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Perspective

## The impact of the acceleration of COVID-19 vaccine deployment in two border regions in Oman



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### ABSTRACT

**Background:** Among the challenges to public health systems imposed by coronavirus disease 2019 (COVID-19) have been vaccine scarcity and the prioritization of high-risk groups. Countries have been prompted to accelerate the pace of immunization campaigns against COVID-19 to deploy the immunization umbrella to the largest possible number of target groups. In this paper, we share the perspective of Oman regarding the impact of accelerating the administration of the first dose of the COVID-19 vaccine in one border governorate (Musandam) by comparison to another border governorate (Al-Buraimi) where this approach was not applied.

**Methods:** Daily admissions data (April 10, 2020 to June 24, 2021) and vaccination data (January 1 to June 24, 2021) were collected systematically. For each governorate, the cumulative doses (first and second doses) and vaccination coverage were calculated daily.

**Results:** Within 1 month, first dose vaccination coverage increased from 20% to 58% in Musandam, reducing the incidence of hospital admission by 75%. In comparison, vaccination coverage plateaued at 20% in Al-Buraimi, and the incidence of hospital admission increased by 500%.

**Conclusions:** Given the peculiarity of the geographical location and being the first line of access for imported cases, border regions should be a priority for vaccine deployment as a preventive measure. The two different approaches reported here, implemented in broadly similar cross-border governorates, provide evidence of the significant effect of accelerating the first dose of vaccine in reducing hospitalizations.

### 1. Introduction

We watched the success of the United Kingdom coronavirus disease 2019 (COVID-19) vaccination program, in which the high vaccine effectiveness from a single dose justified the approach of rapidly offering the vaccine to a wider proportion of the population (Bernal et al., 2021; Government of the United Kingdom, 2021; Harnden and Earnshaw, 2021). This article shares the perspective from Oman, where the acceleration of the first dose of COVID-19 vaccine delivery in one border district (Musandam) clearly led to a significant reduction in the incidence of COVID-19 hospitalizations when compared to a broadly similar border district (Al-Buraimi) where this approach was not applied.

The Sultanate of Oman, a country with a population of 4.6 million, has a unique location in the Middle East, sharing land borders with

three countries (the Kingdom of Saudi Arabia, Yemen, and the United Arab Emirates (UAE)) and having close connections to other countries. These connections serve social, commercial, religious, tourism, and employment purposes. The governorates of Al-Buraimi and Musandam are located on the northern border of Oman, and have total populations of 122,114 and 49,457, respectively (<https://data.gov.om/search?query=Population>). They are considered high-risk areas for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) introduction and spread, due to their proximity to the UAE and the numerous land crossings between the two countries. Population movement across the borders to the UAE for employment and social purposes is a common part of life. Hence, risk assessment, preparedness, and management throughout the pandemic, including the speed of COVID-

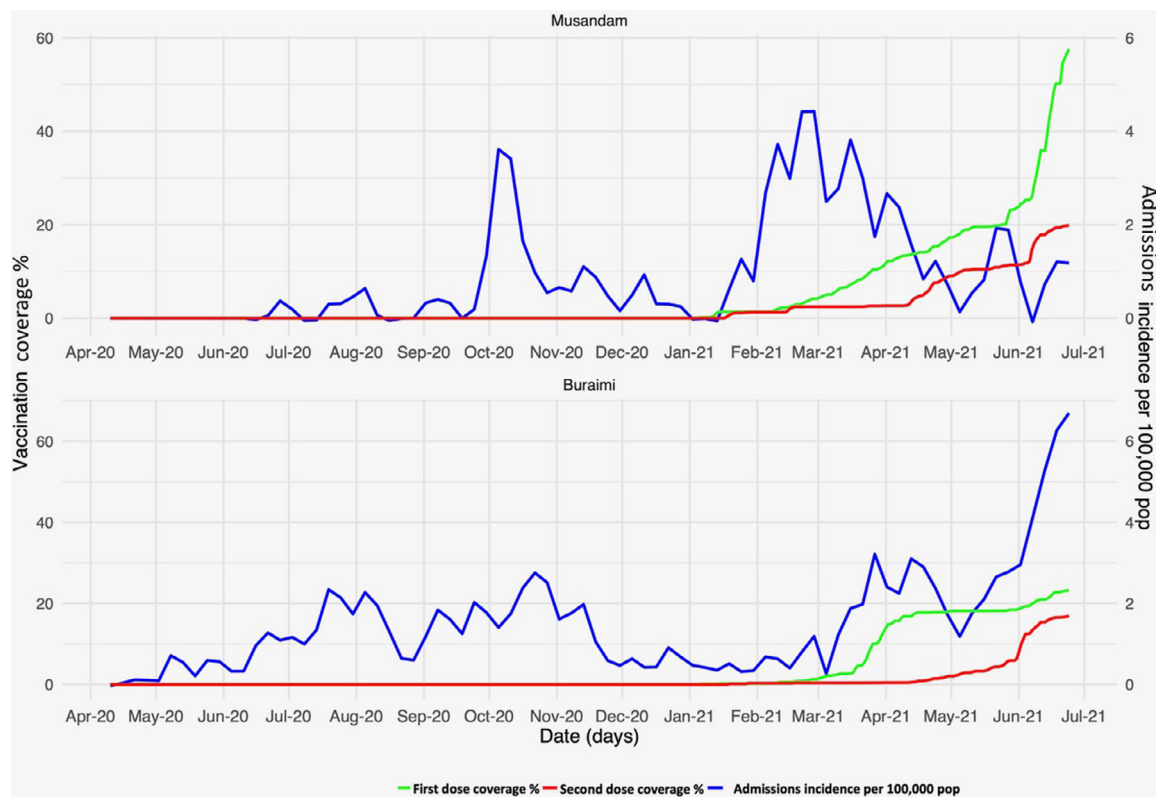
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**Figure 1.** Impact on the incidence of admission (blue line) in relation to vaccination coverage, 2 weeks post-vaccination, of the first dose (green) and second dose (red), in Musandam and Al-Buraimi governorates, Oman.

19 vaccine deployment, has been vital in view of vaccine scarcity in Oman.

Musandam, unlike Al-Buraimi, is only accessible to the rest of Oman through passage via the UAE by land, sea, or domestic airlines. In 2020, public and private healthcare facilities were stretched due to the acceleration of COVID-19 cases, and the Government of Oman decided to prioritize the vaccination of its population in Musandam by vaccinating all of those over 18 years of age starting at the end of January 2021. The aim of this study was to compare the effect of the speed of vaccine deployment on COVID-19 admissions in these two border governorates, Musandam and Al-Buraimi.

## 2. Materials and methods

Systematically collected daily admissions data covering the period April 10, 2020 to June 24, 2021 and vaccination data covering January 1 to June 24, 2021 were analyzed. The cumulative doses (for the first and second doses) were calculated for each governorate each day. Vaccination coverage for each day was calculated by dividing the cumulative doses with the population over the age of 20 years in the governorate (<https://data.gov.om/search?query=Population>). The data were collected by vaccination date; therefore, we moved it to a 2-week period so that it represented cumulative coverage of full vaccination status. The results are presented graphically in Figure 1, which shows a comparison of the trends in incidence of hospital admission in Al-Buraimi and Musandam governorates in relation to the respective levels of vaccination coverage per governorate.

## 3. Results

As shown in Figure 1, the maximum vaccination coverage for the first dose was 58% in Musandam and 23% in Al-Buraimi. It also shows

the effect of faster vaccine deployment in Musandam (first dose vaccination coverage increased from 20% to 58% within 1 month) compared to Al-Buraimi (vaccination coverage plateaued at 20% within the same month), which led to a greatly reduced incidence of COVID-19-related hospital admission by 75% (from 40 to 10 per 100 000 population) in Musandam, compared to an increase in incidence by 500% in Al-Buraimi (from 10 to 60 per 100 000 population).

## 4. Discussion

COVID-19 has inflicted major damage worldwide in terms of morbidity and mortality, despite interventions designed to reduce its spread and impact, from curfews to masking, quarantining to institutional closures, and necessitating a working and well-distributed vaccine (Moghadas et al, 2021). The ongoing COVID-19 pandemic will likely lead to further mutations, thus increasing the probability of new variant formation (Al-Mahruqi et al, 2021).

As a result, countries have been compelled to accelerate their previously scheduled vaccine doses from time to time in order to limit the spread of the infection, thus minimizing the consequences (NHS England and NHS Improvement, 2021). Additionally, as a result of COVID-19 vaccine scarcity, Hinson et al. noted that choosing the best candidates to target with the vaccine is one of the critical prerequisites for the acceleration of vaccination (Hinson et al., 2021).

In Oman, when the vaccine rollout started in December 2020, health care workers, front-line staff, and people with co-morbid conditions such as chronic lung or renal diseases and obesity were initially targeted. The progression of the pandemic, with widespread variant importation, posed challenges to disease control, which were further aggravated by the limited access to vaccine in some countries (Iftekhar et al, 2021).

Due to initial supply limitations and high demand, Oman prioritized those groups of people who had to receive the vaccine. This strategy was also based on a national study by Al Wahaibi et al. on determinants

of COVID-19 severity and mortality in Oman (Al Wahaibi et al., 2021). Subsequently, a strategy to cover 70% of the total population was set, with a deployment plan for administering the vaccine in two phases by priority group (30% starting in late 2020, then 40% from July to October 2021). This was achieved through the establishment of mega vaccination centers in different governorates, in partnership with the private sector. However, due to the lack of vaccine production and problems receiving the quantities of the vaccine ordered from COVAX, Oman purchased the vaccine directly from vaccine manufacturers at much higher prices than those ordered through COVAX.

Although the necessary preventive measures during the COVID-19 pandemic remain the same across regions, special attention, prioritization, and faster vaccine deployment should be given to border regions to sustain control. Moghadas et al. point out that effective vaccination could substantially alleviate the consequences of COVID-19 on individuals and the whole of society, thereby reducing the individual human suffering that the disease causes and the stress on the health care system, even if only adults are vaccinated with a one-dose strategy (Moghadas et al., 2021). Public health and social measures remain an important part of outbreak response as vaccines continue to be distributed over time.

The Government of Oman decided to prioritize the vaccination of the population in Musandam, as the health facilities there started to fill up with COVID-19 patients and there were limited intensive care unit beds available. At that time, the Supreme Committee ordered the closure of points of entry as a health preventive measure in order to prevent the spread of COVID-19 disease. This made the logistics of accelerating COVID-19 vaccination efforts in Musandam more challenging in terms of maintaining the vaccine cold chain, as an mRNA-based vaccine was used, and to not exceed the shelf-life of the vaccine.

The effect of faster vaccine deployment in Musandam with its prioritized one-dose strategy compared to the approach taken in Al-Buraimi provides evidence of the significant impact of such strategies in reducing the incidence of COVID-19-related admissions, similar to the experiences of other countries (Wise, 2021; Roghani, 2021).

In conclusion, this study provided significant evidence that accelerating COVID-19 vaccination (even with one dose) reduced the incidence of COVID-19-related hospitalizations, and this could be the cause of the reduction in deaths due to COVID-19 in the population of Musandam compared to Al-Buraimi.

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## Declarations

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**Conflict of interest:** The authors report no potential conflicts of interest.

**Author contributions:** The corresponding author initiated and wrote the first draft. All other authors commented, revised, and approved the manuscript.

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