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Review Article

COVID-19 in Nepal: Health Sector Emergency Response and Unique Challenges

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Abstract

Background

Coronavirus Disease's (COVID-19) rampant rise has caused numerous challenges to the already strained health infrastructure of Nepal. The combination of underlying geographic and socioeconomic risk factors, and Nepal's unique challenges with its rural majority population, the influx of migrant workers returning during the pandemic and catastrophic monsoon flooding has potentiated disease spread. This review describes the country's health sector response, key strategies, challenges and strengths, and provides lessons learned for future response.

Methods

Open access information from the Nepali government was used to describe the COVID-19 response plan and implementation. The World Health Organization's weekly situation reports, United Nations documents, and local news articles were also reviewed to find key evolution of COVID-19 and challenges faced in response.

Findings

Nepal's COVID-19 response strategy was detailed in the government's Health Sector Emergency Response Plan (HSER) in May 2020, and the strategy can be divided into four main areas: public health and social measures, hospital-based intervention, management and oversight, and budget allocation. Nepal has had COVID-19 cases in all 7 provinces and 77 districts, and due to a large rural population, the sudden influx of more than 1.3 million people from reverse migration and massive monsoon floods contributed to the rise in community spread of the virus. The second wave (Delta wave) found Nepal with the worst viral replication in the world and collapsed the health infrastructure.

Conclusion

Nepal's COVID-19 response was strained by its unique challenges and key lessons were identified from this review that will be needed for future pandemic and disaster response. These include early planning, data centralization, transparent leadership, clear communication and coordination between three tiers of government, private-public partnerships, and utilization of its working population.

Introduction and Background

The first ever reported case of COVID-19 in South Asia was found in Nepal on January 23, 2020. As of February 6, 2022Nepal has seen COVID-19 cases in all 7 provinces and 77 districts with nearly 1 million positive cases, and 12,000 deaths [1]. The Federal Democratic Republic of Nepal is a small landlocked country in Southern Asia that lies between China and India, with a population of almost 30 million. Nepal's terrain ranges from flat plains to the rugged mountains with almost 80% of the population living in rural areas [2]. About 25% of Nepal's population lives below the poverty line, and the country is heavily dependent on remittances from work abroad, which account for 30% of the total gross domestic product [2]. Nepal's government structure was modified in September 2015, when a new constitution was ratified, setting up a decentralized federalist system and ending the monarchical rule and almost two decades of political instability [2]. As a result, local governments have less than five years of experience to implement their new constitutional responsibilities, and have no experience managing a pandemic response.

Healthcare System

The constitution of Nepal guarantees the right to free basic health services, including emergency care for all citizens [3]. Some of the challenges to realizing this constitutional right are unequal distribution of health-services among different demographics, underdeveloped infrastructure, a fragmented private health sector, and poor retention of human resources (particularly in rural areas) [4]. Currently, Nepal has only about 7 healthcare workers per 10,000 population [5]. The National Health Sector Strategy accompanying the new constitution in 2015 led many changes in the health system, most prominently transitioning the decision-making power from the central government to local governments [6]. Though healthcare national policy and budget is decided by the central units, Provinces can modify the policy and reporting generally stops at the provincial level. The young system has proven ill-prepared to respond to a public health crisis.

Geography and Meteorology

The United Nations Development Programme ranks Nepal as 4th most vulnerable country in the world to climate change disasters and the 11th most vulnerable country to earthquakes; furthermore, Nepal suffers catastrophic monsoon floods, landslides as well as resultant disease outbreaks from inadequate sanitation [7]. Due to the geography of the region, Nepal is at high risk for repeated earthquakes and, over prior decades, many government initiatives for Disaster Risk Reduction (DRR) have been created for these seemingly inevitable crises [8]. The major 2015 earthquake caught Nepal by surprise despite extensive plans, and now the COVID-19 pandemic has added stress to the already weak health infrastructure that was recovering from the earthquake, and exposed the gaps disaster and pandemic response [9]. The country's economy, unique geography, and frequent natural disasters have been major barriers to advances within key sectors including technology, transportation, and telecommunications [10].

Section I: Overview of the Health Sector Emergency Response

Since the first case of Sars-CoV-2 was reported in Nepal, immediate actions were taken to strengthen the border entry point at the international airport, and health desks were added to ground crossing points of entry at the Nepal-China and Nepal-India borders. On March 1, 2020, a high-level coordination committee for prevention and control of COVID-19 was formed which later became known as the COVID-19 Crisis Management Center (CCMC) [11]. On April 9, health cluster for COVID-19 was activated led by the Incident Management System coordinator [11]. On May 22, 2020, the Ministry of Health and Population (MOHP) released a detailed Health Sector Emergency Response (HSER) plan, which has guided the country's health sector response. (Figure 1) shows total cases in Nepal.

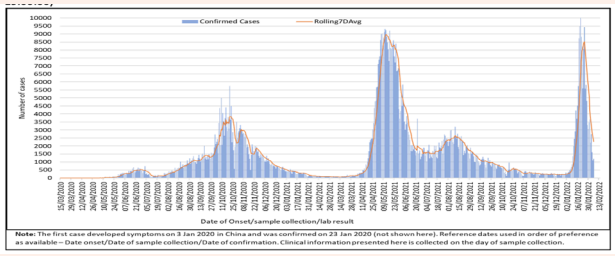

Figure 1: Laboratory Confirmed COVID-19 cases and average number of COVID-19 cases over the last 7 days. Source: WHO Situation Report.

Resources and Testing Availability

As highlighted during previous systemic stressors, Nepal faces a significant lack of healthcare resources. The HSER plan notes a total of 1,595 intensive care (ICU) beds with only 840 ventilators available across the country as of May 2020. While the public sector lacked initial fervor to increase the number of ventilators and ICU beds, various private groups and multilateral organizations started creating alternative solutions for the shortage of equipment early in the pandemic, have since, helped increase their availability [12,13]. Furthermore, the availability of Personal Protective Equipment (PPE), which was initially limited, has been improved due to efforts from the government at curbing black marketing and hoarding [14-16]. Even with these improved efforts, the country's health facilities continue to heavily rely on donations from non-governmental institutions for basic resources [15]. The majority government's early COVID-19 testing efforts have been controversial and mired with corruption allegations as well as use of non-evidence-based processes focusing on Rapid Diagnostic Antibody Tests (RDT) as compared to Reverse Transcription-Polymerase Chain Reaction (RT-PCR) tests [17,18]. Since then, the national testing guidelines have gone through multiple revisions, and recognizes the RT-PCR test as the gold standard of diagnosis. It also prioritizes early detection, isolation and prevention of spread, ensures optimal care of patients at health facilities and ensures containment in the community [19]. As of February 2, 2021, more than 5 million RT-PCR tests have been performed in Nepal within 104 designated COVID-19 labs (43% of which are private) [1]. This private-public partnership has allowed the country to conduct high number of tests daily, especially when the demand is high during different variant surge in the country, with Omicron surge being the most recent [1]. Yet, the country is testing has been below its capacity. During the Delta surge, with nearly 90% positivity rate in some parts of the country, the country had failed to expand testing in large scale in the rural areas [20]. (Figure 2) shows the number of RT-PCR tests administered per 1000 people daily in Nepal since February 2020. As an alternative to the low RT-PCR availability, the country relies on antigen tests, with nearly 1.7 million kits dispatched nationwide in early June [21]. Nearly 1 million antigen tests have been reported as of February 6, 2022 [1].

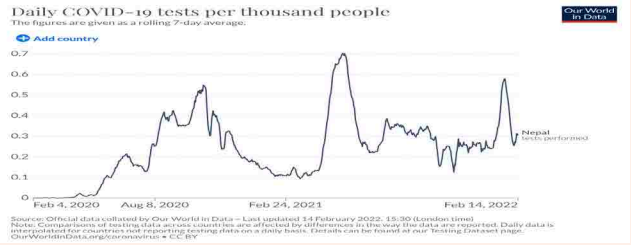

Figure 2: Number of COVID-19 tests per thousand people administered in Nepal since February 2020. Source: Our World in Data.

Training and Capacity Building

In a nationwide survey during the early pandemic, more than 90% of Nepali physicians had reported lack of COVID-19 protocols and resources at their facilities [22,23]. To improve resources and preparedness, the HSER proposed creation of rapid response and emergency medical deployment teams. These two teams were intended to help with the assessment of critical needs and develop quick response strategies [21]. Furthermore, Case Investigation and Contact Tracing (CICT) teams were created to combat the imminent community transmission [24]. Though extensive plans were made for large CICT teams to collaborate with existing networks of local Female Community Health Volunteers (FCHVs), reports of trained and functional CICT teams have not been found since June 25, 2020 [25]. Ten CICT teams were put together in Kathmandu, however each team only has 2 people instead of the goal of 4 people per team [26]. Data on anticipated barriers and quality metrics of these plans is also not found, and it is unknown if the plans outlined in the emergency response plan came to fruition. Local Non-governmental organizations (NGOs) and International NGOs have attempted to fill the gaps in trainings to health care workers and community members. The CCMC COVID-19 learning platform has made a collection of different trainings available in one database [27,28].

Funding

Under the federal system, the yearly budget allocation for healthcare expenditures is divided between the MoHP at the national level, and provincial/local governments. In May 2020, a 31.8% increase in healthcare budget as compared to the prior year was revealed to account for the anticipated need for COVID-19 response [29]. Additionally, Nepal received funding from international agencies including the World Bank, United States Agency for International Development, Asian Development Bank and International Monetary Fund for COVID-19 response [30-32]. However, a survey of 113 municipalities in June 2020 found that amount of money to be transferred directly per person across local governments ranges between $0.51 (enough to buy four surgical masks) and $4.28 (enough for diagnostic tests for 52% of population) [33]. It is estimated, almost 80% of funding for local government's response to COVID-19 has had to come from reallocation of their budget from their own disaster relief funds [33]. In turn, local governments in the regions of the country that have exhausted a significant portion of their disaster budget on flood relief earlier in the year have less funding available for COVID-19 response than governments in regions with lower

prevalence of natural disaster [33]. Similar picture is being painted during the early part of the 2021 monsoon and flood season. For the 2021 fiscal year, the government has allocated 600% more budget for COVID-19 Prevention and Control (up to 35.57 billion NRS from 6 billion NRS in the past year) but relies on foreign donors to provide nearly 70% of that budget [34].

Risk Communication and Community Engagement

The HSER has made community engagement a priority via social mobilization networks including frontline service providers (teachers, FCHVs, religious leaders, and youth volunteers) to drive education campaigns. Radio, television, telephone, national hotlines and social media have been utilized to reach majority of Nepal's population [33]. The MoHP also provides daily briefings and information text information via Viber™. A smartphone application named "Hamro Swasthya" was also launched to assist with symptoms self-assessments and to guide care, and provides content in multiple ethnic languages [35-36].

The HSER is summarized in Figure 3.

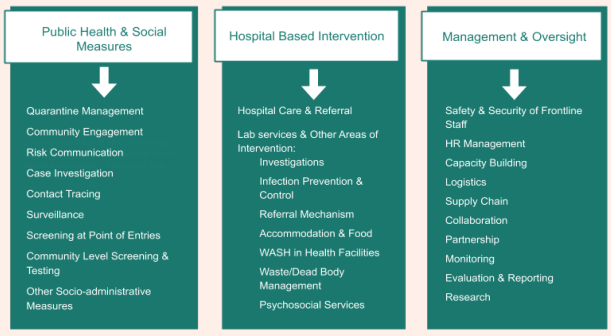

Figure 3: Summary of Health Sector Emergency Response Plan in Nepal. Strategic Approaches and Key Interventions According to the Government of Nepal Ministry of Health and Population. Source: World Health Organization.

Section II: Unique COVID-19 Challenges in Nepal

Nepal's rural majority population, the massive influx of migrant workers via a porous border, and catastrophic Monsoon flood season further strained the health sector response to the COVID-19 pandemic, which may have led to more rampant community transmission.

Rural Majority

About 80% of the population in Nepal lives in rural areas, and a number of COVID-19 outcome determining factors are different between the rural and urban populations [37]. Rural Nepal has a higher percentage of >65 years age, which is a known vulnerable age in COVID-19 mortality [38]. Almost 22% of rural Nepali population is estimated to lack proper hand hygiene facilities as compared to 12.1% of urban population. Furthermore, availability of personal space is very limited with 33% of households having only one room available for sleeping [39]. This limits people's ability to maintain physical distance should a family member get infected. Additionally, most higher-level healthcare facilities in Nepal are in urban areas, and most rural facilities don't have ICU or respiratory support capacity [40]. Nepal also lacks trained paramedics, pre-hospital care protocols and central ambulance service for patient transport. Furthermore, the lack of adequate road infrastructure has made emergency medical services difficult to reach the rural areas [41]. These factors have caused specific strain on rural response to the pandemic and have likely attributed to the rising community transmission of COVID-19. Furthermore, there are wide reports testing hesitancy and lack of testing infrastructure across rural Nepal [42]. These rural challenges require long-term solutions targeting infrastructure development, resource allocation and education, and are expected to pose significant challenges in the upcoming months of the pandemic and vaccine deployment.

Return of migrant workers and porous border

Nepal shares an open border with India, and in May 2021, saw a peak in COVID-19 cases just a few weeks after India's peak [43]. As a result of COVID-19 job losses abroad, more than half a million Nepali people who had migrated for work returned to Nepal starting in March 2020 and thousands more have been steadily returning since [44]. Due to the rapid influx and an uncontrolled border, a safe repatriation plan to contain the spread of the virus from the travelers was limited, likely contributing to import and community spread of the virus across Nepal. Migrants have faced stigma, in some cases, preventing them from accessing items of basic needs. The return of migrant workers has been a major economic challenge for Nepal as well. Personal foreign remittance contributed to 26.9% of Nepal's GDP in 2019, and Nepal's remittance is predicted to decrease by 28.7% this year, the greatest decline in Asia [45-46]. Compared to 2019, Nepal saw a decrease in Gross Domestic Product (GDP) by more than 8 % in 2020. In 2021 and 2022, Nepal's GDP growth rate is expected to be 4.4% and 2.6% lower compared to 2019, respectively [47]. Additionally, 31.2% of the population currently living just above the poverty line are predicted to fall into extreme poverty [43]. Nepal needs to create at least 1.5 million jobs to meet the demand created by the return of migrant workers [48]. The government has doubled the Prime Minister's Employment Plan budget and has received a $250 million loan from the Asian Development Bank to create jobs [49].

Monsoon Floods

Monsoon season (annually, from June to September) generally brings daily heavy rains that can lead to flooding, loss of crops and personal property, can block access to transportation and other critical services, and lead to subsequent human displacement [50]. Prior to the start of the Monsoon season in 2020, a survey of 46 flood-prone communities found that more than half were already facing local food shortages and were lacking in basic sanitation or quarantine facilities [49]. Despite coordinated and multi-sector recognition of the confluence of COVID-19 and Monsoon season, flooding and landslides have led to the loss of hundreds of Nepali lives in 2020 [51]. These floods have caused further strain on a nation already stressed from COVID-19 and the economic downturn [52-53]. Healthcare and relief efforts have been further complicated by the floods affecting the Terai, which has also been the part of Nepali with the highest prevalence and impact from COVID-19. Areas with flooding and landslides has also shown accelerating outbreaks of COVID-19 in the affected regions. There have been reports of aid agencies having increasing difficulty accessing these communities that are in need of relief and support [54]. The 2021 monsoon season brought new challenges and fear across the country as Nepal is in the midst of COVID-19's Delta wave. In mid-June 2021, Nepal started to see massive floods in rural areas, which has strained COIVD 19 relief [55].

Conclusion and Recommendations

Since its first case on January 2020, Nepal's has faced unique and noteworthy challenges, and has significantly evolved in its response to COVID-19. This review highlights key health sector response strategies and describes the unique challenges which include the new federal governmental structure, rural majority population, influx of migrant workers, and heavy monsoon flooding. Nepali government and private organizations have adapted to increase the country's response capacity. Some highlights of country's success include the early planning for CICTs and utilization of local volunteers to reach rural communities, continued update of testing guidelines, utilization of private and public partnerships to expand testing and resources supply, and use of innovative strategies for mass communication, especially to reach vulnerable populations. Challenges in pandemic response include early and continued mismanagement of testing and inequitable resource allocation, lack of specific implementation and oversight mechanisms of the HSER, and delays in tackling stigma and misinformation. In the fight to secure COVID-19 vaccines, the Nepal MoHP has formed committees with specific roles and responsibilities to accelerate preparation for its deployment. Nepal has also reached key milestones in its vaccine, with nearly 70% of adults above 18 having received the first two doses by February 2022 [56]. The country aims to vaccinate 100% of its adult population by April 13, 2022 [1]. The success of the vaccination campaign will be a key to timely economic recovery in the country. The requirement of booster dosing and limited cold-chain infrastructure in the country poses upcoming challenges in vaccine distribution in Nepal. Nepal also remains vulnerable to future pandemics and disasters, and lessons learned so far can help strengthen and improve future response to outbreaks within or affecting Nepal. Our team identified key lessons on preparation Nepal must take to successfully fight against future disasters like the COVID-19 pandemic, which are detailed in (Table 1). These lessons are derived from the experiences of Nepal's response to the COVID-19 pandemic and include early and contingency planning, transparent leadership, expansion of public-private partnerships, data centralization, creation of efficient regulatory bodies, and utilization of young workforce.

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Table 1: Lessons for the Future: Emergency Response for the Health Sector of Nepal.

Lessons	
Contingency and Early Planning, inter-governmental coordination	Create early task force at all levels of governance to increase health capacity and preparedness
	Create a working module for proper flow of information and coordination between all three tiers of government
	Conduct early trainings, and post-training follow-up; Start and expand vaccine related trainings, especially those targeting community health workers and FCHVs
	Secure resources available for rural areas early
Data Centralization	Centralize data collection and data sharing between different levels of government and its agencies
	Provide a platform for collection of data through non-governmental and private agencies
Efficient Regulatory Bodies	For an efficient approval and availability of essential drugs and medical equipment, there is a need for a centralized body equivalent to the U.S. Food and Drug Administration in Nepal. Currently Department of Drug Administration and Health Technology Assessment Committee share the burden.
	Lift ban on import of refurbished or used medical equipment, especially during a pandemic/disaster setting
Transparent Leadership & Clear Communication	Increase interoperability and consistency of planning between involved stakeholders
	Audit funds and resource allocation at the local and national level
	Plan unified central communication platform to maintain trust in leadership
Private-Public Partnerships	Harness existing partnerships between both sectors for resource expansion, and for future vaccine deployment
	Continue scaling of testing services and screenings to promote disease prevention
	Acquire necessary vaccines in coordination with private partners
Utilize Working Population	Create job opportunities to get benefits from the country's demographic dividend
	Hire and train local responders, contact tracers, and vaccine deployers
	Continue to expand funding allocated for job creation and infrastructure building

Declarations

Ethics approval and consent to participate:
Not Applicable

Consent for publication:
Not Applicable

Availability of data and materials:
Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Competing Interests:
The authors have no competing interests to declare. All authors had full access to all study data and had final responsibility for the decision to submit for publication.

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