

## **Online Antenatal Care During The COVID-19 Pandemic: Opportunities and Challenges**

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# Online Antenatal Care During The COVID-19 Pandemic: Opportunities and Challenges

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## Abstract

During this ongoing global pandemic of the Coronavirus Disease (COVID-19), people in different regions of the world have been greatly affected. Recently delivered mothers and currently pregnant women were in a dilemma during this period since they needed professional antenatal care while there were high infection risks of SARS-CoV-2 in hospitals. Therefore, online antenatal care would be a preferable choice for them because it could provide pregnancy-related information and online clinic consultations. In addition, online antenatal care could help to provide relatively cheaper medical services and diminish health inequality due to its convenience and cost-effectiveness, especially in developing countries or regions while not compromising the standard and being very sensitive of pregnancy risks by ensuring emergency services are immediately available when needed. But some pregnant women will doubt the reliability and the confidentiality of the online information. So, how to ensure the quality of their services and establish the stable mutual trust between pregnant women and online program would be a big problem for them. Our study observed that the COVID-19 pandemic brings not only opportunities to the development and popularization of online antenatal care programs but also challenges.

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*Viewpoint***Online Antenatal Care During The COVID-19 Pandemic: Opportunities and Challenges**

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## Abstract

During this ongoing global Coronavirus Disease (COVID-19) pandemic, people in different regions of the world have been greatly affected. Recently delivered mothers and currently pregnant women face a dilemma during this period, since they need professional antenatal care while there are high infection risks of severe respiratory syndrome coronavirus (SARS-CoV-2) in hospitals. Therefore, online antenatal care would be a preferable choice for these women because it could provide pregnancy-related information and online clinic consultations. In addition, online antenatal care could help to provide relatively cheaper medical services and diminish health inequality due to its convenience and cost-effectiveness, especially in developing countries or regions. However, some pregnant women will doubt the reliability of such online information. Therefore, it is important to determine how to ensure the quality of online services and establish a stable mutual trust between pregnant women and online programs. Here we report how the COVID-19 pandemic brings not only opportunities for the development and popularization of online antenatal care programs but also challenges.

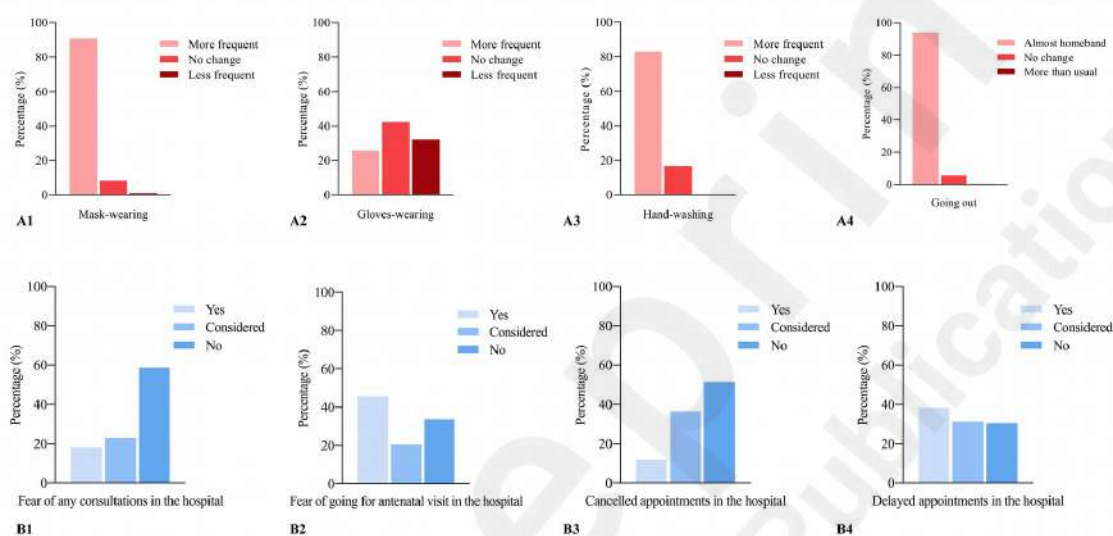
## Manuscript

The Coronavirus Disease (COVID-19) outbreak has spread globally and caused a pandemic which has led to almost 10,000,000 diagnosed cases and 500,000 deaths until 28 June, 2020<sup>1</sup>. The impacts of COVID-19 could be greater in vulnerable population. Pregnant women tend to be more physiologically and psychologically susceptible to infectious diseases, putting them at higher risk of maternal complications such as preterm birth, gestational hypertension, gestational diabetes, and miscarriage<sup>2-4</sup>. In this scenario, pregnant women face a dilemma: They need professional antenatal care, (appropriate antenatal education could be beneficial to them in many ways including reducing cesarean section rates, maternal and infant mortality, and anxiety problems as well as improve their general reproductive health outcomes<sup>5</sup>), but there is potential cross-infection risk for them if they choose to complete antenatal care in hospitals<sup>6</sup>.

Recently, we performed a web-based survey among Chinese pregnant women via a national online platform to investigate their self-protection behaviors and attitudes towards antenatal care during this pandemic. A total of 983 Chinese pregnant women completed the questionnaire and it was found that more than 80% of them had taken self-protection actions, such as facemask-wearing, hand-washing, and home quarantine to avoid being infected with severe respiratory syndrome coronavirus (SARS-CoV-2) (Figure 1). For antenatal visits and consultation, about 20% of the women were afraid of any consultation in hospitals, while over 40% of them feared antenatal visits in hospitals. Moreover,

more than half of the pregnant women considered or decided to cancel their antenatal care appointments, and postponed their appointments in hospitals. These behaviors and attitudes indicated that pregnant women were anxious and worried about potential infection especially when completing antenatal care in hospitals. Considering the dilemma above, online antenatal care might be a preferable choice for pregnant women during this pandemic<sup>7</sup>.

**Figure 1. Pregnant women's self-protection behaviors and attitudes towards antenatal care in hospitals.**



Online antenatal care programs before the COVID-19 pandemic.

Online antenatal care programs could take various forms: online courses to deliver pregnancy-related information, mobile phone apps to motivate healthy behaviors during pregnancy and mHealth applications to provide mental consultations<sup>8,9</sup>. Numerous studies have reported that the great majority of pregnant women search for pregnancy-related information on the Internet<sup>10,11</sup>. However, the popularization rate of online antenatal care programs remains low.

Opportunities of online antenatal care during this pandemic

During the COVID-19 pandemic, pregnant women could stay at home to receive necessary antenatal care via online antenatal care programs. For example, online antenatal care programs could guide pregnant women to perform blood and urine glucose tests at regular times especially for those with gestational diabetes mellitus (GDM) or at high risk of GDM. Then obstetric doctors could closely monitor their glucose levels and give individuals appropriate dietary suggestions and medications. This would be helpful in decreasing the incidence and negative impacts of GDM. Moreover, women

could upload their daily blood pressure and simple home urine dipsticks results to online systems. This would allow monitoring for serious pregnancy complications such as preeclampsia. General gestational education and mental consultation could be done through an online education program either by using voice, or video calls. The pregnant women could also be guided to study pregnancy and labor instructions in books, and receive antenatal care education via online conferencing. All of these approaches would likely contribute to better labor preparedness, maternal experience, post-partum adjustment and outcomes, fewer infection risks, and more economic benefits to the health system and the women themselves. Therefore, it can be suggested that women in pregnancy without any discomfort should use online antenatal care programs as an alternative to routine antenatal care in hospitals to some extent and learn to perform self-monitoring while on lockdown or home quarantine to prevent viral infection or spread<sup>12</sup>, since they are more likely to have severe complications if infected with SARS-CoV-2<sup>13-15</sup>.

Moreover, under the influences of this pandemic, daily necessities were scarce and the cost of medical appointments was dramatically higher than usual, while many families lost their economic sources and suffered heavy economic burdens. People who were unable to obtain or pay for sufficient medical resources were most vulnerable<sup>16</sup>. Online antenatal care could provide relatively cheaper medical services and diminish health inequality due to its convenience and cost-effectiveness especially in developing countries or regions. This could contribute to reduce medical resources inequality and help pregnant women solve various health problems during the pandemic. Medical experts and institutions should strengthen the quality of online antenatal care in terms of skilled professional services, technology and availability.

#### Challenges of online antenatal care during this pandemic

However, online antenatal care faces some challenges and requires much improvement. A study in China found that many pregnant women had concerns about the reliability of online gestational information<sup>17</sup>. Therefore, one important issue for online antenatal care programs during this period is to establish close collaboration between hospitals and professional institutes to improve the quality of online programs, ensuring the reliability of their information. In the meantime, this can be combined with information technology products, such as using electronic devices with remote monitoring functions to monitor basic indicators such as fetal heart rate and movement, to serve as a proxy for some routine obstetric examinations. However, in certain conditions, antenatal care in hospitals is irreplaceable<sup>18</sup>. High-risk pregnant women might present vaginal bleeding, abdominal



pain or other obvious discomforts; and in such cases, further obstetric examinations and consultations in hospitals are essential. Moreover, some specific antenatal examinations such as the Nuchal Translucency test, Down's syndrome screening, and the Oral Glucose Tolerance Test should be completed in hospitals. The future of maternal care is likely to include technological innovations to address the above challenges. Due to this, wider optimal maternal care services should be applied to reduce the overall maternal morbidity and mortality if online antenatal care is further developed, popularized and adopted as an alternative pathway for pregnant women to access healthcare services.

Furthermore, it has been mentioned that less than one-third of the population are Internet users in Africa and the Middle East, with a global proportion rate of 51% in 2018<sup>19</sup>. Therefore, in addition to improving online antenatal care for pregnant women, the popularization of both the use of the Internet and mobile electronic devices is crucial to allow more pregnant women to receive online education and care. Network operators need to be improved to guarantee the widespread use of Internet services in this COVID-19 outbreak. Governments should use their financial budget to support the popularization of modern electronic devices and Internet service, which are essential for online antenatal care programs. Also, governments need to legislate relevant laws to regulate and protect the privacy of pregnant women when they are using online antenatal care services.

In summary, online antenatal care could be a useful alternative option for pregnant women to obtain some basic antenatal care and mental consultation, thereby reducing unnecessary hospital visits and avoiding extra potential-infection risks during this COVID-19 pandemic. Efforts to implement such online care is likely to result in multiple innovations and revolutionize the antenatal care services both in China and the world over. This will contribute to reducing maternal morbidity and mortality by providing opportunities for wider coverage. The popularization of online antenatal care programs is likely to have an economic benefit to both the health system and to the women in terms of saving cost, time, and manpower. This would improve the overall maternal and reproductive health services and family life.

### **Contributors**

Huangliang Wu, Weiwei Sun and Xinyu Huang contributed equally. Huangliang Wu, Weiwei Sun and Xinyu Huang contributed to the conception and design of the study, drafted the primary version of manuscript, modified the manuscript and reviewed the final version. Shining Yu, Hao Wang, Xiaoyu Bi, Jie Sheng, Sihan Chen, Babatunde Akinwunmi and Casper J. P. Zhang modified and

reviewed the final version of manuscript. Wai-kit Ming contributed to the conception and design of the study, modified the manuscript and reviewed the final version. All authors discussed and agreed on the implications of the study findings and approved the final version to be published.

### Conflict of interests

The authors report no conflict of interest.

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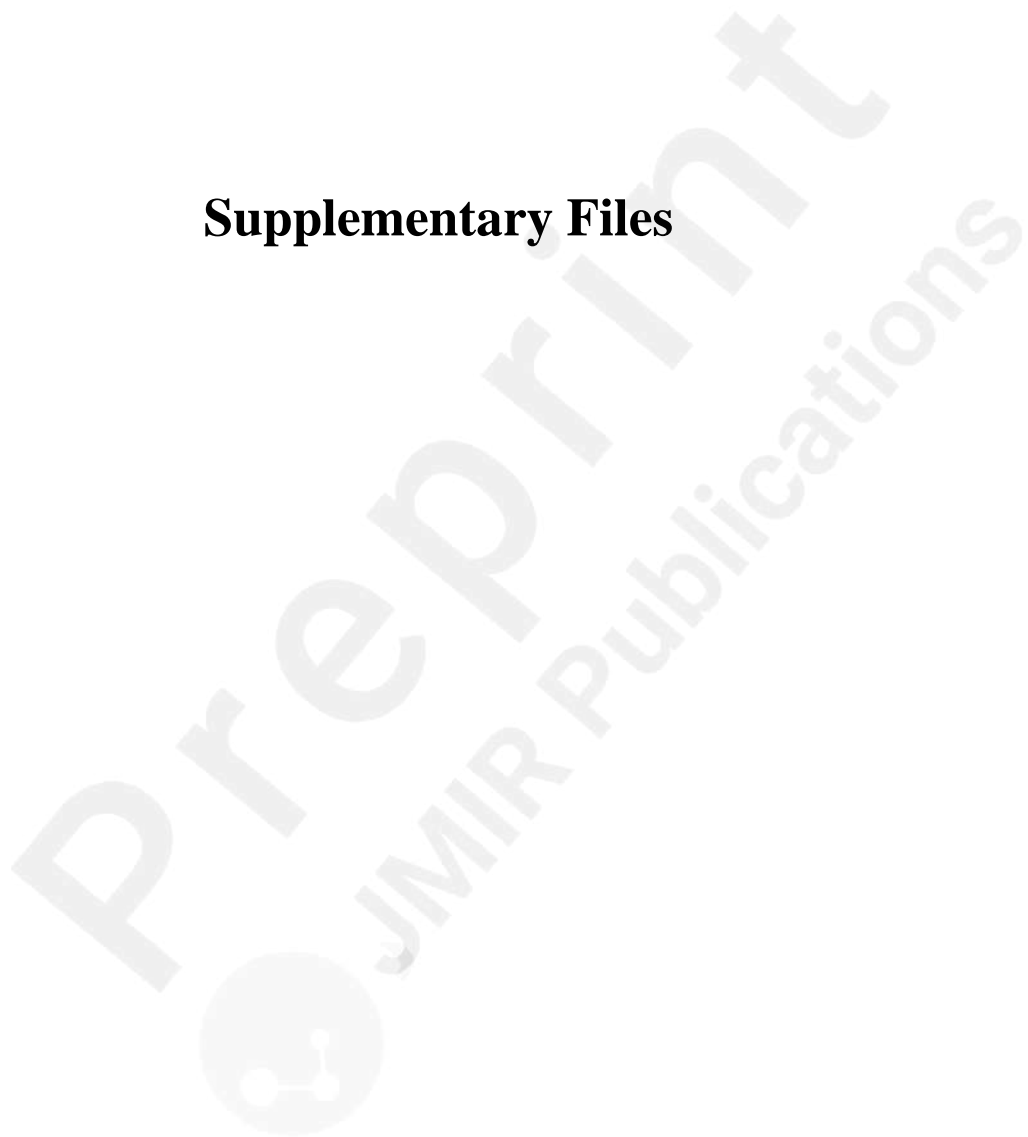
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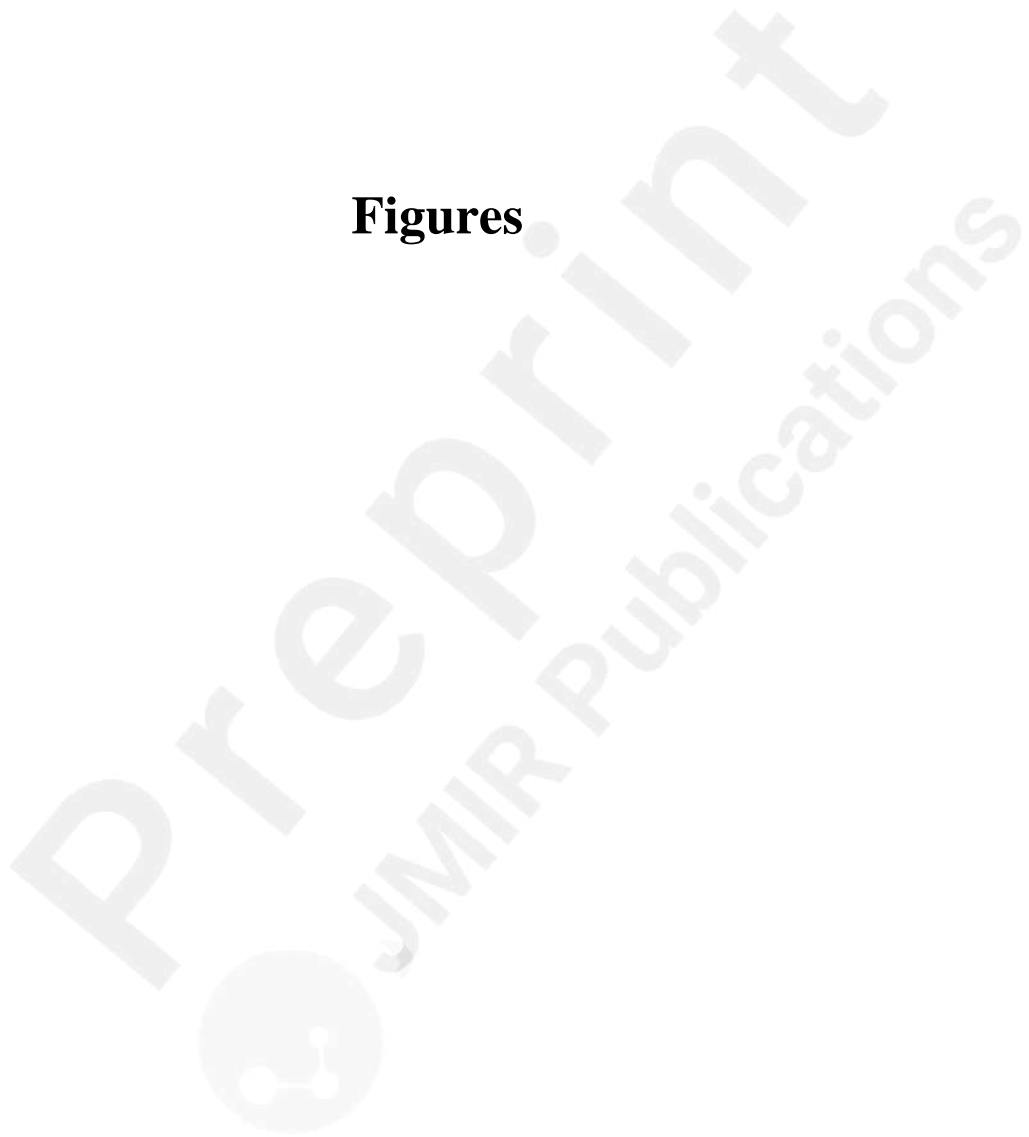
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## Supplementary Files



## Figures



Pregnant women's self-protection behaviors and attitudes towards antenatal care in hospitals.

