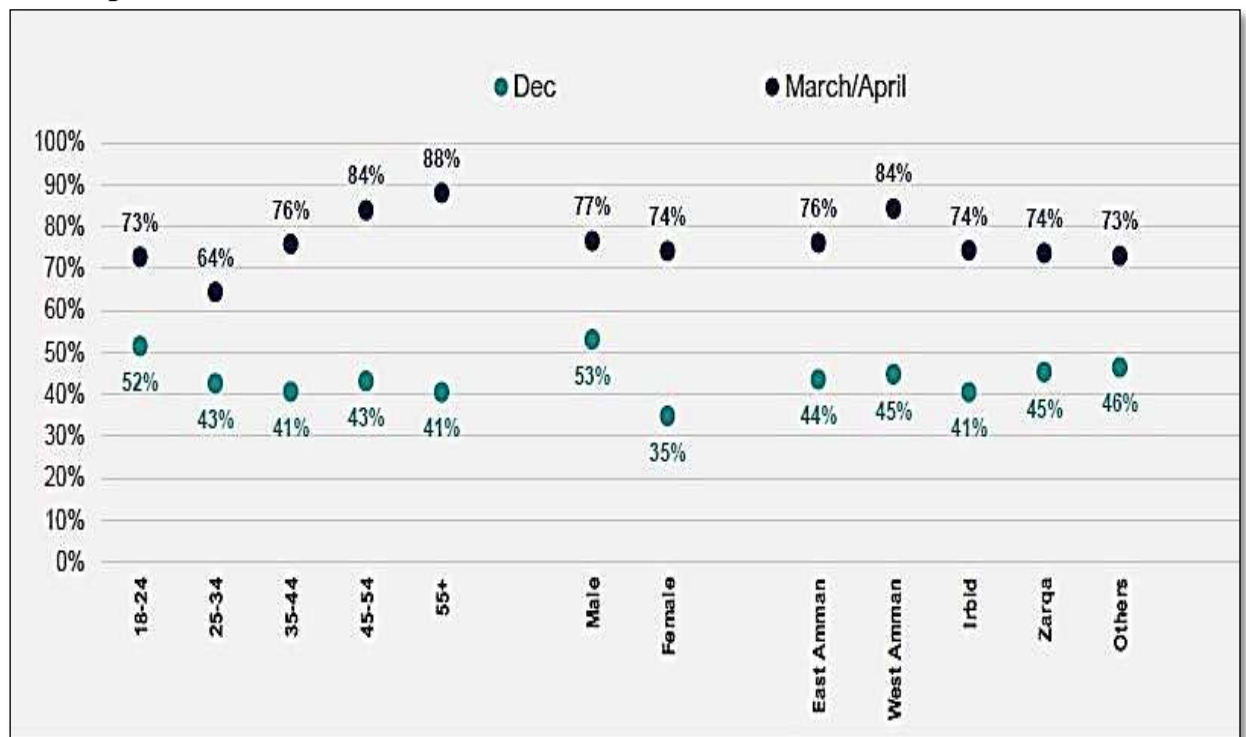


Figure 2.2
Willingness to Take Vaccine by Demographics

2.6.2 Vaccine Hesitancy

There is nothing new or surprising about vaccination refusers and the behaviour of vaccination refusers. In fact, vaccination rejection has been recognized by the WHO as one of the top 10 global health threats in 2019 according to World Health Organization (2020). According to Hatmal et al. (2021), there is a growing problem of vaccination fatigue in Jordan. Therefore, it is crucial to gain a comprehensive understanding of what the public thinks of an upcoming COVID-19 vaccine and what their concerns are.

In the field of vaccine research and policy, cognitivist and individualist assumptions prevail (where vaccination decisions are seen as the end result of an information input/output). Public health, risk communication, health psychology and sociocultural contexts all contribute to our understanding of vaccination refusal and hesitancy (Nelson, 2021). According Moore et al. (2021) recognising the complexity and nuance of vaccination decision-making processes requires taking these additional perspectives to guard against certain implicit assumptions about vaccination hesitancy (such as the assumption that all vaccination decisions are made to maximise public safety). However, one's vaccination history should not be used as the sole basis for decision-making. Reservations about vaccination can range from mild to severe, depending on the vaccine (e.g., one might get vaccinated against MMR but forgo the flu shot). The attitudes and practises of vaccination refusers have changed over time and are likely to continue to change for a variety of reasons (Root-Bernstein, 2021).

2.7 Theoretical and Logical Framework

Vaccines may be effective, easily accessible and widely accepted, but a pervasive conspiracy to cover-up undermines their effectiveness. Even in high-income countries, people may doubt the safety of a newly developed vaccine, making this phenomenon all the more important (Pivetti et al., 2021). In order to protect those who do not receive the vaccine or cannot respond appropriately, achieving sustainable herd immunity requires overcoming vaccine hesitancy (Rutten et al., 2021). A study conducted by Ghosh et al. (2020) in London, contextual factors (such as information sharing, internet, cultural, political and religious influences), individual and group-specific factors (such as vaccination history, knowledge and trust in health systems) and vaccine-specific issues (such as risk and safety) all play a role. Vaccine hesitancy as a whole can be influenced by national factors.

In the vaccine literature, particular care is taken when discussing vaccine hesitancy. Despite the availability of vaccination services, vaccine hesitancy is described as "the reluctance to accept or refuse vaccination" It has been argued that vaccine hesitancy varies according to time, place and vaccine", although other authors disagree with this statement (C. Wang et al., 2021). There are a number of theoretical explanations for vaccination refusal (Marcec et al., 2021; Navin et al., 2019; Omer et al., 2021). To better promote

vaccination to the public, organisations such as the World Health Organisation are developing their own frameworks.

According to Peretti-Watel et al. (2020), vaccination refusal is to be understood as a "collective term" that includes both pro- and anti-vaccination. The environment and the vaccine can influence why people accept or refuse vaccinations. It is estimated that about 70% of the population will need to be infected or vaccinated to have effective herd immunity against the new 2019 COVID-19 epidemic (Fontanet & Cauchemez, 2020). In addition to the development of a safe and effective vaccine, individual, social and contextual factors may also affect vaccination hesitancy. Herd immunity cannot be achieved with an anti- vaccination stance.

2.7.1 Study Logical Framework

Researchers critically employ theoretical and conceptual frameworks to frame the work in order to gain insights, contradictions and alternatives, while the methodology and design of the study evolve in accordance with the research topic and its philosophical and paradigmatic predispositions (Paulston, 1977; Ravitch & Riggan, 2016; Sarid, 2022). Based on the review of the literature, the following logical framework (2.10) was designed to show the involvement of knowledge, attitudes and barriers to COVID-19 vaccine.

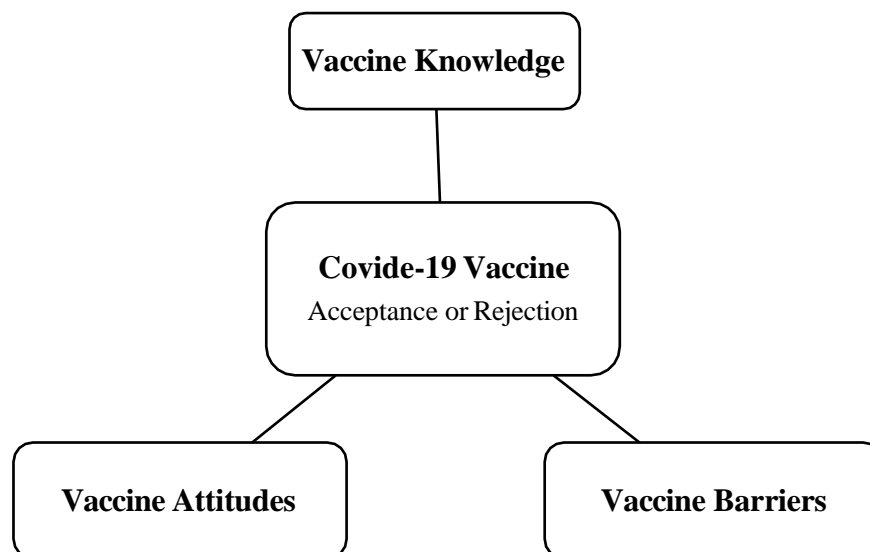


Figure 2.3
Study Logical Framework

A review of the literature for this study revealed that there is little research on factors influencing vaccine acceptance or rejection COVID -19 in Jordan, such as vaccination perceived barriers and refusal. In this study, knowledge about the vaccine is combined with attitudes and perceived barriers to the COVID -19 vaccine to fill the gap left by previous research. As part of the study design, perceived barriers rather than practices were

highlighted due to the nature of the study. To achieve high vaccination coverage, effective immunization is required. High immunization coverage is very important during the current COVID -19 epidemic as it indirectly protects society and helps it return to normal. The general population and those most at risk will benefit from high vaccination rates and a reduction in COVID -19 transmission. However, the extremely contagious nature of COVID -19 poses a major challenge.

CHAPTER THREE METHODOLOGY

3.1 Introduction

This chapter explains the materials and methods used in conducting this study. It includes study design, study setting, study duration, study population, eligibility criteria, sampling, study tools, reliability of the tools, pilot study, data collection procedure, data analysis, and ethical considerations.

3.2 Study design

A cross-sectional study was conducted a self-administered questionnaire.

3.3 Study setting

The study was carried out on people from a street .The study was carried out at three districts chosen randomly from the total nine districts: Qasabah Irbid, Ar-Ramtha and Bani Obeid.

3.4 Study population

The target population included all male and female from 18 years and above in the chosen three districts from the nine that's (Qasabah Irbid, Al-Ramtha and Bani Obeid).

According to the Department of Statistics the total population at Irbid Governorate in Hashemite Kingdom of Jordan is 2050300 and the total study population from the three districts is 1369100.

3.4.1 Eligibility Criteria

3.4.1.1 Inclusion Criteria

The inclusion criteria for this study included, any person in the age of 18 years old and above at the time of conducting the study.

3.4.1.2 Exclusion Criteria

Any person under 18 years.

3.5 Sampling Methods

A convenience sampling was used utilizing a self-administered questionnaire.

3.6 Sample Size Calculation

The study population (people who live in Irbid Governorate in the three districts (Qasabah Irbid, Al-Ramtha, and Bani Obeid)), According to the Department of Statistics the total population total study population from the three districts is 1369100, the total sample size for the study was (N= 900).

3.7 Period and Time of the Study

This study was conducted during the period from 1st of FEB up to 31 MAY 2022, in which four months were spent on a self-administered survey for data collection.

3.8 Collection Methods

3.8.1 Data Collection tools

A self-administered questionnaire containing 32 items was utilized in this study. This questionnaire was composed of four main sections. (1, 2, 3 &4).

Section 1, reflecting, the socio-demographic information of the participant contains 10 questions. Section 2 was reflecting the Participants' knowledge about the COVID-19 vaccine, with 6 questions. While section 3 reflects Participants' attitudes toward the COVID-19 vaccine, composed of 4 questions. The last (4) section, which reflects participants' perceived barriers to the COVID -19 vaccinations, contains 8 questions. The tool developed by Zhong et al (2020). Following is some detailed of these four sections (1, 2, 3 &4) sections of the questionnaire:

First section: The demographic section contains 10 questions on topics such as age, gender, marital status, family size, education level, occupation and general information such as vaccinations.

Section Two: Participants' knowledge of the COVID-19 vaccine consists of 10 questions: "Do you have good information about the Covid- 19 disease? Do you have good information about the Covid-19 vaccine?" "The vaccine is harmful to the body and health." "The vaccine is a microchip that is implanted in the body when you are vaccinated with COVID -19." "Even though you have received the vaccine, you can still get infected." "The vaccine causes infertility." "The vaccine is effective." "The vaccine provides 100% immunity." "There are serious side effects immediately after receiving the COVID-19 vaccine."

Third section: Participants' attitudes towards the COVID-19 vaccine consists of 4 questions: do you have negative attitudes towards vaccination against COVID-19, are you willing to continue to be vaccinated, do you intend to be vaccinated in the future, and do you recommend vaccination to your family members?

Fourth section: The following 8 questions represent participants' perceptions of potential perceived barriers to implementing the COVID -19 vaccination program. Even if the vaccine were effective, I would not get vaccinated because I already take all the necessary precautions and worry about the side effects. I protect myself with gloves and a mask, I do not need the vaccine because I am young and healthy, I do not like injecting anything into my body, I worry about the possible irreversible effects of some vaccines on my genes, and I do not trust the credibility of the vaccine (the manufacturer).

For the Knowledge, Attitude and perceived Barriers towards Covid-19 vaccine among participants, the scale of trends judgment is explained in Table No (3.1).

Table No (3.1)
The weight and grade of the scale

	Yes	No
Weight	1	0
Grade	High	Low

The range of the scale was (1) point (1-0=1), and the range was divided into three equal parts by the equation $1/3 = 0.33$.

The resultant three levels were classified according to the mean value of total scores for each question and item as follows:

1. Low Knowledge, Attitude and perceived Barriers = 0 to 0.33
2. High Knowledge, Attitude and perceived Barriers = 0.67 to 1

3.8.2 Pilot study:

A pilot study was carried out, Forty-five people participated in this study, all from different parts of Irbid Governorate. The people who participated in the pilot study were not counted in the final sample. To find out if the people in the sample group had problems with the questions of the research instrument or were confused, to assess the reliability of the questioners, and to determine whether the questions are clear, relevant, easy to read, and easy to understand by the participants. Minor changes were made, the questionnaire came out in the final version form in the English language (Appendix, I), and into the Arabic language (Appendix, II) which was utilized in this study.

3.8.2.1 Reliability

Cronbach's alpha coefficient was used to assess the reliability of the research instrument. Knowledge, attitude and barriers were all independently assessed. The Cronbach's alpha values for the knowledge scale were 0.739, for the attitude scale 0.861, for the barriers 0.797, demonstrating high reliability. Table 3.2

Table 3.2. Cronbach alpha reliability values for the questionnaire items used in this study

Scale	umber of Items	bach's Alpha value
Knowledge	10	0.739
Attitude	4	0.861
Barriers	8	0.797

3.8.3 Data collection

The data collection was accomplished by using a self-administered questionnaire. Completing the questionnaire took 10-12 minutes. On the

first page of the survey, the participants were informed about the purpose of the study. They were told that only the data collector and the responsible investigator will have access to the questionnaires once completed.

The data collection phase extended from the 1st of Feb up to 31 May 2022. The responses of 900 questionnaires were collected from the participants.

3.9 Ethical Consideration

3.9.1 Ethical approval

Ethical approval was obtained from Mutah University Ethical Committee. Also, informed consent was obtained from each participant which included on the first page of the questionnaire. Therefore all participants confirmed their approval through the question on the first page that was asked, do you agree/ disagree to participate in this research?

3.9.2 Confidentiality

On the first page of the questionnaire, the participant having insured confidentiality; only the data collector and the responsible investigator have access to the questionnaires once completed.

3.10 Data Analysis

Data received from the participants were entered into Microsoft Excel and then by using SPSS Version 25 statistical analysis was performed. Descriptive statistics for the study population variables were presented in the form of simple frequency (n), percentage (%), mean ,standard deviation (\pm SD), statistical test of difference between 2 groups (t-test), test of difference among several groups (ANOVA), in addition Post-hoc test was used. Moreover chi-square test (X^2) was used to detect the association. All statistical tests were performed using the significant level as $p < 0.05$.

CHAPTER FOUR

RESULTS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

4.1 Introduction

This chapter presents the results of the analysis of the data obtained through the questionnaire completed by the study participants. The descriptive characteristics of the participants are presented in section 4.1. The percentage vaccinated Covid-19 in section 4.2. The results on knowledge, attitudes and perceived barriers about the COVID-19 vaccine in 4.3. Section 4.4 presents the assessment of knowledge about the COVID-19 vaccine in relation to socio-demographic characteristics. Section 4.5 describes attitudes towards the COVID-19 vaccine in relation to socio-demographic characteristics. In section 4.6 presents perceived barriers to the COVID-19 vaccine and their relationship to socio-demographic characteristics, in section 4.7 evaluation of the attitude about COVID-19 vaccine in relation to the Sociodemographic characteristics of the participants, in section 4.8 presents evaluation of the perceived barriers about COVID-19 vaccine in relation to the Sociodemographic characteristics of the participants, in section presents 4.9 the socio-demographic characteristics by vaccinated status, in section 4.10 presents knowledge about COVID-19 vaccine by vaccinated status, in section 4.11 presents the attitude towards COVID-19 vaccine by vaccinated, in section 4.12 presents perceived barriers towards COVID-19 vaccine by vaccinated status, in section 4.13 presents sources of information in general and related to health and vaccines of study sample by vaccination status.

4.2 Descriptive Results of Study Participants

The socio-demographic characteristics of the participants are shown in Table 4.1. A total of 900 participants from Irbid Governorate took part in this study. The proportion of male participants 443 (49.2%) was lower than that of female participants (50.8%). By categorizing the age of the 900 participants into three groups, 18 – 34, 35-54, ≥ 55 years old. Regarding the family size, participants have a family with 4-6 members 376 (41.8%), followed by a family with more than 6 members 367 (40.8%), while the family size (1 -3) has the lowest percentage 157 (17.4%).

More than half 559 (62.1%) of the participants were aged between 18 and 34 years, followed by (29.9%) of the group aged 35 to 54 years. Participants over 55 years old accounted for the smallest percentage (8.0). (47.8%) of participants were single, while 45.1% were married, and the remaining (8.6%) were divorced or widowed.

Regarding the educational level of the participants, more than half of the participants (58.6%) have a university degree, 22.6% of the participants have a diploma and 18.8% have school. In terms of occupation, the majority of participants were either employed in government 439 (48.8%) or in the private sector 217 (24.1%). On the other hand, 173 (19.2%) of the participants

were unemployed. The remaining 71 (7.9%) were retired.

Table 4.1
Socio-demographic of 900 Participants in Irbid, Jordan (2022).

Characteristics	Numbers	Percentage
Gender		
Male	443	49.2
Female	457	50.8
Age (years)		
18-34	559	62.1
35-54	269	29.9
≥55	72	8.0
Family size		
1-3	157	17.4
4-6	376	41.8
More than 6	367	40.8
Marital status		
Single	430	47.8
Married	406	45.1
Divorced/ Widowed	64	7.1
Education level		
School	169	18.8
Diploma	203	22.6
University	528	58.6
Occupation		
Unemployed	217	24.1
Employed at private sector	173	19.2
Employed at governmental sector	439	48.8
Retired	71	7.9

4.3 Percentage of Vaccinated with Covid-19

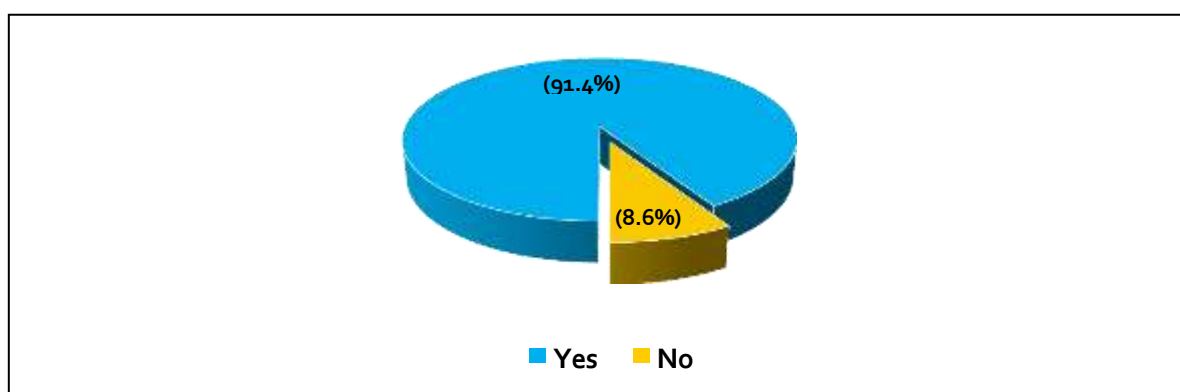


Figure 4.1

Vaccination status in the three chosen districts of 900 participants (2022)

Of the 900 participants who knew about the COVID -19 disease, 823 said they had been vaccinated (one dose and two doses). The percentage of COVID-19 vaccinated in the study sample accounted for 91.4% while the non-vaccinated accounted for 8.6%. Figure 4.1

4.4 Knowledge, Attitude and perceived Barriers towards Covid-19 vaccine

Among the study sample, the highest percentage of those said yes for the question (Fear of long-term genetic effects of some vaccine types) 874 (97.1%), while the highest percentage among who said no 802 (89.1%) for the questions (Do you think you could get an infection with Covid-19 despite the vaccination) and (The vaccine causes infertility). The lowest percentage of those who said yes for the questions (Do you think you could get an infection with Covid-19 despite the vaccination) and (The vaccine causes infertility) was 98 (10.9%), while the lowest percentage among who said no 26 (2.9%) for the question (Fear of long-term genetic effects of some vaccine types).

Table 4.2
Knowledge, Attitude and perceived Barriers towards Covid-19 vaccine of 900 participants (Irbid, 2022)

Main Domains	Level No. (%)			
	Yes	(%)	No	(%)
The knowledge about COVID-19 vaccine				
Do you have good information about the Covid-19 disease	856	(95.1)	44	(4.9)
Do you have good information about the COVID-19 vaccine	854	(94.9)	46	(5.1)
The vaccine is harmful to the body and health	215	(23.9)	685	(76.1)
The vaccine is a microchip implanted in the body when vaccinated with the COVID -19 vaccine	167	(18.6)	733	(81.4)
Do you think you could get an infection with Covid-19 despite the vaccination?	98	(10.9)	802	(89.1)
The vaccine causes infertility	98	(10.9)	802	(89.1)
The vaccine is effective	506	(56.2)	394	(43.8)
Vaccine offers 100% immunity	412	(45.8)	488	(54.2)
Do you think there will be serious side effects immediately after taking the COVID -19 vaccine?	731	(81.2)	169	(18.8)
Do you believe in the modes of transmission of infection with Covid- 19?	836	(92.9)	64	(7.1)
The attitudes towards COVID-19 vaccine				
Do you have a negative attitude towards vaccination against Covid-19	501	(55.7)	399	(44.3)
Are you willing to continue vaccinating	432	(48.0)	468	(52.0)
Do you intend to vaccinate in the future	426	(47.2)	474	(52.7)
Do you recommend the vaccine for your family members	519	(57.7)	468	(42.3)
I am concerned about the vaccine's side effects	828	(92.0)	72	(8.0)
I don't believe that the vaccine will stop the infection	752	(83.6)	148	(16.4)
COVID-19 vaccination is a conspiracy	823	(91.4)	77	(8.6)
I don't need the vaccine because I do all the right things. I wash my hands and wear a mask and gloves	422	(46.9)	110	(53.1)
I don't need the vaccine because I'm young and healthy	493	(48.8)	461	(51.2)
I don't like needles	745	(82.8)	155	(17.2)
Fear of long-term genetic effects of some vaccine types	874	(97.1)	26	(2.9)
Insufficient trust in the vaccination source (producer)	707	(78.6)	193	(21.4)

4.5 Knowledge and Sociodemographic Characteristics

When examining the difference in knowledge about COVID-19 vaccine among the Socio-demographic characteristics of the participants. As can be seen in Table 4.3, this study found that the mean score was slightly higher among females (0.8 ± 0.15) than males (0.79 ± 0.15). However, this difference was not significant $t=0.299$, $p=0.67$.

In the group marital status, a significant difference of knowledge about the COVID -19 vaccine was also found between the three groups (single, married, divorced or widowed), $F=2.91$, $p=0.045$. When the post-hoc test was applied, it was found that participants with married marital status had the highest significant mean compared to the other marital statuses (single, divorced or widowed), $p=0.04$.

When the difference in the level of knowledge assessment and the different age groups (18- 34, 35-54 and over 55) was examined, no significant difference was found $F=1.34$, $p=0.21$. Regarding the family size, no significant difference was found in the knowledge assessment of the COVID -19 vaccine between the three groups (1 -3, 4 - 6, more than 6), $F=2.036$, $p=0.131$.

In terms of educational levels, this study interestingly found that as the level of education (school, diploma and university) increased, the mean score increased. The highest mean score for the evaluation was (0.82 ± 0.17) for the participants who have a university certificate. Followed by (0.79 , 0.60 and 0.53) school, diploma and university respectively. This difference was significant $F=3.1$, $p < 0.031$. When the Post-hoc test was applied, it was found that the participants with a university certificate had the highest significant mean compared to the other education levels (school, university, diploma) $p = 0.029$.

A significant difference in the mean score was found between the four different occupational groups $F=3.41$, $p=0.04$. The highest mean score was found among governmental employees (0.82 ± 0.20), while the lowest mean score (0.58 ± 0.20) was found among the unemployed groups. When the post-hoc test was applied, the only significant difference was found between those working in the government sector and those who are unemployed $p = 0.011$.

Table 4.3
The knowledge about COVID-19 vaccine among the Socio-demographic characteristics of 900 participants (Irbid,2022)

Characteristics	Mean \pm SD	Test of sign.	P value
Gender			
Male	0.79 \pm 0.15	0.299	0.76
Female	0.8 \pm 0.15		
Marital status			
Single	0.70 \pm 0.15	0.045	0.045
Married	0.81 \pm 0.15		
Divorced/ Widowed	0.72 \pm 0.17		
Age (years)			
18-34	0.79 \pm 0.15	0.21	0.21
35-54	0.80 \pm 0.15		
>55	0.81 \pm 0.14		
Family size			
1-3	0.78 \pm 0.154	2.036	0.131
4-6	0.79 \pm 0.153		
More than 6	0.81 \pm 0.156		
Education level			
School	0.53 \pm 0.21	0.031	0.031
Diploma	0.60 \pm 0.21		
University	0.92 \pm 0.37		
Occupation			
Unemployed	0.58 \pm 0.20	0.04	0.04
Employed at governmental sector	0.82 \pm 0.20		
Employed at private sector	0.78 \pm 0.20		
Retired	0.72 \pm 0.20		

4.6 Attitudes and Sociodemographic Characteristics

In examining the difference between variations in the mean score for attitudes towards covid-19 vaccine, with their socio-demographic characteristics. As can be seen in Table 4.4, this study found that the mean score was slightly higher among females (0.34 \pm 0.26) than males (0.32 \pm 0.26). However, this deviation was not significant $t=0.178$, $p=0.85$.

Regarding marital status, no significant difference was also found in the attitude towards the COVID-19 vaccine between the three groups (single, married, divorced or widowed), $F=1.587$, $p=0.205$. When the difference between the rating of attitude and the different age groups (18 to under 35, 35 to 54 and over 55) was examined, no significant difference was found ($F=1.147$, $p=0.25$).

Regarding the family size members, no significant difference was found in the attitude towards the COVID -19 vaccine between the three

groups (1 -3, 4 - 6, more than 6), $F=0.985$, $p=0.374$. Regarding the level of education, interestingly, the study found that as the level of education increased (school, diploma, university), the mean increased. The highest mean score (0.38 ± 0.26) was for participants who had a university certificate. Followed by (0.30, 0.28 and 0.23) school, university and diploma respectively. This difference was significant $F=3.47$, $p= 0.043$. When the post-hoc test was applied, it was found that the participants with a university degree had the highest significant mean score compared to the other levels of education (school, university, diploma) $p = 0.013$.

A significant difference was found in the mean score between the four different occupational groups $F=2.91$, $p=0.033$. The highest mean score was found among government employees (0.39 ± 0.26), while the lowest mean score (0.24 ± 0.25) was found among the unemployed groups. When the post-hoc test was applied, the only significant difference was found between government sector employees and the unemployed $p = 0.03$.

Table 4.4
Attitudes in relation to the Socio-demographic characteristics of 900 participants (Irbid,2022)

Characteristics	Mean \pm SD	Test of sign.	P value
Gender			
Male	0.32 ± 0.26	0.178	0.85
Female	0.34 ± 0.26		
Marital status			
Single	0.30 ± 0.26		0.205
Married	0.32 ± 0.25		
Divorced/ Widowed	0.30 ± 0.30		
Age (years)			
18-34	0.32 ± 0.26		0.25
35-54	0.31 ± 0.26		
>55	0.34 ± 0.25		
family size			
1-3	0.49 ± 0.38	0.985	0.374
4-6	0.51 ± 0.38		
More than 6	0.54 ± 0.37		
Education level			
School	0.23 ± 0.23		0.043
Diploma	0.30 ± 0.27		
University	0.38 ± 0.26		
Occupation			
Unemployed	0.24 ± 0.25		0.033
Employed at governmental sector	0.39 ± 0.26		
Employed at private sector	0.38 ± 0.27		
Retired	0.34 ± 0.25		

4.7 The Perceived Barriers and Sociodemographic Characteristics

When examining the difference in the mean score of perceived barriers to vaccination COVID -19 and socio-demographic characteristics. As can be seen in Table 4.5, this study found that the mean score was slightly higher among males (0.70 ± 0.2) than females (0.69 ± 0.2). However, this difference was not significant $t=0.517$, $p= 0.777$.

Regarding marital status, a significant difference was also found in the perceptions obstacles against COVID-19 between the three groups (single, married, divorced or widowed), $F=3.047$, $p=0.03$. By applying the post-hoc test, it was also found that participants with married marital status had the highest significant mean compared to the other marital status levels (single, divorced or widowed), $p=0.04$. When examining the between the perceived barriers and the different age groups (18 to under 35, 35to 55 and over 55), no significant difference was found ($F=.447$, $p=0.42$). Also, in relation to the family size , no significant difference was found of perceived barriers COVID-19 vaccine between the three groups (1 -3, 4 - 6, more than 6), $F=0.486$, $P = 0.615$.

In terms of educational levels, this study interestingly found that the mean score varied according to the level of education (school, diploma, university). The highest mean score was (0.8 ± 0.20) for participants who had a high school diploma. Followed by (0.74 , 0.69 and 0.59) university and diploma respectively. This difference was significant $F=3.32$, $p= 0.041$. When the post-hoc test was applied, it was found that the participants who had a school leaving certificate had the highest significant rating mean compared to the other levels of education (university, diploma) $p = 0.033$.

A significant difference in the mean score was found between the four different occupational groups $F=2.90$, $p=0.029$. The highest mean score was found among participants in the unemployed sector (0.78 ± 0.20), while the lowest mean score (0.52 ± 0.20) was found among the government groups. When the post-hoc test was applied, the only significant difference was found between the participants from the unemployed sector and the participants from the government sector $p = 0.021$.

Table 4.5
The perceived barriers in relation to the Sociodemographic characteristics of 900 participants (Irbid,2022)

Characteristics	Mean \pm SD	Test of sign.	P-value
Gender			
Male	0.70 \pm 0.2	0.517	0.777
Female	0.69 \pm 0.2		
Marital status			
Single	0.77 \pm 0.19	0.03	0.03
Married	0.60 \pm 0.21		
Divorced/ Widowed	0.70 \pm 0.20		
Age (years)			
18-34	0.69 \pm 0.20	0.42	0.42
35-54	0.70 \pm 0.20		
>55	0.71 \pm 0.20		
Family size			
1-3	0.77 \pm 0.199	0.486	0.615
4-6	0.77 \pm 0.189		
More than 6	0.78 \pm 0.197		
Education level			
School	0.80 \pm 0.20	0.041	0.041
Diploma	0.74 \pm 0.21		
University	0.59 \pm 0.21		
Occupation			
Unemployed	0.78 \pm 0.20	0.029	0.029
Employed at governmental sector	0.52 \pm 0.20		
Employed at Private sector	0.60 \pm 0.20		
Retired	0.80 \pm 0.20		

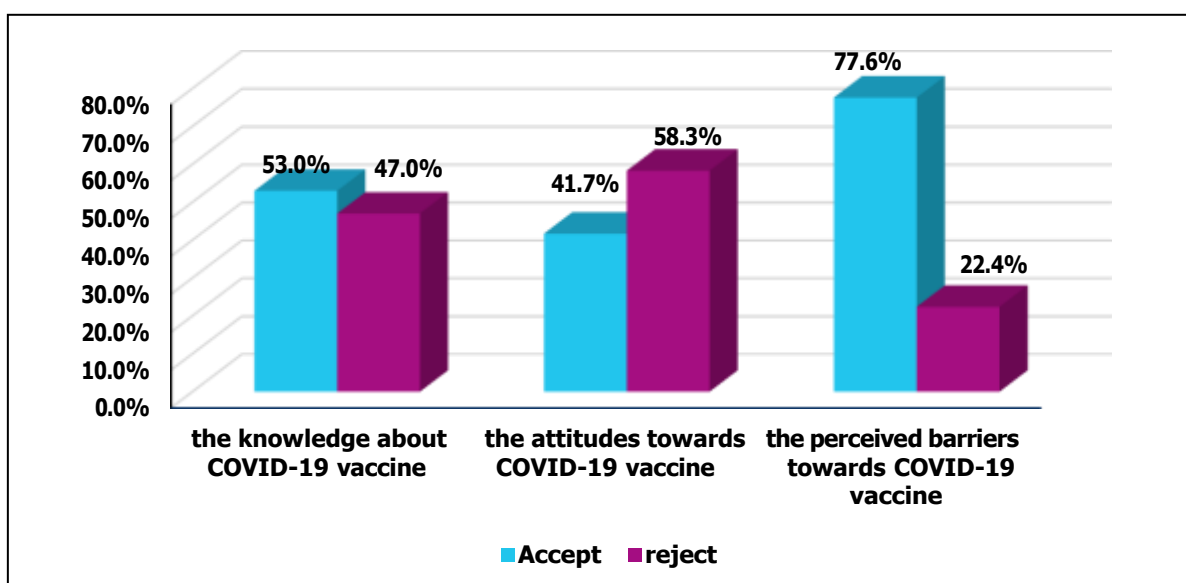


Figure 4.2
Knowledge, attitudes and perceived barriers distribution of participants

The results of the survey show that overall, 53.0% of the respondents have good knowledge, 58.3% of the respondents have a negative attitude, and 77.6% have good perceptions of perceived barriers to COVID-19 vaccination.

4.8 Chi-square Test

4.8.1 Knowledge and Sociodemographic Characteristics

Table 4.6
Knowledge about COVID-19 vaccine in relation to the
Sociodemographic characteristics of 900 participants (Irbid, 2022)

Characteristics			Chi- square	p- value
	High	Low		
Gender				
Male	247(55.7%)	196(44.3%)	0.077	0.781
Female	259(56.6%)	198(43.4%)		
Age (years)				
18-34	332(59.4%)	227(40.6%)	6.136	0.047*
35-54	136(50.5%)	133(49.5%)		
>55	38(52.8%)	34(47.2%)		
Family size				
1-3	96(61.1%)	61(38.9%)	4.775	0.092
4-6	219(58.5%)	157(41.5%)		
More than 6	191(52.0%) 176(48.0%)			
Marital status				
Single	254(59.0%)	176(41.0%)	2.747	0.253
Married	217(53.4%)	189(46.6%)		
Divorced/ Widowed	35(54.6%)	29(45.4%)		
Education level				
School	97(57.4%)	72(42.6%)	0.172	0.917
Diploma	115(56.6%)	88(43.4%)		
University	294(55.6%)	234(44.4%)		
Occupation				
Unemployed	122(56.2%)	95(43.8%)	0.344	0.951
Employed at private sector	94(54.3%)	79(45.7%)		
Employed at governmental sector	250(58.3%)	189(41.7%)		
Retired	40(56.4%)	31(43.6%)		

The objective of this study is to give an overview of the knowledge about COVID-19 vaccine. It can be done by using cross tabulation analysis and Chi-Square test. Table (4.6) shows the knowledge table from cross tabulation analysis between variable –knowledge and –Sociodemographic

characteristics. A cross tabulation analysis was significant between variable knowledge with age.

A relation was not significant between variable knowledge with gender, Occupation, family size, marital status, Occupation and education. It means that there is not a significant relationship.

4.8.2 Attitude and Sociodemographic Characteristics

Table 4.7

Attitude about COVID-19 vaccine in relation to the Sociodemographic characteristics of 900 participants (Irbid,2022)

Characteristics	High	Low	Chi-square	p-value
Gender				
Male	249(56.2%)	194(43.8%)	0.761	0.383
Female	270(59.0%)	187(41.0%)		
Age (years)				
18-34	320(64.2%)	239(35.8%)		
35-54	156(57.9%)	113(42.1%)	0.177	0.915
>55	43(59.7%)	29(40.3%)		
Family size				
1-3	85(54.1%)	72(45.9%)		
4-6	209(55.5%)	167(44.5%)	3.460	0.177
More than 6	225(61.3%)	142(38.7%)		
Marital status				
Single	257(59.7%)	173(40.3%)		
Married	222(54.6%)	184(45.4%)	2.874	0.237
Divorced/ Widowed	40(62.5%)	24(37.5%)		
Education level				
School	89(52.6%)	80(47.4%)		
Diploma	118(58.1%)	85(41.8%)	2.189	0.334
University	312(59.1%)	216(40.9%)		
Occupation				
Unemployed	121(55.7%)	96(44.3%)		
Employed at private sector	98(56.6%)	75(43.4%)	0.779	0.855
Employed at governmental sector	257(58.5%)	182(41.5%)		
Retired	43(60.5%)	28(39.5%)		

The objective of this study is to give an overview of the Attitude about COVID-19 vaccine. It can be done by using cross tabulation analysis and Chi-Square test. Table (4.7) shows the Attitude table from cross tabulation analysis between variable Attitude and –Sociodemographic characteristics.

A relation was not significant between variable Attitude with gender,

age, family size, marital status, education and Occupation It means that there is not a significant relation.

4.8.3 Perceived Barriers and Sociodemographic Characteristics

Table 4.8
Perceived barriers about COVID-19 vaccine in relation to the Sociodemographic characteristics of 900 participants (Irbid,2022)

Characteristics	High	Low	Chi- square	p- value
Gender				
Male	353(79.6%)	90(20.4%)	0.659	0.417
Female	354(77.1%)	103(22.9%)		
Age (years)				
18-34	441(78.8%)	118(21.2%)	0.101	0.951
35-54	210(78.0%)	59(22.0%)		
>55	56(77.8%)	16(22.2%)		
Family size				
1-3	117(74.5%)	40(25.5%)	1.916	0.384
4-6	297(78.9%)	79(21.1%)		
More than 6	293(79.8%)	74(20.2%)		
Marital status				
Single	341(79.3%)	89(20.7%)	0.275	0.871
Married	316(77.8%)	90(22.2%)		
Divorced/ Widowed	50(78.1%)	14(21.9%)		
Education level				
School	131(77.5%)	38(22.5%)	0.487	0.783
Diploma	157(77.3%)	46(22.7%)		
University	419(79.3%)	109(20.7%)		
Occupation				
Unemployed	178(82.0%)	39(18.0%)	5.115	0.163
Employed at private sector	142(82.0%)	31(18.0%)		
Employed at governmental sector	332(75.6%)	107(24.4%)		
Retired	55(77.5%)	16(22.5%)		

Table (4.8) shows the perceived barriers table from cross tabulation analysis between variable barriers and Socio-demographic characteristics. A relation was not significant between variable barriers with gender, age, family size, marital status, education and occupation. It means that there is not a significant relationship.

4.8.4 Socio-demographic characteristics by vaccinated status.

Table (4.9) shows the socio-demographic characteristics by vaccinated status. Among the study sample the highest percentage of those vaccinated were females (50.9%) while the highest percentage among the non-vaccinated group were males (50.6%). The age group (18 – 34) accounted for the highest percentage in both groups (62.2%) for vaccinated and (61.0%) for the non-vaccinated group, while the age group (≥ 55) accounted for the lowest percentage in both groups (7.9%) and (9.1%) respectively.

As regards the family size, groups of families with members (4-6) accounted for the highest percentage in both vaccinated and non-vaccinated groups (42.2%) and (37.7%) respectively while groups of families with members (1-3) accounted for the lowest percentage in both vaccinated and non-vaccinated groups (16.6%) and 26.0%) respectively.

Regarding the marital status, the group (single) accounted for the highest percentage (49.0%) and the group (divorced/widowed) accounted for the lowest percentage (6.3%) among the vaccinated group. The group (married) accounted for the highest percentage (49.4%) and the group (divorced/widowed) accounted for the lowest percentage (15.6%) among the non-vaccinated group.

Respondents with university education level accounted for the highest percentage in the vaccinated group (58.0%) and non-vaccinated group (64.9%) while respondents with school education level accounted for the lowest percentage in both groups (15.6%) and (19.0%) respectively.

As regards occupation, the highest percentage in the vaccinated group were governmental employees (49.4%) and similarly in the non-vaccinated group (41.5%). The lowest percentage in both groups was represented by the retired group (7.7%) and (9.1%) respectively.

A statistically significant association was detected between marital status and vaccination status ($X^2 = 11.68$).

Table (4.9)
The socio-demographic characteristics by vaccinated status of 900 participants (Irbid, 2022)

Characteristics	Level No.(%)		Chi-square	p-value
	Vaccinated	Non vaccinated n=823 n=77		
Gender				
Male	404(49.1%)	39(50.6%)	0.06	0.79
Female	419(50.9%)	38(49.4%)		
Age (years)				
18-34	512(62.2%)	47(61.0%)	0.14	0.93
35-54	246(29.9%)	23(29.9%)		
>55	65(7.9%)	7(9.1%)		
Family size				
1-3	137(16.6%)	20(26.0%)	4.25	0.11
4-6	347(42.2%)	29(37.7%)		
More than 6	339(41.2%)	28(36.3%)		
Marital status				
Single	403(49.0%)	27(35.0%)	11.68	0.003*
Married	368(44.7 %)	38(49.4%)		
Divorced/ Widowed	52(6.3%)	12(15.6%)		
Education level				
School	157(19.0%)	12(15.6%)	1.37	0.50
Diploma	188(22.8%)	15(19.5%)		
University	478(58.0%)	50(64.9%)		
Occupation				
Unemployed	192(23.3%)	25(32.5%)	3.73	0.29
Employed at private sector	160(19.4%)	13(16.9%)		
Employed at governmental	407(49.4%)	32(41.5%)		
Retired	64(7.7%)	7(9.1%)		

- **p< 0.05**

4.8.5 Knowledge about covid-19 vaccine by vaccinated status.

Table (4.10) shows knowledge about covid-19 vaccine by vaccinated status. As regards (Do you have good information about the Covid-19 disease) the higher percentage in group vaccinated responded (yes) which accounted for (97.1%) and the lower percentage responded (no) accounted for (2.9%).

The higher percentages in non-vaccinated group were said yes which accounted (74.0%) and the lower percentage said no which accounted (26.0%).

As regards (Do you have good information about the COVID-19 vaccine) the higher percentage in group vaccinated were said yes which accounted (96.3%) and the lower percentage said no accounted (3.7%). The higher percentage in non-vaccinated group were said yes which accounted

(79.2%) and the lower percentage said no which accounted (20.8%).

As regards (The vaccine is harmful to the body and health) the higher percentage in group vaccinated were responded that the vaccine was harmful to the body and health which accounted (77.8%) and the lower percentage assured that the vaccine was not which accounted (22.2%). The higher percentage in non-vaccinated group were responded that the vaccine was harmful to the body and health which accounted (58.5%) and the lower percentage assured that the vaccine was not which accounted (41.5%).

The higher percentage of the study sample said that vaccine is not a microchip implanted in the body when receiving the Covid-19 vaccine (82.7%) was for those vaccinated and the lower percentage said that vaccine is a microchip implanted in the body when receiving the Covid-19 vaccine (17.3%) for the same group, The higher percentage of the study sample said that vaccine is not a microchip implanted in the body when receiving the Covid-19 vaccine (68.9%) was for those non-vaccinated and the lower percentage said that vaccine is a microchip implanted in the body when receiving the Covid-19 vaccine (31.1%) for the same group.

As regards (Do you think you could get an infection with Covid-19 despite the vaccination) the higher percentage in group vaccinated were said no which accounted (82.6%) and the lower percentage said yes accounted (17.4%). The higher percentage in non-vaccinated group were said no which accounted (68.8%) and the lower percentage said yes which accounted (31.2%).

The higher percentage of the study sample confirmed that (the vaccine does not cause infertility) (90.5%) for those vaccinated while the lower percentage stated that the vaccine causes infertility (9.5%) for the same group, the higher percentage of the study sample confirmed that (the vaccine does not cause infertility) (75.4%) for those non-vaccinated while the lower percentage stated that the vaccine causes infertility (24.6%) for the same group.

The higher percentage of the study sample stated that (vaccine was effective) (55.1%) for those vaccinated while the lower percentage stated they were vaccine not effective (44.9%) for the same group, the higher percentage of the study sample stated that (the vaccine was effective) (67.5%) for those non-vaccinated while the lower percentage stated they were vaccine not effective (32.5%) for the same group.

The higher percentage of the study sample stated that (vaccine not offers 100% immunity) (54.0%) for those vaccinated while the lower percentage stated they were vaccine offers 100% immunity (46.0%) for the same group, the higher percentage of the study sample stated that (the vaccine not offers 100% immunity) (57.1%) for those non-vaccinated while the lower percentage stated they were vaccine offers 100% immunity (42.9%) for the same group.

As regards (Do you believe in the modes of transmission of infection with Covid-19), the higher percentage of the study sample in vaccinated group and

said yes (94.1%), while the lower percentage and said no (5.9%) for the same group, the higher percentage of the study sample in non- vaccinated group and said yes (79.2%), while the lower percentage and said no (20.8%) for the same group.

A statistically significant association was detected between the knowledge dimensions and the vaccination status as regards, do you have good information about the Covid-19 disease, do you have good information about the COVID-19 vaccine, the vaccine is harmful to the body and health, the vaccine is a microchip implanted in the body when vaccinated with the COVID -19 vaccine, the vaccine causes infertility, the vaccine is effective and do you believe in the modes of transmission of infection with Covid-19 ($X^2=80.509, 42.622, 14.459, 8.864, 16.494, 4.376$ and 23.815).

Table (4.10) Knowledge about COVID-19 vaccine by vaccinated status of 900 participants (Irbid, 2022)

The knowledge about COVID-19 vaccine	Level No. (%)		Chi-square	p-value
	Vaccinated	Non vaccinated n=823 n=77		
Do you have good information about the Covid-19 disease				
Yes	799(97.1%)	57(74.0%)	80.509	0.001*
No	24(2.9%)	20(26.0%)		
Do you have good information about the COVID-19 vaccine				
Yes	793(96.3%)	61(79.2%)	42.622	0.001*
No	30(3.7%)	16(20.8%)		
The vaccine is harmful to the body and health				
Yes	183(22.2%)	32(41.5%)	14.459	0.001*
No	640(77.8%)	45(58.5%)		
The vaccine is a microchip implanted in the body when vaccinated with the COVID -19 vaccine			8.864	0.003*
Yes	143(17.3%)	24(31.3%)		
No	680(82.7%)	53(68.9%)		
Do you think you could get an infection with Covid-19 despite the vaccination?			8.864	0.003*
Yes	143(17.3%)	24(31.3%)		
No	680(82.7%)	53(68.9%)		
The vaccine causes infertility				
Yes	79(9.5%)	19(24.6%)	16.494	0.001*
No	744(90.5%)	58(75.4%)		
The vaccine is effective				
Yes	454(55.1%)	(67.5%)	4.376	0.036*
No	369(44.9%)	25(32.5%)		
Vaccine offers 100% immunity				
Yes	379(46.0%)	33(42.9%)	0.289	0.591
No	444(54.0%)	44(57.1%)		
Do you think there will be serious side effects immediately after taking the COVID-19 vaccine?				
Yes	672(82.0%)	59(76.6%)	1.168	0.280
No	151(18.0%)	18(23.4%)		
Do you believe in the modes of transmission of infection with Covid-19?				
Yes	775(94.1%)	61(79.2%)		
No	48(5.9%)	16(20.8%)	23.815	0.001*

• $p < 0.05$

4.8.6 The attitude towards Covid-19 vaccine by vaccinated status.

Table (4.11) shows the attitude towards Covid-19 vaccine by vaccinated status. As regards (Do you have a negative attitude towards vaccination against Covid-19), the higher percentage in group vaccinated were doesn't have a negative attitude towards vaccination against Covid-19 which accounted (47.5%) and the lower percentage have a negative attitude towards vaccination against Covid-19 which accounted (42.5%). The higher percentage non-vaccinated were have a negative attitude towards vaccination against Covid-19 which accounted (64.9%) and the lower percentage were doesn't have a negative attitude towards vaccination against Covid-19 which accounted (35.1%).

As regards (Are you willing to continue vaccinating), the higher percentage in group vaccinated were said yes which accounted (52.0%) and the lower percentage said no accounted (48.0%). The higher percentage non-vaccinated were said yes which accounted (52.0%) and the lower percentage said no which accounted (48.0%).

As regards (Do you intend to vaccinate in the future), the higher percentage in group vaccinated were said yes which accounted (51.8%) and the lower percentage said no accounted (48.2%). The higher percentage non-vaccinated were said yes which accounted (61.0%) and the lower percentage said no which accounted (39.0%).

As regards (Do you recommend the vaccine for your family members), the higher percentage in group vaccinated were said yes which accounted (59.0%) and the lower percentage said no accounted (41.0%). The higher percentage non-vaccinated were said no which accounted (54.5%) and the lower percentage said yes which accounted (45.5%).

A significant association was detected at the 5% level of significance between the vaccinated and non-vaccinated groups and do you have a negative attitude towards vaccination against Covid-19 and do you recommend the vaccine for your family members ($X^2=14.482$ and 5.144).

Table (4.11) The attitude towards COVID-19 vaccine by vaccinated status of 900 participants (Irbid, 2022)

The attitudes towards COVID-19 vaccine	Level No. (%)		Chi-square	p-value
	Vaccinated n=823	Non vaccinated n=77		
Do you have a negative attitude towards vaccination against Covid-19			14.482	0.001*
Yes	349(42.5%)	50(64.9%)		
No	474(57.5%)	27(35.1%)		
Are you willing to continue vaccinating			0.001	0.992
Yes	428(52.0%)	40(52.0%)		
No	395(48.0%)	37(48.0%)		
Do you intend to vaccinate in the future			2.368	0.124
Yes	427(51.8%)	47(61.0%)		
No	396(48.2%)	30(39.0%)		
Do you recommend the vaccine for your family members			5.144	0.023*
Yes	484(59.0%)	35(45.5%)		
No	339(41.0%)	42(54.5%)		

- $p < 0.05$

4.8.7 The perceived barriers towards COVID-19 vaccine by vaccinated status. Table (4.12) shows the perceived barriers towards COVID-19 vaccine by vaccinated status.

The results showed that a higher percentage of vaccinators were concerned about the vaccine's side effects (92.4%) and a lower percentage was not concerned about the vaccine's side effects (7.6%). The results showed that a higher percentage of not vaccinators who concerned about the vaccine's side effects were (88.3%) and a lower percentage were not concerned about the vaccine's side effects (11.7%)

The higher percentage of those doesn't believe that the vaccine will stop the infection in the study sample (84.2%) for vaccinated respondents and the lower percentage believe that the vaccine will stop the infection (15.8%) for the same group. The higher percentage of those doesn't believe that the vaccine will stop the infection in the study sample (76.7%) for non-vaccinated respondents and the lower percentage believe that the vaccine will stop the infection (23.3%) for the same group.

The higher percentage of those doesn't believe that COVID-19 vaccination is a conspiracy in the study sample (91.9%) for vaccinated respondents and the lower percentage believe that the COVID-19 vaccination is a conspiracy (8.1%) for the same group. The higher percentage of those believe that the COVID-19 vaccination is a conspiracy in the study sample (87.0%) for non-vaccinated respondents and the lower percentage believe that the COVID-19 vaccination is a conspiracy (13.0%) for the same group.

The higher percentage of those said they need the vaccine because although do all the right things, wash hands and wear a mask and gloves in

the study sample (52.7%) for vaccinated respondents and the lower percentage said they don't need the vaccine because they do all the right things, wash hands and wear a mask and gloves (47.3%) for the same group. The higher percentage of those said they need the vaccine because although do all the right things, wash hands and wear a mask and gloves in the study sample (58.5%) for non-vaccinated respondents and the lower percentage said they don't need the vaccine because they do all the right things, wash hands and wear a mask and gloves (41.5%) for the same group.

As regards (I don't need the vaccine because I'm young and healthy) the higher percentage in group vaccinated were said no which accounted (51.4%) and the lower percentage said yes accounted (48.6%). The higher percentage in non-vaccinated group were said yes which accounted (50.6%) and the lower percentage said no which accounted (49.4%).

The higher percentage of those said they don't like needles in the study sample (83.2%) for vaccinated respondents and the lower percentage said they like needles (16.8%) for the same group. The higher percentage of those said they don't like needles in the study sample (77.9%) for non- vaccinated respondents and the lower percentage said they like needles (22.1%) for the same group.

The higher percentage of those doesn't believe there are long-term genetic effects of some vaccine types in the study sample (97.6%) for vaccinated respondents and the lower percentage believe there are long- term genetic effects of some vaccine types in the study sample (2.4%) for the same group. The higher percentage of those believe there are long-term genetic effects of some vaccine types in the study sample (92.2%) for non- vaccinated respondents and the lower percentage doesn't believe there are long-term genetic effects of some vaccine types in the study sample (7.8%) for the same group.

The higher percentage of those who have sufficient trust in the vaccination source (producer) in the study sample (79.6%) for vaccinated respondents and the lower percentage have insufficient trust in the vaccination source (producer) in the study sample (20.4%). The higher percentage of those who have insufficient trust in the vaccination source (producer) in the study sample (67.5%) for non-vaccinated respondents and the lower percentage have sufficient trust in the vaccination source (producer) in the study sample (32.5%) for the same group.

A significant association was detected at the 5% level of significance between the vaccinated and non-vaccinated groups and COVID-19 vaccination is a conspiracy, fear of long-term genetic effects of some vaccine types and insufficient trust in the vaccination source (producer) ($X^2=345.6$, 624.4 and 84.6).

Table (4.12) perceived barriers towards COVID-19 vaccine by vaccinated status of 900 participants (Irbid, 2022)

Perceived barriers towards COVID-19 vaccine	Level No. (%) vaccinated		Chi-square	p-value
	Non vaccinated n=823	n=77		
I am concerned about the vaccine's side effects				
Yes	760(92.4%)	68(88.3%)	1.556	0.212
No	63(7.6%)	9(11.7%)		
I don't believe that the vaccine will stop the infection				
Yes	693(84.2%)	59(76.7%)	2.945	0.086
No	130(15.8%)	18(23.3%)		
COVID-19 vaccination is a conspiracy				
Yes	67(8.1%)	67(87.0%)	345.6	0.00001*
No	756(91.9%)	10(13.0%)		
I don't need the vaccine because I do all the right things. I wash my hands and wear a mask and gloves				
Yes	390(47.3%)	32(41.5%)	0.961	0.327
No	433(52.7%)	45(58.5%)		
I don't need the vaccine because I'm young and healthy				
Yes	400(48.6%)	39(50.6%)	0.118	0.731
No	423(51.4%)	38(49.4%)		
I don't like needles				
Yes	685(83.2%)	60(77.9%)	1.393	0.238
No	138(16.8%)	17(22.1%)		
Fear of long-term genetic effects of some vaccine types				
Yes	20(2.4%)	71(92.2%)	624.4	0.00001*
No	803(97.6%)	6(7.8%)		
Insufficient trust in the vaccination source (producer)				
Yes	168(20.4%)	52(67.5%)	84.6	0.00001*
No	655(79.6%)	25(32.5%)		

- $p < 0.05$

4.9 DISCUSSIONS AND RECOMMENDATIONS

4.9.1 Introduction

The aim of this study is to determine the knowledge about the Covid 19 vaccine, attitudes, perceived barriers and factors related to the acceptance or rejection of the Covid-19 vaccine in Irbid Governorate. The COVID-19 vaccine has been positioned as the ultimate approach to preventing the current epidemic. Numerous vaccine candidates have been developed and several clinical trials have recently been published with excellent results, leading to a number of countries granting licenses for specific vaccines for use in immunization programmers. The Jordanian government had introduced the COVID-19 vaccine, which gave rise to optimism about a pandemic solution. Although Jordan had several vaccination sites, the novelty of the COVID-19 vaccination programmer raised concerns about the delivery and uptake of the vaccine in the country. The study also asks about knowledge, attitudes and perceived barriers to COVID -19 vaccination. This study includes data from a

unique study conducted in Jordan, specifically in Irbid Governorate, to analyses knowledge, attitudes and perceived barriers to COVID -19 vaccination. The research findings are considered critical for the design of COVID -19 vaccination-related education and health programmers as they represent a significant number of socio-demographic characteristics that influence knowledge, attitudes and perceived barriers to COVID -19 vaccination

The following discussion and implications are the way to answer the research equations and lead to a deeper understanding of the research objectives stated in the first chapter: What are the levels of knowledge, attitudes and perceived barriers to COVID -19 vaccine. What factors influence vaccination knowledge, attitudes and perceived barriers among residents of Irbid Governorate (COVID -19) based on their socio-demographic characteristics (age, gender, marital status, education, occupation)?

4.9.3 Discussion

COVID-19 was a comparatively new virus that quickly became a global health threat after its discovery in Wuhan, China. However, there is little published evidence on the knowledge, attitudes, and perceived barriers of Jordanians regarding COVID-19. The uniqueness of this epidemic and the numerous difficulties identified will certainly be exacerbated if these concerns are not adequately addressed. Therefore, leaders must develop appropriate methods to mitigate the impact of the disease and raise public awareness. Although the sample size is small, this study provides valuable and up-to-date insights into how participants in this survey interpret the issue, which will guide government initiatives.

In terms of marital status, there is a significant difference between the three groups (single, married, divorced or widowed) in knowledge about the COVID-19 vaccine, but no significant difference between the different age groups. The highest mean score was found among participants with a university degree, followed by school, diploma and unemployment groups. A significant difference in mean score was found between the four different occupational groups. The mean score for the COVID-19 vaccine was slightly higher for women than for men, but this difference was not significant. No significant difference was found between attitudes toward the COVID-19 vaccine among single, married, divorced or widowed persons, or among persons over 55 years of age.

Regarding the family size, no significant difference was found between the three groups in the evaluation of the attitude towards the COVID-19 vaccine. However, a significant difference was found between those working in the government sector and those who are unemployed. The average of perceived barriers to the COVID-19 vaccine was higher among men than women, but this difference was not significant. Regarding marital status, there

is a significant difference in the rating of perceived barriers to the COVID-19 vaccine between the three groups (single, married, divorced, or widowed), but no significant difference was found between the different age groups. The individuals with the highest average score on the assessment were those who had a high school diploma, followed by those who had a university, university, or technical university degree. A significant difference was found between the four different occupational groups, with the government employee group having the lowest average score.

In the study 48.0% of participants were not willing to continue vaccinating and 48.2% did not intend to vaccinate in the future (reluctant to take COVID-19 vaccine). Such high percentages of unwillingness to vaccinate were supported by a recent report from the USA that showed more than half of surveyed black Americans and 30% of Latin American individuals were reluctant to take a free COVID-19 vaccine T J. Padamsee et al (2022), that because the quick and pervasive transmission of vaccine disinformation online and the anti-vaccine campaigns are variables that could lower faith in vaccines and believing the conspiracy theory and being afraid of the vaccine because of its novelty and because of the side effects that occur after taking the vaccine Henry J. Kaiser Family Foundation. (2020).

In the study 82.0% of participants think there will be serious side effects immediately after taking the COVID-19 vaccine. Our findings were supported by A Issanov et al. report from Kazakhstan that showed that the vaccine side effects appeared to be a concerning factor for more than 66% of the respondents.

Positive perceptions about the COVID-19 vaccine decreased with age in our study. Those vaccinated was highest among subjects aged 18–34 years (62.2%) and lowest among those aged >55 years (7.9%). These findings are similar to the results of a study conducted among adults in the United States, which demonstrated that participants aged 18–29 years exhibited higher acceptance (71%) than participants aged 50–64 years (64%) (Reiter et al., 2020) and similar to the results of a study conducted in Turkey that was the highest among subjects aged 18–29 years (69%) and lowest among those aged 40–49 years (58%) (MC Sonmezer et al., 2022) .This is feasible because a person's dread of trying or taking something new increases with age.

Those recommend COVID-19 vaccine for their family members in our study were (484, 59.0%). Our findings were supported by (M Elhadi et al., 2021) which setting in Libya, which showed that the most of participants (12.957, 85.9%) reported that they would encourage their parents to vaccinate ,these results are possible because of their fear of the covid-19 disease and the effects could accord on their parents .

4.9.4 In Terms of Knowledge

The survey results showed that the majority of people (79%) had a good knowledge of vaccination, with gender being the only significant

predictor, with more women having a positive knowledge than men. This differs from the findings of a study by Mahmud 2021 among the general population in Bangladesh, which found less poor knowledge about immunization COVID-19 (62%), and a study by Abdelkader among nursing students in Egypt (62%). The same result was found in a systematic review study by Cascini et al. (2021) among the general population worldwide for vaccination COVID-19 with a rate of 80% and in a study by Ciardi et al. (2021) among health workers in an inner-city hospital in New York with a rate of 79%.

The results show that participants had a solid knowledge of COVID-19 prevention strategies, which influenced their attitudes towards preventing transmission of infections . In addition, 91.4% of the participants got vaccinated, with only 8.6% reporting that they did not get vaccinated. The high percentage of people who got vaccinated can mainly be attributed to the availability of vaccines or the power of health authorities in promoting the availability of vaccines, as well as compulsory vaccination. (89.1%) believed that vaccination would prevent future infections and 76.1% believed that the vaccine was not dangerous to the body or health, but 81.2% believed that taking the COVID-19 vaccine would lead to immediate serious adverse effects. A similar result was found in the study by Al-Tukmagi et al. (2021) in Iraq and in the survey by Duong et al. (2021) in Vietnam on the reasons for the population's willingness to be vaccinated against COVID -19.

The Jordanians who participated in this study achieved a high knowledge level of 79% on average. Due to the limited knowledge about the pandemic, providing basic information about the disease will be a burden for the government. It is a positive sign that Jordanians are aware of the disease despite the misinformation and disinformation on social media.

4.9.5In Terms of Attitude

the study found that after the development of the vaccine, less than half (41% of respondents) had a good opinion about the acceptability of COVID -19, while 58.3% had a negative attitude about the acceptability of COVID -19, indicating that the acceptability of the vaccine is moderate. 52% are unwilling to continue to be vaccinated, indicating that fear of long-term consequences, doubts about the safety profile of the vaccine, lack of information about vaccination and the long development time seem to be the main reasons for negative attitudes towards vaccines. The same result was found in the survey conducted by Alibrahim et al. (2021) among the Kuwaiti public, where more than half (57.2%) of the respondents had neutral to negative attitudes towards vaccination in general.

In other studies, comparable to this study, the following reasons were given for negative attitudes towards the COVID-19 vaccine : Fears of the unpredictable consequences of vaccination, general scepticism about the efficacy and safety of vaccines, and distrust of the government and others

(Latkin et al., 2021; Lazarus et al., 2022; Yoda & Katsuyama, 2021). According to an Australian study by Rozbroj et al. (2019), unfavourable views on vaccination are related to political parties. To address such concerns, vaccine manufacturers and governments need to clearly disclose test results and regularly inform the public. Regardless of how effective the vaccine may be, it would be difficult to achieve the required level of immunity against the pandemic COVID -19 and some other infectious diseases if the public does not accept vaccination. Therefore, public health in the community needs to be promoted, as well as efforts in the vaccine development phase and attempts to eradicate vaccine hesitancy.

Another research article from Nigeria by Ogueji and Okoloba (2022) found that participants had a positive attitude. The positive attitude one year after the development of the vaccine could be due to better understanding and education programmes about the benefits of the vaccine in combating the epidemic. In this study, being female was found to be significantly more strongly associated with unfavourable attitudes towards accepting COVID -19. This is at odds with a recent report from Turkey by Gursay and Sağtaş (2022), who claimed that being male played a role in acceptance of COVID -19 vaccination. Further discrepancies were discovered in a study by Collins et al. (2021), in which researchers found that women were less likely to get vaccinated than men. In contrast to this study, a survey in Bangladesh showed that female participants were much more interested in COVID -19 vaccination than male respondents (M. Islam et al., 2021). These findings should help identify target demographic groups to improve knowledge about COVID -19 vaccination, especially among Jordanian men.

4.9.6 In Terms of Barriers

In terms of perceived barriers to COVID-19 immunization, 77.6% of the respondent understands the perceived barriers to COVID-19 vaccination. Respondents in this survey adhere to precise guidelines such as hand washing with soap, keeping appropriate hygiene, using antiseptics and alcohol, using face masks, or keeping sufficient social distance while outside the home. They also shun personal touch and prefer to go via public transit. Overall, responders in this survey are taking appropriate precautions to prevent developing or transmitting COVID-19.

This study found that 22.4% of participants believed the vaccination would have some negative effects and therefore was unsafe for them, which is in line with results from studies done in Bangladesh (Hossain et al., 2021; H. Islam et al., 2021). In a Chinese study, upwards of half of the participants stated that they were concerned about the vaccine's side effects and as a result, they will postpone vaccinations with COVID-19 until their safety is confirmed, indicating their scepticism about the vaccine's safety despite believing it is critical to halt the pandemic (S. Sun et al., 2021). This might be due to misinformation conveyed through the media and social media, which

promotes vaccination resistance and rejection. This insight was corroborated by the findings of (Banik et al., 2021; Tao et al., 2021; Zhang et al., 2022) who found that vaccine safety concerns and incorrect health beliefs are key determinants of vaccination willingness.

The majority of respondents in this study continue to deny the virus's existence and believe that their natural immunity will protect them from infection. This outcome is comparable to one from (Anand & Stahel, 2021; Jakuszko et al., 2021; Logunov et al., 2021) research, in which respondents questioned the vaccination's safety, trusted their bodies' immune systems more than the vaccine, and were concerned about the vaccine's long-term consequences. Because of religious beliefs concerning vaccination and the COVID-19 virus, this is a possibility. These findings suggest that there is a major need for further and planned public awareness and educational programmes that will deliver accurate and trustworthy information to the public about the benefits of the COVID-19 vaccination. This may be accomplished through legitimate and well-respected national and local health promotion platforms. Schoch-Spana et al. (2021) agreed, suggesting that developing community-specific communication materials might aid in addressing concerns about COVID-19 vaccine acceptability.

4.9.7 Conclusion

Vaccination is one of the most successful preventive health services. Vaccination barriers are an important public health issue because the decision to be vaccinated affects not only the individual but the whole society. The study also shows that demographic characteristics are an important predictor of knowledge, attitudes and perceived barriers, which helps to improve intervention methods that promote and maintain community health in COVID -19 vaccination acceptance and rejection.

The results show that Jordanians have an unfavourable attitude towards vaccination COVID -19. Willingness to continue vaccination was found to influence unfavourable attitudes, with participants not recommending the vaccine to family members. Adverse effects of the vaccine and the perception that vaccination will not stop the virus were among the perceived barriers to uptake identified. The results can be used by health authorities to increase public acceptance of COVID -19 vaccines . Respondents showed a good level of knowledge about the causes and preventive measures for COVID -19. The problem now is to maintain this high level of knowledge so that future studies can confirm whether this also applies to the wider population. Respondents are also optimistic about the importance of health education and the severity of COVID -19. In addition, respondents have become more aware of preventive practises and are taking steps to prevent further spread of the virus. The study shows that there was a significant correlation between the variable 'attitude' and 'education level', also a significant correlation between the variable

'knowledge' and 'marital status', and there was a significant correlation between the variable 'barriers' and 'gender'

The study examined the factors that affect acceptance or rejection of the COVID -19 vaccine . Therefore, it is crucial to understand the characteristics associated with vaccine acceptance and rejection.

4.9.8 Limitations and Further Research

The researchers acknowledge some limitations in their study. The first factor to be examined is the sample size. The sample was drawn at haphazardly. In a non-probability sample, people are selected at haphazardly, which means that not everyone has an equal chance of being selected. As a result, there is a significant risk of selection bias and participants may not be representative of the general population.

Secondly, there are issues regarding the sampling frame, as this study only included a representative sample from the Irbid population area. Therefore, it is recommended that a comprehensive study be conducted that includes all areas of Jordan.

The study was conducted within a short period of time (about two months). Since waves of virus spread can change the acceptance of vaccination, it is recommended that the current results be validated by longer-term studies.

In addition, the data were collected through self-report. Therefore, self- report bias cannot be completely ruled out. Finally, the current study only investigated vaccination knowledge, attitudes and perceived barriers, even though vaccination was made compulsory rather than voluntary by the government.

Despite the limitations, the results of this study will provide professionals with helpful information and insights on how to proactively engage the public to accept the COVID-19 vaccine and will also be helpful for future vaccine acceptance studies. Therefore, a comprehensive study involving the entire Jordanian community is needed to make better policy decisions on this issue.

4.9.9 Recommendation

The findings of this study are encouraging and can be used to address practical issues of knowledge, attitudes and perceived barriers to COVID - 19 vaccination. This study teaches us that in addition to trying to curb the rapid spread of COVID -19 in general, special attention should be paid to minimizing rumors surrounding the COVID-19 vaccine. by closing the gaps in health behaviors and outcomes, addressing inequalities in knowledge and selecting people with limited health knowledge.

Vaccine uptake can improve if more information on vaccine safety and efficacy is publicly available, especially from a reliable, centralised source. In addition, every effort must be made to prevent the spread of disinformation about vaccination. Interventional education programmes, especially those targeting populations at increased risk of not being vaccinated, are therefore crucial to avoid poor vaccination rates. Further research is needed to identify the perceived barriers to vaccine uptake and those at higher risk of vaccine hesitancy. It will help public health decision-makers to develop more accurate and efficient methods so that Jordan can effectively implement the COVID -19 vaccination campaign.

COVID -19 Vaccines must be properly explained, as well as their overall safety and benefits. More emphasis should be placed on the relevance and effectiveness of vaccines, and previously held misconceptions about vaccines should be challenged and refuted.

Health care providers should have the opportunity to share their knowledge about COVID -19 and other vaccines in a forum. This encouragement will build trust.

1. Provide risk information in a variety of forms to reduce individuals' and parents' concerns about vaccination.
2. Improving communication and confidence of health professionals through individualised treatment
3. Media: producing short films depicting vaccine-preventable diseases and distributing an educational manual that uses multimedia to address typical vaccination concerns.
4. Information on how people can get credible immunization information online, through flyers and brochures, social media messages and blog posts.
5. A three-step intervention: Asking, acknowledging and counselling vaccine-critical individuals and parents to increase the confidence of doctors and nurses.

4.9.10 Solutions

To effectively combat the pandemic, the COVID-19 vaccine is expected to be needed. Low uptake of the vaccine has been reported in the past due to factors such as belief in the threat of the disease, fears about the safety of the vaccine, misconceptions about health and doctors' recommendations. In addition, knowing the sources of information that are most trusted is critical for future national immunization campaigns COVID-19 vaccines. Government and pharmaceutical companies are seen as less reliable sources of information than social media and the internet.

To increase vaccination coverage, it is important that the public has access to credible and scientific information about COVID-19 vaccines through the press and media. Therefore, it is important that our social media and the internet provide people with science-based information. In addition, the authorities should tackle rumours and limit their influence on society. They should also educate media representatives about vaccines so that they can promote their use and inform the public about their benefits and risks.

Finally, the results of this study will help Jordanian health care providers and policy makers to better understand the public's knowledge, attitudes and perceived barriers to vaccine acceptance and rejection COVID-19. This will enable them to improve the health sector and increase vaccine acceptance through appropriate practises and policies.

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APPENDICES
APPENDIX I: Questionnaires



Knowledge, Attitude and Barriers towards Covid-19 vaccine in Irbid Governorate, Hashemite Kingdom of Jordan

To whom it may concern,

This study is a continuation of a Master's degree in Public Health Management at Mutah University Faculty of Medicine.

This study is entitled: "Knowledge, Attitude and Barriers towards Covid-19 vaccine in Irbid Governorate, Hashemite Kingdom of Jordan". Please answer all questions as we know that all information you provide will be kept confidential and used for scientific research purposes only. We thank you in advance for your cooperation.

Best regards,

Ahmad Al-Aryan Department of Public Health Faculty of Medicine
Mutah University

- **Part one: This part is designed to collect the socio-demographic information. Please select the answers match your choice through putting (x) in front the suitable answer**

Q1. Age:

1. 18-34 years 2. 35-54 years 3. 55<

Q2. Gender:

1. Female 2. Male

Q3. Marital status:

1. Single 2. Married 3. Divorced/ Widowed

Q4. Family size:

1. 1-3 2. 4-6 3. More than 6

Q5. Educational level:

1. School 2. Diploma 3. University

Q6. Occupation:

1. Unemployed 2. Employed at governmental sector
3. Employed at private sector 4. Retired

Q7. Sources of information in general:

1. Relatives 2. Friends 3. Magazines 4. Social media
5. Books 6. TV

Q8. Sources of information related to health and vaccines:

1. Relatives 2. Friends 3. Magazines 4. Social media
5. Books 6. TV

Q9. Are you vaccinated:

1. Yes 2. No

Q10. Are you get the infection with covid-19:

1. Yes 2. No

- **Part Two:** This part designed to collect information regarding the knowledge about COVID-19 vaccine, please put (×) in front the correct answer.

Q1. Do you have good information about the Covid-19 disease:

1. Yes

2. No

Q2. Do you have good information about the Covid-19 vaccine:

1. Yes

2. No

Q3. The vaccine is harmful to the body and health:

1. Yes

2. No

Q4. The vaccine is a microchip implanted in the body when receiving the corona vaccine:

1. Yes

2. No

Q5. Although you are getting the vaccine; you might get the infection:

1. Yes

2. No

Q6. The vaccine causes infertility:

1. Yes

2. No

Q7. The vaccine is effective:

1. Yes

2. No

Q8. Vaccine offers 100% immunity:

1. Yes

2. No

Q9. Do you think there will be serious side effects immediately after taking the COVID -19 vaccine:

1. Yes

2. No

Q10. Do you believe in the modes of transmission of infection with Covid-19?

1. Yes

2. No

- **Part three: This part is designed to collect information about the attitudes towards COVID-19 vaccine, please put (×) in front the correct answer.**

Q1. Do you have negative attitude from the vaccination against Covid-19:

1. Yes

2. No

Q2. Willingness to continue vaccinating:

1. Yes

2. No

Q3. Do you intend to vaccinate in the future:

1. Yes

2. No

Q4. Do you recommend the vaccine for your family members:

1. Yes

2. No

Part four: This part is designed to collect information about the perceived barriers towards COVID-19 vaccine, please put (x) in front the correct answer.

Q1. I am concerned about the vaccine's side effects:

1. Yes 2. No

Q2. I don't believe that the vaccine will stop the infection:

1. Yes 2. No

Q3. COVID-19 vaccination is a conspiracy:

1. Yes 2. No

Q4. I don't need the vaccine because I do all the right things. I wash my hands and wear a mask and gloves:

1. Yes 2. No

Q5. I don't need the vaccine because I'm young and healthy:

1. Yes 2. No

Q6. I don't like needles:

1. Yes 2. No

Q7. Fear of long-term genetic effects of some vaccine types:

1. Yes 2. No

Q8. Insufficient trust in the vaccination source (producer):

1. Yes 2. No

Appendix II: Arabic Questionnaires



السلام عليكم ورحمة الله وبركاته، وبعد:

تأتي هذه الدراسة استكمالاً لمتطلبات الحصول على درجة الماجستير في إدارة الصحة العامة من كلية الطب في جامعة مؤتة.

هذه الدراسة بعنوان: "المعرفة والمواقف والعوائق تجاه التطعيم بلفاح كوفيد-19 في محافظة اربد في المملكة الاردنية الهاشمية"، أرجو التكرم بالاجابة على الأسئلة الواردة فيها، بما ينسجم مع حالتكم، وتعاونكم في الاجابات يساهم في إنجاح هذه الدراسة ، علماً بأن أية معلومات ستدلون بها ستعامل بسرية تامة ولأغراض البحث العلمي فقط.

شاكراً لكم مقدماً ما تقدم منكم من إجابات و ما بذلت من جهد في إنجاح هذه الدراسة و الوصول إلى أفضل النتائج.

أحمد العريان
إدارة الصحة العامة ، قسم الصحة العامة.
كلية الطب - جامعة مؤتة،
الكرك

الجزء الأول: تم تصميم هذا الجزء لجمع البيانات الخاصة بالخصائص الديمغرافية والاجتماعية ،
يرجى وضع (X) أمام الإجابة الصحيحة:

- س1.العمر:.....سنة.
 1. 18-35 2. 35-55 3. 55 >
- س2.النوع الاجتماعي:
 1. ذكر 2. أنثى
- س3.الحالة الاجتماعية:
 1. أعزب/ عزباء 2. متزوج/ة 3. مطلق/ة ارمل/ة
- س4.كم عدد افراد اسرتك:
 1. 1-3 2. 4-6 3. اكثر من 6
- س5.المستوى التعليمي:
 1. مدرسة 2. دبلوم (كلية مجتمع) 3. بكالوريوس
- س6.المهنة:
 1. عاطل عن العمل 2. القطاع الحكومي 3. القطاع الخاص 4. المتقاعدون
- س7.مصادر المعلومات بشكل عام:
 1. الأقارب 2. الأصدقاء 3. المجلات 4. وسائل التواصل الاجتماعي 5. الكتب 6. التلفزيون
- س8.مصادر المعلومات المتعلقة بالصحة واللقاحات:
 1. الأقارب 2. الأصدقاء 3. المجلات 4. وسائل التواصل الاجتماعي 5. الكتب 6. التلفزيون
- س9. هل تلقيت مطعوم كوفيد-19:
 1. نعم 2. لا
- س10. هل اصبت بـقـيـرـوس كـوفـيـد-19 :
 1. نعم 2. لا

الجزء الثاني: تم تصميم هذا الجزء لجمع المعلومات المتعلقة بالمعرفة حول لقاح كوفيد- 19 ، يرجى وضع (x) أمام الإجابة الصحيحة.

- س1. هل لديك معلومات جيدة عن مرض كوفيد-19
1. نعم
2. لا
- س2. هل لديك معلومات جيدة عن لقاح كوفيد-19
1. نعم
2. لا
- س3. هل اللقاح مضر بالجسم والصحة:
1. نعم
2. لا
- س4. هل اللقاح عبارة عن رقاقة يتم زرعها في الجسم عند تلقي لقاح كورونا:
1. نعم
2. لا
- س5: على الرغم من تلقيك اللقاح ؛ هل يمكن ان تصاب بالعدوى:
1. نعم
2. لا
- س6. هل يسبب اللقاح العقم:
1. نعم
2. لا
- س7. هل اللقاح فعال:
1. نعم
2. لا
- س8. هل يوفر اللقاح مناعة بنسبة 100%؟
1. نعم
2. لا
- س9. هل هناك آثار جانبية خطيرة فورية بعد أخذ لقاح كوفيد- 19 ؟
1. نعم
2. لا
- س10. هل تؤمن بطرق انتقال العدوى بفيروس كوفيد-19 ؟
1. نعم
2. لا

الجزء الثالث: تم تصميم هذا الجزء لجمع المعلومات حول المواقف تجاه لقاح COVID-19 ، يرجى وضع (X) أمام الإجابة الصحيحة.

س1. هل لديك موقفك سلبية تجاه التطعيم ضد كوفيد-19:

1. نعم 2. لا

س2. هل لديك الاستعداد لمواصلة تلقي اللقاح:

1. نعم 2. لا

س3. هل تنوي تلقي اللقاح في المستقبل:

1. نعم 2. لا

س4. هل توصي باللقاح لأفراد عائلتك:

1. نعم 2. لا

الجزء الرابع: تم تصميم هذا الجزء لجمع المعلومات حول العوائق التي تحول دون تلقي لقاح COVID-19 ، يرجى وضع (x) أمام الإجابة الصحيحة.

- س1: أنا قلق من الآثار الجانبية للقاح:
1. نعم 2. لا
- س2: لا أعتقد أن اللقاح سيوقف العدوى:
1. نعم 2. لا
- س3: التطعيم ضد كوفيد- 19 مؤامرة:
1. نعم 2. لا
- س4: لست بحاجة إلى اللقاح لأنني أقوم بكل الأشياء الصحيحة وأغسل يدي وأرتدي قناعًا وقفازات:
1. نعم 2. لا
- س 5: لست بحاجة للقاح لأنني شاب وبصحة جيدة:
1. نعم 2. لا
- س 6: لا أحب الوخز بالإبر:
1. نعم 2. لا
- س 7: عدم تلقي اللقاح بسبب الخوف من الآثار الجينية طويلة المدى لبعض أنواع اللقاحات:
1. نعم 2. لا
- س 8: عدم تلقي اللقاح بسبب عدم الثقة في مصدر التطعيم (المنتج):
1. نعم 2. لا