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# Seasonal Variation and COVID-19 Pandemic in Nepal

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## ABSTRACT

The World Health Organization has declared the novel coronavirus (SARS-CoV-2) Covid-19 as a pandemic as it has spread globally. Understanding severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) global dispersal pattern, it is important to know the environmental parameters within which the virus survives. There is adequate evidence in epidemiological and biological aspects to prove human beings are prone to viral pathogens such as Middle East respiratory syndrome coronavirus, respiratory syncytial virus, and influenza virus in cold weather.Apart from the influence of seasonality, other factors that might impact the rate of virus spread includes the effectiveness of infection control practices, individual behavior and immunity, and emergency preparedness levels of countries. This viewpoint highlights the potential influence of weather conditions, seasons, and non-climatological factors on the geographical spread of cases of COVID-19 across the globe.

## INTRODUCTION

The coronavirus is a new kind of virus, classified into subfamily alpha, beta, gamma, and delta coronaviruses. The human coronaviruses (HCoVs) are of two types; alpha coronaviruses (HCoV-229E and HCoV-NL63) and beta coronaviruses (HCoV-HKU1, HCoV-OC43).[1] The outbreak of the virus is recorded in the past in various years. The first outbreak by the SARS-CoV virus causing Severe Acute Respiratory Syndrome (SARS) was recorded in the year 2002 during the fall, the secondoutbreak was in south Arabia in Autumn 2012 caused by the new MERS-CoV virus causing Middle East Respiratory Syndrome (MERS). The third one turned into a COVID-19 pandemic caused by the SARS- CoV -2 virus that emerged in China in the Autumn 2019[2] and has spread across the world during early 2020, with unforeseen consequences.[1] MERS and SARS did not spread widely or fast enough to show seasonality[1] whereas, the beta coronaviruses (OC43 and HKU1) spreads more in the winter.[1] As the novel Coronavirus is an emerging virus, the new pathogen has exhibited high human-to-human transmissibility nationally and internationally[3] it is hard to conclude the seasonality. Even though, it is being predicted the cases will surge back in autumn or winter if coronavirus favors winter like its cousins.[1] Beyond

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social measures and biomedical research, it is important to assess the seasonality of the epidemic to inform strategies, with limited available data in a short period.

## DISCUSSION

Viruses are sensitive to heat.High temperatures inactivate viruses, resulting reduction in the number of active viruses. The viral transmission has been suggested to be lower at higher humidity and temperature[8] In the same way many respiratory viral infectious diseases caused by the human respiratory syncytial virus (RCV), influenza virus, and human coronaviruses show seasonalfluctuation andrampant during winter. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can be transmitted through aerosols, large droplets, or direct contact with secretions (or fomites) as an influenza virus. Respiratory Syncytial viruses (RSV) are transmitted by the droplet transmission and have clear seasonal rhythms as cases of influenza and several types of coronaviruses that surge in the winter.The influenza virus and RSV survive better in the environment whether it may be surface or aerosol in low humidity and low temperature. Whereas, relative humidity and high humidity the aerosol transmission is reduced reducing the virus's survival in an aerosol.In addition to this, during winter, humidity, and the speed of air movement decreases favoring the spread of respiratory infections.[4, 5]

SARS-CoV-2 is an emerging virus that causes respiratory and gastrointestinal infections. The SARS-CoV-2 virus is spreading strikingly fast in comparison to the SARS-CoV and the MERS-CoV. Theaverage incubation period for viral infection is 5–6 days with the extension of 14 days including the symptoms as fever, coughing, and shortness of breath, and diarrhea. Also, the severe condition leads to pneumonia, acute respiratory syndrome, kidney failure and even death. The patient with COVID-19 in severe and critical conditions closely relates to the features of SARS and MERS.[6]

The viral transmission seemslower at higher humidity and temperature, but the behavior of coronavirus is still under investigation. [7] The survival and transmission of the SARS virus include temperature, humidity, and wind speed. Virus transmission is regulated by several factors, including climatic conditions (such as temperature and humidity), and population density, the same applies in SARS-CoV-2. Behavioral patterns and travel history of humansare also related tothe transmission of the virus. The human factors as lack of physical distancing, low immunity, high transmissibility increase the probability of climatic influence on transmission[8] Other significant variables include population density, societal composition, socioeconomic structures, and government policy, and surface life and the number of tests.[7]

Among the five weather variables, temperature average seems significantly correlated where temperature minimum, temperature maximum, humidity, and rainfall were not significantly correlated. Additionally, COVID-19 cases in Jakarta is seemed due to human behavior i.e. human mobility and population density.[9] The epicenter of COVID-19 Wuhan,the mean temperature has dropped from18.280C to 13.430C in October to November and humidity remained between73.12% to 77.58%. The findings overlapped with SARS onset in Guangzhou in 2002, where the temperature was between 13.85$^0$C to 15.850C and humidity between 69.05% to 78.91%. Furthermore, based on this finding the temperature between 13–19 °C and humidity between 50% and 80% seems suitable for the survival and transmission of the coronavirus. Lower rainfall and reduced relative humidity provide a good opportunity for the transmission of respiratory pathogen infections, including coronavirus.[4, 10]

Similarly, fromJanuary to March, China and Italy share a similar environment but the infectionspread was more in Italy as cold weather week lasted longer. The highest rates were found in places having mean March monthly temperatures roughly

between 40C to 120C and with relative humidity roughly between 60% to 85%.[8] Besideslarge-scale studies from 21 different countries including France, Italy, Germany, Iran, Spain, Malaysia, Australia, United Kingdom, and United States of America,state that decrease in temperature spreads the disease.[11] Conversely, the weak correlation between COVID-19 spread and atmospheric temperature between 26.00±1.660C and 33.38±1.430C,suggests Covid-19 likely to be nonseasonal.[10] However, the possible cofactors for the spread of the pandemic are the median population age and the air pollution. Similarly, low relative humidity (from 61% to 85%), low-speed wind (from 6 km/h to 11 km/h), and high atmospheric pressure (from 1016 mbar to 1026 mbar) induce atmospheric stability facilitating the spread of the virus.[8] During the outbreak of COVID-19 in china, the temperature tends to be an environmental driver as with a rise in temperature the transmission rate dropped, leading to a decline in infection rate and outbreak duration.[12] Until a vaccine is successfully launched,human beings need to be prepared for a continuous battle against the newly emerged virus.

## SCENARIO OF NEPAL

Nepal is located at latitude 28.394857N and longitude 84.124008 E. It lies in the northern hemisphere in the Asia region[13] with a population density of 203 per Km2.[14] Nepal has a diverse climatic condition varying from place to place depending on its geographical characteristics. In the Te rai region, winter temperatures range from 70C to 20C, while in mountainous areas, hills and valleys, winter temperatures fall below freezing.The Kathmandu valley has a nice climate with winter temperatures of between 20C - 120C.[15] The major citiesof Nepal above one lakh include Bharatpur, Dharan, Birgunj, Biratnagar, Patan, Pokhara, and Kathmandu the highest with 1,442,271 population.[14] A recent survey done in Kathmandu valley reports, among the participants more than one-quarter of the participants were not wearing the mask, 27.34% were found to have used the mask inappropriately, only 20% of the hospitals were found to have maintained social distancing and 80% of the hospitals have arranged soap or sanitizer but unavailability of handwashing facilities with soap or sanitizer in the public places. [16]

As we entered six months of the pandemic, there seems more cases increasing day by day. Unlike other Coronavirus, SARS-CoV-2 is also an emerging virus that causes respiratory infections. In addition to this, decreased temperature and humidity favor the formation of aerosols in winter. As we are entering the winter month from October and lasts till November when the temperature falls and humidity increases creating a favorable environment for the virus to expand. Furthermore, less exposure to sunlight decreases the Vitamin D levels weakening the immune system thus winter can be a crucial time to upward tick.Human behaviorsarean important driver of the pandemic. So, to halt the spread of the virus the proper practice of using a face mask, hand hygiene, and maintaining physical distancing is utmost.

## CONCLUSION

Although various studies hypothesize on seasonalityof Covid-19, the spread of the novel coronavirus and seasonal variations in humidity, temperature, rainfall, and other environmental variables are under study. The evidence is emerging but is inconsistent. It is too early to jump to any conclusion about the seasonality of coronavirus. Furthermore, research is required to examine.

## RECOMMENDATION

As the infection rate is increasing day by day in Nepal how SARS-CoV-2 will behave in the upcoming days is the burning issue. Efforts should therefore focus on the adoption of effective preventive measures such as wearing masks and practicing physical distancing will be important in communities to curtail the spread of the disease.

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## REFERENCES

1. The Medical Futurist. Will there be a second wave of COVID-19? Accessed on 5 September 2020d. [Full text]
2. Smith D. Coronavirus pandemic expected to get worse before it gets better, experts say Accessed on 5 September 2020 [Full text]
3. Mecenas P, Bastos R, Vallinoto A, Normando D. Effects of temperature and humidity on the spread of COVID-19: A systematic review. medRxiv. 2020 Jan 1. [DOI]
4. Anis A. The effect of temperature upon transmission of COVID-19: Australia and Egypt case study. SSRN Electronic Journal 2020. [DOI]
5. Paynter S. Humidity and respiratory virus transmission in tropical and temperate settings. Epidemiology & Infection. 2015 Apr; 143(6):1110-8. [DOI]
6. Rana Bhat D. Novel coronavirus (2019-nCoV): A Pandemic Situation in Nepal. Europasian J Med Sci. 2020; 2(2): 1-4. [DOI]
7. Bukhari Q, Massaro JM, D'Agostino RB Sr, Khan S. Effects of weather on Coronavirus pandemic. Int J Environ Res Public Health. 2020; 17(15):5399. [DOI]
8. Scafetta N. Distribution of the SARS-CoV-2 Pandemic and Its Monthly Forecast Based on Seasonal Climate Patterns. International Journal of Environmental Research and Public Health. 2020 Jan; 17(10):3493.
9. Tosepu R, Gunawan J, Effendy DS, Lestari H, Bahar H, Asfian P. Correlation between weather and Covid-19 pandemic in Jakarta, Indonesia. Science of the Total Environment. 2020 Apr 4:138436. [DOI]
10. Ogaugwu C, Mogaji H, Ogaugwu E, Nebo U, Okoh H, Agbo S, Agbon A. Effect of Weather on COVID-19 Transmission and Mortality in Lagos, Nigeria. Scientifica. 2020 Aug 18; 2020. [DOI]
11. Demongeot J, Flet-Berliac Y, Seligmann H. Temperature Decreases Spread Parameters of the New Covid-19 Case Dynamics. Biology. 2020 May; 9(5):94. [DOI]
12. Shi P, Dong Y, Yan H, Li X, Zhao C, Liu W, He M, Tang S, Xi S. The impact of temperature and absolute humidity on the coronavirus disease 2019 (COVID-19) outbreak-evidence from China. MedRxiv. 2020 Jan 1. [DOI]
13. Geodates. Nepal Geographic coordinates. Accessed on 17 September 2020 [Full text]
14. Worldometer. Nepal Population (2020). Accessed on 17 September 2020 [Full text]
15. Asian Hiking Team. Climate and weather in Nepal. Accessed on 21 September 2020. [Full text]
16. Gyanwali P. Nepal Health Research Council in collaboration with the Ministry of Health and Population presents the study "Compliance with SMS measures against COVID-19 in Kathmandu" Gov.np. [Cited 2020g Sep 21]. Available from: http://nhrc.gov.np/wp-content/uploads/2020/08/SMS_Report.pdf