Discrepancies in sex-specific COVID-19 outcomes in South Asia

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Short Report

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Abstract

Divergent sex and gender norms in South Asia are key determinants of health conditions and healthcare access. However, sex-discrepancies among South Asians in important COVID-19 outcomes are unknown. We report and examine sex-specific patterning of infection, hospitalisation, deaths, case-fatality and recovery in South Asia, and conclude that contrary to trends in many high-income countries, there is a male predominance in the number of COVID-19 cases and hospitalisations, and a comparatively very low men to women case-fatality-ratio. Our findings emphasise the demand for detailed research into reasons for these sex-discrepancies to develop combative strategies in settings with suboptimal health systems infrastructure.

Introduction

As the Coronavirus Disease 2019 (COVID-19) pandemic progresses, South Asian countries, with generally suboptimal health systems resilience, face considerable public health challenges. In the region, due to the somewhat paternalistic nature of the societies, divergent sex and gender norms have been key social determinants of various health conditions, healthcare access and utilisation patterns (1). Historical neglect of women's health, high maternal mortality and poor access to health care have been connected to unbalanced sex ratios and women are less likely to seek appropriate and early care for diseases. Diseases that otherwise have equal prevalence in men and women are found to affect women disproportionately in this part of the globe (2).

In the context of COVID-19, while current global data shows a higher proportion of cases in women in many high-income countries (HICs) and a generally higher case-fatality rate of case fatality among men (3), there remains uncertainty in sex-specific discrepancies among South Asians across key COVID-19 outcomes.

In order to address these uncertainties, we sought to achieve the following objectives: 1) report sex-disaggregated data on a wide range of outcomes (infection, hospitalisation, deaths, case-fatality-ratio and post-infection recovery) from 5 major South Asian countries: India, Pakistan, Bangladesh, Nepal and Bhutan (comprising ~95% of the South Asian population), and 2) examine whether these key COVID-19 related outcomes vary by sex in these contexts.

Methods

We obtained data for this study from various sources. Sex-specific proportions for each of the outcomes for India was obtained from a real time volunteer-driven crowdfunded database (4) and applied to aggregated data reported on the webpage of the Ministry of Health and Family Welfare on the 27th May 2020 (5). Sex-specific proportions for Pakistan were obtained directly from national government statistics on the 25th April 2020 and applied to aggregated data provided by the Government of Pakistan on the

27th May 2020. Information for Nepal and Bhutan were obtained directly from national government statistics on the 21st and 23rd April, whereas sex-specific COVID outcomes were obtained for Bangladesh from the Institute of Epidemiology, Disease Control and Research (6) on 27th May 2020.

Results

Our findings suggest almost 70% of all COVID-19 cases across South Asia are men, with very similar percentages found for sex-specific hospitalisation, deaths and post-infection recoveries (Table 1). These aggregated results hide variation by country. Whereas the percentage of cases who are men is 29% in Bhutan, this increases to 67% in India, 71% in Bangladesh, 76% in Nepal and 78% in Pakistan. Across the three countries with sex-specific data on percentage of all COVID-19 related deaths (India, Pakistan and Bangladesh), the percentage of deaths among men ranged from 65% to 76%.

By contrast, we found that the case-fatality in men, relative to women, is considerably lower in South Asia compared to reported sex-specific case fatality patterns elsewhere (3). The case fatality rates in Indian women (3.0%) exceeds the case fatality among Indian men (2.8%). A similar trend is also observed in Pakistan, where the ratio of case fatality rates in men to women is 0.9 (1.9% in men vs 2.1% in women). We identified no notable differences in the duration of hospitalisation between men and women in India, and the large difference in the duration of hospitalisation reported in Bhutan could be driven by considerably low number of cases.

Discussion

Our findings suggest a considerable male predominance in COVID-19 cases however a male advantage in terms of case fatality.

These trends are in contrast to what is currently being observed in many HICs. For instance, in Denmark and the Netherlands, women account for 58% and 63% of all cases, respectively. On the other hand, in the Netherlands the case fatality rate in men is more than double that of women (19.3% vs 9.1%), as of the 26th May 2020. Similarly, in Denmark, the case fatality rate in women was 3.7% in women and 6.6% on the 26th May 2020 (3).

These findings may have several explanations.

Firstly, socially constructed gender roles in this region may enable men better access to healthcare facilities and COVID-19 testing. Data from the Institute of Epidemiology Disease Control and Research (IEDCR) in Bangladesh shows considerable discrepancies in the rates of testing between men and women, whereby 65% of all tests performed in Bangladesh are in men (6). Despite this, it is still unclear whether differential testing by sex is associated with differences in the number of positive cases by sex in the remainder of South Asia.

Secondly, concomitant cardio-respiratory disorders and related risk factors (e.g., smoking and diabetes) tend to be more prevalent in South Asian men than women (7). For example, among Indian men, there is a higher proportion of mortality attributable to cardiovascular diseases (CVD), higher age-standardized CVD mortality rate and considerably higher smoking rates (among younger Indians, prevalence of smoking is 24% in men compared to 3% in women) (8). In terms of respiratory diseases, prevalence of asthma and chronic cough are considerably high in all South Asian countries. Although prevalence of asthma is generally higher among women, chronic cough is higher among men, particularly those who smoke (9).

Thirdly, women may have an amplified immune response to different lung diseases. For instance, significant sex differences exist in the development, course, and outcome of respiratory tract infections (RTIs), whereby most types of RTIs affect men more than women. In addition, more severe RTIs disproportionately impact men, leading to higher mortality. Research has repeatedly shown a stronger immune response to infections among women potentially due to enhanced capabilities of producing antibodies. The role of sex hormones in the regulation of the immune system may also contribute to reported sex differences in the incidence and severity of the various types of RTIs, especially in adolescents and adults (10). However, direct evidence related to COVID-19 is still lacking on this hypothesis.

Finally, the low men to women case-fatality-ratio could be driven by relatively conservative social structures that may restrict women's access to both healthcare facilities. Women are less likely to seek appropriate and early care for most diseases. However, the frequency with which such care is required: burden of disease, maternal mortality, morbidity and the quality of care provided to women has not been well documented in South Asia. Diseases that generally have an equal prevalence in men and women are found to have affected women disproportionately in this region. This may explain the low rates of COVID-19 testing for women, resulting in (undocumented) deaths at home, or poorer prognosis at hospitals given the late stage admissions.

The main limitation of this report relates to the relatively low number of tests conducted in the region, suggesting that the total numbers may be considerably higher than what we report. Despite this, we do not expect the main message of this report to change considerably.

Our findings indicate a male predominance in the number of COVID-19 cases and hospitalisations; however, highlight a low men to women case-fatality-ratio compared to other world regions. These findings reinforce the need for 1) detailed research to quantify the extent to which sex and gender may contribute to COVID-19 outcomes among South Asians, and 2) context-specific public health strategies.

Key Points

- Current data from high-income countries indicate a generally higher proportion of COVID-19 cases among women in and a higher case-fatality rate in men.

- In South Asia the proportion of positive COVD-19 cases is higher among men than women, however, the case-fatality rates in women exceeds that of men in South Asia, in contrast to much higher case-fatality trends in men observed in high-income countries.
- The higher number of positive cases in men is likely due to differences in testing practices between the sexes, higher predisposition to cardio-respiratory disorders among men and potentially higher immune response to different respiratory diseases among women.
- The relatively high case-fatality among women is likely to be driven by relatively conservative social structures that may restrict women's access to healthcare and testing.
- We stress the need for research to quantify the impact of sex and gender on differences in COVID-19 outcomes among South Asians, in addition to context-specific public health strategies.

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Table

Table1.SexdistributionofCOVID19 related outcomes acrossSouthAsiabycountry

Outcomes	India*		Pakistan []		Bangladesh‡		Bhutan§		Nepal	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Total cases (%)	67 (101,684)	33 (50,082)	78 (46091)	22 (13000)	71 (27,187)	29 (11,105)	29 (2)	71 (5)	76 (32)	24 (10)
Hospitalisation (%)	67 (101,684)	33 (50,082)	.	.	.	.	29 (2)	71 (5)	76 (32)	24 (10)
Deaths (%)	65 (2819)	35 (1518)	76 (855)	24 (270)	72 (132)	28 (51)	0 (0)	0 (0)	0 (0)	0 (0)
Case Fatality (%)¶	2.8	3.0	1.9	2.1	.	.	.	.	0 (0)	0 (0)
Duration of Hospitalisation (days)	10.9	10.6	.	.	.	.	5	9.9	.	.
Recovered (%)	64 (41232)	36 (23,193)	.	.	.	.	20 (1)	80 (4)	60 (3)	40 (2)

* India information based on individual datawithcompletesexinformation as of the 27th May 2020 and sexratiosapplied tothenational statistics reported by the Ministry ofHealthandFamilyWelfare. Duration of hospitalisationfrom5thMay2020;

[] Sex-disaggregatedproportionsofoutcomesfrom Pakistan provided as of the 25th Apriland appliedtoaggregateddata on the 27thMay2020;

‡Bangladeshinformationobtainedfromthe Institute of Epidemiology DiseaseControl andResearch IEDCRonthe 27th May 2020 and total cases (%)refer tototalactivecases;

§ BhutanandNepaldataobtained on the 23rd and21stApril,respectively;

¶CaseFatalityreferstothe proportion of positivecasesthatsubsequentlydie;

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Declarations

This research article has no competing interest with anyone or any organisation. This has been done through publicly available data from government websites of respecting countries. No funding was required.