

Short Communication

The Evaluation of COVID-19 Vaccination Program in Duhok Province, Iraqi Kurdistan: Challenges and Solutions

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**ABSTRACT**

This review aims to evaluate the COVID-19 vaccination program in Duhok, determine its negative and positive points, and subsequently improve it. In Duhok, across the 59 mass vaccination centers, vaccination coverage rates were investigated for all populations aged ≥ 18 years and populations aged ≥ 12 years receiving the three available vaccines, namely: Sinopharm, AstraZeneca, and Pfizer, by the end of the year 2021. By December 2021, the total number of vaccine doses provided was 621430, of whom 72.92% were Pfizer receivers. At the end of 2021, 35.92% of people aged ≥ 18 years were vaccinated with at least one dose, whereas the rate was reduced to 25.15% after including people aged ≥ 12 years. Notably, this rate is higher among health care workers (HCWs), showing that 9474 (60%) of 12000 HCWs were vaccinated with at least one dose. COVID-19 vaccination education highlights its importance in disease prevention and attenuation. Although the average vaccination coverage in Duhok is better than in other cities in Iraq, it remains below the World Health Organization (WHO) standard; hence, urgent action is indicated to increase the coverage rate and to expand the vaccines to include 5-11 years old children. The coverage rate among HCWs is fairly good in Duhok Province. Furthermore, it is important to strengthen the vaccination program in Duhok by improving staff experience, implementing infection preventive measures, and improving the registration system.

Keywords: COVID-19 vaccines, Program, Coverage rate, Prevention, Immunization

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1. Introduction

Globally, the coronavirus (COVID-19) pandemic resulted in a huge burden in terms of morbidity and mortality. In Iraq, from January 3, 2020, until March 9, 2022, there were 2309816 confirmed COVID-19 cases and 25076 deaths [1].

Iraq is one of the countries in the World Health Organization-Eastern Mediterranean Region (WHO-EMR) with a population of over 40 million. Iraqi Kurdistan is an autonomous region in Iraq that consists of 4 governorates with a population of approximately 5309313 [2] (Figure 1). The Ministry of Health in Iraqi Kurdistan reported 434409 confirmed cases and 7401 deaths from the above data [3]. The number of COVID-19 cases in Duhok represents one-third of the total cases in Iraqi Kurdistan, which reflects a high infection rate compared to the other 3 provinces [1, 3]. Although the population density of Duhok (1292535) is less than Erbil and Sulaymaniyah [2], the high infection rate can be explained by higher screening tests for detecting COVID-19 cases. The number of COVID-19 cases has doubled from January 15 to February 18, 2022, in Iraqi Kurdistan. This dramatic increase coincides with the Omicron wave in the Kurdistan region, highlighting the need for medical attention and increasing awareness [4].

Generally, since the emergence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak in December 2019, several preventive measures have been applied to restrict the spread of the virus, such as wearing face masks, social distancing, and handwashing [5]. Similarly, in our region, these measures were implemented to handle the disease effectively [6, 7]. Worldwide, the measures mentioned above rely on social interactions and non-pharmaceutical interventions [8], which did not maintain adequate control over the pandemic. Hence, swift action toward developing vaccines and a special focus on exploiting novel discoveries on various aspects of SARS-CoV-2 were implemented. First, in December 2020, Pfizer and Moderna vaccines were proven effective in preventing COVID-19 in most people [9]. Currently, several countries are manufacturing COVID-19 vaccines with functional national regulatory authorities [10]. The World Health Organization (WHO) licensed vaccines that have been proven effective against highly virulent COVID-19 variants [11]. In Iraq, four COVID-19 vaccines were approved for use, namely: Sinopharm, Sputnik V, AstraZeneca, and Pfizer [12]. Three of these vaccines have been used in Duhok. This review aims to evaluate the COVID-19 vaccination

program in Duhok, determine negative and positive points, and subsequently improve it.

2. Methods

Study design and study population

This research was a review study on the vaccination program and vaccination process. The study includes all vaccinated subjects by the end of 2021.

Study setting

The directorate general of health in Duhok has been arranged into 59 COVID-19 vaccination centers. Most of the 59 centers are mass vaccination types with few mobile stations. After that, two of the centers were combined into one center for technical reasons. The mobile stations operate short term by targeting special populations such as universities, school communities, or other governmental sectors.

Type of vaccines

In Duhok, as mentioned earlier, there are three available vaccines: Sinopharm, AstraZeneca, and Pfizer. The first vaccine dose given on March 26, 2020, was Sinopharm. Afterward, the AstraZeneca vaccine was introduced at the beginning of April 2021, followed by Pfizer in the middle of April 2021.

COVID-19 vaccination target

In Duhok, a 40% coverage of the population aged ≥ 18 years was set as a target by the end of 2021. Then, the target slightly increased after including the population aged ≥ 12 years old, according to instruction from the Public Health Directorate-Ministry of Health of Iraq aiming to improve the vaccination process. The issues of experienced staff availability, the applicability of the online registration system, and discrepancies between the online registration process and hand documentation of the vaccination process were also investigated in this review.

3. Results

By December 2021, the total number of vaccine doses provided was 621430; of those, 72.92% were Pfizer vaccines (Table 1). Figure 2 demonstrates the numbers and percentages of people who have received first, second, and booster doses. Based on Figure 2, more than 75% of

Table 1. Types of vaccines used

Name	No. (%)
Sinopharm	70770(11.38)
AstraZeneca	97459(15.68)
Pfizer	453201(72.92)
Total	621430(100)



the people who received the first dose of the COVID-19 vaccine have had the second dose too.

Coverage rate and vaccination process

The vaccine coverage rate for the population aged ≥ 18 years by the end of 2021 in Duhok Province is 35.92%. The coverage rate was reduced to 25.15% after the inclusion of vaccinated people aged ≥ 12 years. Notably, the vaccination coverage among healthcare workers (HCWs) is 78.95% (Table 2). Lack of experience in vaccination is notable among most of the available staff that belongs to various healthcare institutions. The online registration process seems to be a barrier to the vaccination program. Another concern was the problem of discrepancies between the online registration system and the subsequent hand documentation process.

4. Discussion

Achieving a high-rate vaccination coverage is a top priority in facing the threatening COVID-19 pandemic. COVID-19 vaccines global access (COVAX) by WHO and the independent allocation of vaccines group (IAVG) collaborated to facilitate and regulate the distribution of vaccines worldwide, changing the vaccination coverage targets promptly [13]. The initial coverage target was 3%; after that, it aimed at 20% by the end of 2021. However, in October 2021, a global expansion in the target was advised by the WHO upon releasing the strategy to achieve global COVID-19 vaccination by mid-2022. About 40% and 70% coverage of the total population

were set as a new global target by the end of 2021 and by mid of 2022, respectively [14].

Following WHO's goal, the initial target for the vaccination campaign in Duhok was 40% for people aged ≥ 18 years. However, after including people aged ≥ 12 years, according to the vaccination regulation issued by the Public Health Directorate-Ministry of Health of Iraq numbered 113008 on November 1, 2021, the coverage was targeted to exceed 40%. At the end of 2021, 35.92% of people aged ≥ 18 years were vaccinated with at least one dose, whereas the rate was reduced to 25.15% after including people aged ≥ 12 years. This vaccination coverage is under the WHO target, but it could be considered promising as the average vaccination coverage in Iraq, as of February 8, 2022, has been 23.2% for one dose and 15.8% for fully vaccinated people [15]. Worldwide, 89 countries have not achieved the 40% coverage target [16]. Overall, in low-income countries, 13.55% of the population received the first dose of vaccines by March 2, 2022; this low coverage promotes the risk of acquiring severe SARS-CoV-2 infection [17]. However, studies from neighboring countries such as Iran, Saudi Arabia, and Kuwait showed a vaccination coverage of more than 70% and 60% for the first and second doses, respectively, by February 2022 [18]. Meanwhile, Jordan documented a 30%-40% vaccination coverage for the first and second doses [18]. Therefore, considering the coverage target in Duhok, it is an urgent demand to increase vaccination coverage by improving COVID-19 vaccine uptake by promoting health education about vaccination.

Table 2. People vaccinated with at least one dose by the end of 2021

Vaccinated Group	No. (%)
Adults (population ≥ 18 years)	572492(35.92)*
Population aged ≥ 12 years, including adults	400840(25.15)*
Health Care Workers (HCWs)	9474(78.95)**

* Total population of Duhok for the year 2021 = 1592797. **Total number of HCWs in Duhok=12000.





Figure 1. Iraq Map including Iraqi Kurdistan MAP



Considering healthcare workers in Duhok, it is notable that 9474 (78.95%) of 12000 healthcare workers were vaccinated with at least one dose. This rate is fairly good in comparison to other studies. The WHO regional office for Africa documented that 27% of healthcare workers have been fully vaccinated [19]. Another study by Reses et al. conducted on hospital-based HCWs from January to September 2021 showed a 70% coverage rate [20].

Most of the available staff are from healthcare institutions that lack experience in vaccination campaigns. Hence, they are prone to COVID-19 infection during their duty in hospitals and healthcare centers. Likewise, Vindrola-Padros et al. concluded that lack of training and mismatching the needed skills were the main problems among redeployed HCWs facing the pandemic in the UK, consequently increasing the risk of acquiring COVID-19 infection [21]. Likewise, in Duhok, this condition has resulted in a massive reduction of healthcare workers, which has a negative impact on vaccination coverage. This barrier was resolved by increasing the working hours of uninfected HCWs through financial and non-

financial incentives. Bihar, the third most populous state in India, was reported to have a sustained motivation plan, such as appreciation letters to healthcare workers with positive feedback on staff performance [22].

COVID-19 vaccine hesitancy is a major challenge. Many people are reluctant to receive the vaccine. This seems to happen because such people remain unaware of the intensity of the problem. The fear of potential side effects is another major problem of vaccine hesitancy, even among healthcare workers. In a study in Saudi Arabia, the refusal rate of the vaccine was reported at 8202 (35.1%) among 23582 healthcare workers who participated in a survey questionnaire about COVID-19 vaccine uptake [23]. Another study from 4 Middle-Eastern countries, including Iraq, documented a low acceptance rate (25%) of COVID-19 vaccination [24]. Reluctance to COVID-19 vaccination is a global problem, which is related to several reasons, most importantly concerning the safety profile of the vaccine and the lack of scientific knowledge [25, 26]. Therefore, social media must provide scientific information and avoid misconceptions

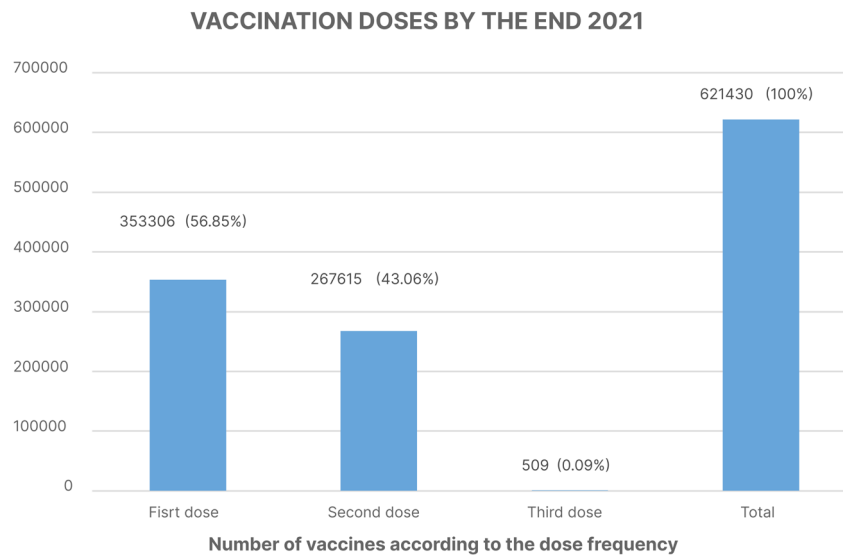


Figure 2. Number of vaccination according to dose frequency

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about COVID-19 vaccines, promoting and updating official websites. Indeed, in Duhok, good advertisement through social platforms and involving famous and religious leaders to motivate people about the importance of vaccine acceptance and uptake have been done. For instance, a recent study from Iran [26] reported an increase in the COVID-19 vaccine acceptance rate by 70% in the most religious city, namely Mashhad, implementing such measures [27].

Filling out the online registration form for the vaccination program was a huge barrier. The literacy level and restricted technology were the main obstacles to accessing internet services in Duhok [28]. Similar reports were documented globally [29-31]. The online registration process started at the beginning of May 2021 using the Arabic language of the Iraqi government. The official language in Iraqi Kurdistan, which is Kurdish, has resulted in constrain. Fortunately, this barrier was overcome by implementing a new online registration form by Iraqi Kurdistan authorities that were presented in three languages, i.e., Kurdish, Arabic, and English. This finding agrees with a study by Paz et al., who documented the language barrier in the online registration system among Hispanics with limited English proficiency in the 10 most populous cities of the USA [32].

Discrepancies between the online registration system and the hand registration process were concerning. The hand registration process is managed by HCWs, while the online registration system is managed by information technology staff. There are discrepancies and tech-

nical errors between the two methods, particularly due to overtime duties and limited staff. Hence, spending extra time double-checking both processes or unifying both systems to be managed by trained HCWs would be a reasonable solution.

The decline of the coverage rate of AstraZeneca (15.68%, n=97459) compared to the Pfizer vaccine (72.92%, n=453201) was due to myths on social media caused panic against the AstraZeneca vaccine. Globally, fears and misconceptions about the AstraZeneca vaccine were a concern in early 2021, particularly following the rare blood clot complication attributed to this vaccine [33]. Although the initial declaration of the European medicines agency disproved such association, the immunization authorities in several countries temporarily suspended the vaccine [34]. It has been well documented that the benefit of AstraZeneca vaccine uptake outweighs the possible risk linked to rare thrombosis complications [34]. Therefore, it is important to disseminate appropriate information in the community about the benefits of this vaccine and avoid the misconception of exaggerated blood clot events.

5. Conclusion

COVID-19 vaccination education highlights its importance in disease prevention and attenuation. Although the average vaccination coverage in Duhok is better than in other cities in Iraq, it remains below the WHO standard. Therefore, urgent action is indicated to increase the coverage rate and expand the vaccines

to include 5-11 years old children. The coverage rate among HCWs is fairly good in Duhok Province. Furthermore, it is important to strengthen the vaccination program in Duhok by improving staff experience, implementing infection preventive measures, and improving the registration system.

Ethical Considerations

Compliance with ethical guidelines

The Research Ethics Committee of the Ministry of Health, KRG Ethical approved this study (Code: 24102021-10-2).

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Authors' contributions

Writing original draft and data preparation: Manhal Ahmed Abdulkader; Writing, review, editing, and supervision: Muayad Aghali Merza.

Conflict of interest

The authors declared no conflict of interest.

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