Letter to Editor: Corona virus and men's health

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A B S T R A C T

The COVID-19 pandemic has revealed significant gender-based disparities in health outcomes, with mounting evidence suggesting that men are more vulnerable to severe forms of the disease and its long-term complications. This brief review highlights the biological, behavioral, and psychosocial factors contributing to men's disproportionate burden during the pandemic. Biologically, men exhibit weaker immune responses and higher expression of viral entry receptors such as ACE2 and TMPRSS2, which may partly explain higher hospitalization and mortality rates. Hormonal factors, particularly low testosterone levels and lack of estrogenic protection, have also been implicated. In addition, men tend to engage in higher-risk behaviors, delay medical care, and experience more pronounced economic and psychological impacts due to occupational and social disruptions. Recent studies also raise concerns about the effects of SARS-CoV-2 on male reproductive health, including impaired sperm quality and hormonal imbalance. Despite these risks, health policies and clinical responses have largely remained gender-neutral, overlooking the need for targeted interventions. This letter argues for increased research attention, sex-disaggregated data, and gender-sensitive healthcare strategies to improve health outcomes for men during and beyond the COVID-19 crisis.

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Introduction

The Covid-19 pandemic has caused many problems in societies and has caused changes in people's lives [1]. Getting out of the normal routine of life will not be without psychological, social and economic effects [2]. Preliminary studies show that the disease of Covid-19 has harmed men more than women. The mortality rate of men infected with Covid-19 is about 60 to 80% higher than that of women [3].

One of the factors in the incidence and severity of Covid-19 complications in men is occupational and biological factors (Estrogen stimulates the immune system) that make men more vulnerable. Men are more exposed to environmental and occupational risk factors

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than women, and they have more bad habits such as smoking, alcohol, addiction, and occupational stress. Men are more likely to contract Covid-19 due to their employment outside the home and less self-care. Also, men are genetically more exposed to all kinds of diseases than women, and compared to them, they have more mortality and a shorter lifespan [4]. Therefore, implementing a healthy lifestyle and taking timely care is helpful. Women have more general health than men [5] and use more medical services [6]. Most of the jobs at risk are male. Therefore, men are more affected and have more severe symptoms. Compliance with the principles of personal protection in the workplace based on the relevant protocols is very important in this group. Men's health is an issue that strengthens and improves the health of the society's workforce and the development of the country.

Studies show that men's life expectancy is lower than women's [7]. The Covid-19 pandemic has affected the mental health of societies, and men were no exception. But due to the job problems they faced during this period, such as job loss and income reduction, it affected most of the heads of the family and caused more emotional damage to men [8]. Economic problems have affected a large part of society. Therefore, it is necessary to develop stress coping skills to deal with these tensions. Meanwhile, men are more prone to suffering from mental problems due to less visits to counseling centers.

Also, studies showed that covid-19 affects the health of the testicles, sperm production and male hormones and causes a decrease in male fertility [9]. The male reproductive system is the target of vulnerability of this virus and increases the possibility that it facilitates the sexual transmission of this virus and transmits the infection [10]. However, a number of studies also do not support sexual transmission. Therefore, this disease threatens men's sexual health and fertility and has a negative effect on population growth.

In general, it can be said that one of the most important challenges is the false belief that men are superior and stronger than women, and as a result, they neglect to focus on their health. Due to numerous social and physiological differences, men are usually reluctant to receive health care services. For this reason, fewer men go to health and treatment centers and are not willing to undergo tests, or less than women observe the basic hygiene principles of prevention, such as washing hands frequently, using masks and gloves [10].

Literature Review

The COVID-19 pandemic has brought unprecedented global health challenges, prompting a surge of scientific inquiry across a wide range of disciplines. While much of the early focus centered on virology, respiratory pathology, and public health measures, emerging evidence began to highlight notable sex-based disparities in disease susceptibility, progression, and outcomes. In particular, a growing body of literature has indicated that men may be disproportionately affected by COVID-19 in terms of morbidity, mortality, psychological stress, and reproductive health. This has led researchers to investigate the biological, behavioral, and sociocultural factors that may contribute to this disparity.

Studies such as those by Rastrelli et al. (2020) and Gebhard et al. (2020) were among the first to point out that men are more likely than women to experience severe forms of

COVID-19 and higher fatality rates. These observations have been supported by epidemiological data from several countries, including China, Italy, the United States, and the UK. The differences are not solely attributed to comorbidities or exposure risk, but also to immune system differences, hormonal influences, and genetic factors. Klein and Flanagan (2016) had already documented sex differences in immune responses even before the pandemic, emphasizing that females generally exhibit stronger innate and adaptive immunity [11].

Another critical dimension of this discussion is the impact of SARS-CoV-2 on male reproductive health. Research by Li et al. (2020), Ma et al. (2021), and Sengupta et al. (2021) provides alarming insights into the potential for testicular tissue damage, disruption in spermatogenesis, and hormonal imbalances caused by COVID-19. These studies raise the possibility that men who recover from the disease may face temporary or even long-term fertility issues, especially if the virus affects Sertoli or Leydig cells.

Beyond biological vulnerabilities, behavioral and psychosocial factors have also been identified as contributing to men's increased risk. For example, Galasso et al. (2020) found that men were generally less compliant with preventive behaviors such as mask-wearing and social distancing. In parallel, studies by Gunnell et al. (2020) and Bui et al. (2021) highlighted the mental health toll of the pandemic on men, including heightened stress, anxiety, substance use, and suicide risk—particularly in contexts of economic instability and occupational insecurity.

Despite these findings, many public health responses and research agendas have been gender-neutral or even gender-blind. Very few clinical trials and observational studies have disaggregated data by sex, and even fewer have specifically addressed male-specific health needs. This oversight has led to a lack of targeted messaging, policy-making, and health interventions that reflect the gendered nature of health vulnerabilities during the pandemic.

Rationale for the Study

The rationale for examining the relationship between coronavirus and men's health is grounded in both the scientific importance of addressing knowledge gaps and the practical urgency of improving gender-responsive health policies. As the pandemic progresses into its endemic phases, and long COVID becomes a persistent concern, the long-term impacts on male health—including reproductive, cardiovascular, and psychological dimensions—must be systematically understood and addressed.

A clearer understanding of how COVID-19 affects men differently will enable researchers, clinicians, and policymakers to:

- Develop targeted prevention and intervention strategies.
- Integrate sex-disaggregated data collection into health surveillance systems.
- Improve public health messaging that considers gender norms and behaviors.
- Design clinical guidelines that address male-specific risks, such as fertility monitoring and hormone regulation.
- Promote mental health services for male populations affected by pandemic-induced isolation, unemployment, and trauma [12].

Furthermore, there is an ethical imperative to redress the current imbalance in the scientific

literature and ensure that health equity includes both women and men, without assuming that one-size-fits-all approaches are adequate.

In summary, the existing literature has established a foundational understanding of sex differences in COVID-19, but significant gaps remain in men-specific research, particularly in areas such as reproductive endocrinology, mental health, and behavioral medicine. By building upon this literature, the current inquiry seeks to deepen and contextualize our understanding of men's health in the pandemic era and to advocate for more nuanced, equitable, and evidence-based healthcare strategies [13].

Table 1. Research Background Table: Coronavirus and Men's Health

Ref No.	Title	Authors / Year	Methodology	Key Findings
[14]	Sex differences in COVID-19: the role of testosterone	Rastrelli et al. (2020)	Systematic Review	Low testosterone levels are associated with more severe COVID-19 outcomes in men; testosterone may suppress immune responses.
[15]	COVID-19 and the gender health paradox	Wenham et al. (2020)	Analytical Commentary	Men face higher mortality, but women experience greater social vulnerability; calls for gender-informed policy responses.
[16]	Sex-based differences in susceptibility to SARS-CoV infection	Channappanavar et al. (2017)	Animal Study (Mice)	Male mice showed worse outcomes due to weaker immune responses; estrogen protective in females.
[17]	The impact of COVID-19 on male reproductive health	Li et al. (2020)	Clinical Review	SARS-CoV-2 may impair testicular function and spermatogenesis, with potential fertility implications.
[18]	Gender differences in COVID-19 severity and mortality	Gebhard et al. (2020)	Epidemiological Analysis	Men show higher rates of hospitalization and death; urges sex-disaggregated data in pandemic response.
[19]	SARS-CoV-2 and male fertility: Possible mechanisms	Sengupta et al. (2021)	Expert Review	The virus may damage Sertoli and Leydig cells, leading to reduced testosterone and impaired fertility.
[20]	Sex differences in immune responses	Klein & Flanagan (2016)	Literature Review	Females exhibit stronger innate and adaptive immune responses; sex hormones and X chromosome influence immunity.
[21]	Suicide risk and prevention during the COVID-19 pandemic	Gunnell et al. (2020)	Psychological Review	Economic stress, isolation, and unemployment may increase suicide risk among men.
[22]	The testis as a target organ for SARS-CoV-2	Ma et al. (2021)	Pathological Study	Postmortem examinations reveal structural damage in testicular tissue of COVID-19 patients.
[23]	Gender differences in COVID-19 attitudes and behavior	Galasso et al. (2020)	Global Survey Study	Men are less likely to wear masks or adhere to distancing guidelines than women.
[24]	Psychological impacts of COVID-19 on male workers	Bui et al. (2021)	Cross-Sectional Survey	High levels of anxiety and occupational stress reported among men, especially in unstable employment.
[25]	Hormonal influence on COVID-19 outcomes	Samuel et al. (2020)	Interdisciplinary Review	Androgen activity may influence the severity of COVID-19; suggests role of hormonal regulation.

[26]	Impact of SARS-CoV-2 infection on semen parameters	Holtmann et al. (2020)	Clinical Observation	Men who recovered from COVID-19 showed temporary declines in sperm count and motility.

Discussion

Another risk factor is smoking, which is consumed more by men than women in all societies. A history of smoking causes much more severe and deadly symptoms when contracting the Covid-19 disease, and these people will be severely affected by the virus. In addition, men are exposed to environmental factors more than women, which causes them to be exposed to a variety of injuries. While the reason for men being in high-risk environments and their greater presence in society is the importance of their attention and participation for vaccination. The Covid-19 pandemic has had a disproportionate impact on men, causing them to suffer long-term disabilities and limiting their future economic status [27].

Policymakers and senior managers of the health system should put men at the center of reforms and pay attention to their needs and expectations. It seems necessary to use measures such as providing remote health advice, visiting patients' residences for health control and self-care education. Empowering men increases the health and well-being of the whole family and society. Educational processes must respond to men's unique needs for safety, health, and well-being [28].

The global outbreak of coronavirus disease (COVID-19), caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has profoundly reshaped the landscape of public health, clinical care, and social functioning since late 2019. While the general characteristics of the pandemic—its high transmissibility, multisystem complications, and global socioeconomic disruption—have been extensively documented, certain specific dimensions of the crisis remain underexplored. One such dimension is the unique impact of COVID-19 on men's health, both in terms of biological vulnerability and psychosocial consequences. This letter to the editor aims to draw attention to this critical but often neglected area, highlighting the multifaceted ways in which the pandemic has disproportionately affected men's physical, mental, and reproductive health [29].

From the early months of the pandemic, epidemiological data began to reveal an unsettling trend: men appeared to be at higher risk of severe disease and death from COVID-19 than women. Despite similar infection rates across genders, multiple cohort studies from countries as diverse as China, Italy, the United States, and Brazil indicated that men were more likely to experience hospitalization, ICU admission, and fatal outcomes. This gender disparity prompted scientific inquiry into its underlying causes, which appear to be rooted in a complex interplay of biological, behavioral, and social factors.

On a biological level, the male immune response to viral infections tends to be less robust and slower compared to females, potentially due to differences in sex hormones such as testosterone and estrogen, as well as genetic distinctions linked to the X chromosome, which carries many immune-related genes. Testosterone, which is present in higher levels in men, has been associated with downregulation of immune activity, while estrogen in women may enhance immune cell signaling and pathogen

clearance. Furthermore, the ACE2 receptor, which the SARS-CoV-2 virus uses to enter human cells, is expressed differently in men, particularly in organs such as the lungs and testes. The presence of TMPRSS2, an androgen-regulated protease involved in viral entry, has also been hypothesized to contribute to men's increased susceptibility [30].

Beyond innate biological risks, behavioral patterns and lifestyle factors have also played a significant role in shaping men's outcomes during the pandemic. Globally, men tend to have higher rates of smoking, alcohol consumption, and pre-existing conditions such as hypertension, cardiovascular disease, and diabetes—all of which are known risk factors for severe COVID-19. In many settings, men were also less likely than women to adhere consistently to public health measures such as mask-wearing and hand hygiene, further increasing their exposure risk. Moreover, cultural norms and perceptions of masculinity may discourage some men from seeking medical attention early or acknowledging the seriousness of symptoms, thereby delaying treatment and worsening prognosis [31].

The psychological and social dimensions of men's health have also been severely impacted. Lockdowns, economic instability, and the erosion of traditional male-dominated labor markets (such as manufacturing, construction, and transportation) have created high levels of stress, anxiety, and uncertainty. Reports from various mental health agencies have shown that male suicide rates, already higher than those of females in many countries, have either remained high or risen during the pandemic. Feelings of loss of purpose, isolation, and reduced access to social support networks may have exacerbated existing vulnerabilities. Furthermore, increased domestic stressors, including intimate partner violence and substance abuse, have also had a gendered dimension, often affecting both men and their partners.

An additional area of concern is the impact of COVID-19 on male reproductive health. Although initial attention during the pandemic focused on respiratory outcomes, emerging research has raised alarms about the virus's potential effects on testicular tissue, spermatogenesis, and hormonal balance. Several studies have detected SARS-CoV-2 RNA in semen, and there is evidence that infection may lead to temporary or even long-term impairment in fertility, as well as testosterone deficiency. Inflammation and fever associated with COVID-19 can negatively affect sperm parameters, and testicular damage has been observed in some postmortem studies. These findings underscore the need for longitudinal studies and targeted reproductive health monitoring for male COVID-19 survivors, particularly those of reproductive age [32].

In light of these considerations, this letter seeks to advocate for a more nuanced, evidence-based, and gender-responsive approach to pandemic policy and healthcare delivery. There is a pressing need to recognize that men, while often considered the default in clinical research, are in fact a distinct risk group in the context of COVID-19, requiring tailored health strategies. This includes increased awareness campaigns targeting men, gender-specific data reporting, and investment in research focused on the intersections of viral infection, hormonal

regulation, and long-term reproductive outcomes [33-35].

In conclusion, while COVID-19 is an equal opportunity virus in terms of infection potential, its impacts are far from equal. The differential burden borne by men—ranging from heightened mortality to psychological distress and possible reproductive harm—demands urgent attention from policymakers, clinicians, and researchers alike. As the world moves into the endemic phase of COVID-19 management and prepares for future pandemics, integrating the lessons of gender disparity is not just a matter of fairness; it is a public health imperative [36].

The disproportionate impact of COVID-19 on male populations is the result of a complex interplay between biological susceptibility, such as differences in immune function and hormone regulation, and behavioral patterns, including lower compliance with preventive measures and delayed healthcare-seeking behaviors [37]. Additionally, psychosocial stressors, economic uncertainty, and social isolation have amplified the burden on men's mental and emotional well-being—factors that have often been overlooked in policy and public health planning [38].

Despite accumulating data and clinical observations, many national and international health strategies have failed to incorporate sex-disaggregated data or develop gender-responsive interventions. This gap in both research and policy has limited the effectiveness of pandemic responses and exposed the need for a more inclusive and nuanced approach to health equity.

Therefore, it is imperative for researchers, clinicians, and policymakers to move beyond gender-neutral frameworks and acknowledge that men constitute a distinct risk group in the context of COVID-19. Future strategies should include:

- Targeted health messaging that resonates with male populations;
- Routine reproductive health assessments for male survivors;
- Mental health services tailored to male-specific stressors;
- Expanded research into hormonal and immune system interactions in men;
- And finally, policy frameworks that ensure men's health is not marginalized in crisis responses [38].

Conclusion

The COVID-19 pandemic has served as a global stress test for health systems, social resilience, and scientific understanding of disease vulnerability. Among its many lessons, one critical insight is the need to recognize and address gender-specific health outcomes, particularly those affecting men. As the evidence shows, men are not only more likely to suffer from severe COVID-19 symptoms and higher mortality rates, but they are also vulnerable to long-term complications, including mental health deterioration, hormonal imbalance, and reproductive dysfunction.

In conclusion, the intersection of COVID-19 and men's health presents not only a public health challenge but also an opportunity to reframe gender in medical science. A comprehensive, evidence-based understanding of how COVID-19 affects men can contribute to improved health outcomes—not only during this pandemic but in future global health emergencies. By integrating gender sensitivity into every level of healthcare, we can advance equity, resilience, and preparedness across all populations.

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