

**Epidemiological Characteristics of Confirmed Cases and Nepal's Response for Prevention and Control of COVID-19**Sasmita Poudel<sup>1</sup><sup>1</sup>Institute of Himalayan Risk Reduction, Kathmandu, Nepal**ABSTRACT**

**Introduction:** The first case of COVID-19 was reported in Wuhan, China. To date, "COVID- 19 has already spread worldwide with the total number of 2,241, 778 confirmed cases and 152, 551 deaths. There are 31 confirmed cases of COVID-19 in Nepal as of 19 April 2020." This article aims to analyze the epidemiological characteristics of confirmed cases of COVID-19 in the context of Nepal and discuss prevention and control measures taken by the Government of Nepal (GoN).

**Methods:** The epidemiological characteristics of 31 confirmed cases in Nepal were analyzed using data available from a daily press release and Nepal situation report published by the Ministry of Health and Population, GoN. The data were analyzed and presented using SPSS and Arc GIS.

**Results:** Of these 31 confirmed cases, 29 (93.5%) cases were imported into the country and 2 (6.5%) were suspected to be secondary cases originating in Nepal either through the family contact or community contact. Among the confirmed cases, 77.4% are males and four cases have already been recovered. The mean age of confirmed cases in Nepal is 36.7 years, with the age ranging from 19 years to 81 years with the highest number (13) reported from province 1. The highest number of cases (14) were reported on 17 April 2020.

**Conclusion:** The distribution of confirmed cases varied with age, sex, and geographical location. The cases are high in males, in the age group of 20-29 years, and in Udayapur district of Province 1. Most of the confirmed cases in Nepal was reported among the individuals who have recently returned to Nepal from foreign countries with evidence of local transmission in the country linked with the imported cases. Different prevention and control strategies are being implemented at the provincial and national levels with the expansion of laboratory facilities for testing COVID-19.

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**Keywords :** *COVID-19, Epidemiology, Prevention and control, Nepal*

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**INTRODUCTION**

The SARS-CoV-2 virus was first detected in Wuhan, China.<sup>1,2</sup> At first, the World Health Organization (WHO) used the term 2019 novel coronavirus to this virus. The official name was announced later as COVID-19 for the disease and SARS-CoV-2 for the virus.<sup>3,4</sup> The first genome of COVID-19 was published on 10 January 2020 by the research team led by professor Yong-Zhen Zhan.<sup>5</sup> World Health Organization had declared COVID-19 as Public Health Emergency of International concern on 30 January 2020 which was later declared as pandemic on 11 March 2020.<sup>6,7</sup> COVID- 19 has already spread across worldwide with the total number of 2,241, 778 confirmed cases and 152, 551 deaths as of 19 April 2020.<sup>8</sup> In Nepal, the first COVID-19 case was confirmed on 23 January 2020 which was the imported case to Nepal from a person traveling from Wuhan, China.<sup>9-11</sup> As of 19 April 2020, 31 confirmed cases of COVID-19 have been reported in Nepal, out of which 4 have recovered, and 27 are active cases.<sup>9</sup>

The early cases of COVID-19 reported some link to Hunan sea-food market in Wuhan, China.<sup>2,12,13</sup> However, a secondary source

of infection was found to be human-to-human transmission through close contacts when an increased number of cases were reported among people with no history of exposure to the Seafood market and infections among medical professionals.<sup>2,14</sup> The most commonly reported symptoms include fever, cough, myalgia, difficulty in breathing, and pneumonia. Less commonly reported symptoms include headache, diarrhea, runny nose, hemoptysis, and phlegm producing cough.<sup>3,15</sup> It is reported that the transmission of this virus is possible from symptomatic, pre-symptomatic, and asymptomatic people infected with COVID-19.<sup>4,6</sup> This coronavirus is reported to mainly transmit through droplets and contact transmission with some possibility of transmission through aerosol. Droplets transmission was reported to occur when respiratory droplets (such as coughs or sneezes from infected people) are ingested/inhaled by individuals; contact transmission was reported to occur when a

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person touches a contaminated surface/object and subsequently touch their mouth, nose, or eyes; while the possibility of aerosol transmission is reported when respiratory droplets mix into the air, forming aerosols and may cause infection when inhaled high dose of aerosols into the lungs in a relatively closed environment.<sup>16, 17</sup> Performing real-time polymerase chain reaction (RT-PCR) to detect positive nucleic acid of SARS-COV-2 in sputum from the sample of sputum, throat swabs, and secretions of lower respiratory tracts have been suggested for the diagnosis.<sup>17-19</sup>

Despite the worldwide spread, the case patterns and other epidemiological indicators of COVID-19 are found to vary in different places and countries.<sup>2, 14, 15</sup> Analyses and sharing of epidemiological patterns on the reported cases are important to treat new cases and prevent further transmission in the country. Therefore, this study aims to analyze the epidemiological characteristics of confirmed cases of COVID-19 in the context of Nepal and discuss prevention and control measures taken by the Government of Nepal (GoN).

## METHODS

### Data sources

This study is the retrospective analysis of the epidemiological characteristics of 31 confirmed COVID-19 cases in Nepal as of 19 April 2020. This article uses the data of early 31 confirmed cases in Nepal available from daily press release and Nepal situation report (SitRep 1-69) published by the Ministry of Health and Population, Government of Nepal and from other published sources.<sup>9,20,21</sup>

### Statistical Analysis

Case characteristics such as age, gender, geographical distribution (according to province and district), the status of confirmed cases, and sources of infection were described using descriptive analysis. The epidemic curve was constructed using the date of confirmed cases. Data were analyzed using excel 2010 and Statistical Package for Social Sciences (SPSS) version 23, and Arc GIS 10.3.

### Few terminologies used in this article:

- 1.Imported case: (referring to the confirmed cases who have recently returned to Nepal from foreign countries),
- 2.Local transmission (referring to the cases who are infected in Nepal either through a family member or community contact during outdoor activities such as traveling, shopping, etc.).

## RESULTS

### Epidemiological Characteristics

Of the 31 confirmed cases, 77.4% are male. The mean age is 36.7 years, ranging from age 19 to 81 years. The majority of cases are in the age group of 20-29 (35.5%) followed by the age group of 30-39 (19.4%). Twenty-nine (93.5%) cases are imported from 6 different countries and 2 (6.5%) cases are suspected to be local transmission either through family contact (3.2%) or community contact (3.2%) (Table 1).

Table 1: Epidemiological characteristics of COVID-19 confirmed cases in Nepal (N=31)

Characteristics		No of cases (N)	%
Age- Distribution		6.7 (16.5) <sup>a</sup>	
	< 20	4	12.9
	20-29	11	35.5
	30-39	6	19.4
	40-49	4	12.9
	50-59	1	3.2
	60-69	4	12.9
	70 and above	1	3.2
Sex distribution			
	Male	24	77.4
	Female	7	22.6
Geographical Distribution			
Province-wise	Province 1	13	41.9
	Province 2	4	12.9
	Bagmati	7	22.5
	Gandaki	2	6.5
	Province 5	0	0.0
	Karnali	0	0.0
	Sudur Paschim	5	16.1
	Udayapur	13	41.9
	Rautahat	1	3.2
District-wise	Parsa	3	9.7
	Kathmandu	5	16.1
	Dhading	1	3.3
	Chitawan	2	6.5
	Baglung	2	6.5
	Kailali	3	9.7
	Kanchanpur	1	3.3
Status of confirmed cases			
	Active case	27	87.1
	Recovered	4	12.9
Sources of infection			
Imported cases from foreign countries		29	93.5
	India	19	61.3
	UK	4	12.9
	Belgium	2	6.5

	UAE	2	6.5
	France	1	3.2
	China	1	3.2
Local transmission		2	6.5
	Family Infection	1	3.2
	Community Contact	1	3.2

<sup>a</sup> Mean (standard deviation)

Distribution of imported cases show that 19 cases (61.3%) were imported from India followed by 4 cases (12.9%) from the United Kingdom (UK), the United Arab Emirates (UAE) (6.5%), Belgium (6.5%), France (3.2%) and China (3.2%) (Fig. 1).

The first case was confirmed on 23 January 2020 followed by a second case on 23 March 2020 (Fig. 2). The highest number of cases (14) were reported on 17 April 2020. The analysis shows that the diagnostic test increased significantly from 7 April 2020 till 11 April 2020 where 19 positive cases were reported.

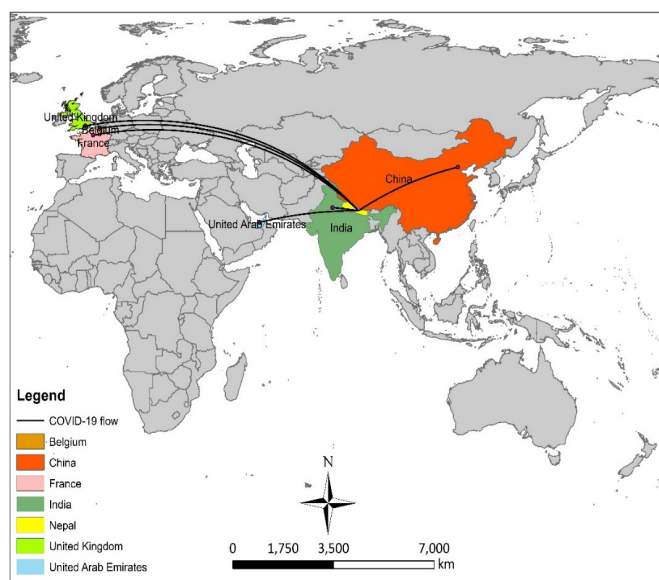


Fig 1: Distribution of countries of imported cases to Nepal

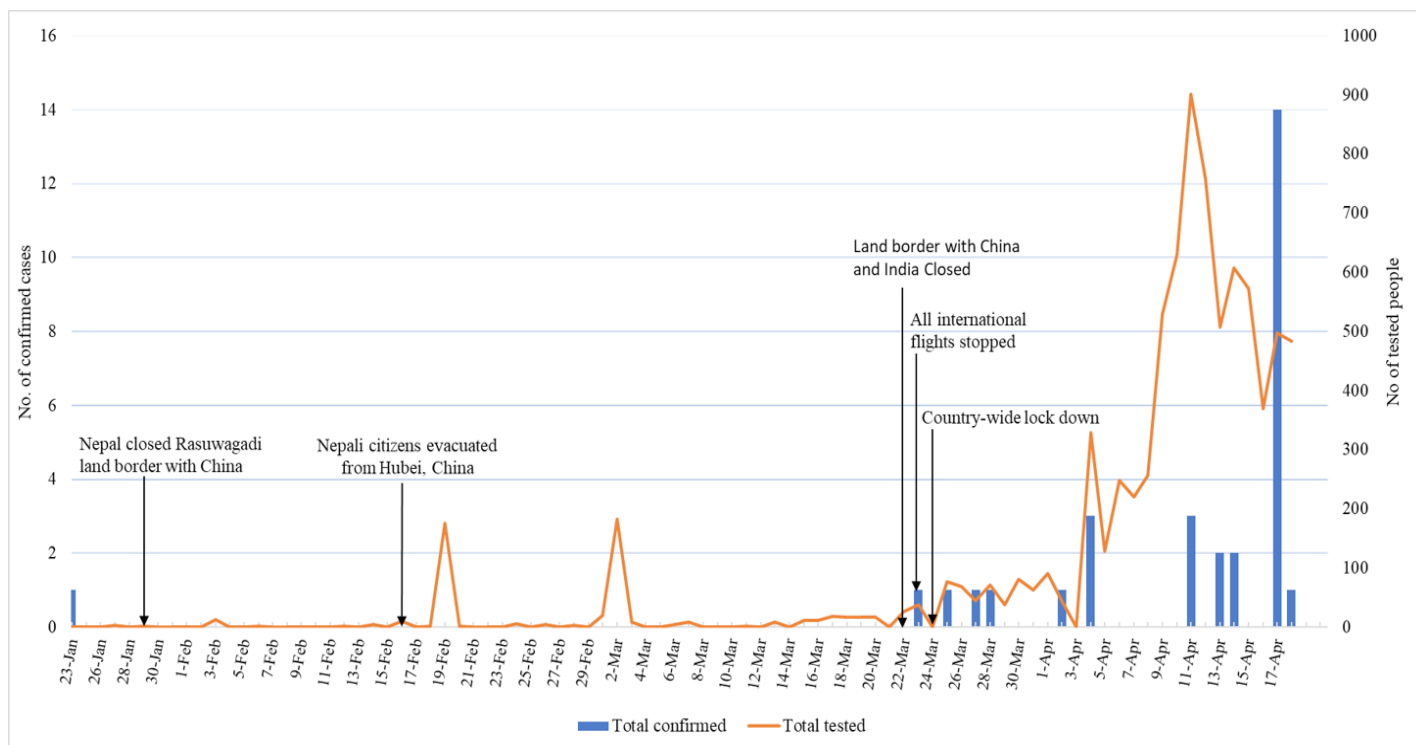


Fig. 2: Nepal COVID-19 epidemic curve and timeline

The spatial distribution shows that the confirmed cases are more in the Udayapur district of Province 1 followed by Kathmandu district of Bagmati Province. To date, no confirmed cases are reported from Province 5 and Karnali Province. Confirmed cases are spatially scattered within the countries (Fig. 3).

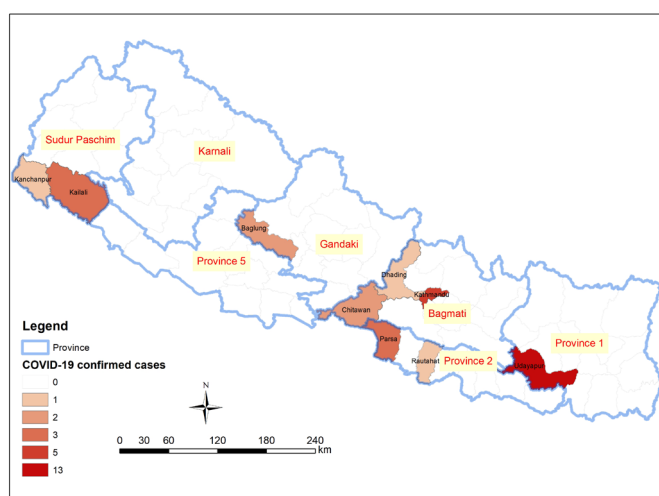


Fig. 3: Spatial distribution of confirmed cases in Nepal

### Prevention and Control Strategies for COVID-19 in Nepal

After the first confirmed case of COVID-19 in Nepal on 23 January 2020 and increasing cases in China and abroad, GoN closed the Rasuwagadi land border with China and started to set up facilities for screening passengers arriving at Tribhuvan International Airport from abroad.<sup>9</sup> On February 2020, GoN decided to suspend visit Nepal 2020 and established a quarantine center at Kharipati, Bhaktapur. Nepali citizens from Hubei province, China were evacuated and quarantined there for 14 days and their throat swab samples were tested and confirmed to be negative before sending them back home.<sup>9</sup> In the meantime, a high-level coordination committee under the leadership of deputy prime-minister was formed to prevent and control the COVID-19. This committee established a COVID-19 Crisis Management Center (CMC).<sup>9</sup> On March 2020, at first, visa-on-arrival services were suspended followed by the suspension on flights to and from the countries highly affected by COVID-19.<sup>22</sup> Later, GoN has suspended all the examinations and classes of all the academic institutions including schools, colleges, and universities. Moreover, large gatherings of more than 25 people were restricted; all the international flights were stopped and travel of all passengers including Nepali citizens from/to Nepal was restricted. Subsequent strategies include the closing of land border with China and India on 22 March and country-wide lockdown on 24 March 2020.

### Health Sector Response to COVID-19

Different strategies and activities under the leadership of the Ministry of Health and Population is being conducted in the prevention and control of COVID-19. As the preparation to response, decisions to identify the space for isolation facilities at all hub hospitals and key satellite hospitals was taken.<sup>9</sup> Moreover,

Information, education, and communication materials were developed and disseminated; a thermal scanner was installed at Tribhuvan International airport; the discussion was initiated with a provincial health emergency operation center for the preparedness with the instruction to set up 120 ICU beds in all provinces.<sup>9</sup> By the end of January 2020, 5 hub hospitals and 13 key satellite hospitals have separated the isolation facilities for COVID-19; Nepal Public Health Laboratory (NPHL) started for laboratory confirmation diagnosis; personal protective equipment was prepositioned at different hospitals.<sup>9</sup>

A high-level multi-sectoral coordination committee was formed and regular high-level official debriefing on daily monitoring status and situation update was initiated. Orientation training to the health workers who would involve in quarantine and screening was conducted.<sup>9</sup> Different guidelines and standard operating procedures to be used while screening, sample collection, transport, and treatment of suspected or confirmed cases of COVID-19 were developed and put into action.<sup>9</sup> As of 18 April 2020, there was a total of 30, 754 number of beds available for the quarantine and 3077 number of beds for isolation. Similarly, a total of 13 laboratories with the facility of diagnosing COVID-19 with the Polymerase Chain Reaction (PCR) procedure has been provisioned throughout the country.<sup>9</sup> The provincial breakdown of the available facilities is shown in Table 2.<sup>9</sup>

Table 2: Provincial level breakdown of laboratories and beds facilities

Province	Total number of laboratories for COVID-19	Available beds for quarantine	Available beds for isolation
Province 1	2	4208	449
Province 2	1	3570	220
Bagmati	6	4571	855
Gandaki	1	3744	279
Province 5	1	6403	534
Karnali	1	3821	466
Sudurpaschim	1	4437	274
Total	13	30754	112

### DISCUSSION

Among the COVID-19 confirmed cases in Nepal, male shares a large percentage of 77.4%, which is 3.5 times higher in males compared to females. This percentage is slightly higher than the other studies, which have reported the percentage of males on confirmed cases ranging from 56% to 73%.<sup>2, 15</sup> Most of the confirmed cases in Nepal are young people with the mean age of 36.7 years and the highest percentage (35.5%) belongs to the age range of 20-29 years. Some studies from other countries have reported the higher percentage of confirmed cases to be shared



by the people above 50 years with a case ranging from 2 to 89 years.<sup>2,19, 23</sup> Out of the total confirmed cases, 29 (93.5%) were identified to be the imported cases from 6 different countries and cases of local transmission have also been reported.<sup>21</sup> In this situation, the important concern is that these reported confirmed cases could only be the tip of Iceberg. The current evidence highlights the need for increased contact tracing, case detection, quarantine management, and community control measures to control the transmission. The confirmed cases increased after 3 April 2020 with a peak on 17 April 2020. The highest number of cases are distributed in Udayapur district (41.9%) of Province 1. Confirmed cases from Terai districts show clear linkages to India as 61.6% confirmed cases are imported from India. This might be due to open border between Nepal and India. Out of the confirmed cases, 87.1% are active cases, 12.9 % are recovered, and there is no mortality in the country.

## CONCLUSION

COVID-19 – a pandemic of 2020 is a global threat to humans and humanity. Nepal has reported 31 confirmed cases of COVID-19 till 19 April 2020. The distribution of confirmed cases varied with age, sex, and geographical location. The cases are highly concentrated in males, in the age group of 20-29 years, and in Udayapur district of Province 1. Different prevention and control strategies are being implemented at the provincial and national level with the establishment of quarantine centers, isolation beds, provisions of Intensive Care Units (ICUs) and the expansion of laboratory services across the countries. However, reassessment on the available facilities and proper allocation of physical and human resources based on epidemiological data is very crucial at this stage.

## RECOMMENDATION

In this scenario, priority should be given to contact tracing, case detection, and community control measures to control the transmission. Health workers and other front line workers should be provided the training on standard operating procedures while dealing with the suspected and confirmed COVID-19 cases. All the concerned stakeholders should be prepared with the personal protective equipment and other necessities for combating the COVID-19. Further research on all aspects of COVID-19 for a better understanding of symptoms and transmission pattern in Nepal, people risk perception, and preparedness would be essential to establish effective prevention and control strategies both at local and national levels.

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