# Age and Gender Differences in COVID 19 Morbidity and Mortality in Nepal

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## ABSTRACT

**Background**

The global health community has emphasized the importance of reporting epidemiological data by age and sex groups in the COVID-19 pandemic. However, age and sex disaggregated data of COVID-19 cases and deaths are rarely reported. Such data are very crucial for public to make truly informed choices about their own diseases risk and also for governments for public policy response.

**Objective**

To assess age and gender difference among COVID-19 cases and deaths in Nepal.

**Method**

This is a retrospective study which uses public data on COVID-19 cases and deaths released by Ministry of Health and Population, Government of Nepal from January to November, 2020. The data analysis was carried out using SPPS software version 26.

**Result**

Nepal reported 233,452 confirmed cases and 1,566 deaths of COVID-19 from 23 January 2020 to 30 November 2020. We found statistically significant differences on COVID-19 cases by age and gender in Nepal with higher number of cases among males of economically active age groups (20-60 years). Similarly, we found significant difference in COVID-19 mortality with more death occurred among male group compared to female group and with highest number of deaths among the people of above 60 years. Furthermore, we found differences in cases and deaths among provinces.

**Conclusion**

The age and gender differences in COVID cases and deaths in Nepal indicates needs of considering age and sex groups seriously while planning for testing, case management and vaccination against COVID-19 infections in Nepal.

### KEY WORDS

*Age, COVID-19, Gender, Nepal*

## INTRODUCTION

The COVID-19 pandemic caused by severe acute respiratory syndrome corona virus 2 (SARS CoV 2), initially detected in Wuhan has spread to many parts of the world creating the global pandemic.[1] The COVID-19 pandemic is an unprecedented health emergency around the globe which has caused significant health, economic and social consequences, and millions of morbidity and mortality. The first confirmed imported case in Nepal was reported on 23rd of January 2020 and Nepal made different efforts for prevention and control of COVID-19 in the country.[2] The COVID-19 pandemic has become a serious national health challenge and several public health measures have been initiated at the national, provincial and local levels to combat it.

The COVID-19 pandemic has affected every nation and tracking the differences in morbidity and mortality is essential for better understanding and responding it. Documenting the role of sex and gender playing in pandemic is crucial to build the evidence-based response in tackling gender disparities in health outcomes, and advocating for effective gender friendly responses.[3] Age and sex-disaggregation pattern of COVID-19 helps to implement the targeted diagnostic and treatment strategies with interventions. Though there are very few studies none of the studies have systematically explored the age and gender differences in COVID-19 morbidity and mortality in Nepal.[2,4,5] This study is aimed to explore age and gender differences in COVID-19 morbidity and mortality in Nepal.

## METHODS

This is a retrospective study using the publicly available data of COVID-19 from 23 January 2020 to 30 November 2020. The data released by the Ministry of Health and Population, Government of Nepal and Epidemiology and Disease Control Division, Department of Health Services, Ministry of Health and Population is used in the study. The data analysis was carried out using the SPPS software version 26.

## RESULTS

**Age and Gender Difference in COVID-19 cases in Nepal.**

The COVID-19 cases by age group and gender in Nepal is presented in figure 1. Nepal reported 233452 confirmed cases till November 2020. Among COVID-19 cases, 153138 (65.6%) were male, 80312 (34.4%) were female and 2 were categorized as others. In each age groups, there are more cases of male than female with highest gender difference in 15 to 70 years. The gender difference is small among the less than 15 years population and above 70 years populations. The age and gender difference of COVID-19 infections is found statistically significant (p < 0.001).
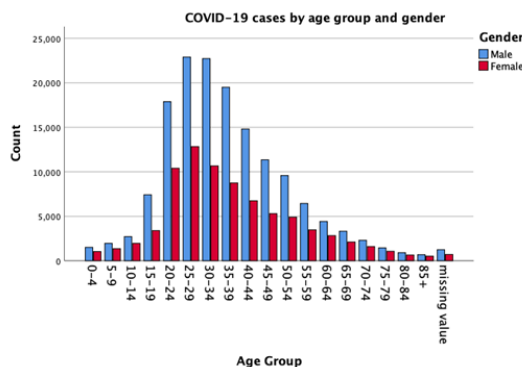


**Figure 1.** COVID 19 cases by age group and gender in Nepal

**COVID-19 cases by Province level and gender**

The COVID-19 cases by province level and gender are presented in figure 2. The highest number of COVID-19 cases (127676) were reported from Bagmati province with 77642 male (60.8%), 50034 female (39.2%) and 2 others. The lowest number of cases were reported from Karnali province with 4583 male (74.9%) and 1532 female (25.1%) followed by Sudurpachim Province. The highest gender difference is observed in Province 2 (male 82.5% vs female 17.5%). The gender difference of COVID-19 cases by province is also found statistically significant (p < 0.001).
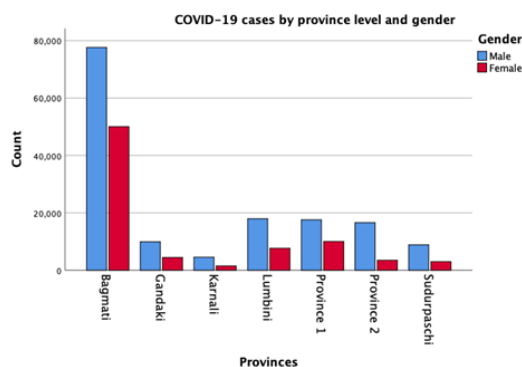


**Figure 2.** COVID 19 cases by provincial level and gender distribution

**Age and gender difference in COVID-19 deaths in Nepal**

Table 1 presents COVID-19 deaths by age groups and gender. Nepal reported 1566 deaths of COVID-19 till November 2020. Deaths counts due to COVID 19 among the male were more than double when compared with female population (69.2% vs 30.8%). The age and gender difference of COVID-19 mortality is found statistically significant (p < 0.003).

The table 2 presents COVID-19 deaths by province and gender. We did not find any statistically significant difference in COVID-19 deaths by gender at province levels. The highest number of deaths occurred in Bagmati province (800) with male 67.5% and female 32.5% followed by Lumbini Province (205) and lowest deaths in Karnali Province (24) with male 70.8% and female 29.2%. The highest gender difference is observed in Province 2 (male 75.3% vs female 24.7%).

**Table 1.** Distribution of COVID-19 deaths by age group and gender

| Age Group | Gender | | Total (N) | |
|-----------|--------|--------|-----------|---|
| | Male n (%) | Femalen (%) | | |
| 0-4 | 3 (33.3) | 6 (66.7) | 9 | |
| 5-9 | 1 (33.3) | 2 (66.7) | 3 | |
| 10-14 | 1 (100) | 0 (0) | 1 | |
| 15-19 | 4 (30.8) | 9 (69.2) | 13 | |
| 20-24 | 14 (51.9) | 13 (48.1) | 27 | |
| 25-29 | 21 (72.4) | 8 (27.6) | 29 | |
| 30-34 | 30 (65.2) | 16 (34.8) | 46 | |
| 35-39 | 43 (71.7) | 17 (28.3) | 60 | |
| 40-44 | 48 (62.3) | 29 (37.7) | 77 | |
| 45-49 | 79 (77.5) | 23 (22.5) | 102 | p <0.003 |
| 50-54 | 75 (69.4) | 33 (30.6) | 108 | |
| 55-59 | 104 (72.2) | 40 (27.8) | 144 | |
| 60-64 | 116 (72.5) | 44 (27.5) | 160 | |
| 65-69 | 131 (70.4) | 55 (29.6) | 186 | |
| 70-74 | 149 (71.6) | 59 (28.4) | 208 | |
| 75-79 | 112 (72.3) | 43 (27.7) | 155 | |
| 80-84 | 72 (56.7) | 55 (43.3) | 127 | |
| 85+ | 79 (71.8) | 31 (28.2) | 110 | |
| Age not reported | 1 (100) | 0 (0) | 1 | |
| Total | 1083 (69.2) | 483 (30.8) | 1566 | |

**Table 2.** Distribution of COVID-19 deaths by province and gender

| Province | Gender | | Total (N) | |
|----------|--------|--------|-----------|---|
| | Male n (%) | Femalen (%) | | |
| Bagmati | 540 (67.5) | 260 (32.5) | 800 | |
| Gandaki | 74 (67.3) | 36 (32.7) | 110 | |
| Karnali | 17 (70.8) | 7 (29.2) | 24 | |
| Lumbini | 147 (73.1) | 54 (26.9) | 201 | p=0.367 |
| Province 1 | 137 (66.8) | 68 (33.2) | 205 | |
| Province 2 | 140 (75.3) | 46 (24.7) | 186 | |
| Sudurpaschim | 28 (70.0) | 12 (30.0) | 40 | |
| Total | 1083 (69.2) | 483 (30.8) | 1566 | |

## DISCUSSION

Our study reveals a significant age and gender differences in COVID-19 infections and deaths in Nepal with a huge variation in number of cases and deaths by provinces. Various studies from different countries have shown gender difference in COVID-19 infections with higher mortality in male.[6-11] Furthermore, a study to examine the magnitude of sex differences in survival from the COVID-19 in Europe revealed that the relative risk of dying was higher for men than women in almost all age groups in all regions.[12] The mortality rate in Wuhan China is reported higher in males than females and compared with males, more females had no initial symptoms.[13] A study from South Korea showed case fatality rate (CFR) in males was significantly higher than females within each age strata where deaths were reported and the estimated CFRs increased substantially from age 60 years in males and from 70 years in females.[14] A recent systematic review and meta-analysis also shows that COVID-19 male patients were associated with significantly increased risk of mortality compared to females.[15] Hence, our study finding of higher mortality among male is consistent with other studies findings.

In our study, we found higher infections among males compared to female and among the people of economically active age group which is consistent with findings reported from India.[16-18] Our findings are consistent with findings

from other countries such as of Oman.[19] In contrast, some studies have reported the infection rate is lower in males than in females suggesting that gender-related factor may worsen disease evolution.[20]

Although different studies showed that male has significantly higher mortality than female, it is not clearly understood that the reason behind the mortality, whether this difference in mortality is due to sex (biological) based factors, comorbidities that differ in men and women, or gender influences. Different studies show that there are various determinants that have affected COVID-19 susceptibility in males compared to females. Various Biological, psychological, behavioural, and social factors put men in more vulnerable to COVID-19 mortality as compared to female.[21]

The ACE2 gene encodes the angiotensin-converting enzyme-2 and had been proved to be the receptor for both the SARS-coronavirus (SARS-CoV) and the human respiratory coronavirus NL63 and a recent single-cell RNA-sequencing (RNA-seq) analysis indicated that Asian males may have higher expression of ACE2.[22]

It is hypothesized that biological differences in the immune system may have a role in the sex-based difference in mortality from COVID-19.[23] The biological factor includes an absence of X-chromosomes (a powerhouse for immune-related genes) in male which affects a high level of testosterone that inhibits antibody production, and also due to the presence of ACE2 receptors that facilitate viral replication.[24]

In addition, behavioural factors like higher smoking and alcohol consumptions, low level of hand washing practices, and high-risk behaviour like non-adherence to health services and reluctance to follow public health measures in males might have added the risk.[24] Whereas, women have stronger innate and adaptive responses to infection, so due to that fact also women have less mortality due to COVID-19.[9,10]

In the context of Nepal, the majority of Nepali people go to India and other Golf countries for work every year. After

rapid spread of COVID-19 infection, most of the countries including India and Nepal declared lockdown and many Nepali migrant workers returned back to Nepal.[25] This might be one reason of high number of COVID-19 cases among young males due to high level of testing among migrant workers from India, golf countries and other countries.

As the pandemic exacerbates existing health inequities, including gender disparities, we must learn from previous global public health threats to build a gender-responsive, intersectional approach to address immediate and long-term consequences of COVID-19. Most importantly, as the COVID-19 pandemic unfolds, age and gender-disaggregated data can help guide clinical care and therapeutics including vaccination. Furthermore, the COVID-19 pandemic has clearly demonstrated that the current public policy and health care systems are inadequate to deal with the challenges and the pandemic does not have any nationality or specific political boundaries.[26]

## CONCLUSION

Males, compared to females, seem to be more susceptible to COVID-19 infections and prone to deaths. Hence, the coordination of preventive and control activities including equitable sharing of therapeutics and vaccine at local, national, regional and global level should be prioritized based on epidemiology of COVID-19 including distribution of age group and gender in order to contained this COVID-19 pandemic.

## ACKNOWLEDGEMENT

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