


Bhutan's experience with COVID-19 vaccination in 2021

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To cite: Dorji T, Tamang ST. Bhutan's experience with COVID-19 vaccination in 2021. *BMJ Global Health* 2021;**6**:e005977. doi:10.1136/bmjgh-2021-005977

Received 11 April 2021
Revised 20 April 2021
Accepted 23 April 2021

INTRODUCTION

As of April 2021, COVID-19 cases continue to rise globally and in the South Asia region causing devastating morbidity, mortality and disruption of socioeconomic life. Apart from public health measures to prevent spread of COVID-19, significant investment has been made to develop, test and roll out vaccines. Modelling studies predict significant reduction in overall attack rates by SARS-CoV-2 through use of effective COVID-19 vaccines, with the highest relative reduction among older adults (aged 65 years and older), reduction of intensive care admissions and deaths.¹

As of 18 April 2021, 14 vaccines have been approved for human use by at least one country² and 890 million doses of COVID-19 vaccines have been administered globally.³ In the South Asia region, the Oxford-AstraZeneca (COVISHIELD) vaccine manufactured in India has been made available through the COVAX Facility.² As of 18 April 2021, 122 million doses (7.9% of the population) have been administered in India, 6.6 million doses (3.5%) in Bangladesh, 0.9 million doses (4.3%) in Sri Lanka, 0.8 million doses in Pakistan, 0.3 million doses (54%) in Maldives and 0.1 million doses (0.3%) in Afghanistan.³ Bhutan, a country with a population of 0.72 million, has vaccinated 472 139 individuals with the first dose of COVISHIELD covering 94% of the eligible population (18 years and older) within a span of 2 week.⁴

Bhutan has reported a total of 957 cases of COVID-19 up till 18 April 2021 with one death.⁴ The country has seen two nationwide lockdowns and disruption of public services, schools and colleges.^{5 6} The physical distancing measures and the closure of international borders has impacted almost all sectors of socioeconomic activities in the country with the major brunt on the tourism, entertainment and export-import industries leading to an all-time high unemployment rate. While the scenario of COVID-19

Summary box

- ▶ COVID-19 has caused a major socioeconomic impact on the lives of people in Bhutan, a landlocked nation situated in the eastern Himalayas.
- ▶ The pandemic has led to the closure of its international border, restriction on cross-border trade, closure of businesses, schools and colleges, and restrictions on social gatherings.
- ▶ Bhutan has reported 957 cases of COVID-19 with one death as of 18 April 2021.
- ▶ Despite limitations of resources and experiences, Bhutan has achieved good control of the pandemic through its unique public health approaches.
- ▶ Bhutan vaccinated 94% of its adult population with COVID-19 vaccine within a span of two weeks in April 2021.
- ▶ This achievement comes at the backdrop of Bhutan's well-established primary healthcare and vaccination systems.
- ▶ However, the country now faces the daunting task of preventing complacency in physical distancing measures, hand washing and use of face mask by the public in a background of the rapid spread of new strains of SARS-CoV-2.

continues to worsen globally and in the South Asia region, Bhutan has managed to control the spread of the disease with an array of unique public health measures.^{5 6} Despite challenges in the availability of human and financial resources, vaccinating the entire population to achieve effective herd immunity was yet another bold move.⁷ The country vaccinated 94% of eligible adult population within a span of 2 weeks from 27 March 2021 to 9 April 2021. This article describes the challenges and enablers that allowed Bhutan to achieve the highest COVID-19 vaccination coverage of adults.

BHUTAN'S HEALTH AND VACCINATION SYSTEM

Bhutan is situated in the eastern Himalayas with its population scattered across mountains making physical access a major challenge. The country, since becoming a signatory



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Table 1 Coverage of childhood and maternal vaccines in Bhutan in 2020⁸ and COVID-19 vaccine in 2021

| Vaccine | | Coverage (%) |
|----------------------------|---------------|--------------|
| BCG | BCG | 100 |
| OPV | OPV0 | 96.3 |
| | OPV1 | 99.2 |
| | OPV2 | 99.0 |
| | OPV3 | 97.4 |
| Pentavalent | DTP-HepB-Hib1 | 99.6 |
| | DTP-HepB-Hib2 | 99.1 |
| | DTP-HepB-Hib3 | 98.7 |
| HPV vaccine (quadrivalent) | HPV1 | 90.5 |
| | HPV2 | |
| TT for pregnant women | TT1 | 97.9 |
| COVID-19 vaccine | COVISHIELD 1 | 94.0 |

BCG, Bacillus Calmette-Guerin; DTP-HepB-Hib, Diphtheria, tetanus, pertussis, hepatitis B, *Haemophilus influenzae b*; HPV, human papillomavirus; OPV, oral polio vaccine; TT, tetanus toxoid.

to the Alma-Ata Declaration in 1978, has expanded its primary healthcare network to include 48 hospitals, 186 primary health centres, three *thromde* (municipality) health centres and 542 outreach clinics in 2021.⁸ This network covers >95% of the population within 3 hours of travel.

The other major constraint has been the shortage of trained health human resources. A health school was established in 1974 and has trained almost all of its primary health workers that include district health officers, health assistants, nurses, midwives, technicians and village health workers. In 2012, the school was incorporated as the Faculty of Nursing and Public Health under the Khesar Gyalpo University of Medical Sciences of Bhutan, the only medical university in the country. As of 2020, there were 620 health assistants, 1364 nurses and 1187 technologists and technicians with only 376 doctors (including 129 specialist doctors).⁸

Bhutan's primary healthcare workers have contributed significantly in establishing the Expanded Programme on Immunisation (EPI) in 1973, expanding it to include all 20 districts by 1980, achieving Universal Childhood Immunisation by 1991 and maintaining childhood vaccination coverage of >95%.^{8,9} Bhutan has achieved major successes in vaccine-preventable diseases with poliomyelitis eradicated in 1988,⁹ measles eliminated in 2017¹⁰ and rubella verified to be under control.¹¹ Bhutan continues to maintain high coverage of both childhood vaccines and adult vaccines (table 1). In the recent years, Bhutan has introduced the following vaccines into the national immunisation schedule: pentavalent (DPT-HepB-Hib) in 2009, human papillomavirus (HPV) vaccine in 2010, inactivated polio vaccine in 2015, pneumococcal vaccine (PCV13) in 2019,¹² influenza vaccine in 2020⁵ and gender-neutral HPV vaccine since 2020.¹³ In yet another

remarkable step in the vaccination programme, the country rolled out the COVID-19 vaccine in March 2021.

Guided by its development philosophy of Gross National Happiness, Bhutan has a state-sponsored healthcare system that provides free basic healthcare to all. Vaccines in the national immunisation schedule are funded through the Bhutan Health Trust Fund established in 1998. Additionally, the funding of vaccines from international development partners has played a crucial role as reported in the polio eradication and measles elimination efforts.^{9,11} With the COVID-19 pandemic incurring huge amounts of government spending, it came as a relief when the Government of India donated 550 000 doses of COVID-19 vaccine through its Vaccine *Maitri* initiative in January 2021 and March 2021.

CHALLENGES IN COVID-19 VACCINE DELIVERY

Planning stage

The country's national vaccination programme is run by the EPI Unit, Department of Public Health, Ministry of Health. During this pandemic, all efforts against COVID-19 were implemented through the National COVID-19 Task Force working in coordination with the Health Emergency Management Committee (HEMC) established at the Ministry of Health.⁵ The HEMC set up the National Immunisation Technical Advisory Group (NITAG), which worked closely with the Department of Public Health in planning and rolling out the vaccine.

During the planning phase, members of NITAG and the Health Minister made extensive field visits covering districts in the east that were 2 days drive away from the capital city. The government mapped the volume of adult population in each district through the Bhutan Vaccination System (BVS) portal that allowed registration, follow-up and generation of vaccine certificate. Mapping out of volume of expected recipients of vaccine was important to identify facilities that would serve as vaccination centres such as schools, monasteries, public sheds, etc. Identification of vaccination centres were key in the placement of cold chain storages at central locations catering to several vaccination centres in the catchment area. Online conferences were conducted with stakeholders at the district level (*dzongdas*) and at the village level (*gups*) that enabled identification of challenges including logistics for the vaccine delivery team. In the months leading up to the vaccine roll out, multiple batches of health workers were trained on the management and monitoring of vaccine cold chain, organisation of vaccination booths, delivery of vaccine and post-vaccination monitoring.

Infrastructure and delivery

Physical transportation is still a major concern especially when the cold chain of the vaccine is concerned. With recent improvement in air connectivity, domestic flights operated by the Royal Bhutan Airlines and helicopter services run by the Royal Bhutan Helicopter Services, otherwise

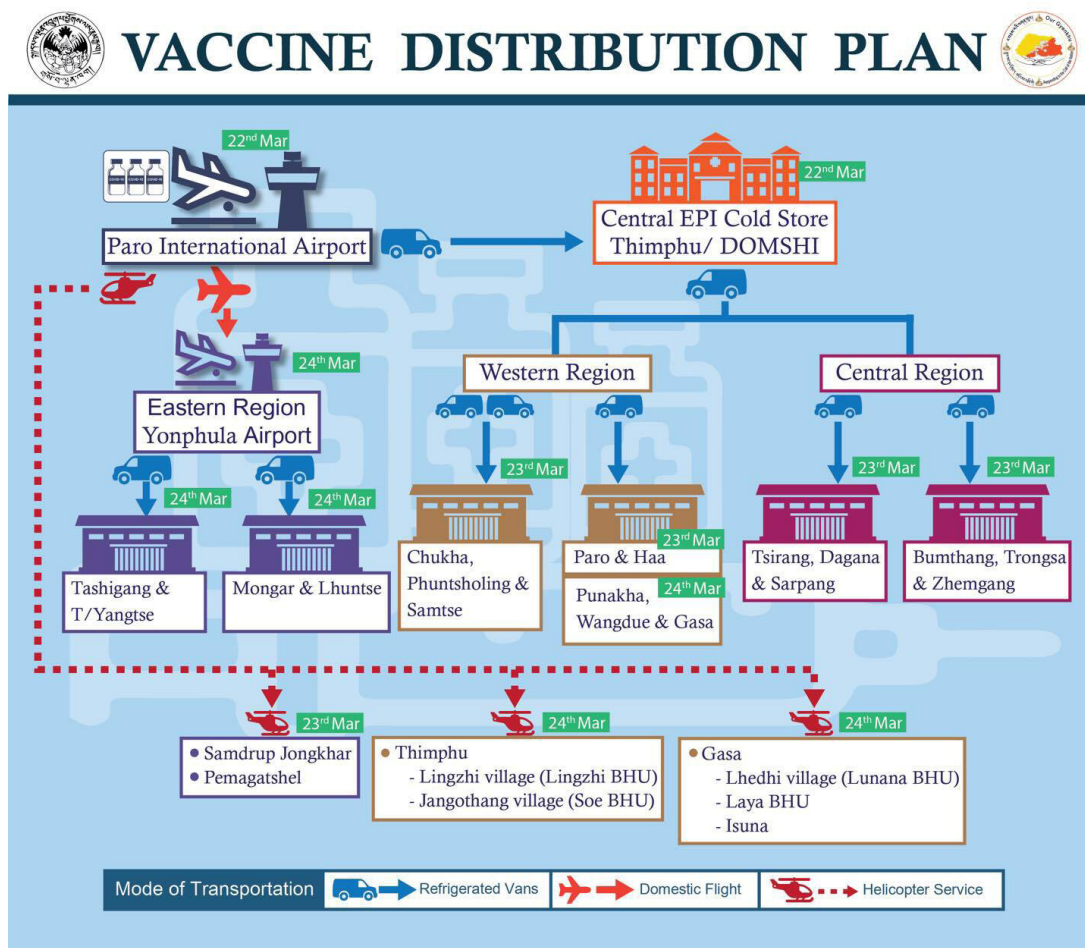


Figure 1 COVID-19 vaccine delivery pathway in Bhutan: receiving the consignment at the Paro International Airport, transportation to multiple centres across the country using refrigerated vans, domestic flights and helicopter services and delivery through vaccination booths. Source: Ministry of Health, Bhutan, 22 March 2021. BHU, Basic Health Unit; DOMSHI, Department of Medical Supplies and Health Infrastructure; EPI, Expanded Programme on Immunisation.

used by the Bhutan Emergency Aeromedical Retrieval air rescue, were used for transportation of vaccines within the country (figure 1). The vaccines were delivered to regional and district cold storage centres from where daily doses of vaccines were released on the days of vaccination.

At the field level, teams comprising of a doctor, nurses and health assistants delivered the vaccines to village, community and urban centres as per the roster planned by local leaders, district health officers and health assistants and doctors at the primary health centres. Using the BVS, information on comorbid conditions and known allergies in recipients were collected in advance to plan appropriate measures to handle emergencies or to direct these individuals to receive the vaccine at a hospital. The Ministry of Health assigned a medical doctor as a monitoring medical officer to each of the 1001 vaccine booths across the country to respond to any severe immediate adverse event following immunisation (AEFI). To supplement the shortage of doctors in the country, postgraduate trainee doctors from the Faculty of Postgraduate Medicine, Khesar Gyalpo University of Medical Science of Bhutan, and doctors from hospitals were deployed all over the country. At the vaccination

centres, members from the *De Suung* volunteer group managed the maintenance of physical distance of crowds. All vaccination records were monitored real time by the NITAG and two Regional Immunisation Technical Advisory Group (RITAG) for COVID-19 through the BVS portal. All queries on identification of eligible persons for vaccine and management of post-vaccination events were managed through communication with the experts in the NITAG and RITAG.

Leadership

Bhutan is a democratic constitutional monarchy with governments elected every 5 years. The current government 2018–2023 has 2 doctors and 2 public health experts in its 11-member cabinet. The Prime Minister and the Health Minister spent substantial time in mitigating the national response to COVID-19 and functioned through the National COVID-19 Task Force. The National COVID-19 Task Force was supported by three regional and district task forces that were led by district and local leaders. The King of Bhutan, Jigme Khesar Namgyel Wangchuck, since the beginning of the pandemic, has provided timeless



Figure 2 King Jigme Khesar Namgyel Wangchuck (centre) has travelled the length and breadth of the country to guide national efforts against the COVID-19 pandemic. Featured, the King witnessing vaccination at Monggar district, east Bhutan at the launch of the nationwide COVID-19 vaccination programme. Source: His Majesty King Jigme Khesar Namgyel Wangchuck's Facebook page, 27 March 2021.

inspiration, encouragement and overall guidance in mitigating the damage caused by this pandemic (figure 2).

Funding for the vaccine

Bhutan was the first country to receive the vaccines through the Government of India's Vaccine *Maitri* humanitarian support to countries across the world. The Government of India donated 150 000 doses of COVISHIELD vaccine in January 2021 as a gesture of friendship. Bhutan received the second consignment of 400 000 vaccine doses in March 2021, the cumulative of which were adequate to vaccinate all eligible adults in the country. This was a major budgetary save for the government.

Bhutan is yet to announce the dates and timing for the second round of vaccines. In addition, the government is in the process of procuring the Pfizer BioNTech COVID-19 vaccine to be delivered to children. For these, the government has to arrange its own funds.

In such mass vaccination campaigns, the logistics of setting up vaccination booths, travel of medical team and public health communications added up to the cost. At the time of writing, the government had not released the amount spent on logistics.

Communications and public opinion

Right from the beginning, the government led a two-way communication with press briefs, pamphlets and short videos encouraging the public to receive the vaccine while a survey on concerns and hesitancy over vaccines were studied and addressed. Some of the key faces in this communication strategy were the Prime Minister, Foreign Minister and the Health Minister who had public standings as health professionals prior to joining politics. In an effort to build public support, the Prime Minister's family members, social media influencers and film industry personalities shared their stories of receiving the vaccine.

Public acceptance of vaccine

During the planning stage, there were some people who were reluctant about accepting the COVID-19 vaccine. The government's communication strategy included communicating the science of vaccine, building on the successes Bhutan has made in vaccine-preventable diseases, promotion of vaccine uptake status by social media influencers and television and film industry personalities. The day of roll out of vaccine was determined based on astrology by the monk body and public prayer ceremonies conducted thereby helping build people's confidence in the vaccine.

HOW MANY WERE VACCINATED?

The vaccination campaign lasted from 27 March 2021 to 3 April 2021, where 459 752 adults older than 18 years were vaccinated achieving coverage of 63.2%. Subsequently, vaccines were delivered to elderly and disabled who could not make it to the vaccination booths. Unlike in other countries, health workers were vaccinated after the general population in order to avoid human resource shortages in hospitals due to potential side effects of the vaccine. By 9 April 2021, 472 139 individuals (250 362 men and 221 777 women) were vaccinated achieving a coverage of 94%.⁴ Health centres continue to offer vaccination to those who missed the vaccine during the initial vaccine campaign; as of 18 April 2021, 478 553 individuals have been vaccinated. In addition, all foreign nationals working in diplomatic missions and international organisations were provided the COVISHIELD vaccine. There were 8561 AEFIs reported (6%), the most common were headache (27%), fever (20%) and nausea (13%). There were no deaths related to the COVISHIELD vaccine. The data on the proportion of persons who have declined the vaccine is not yet available.

WHAT AFTER VACCINATION?

Media surveys in the post-vaccination period showed that the public may be less likely to follow physical distancing measures, hand washing and the use of face mask.¹⁴ The government continues to encourage these health measures, including the use of *Druk Trace* mobile phone application that allows registration at locations of visit. Up until COVID-19 vaccines were available, all persons entering

Bhutan via land or air had to undergo mandatory 21-day facility quarantine.⁵ Now, for persons entering Bhutan with valid certificate proof of vaccination and adequate levels of neutralising antibody levels, the duration of facility quarantine has been reduced to 7 days.

CONCLUSION

Bhutan drew from its earlier experiences of a well-established primary healthcare system and high coverage of immunisation in delivering COVID-19 vaccine to almost all of its adult population. This was achieved through proper planning, judicious use of health resources and a strong central leadership. However, the country now has to find means to fund the second dose of vaccine for adults and explore means to vaccinate the children. Another threat that arises from this vaccination effort is the possible decline in compliance to public health measures and complacency that may be counterproductive in the background of new strains of the SARS-CoV-2 virus.

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Acknowledgements We thank the social media teams of the Facebook pages: *His Majesty Jigme Khesar Namgyel Wangchuck*, and *Ministry of Health, Royal Government of Bhutan* for allowing the use of images.

Contributors Both authors conceived the idea, were involved in critical review of the article and have approved the final draft for publication. TD drafted the article.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article.

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