

# Prioritizing Pregnant Women for Coronavirus Disease 2019 Vaccination in African Countries

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Coronavirus disease 2019 (COVID-19) in pregnancy is associated with excess maternal and infant morbidity and mortality in both African and higher-resource settings. Furthermore, mounting evidence demonstrates the safety and efficacy of COVID-19 vaccination for pregnant women and infants. However, national guidelines in many African countries are equivocal or lack recommendations on COVID-19 vaccine in pregnancy. We summarize key data on COVID-19 epidemiology and vaccination among pregnant African women to highlight major barriers to vaccination and recommend 4 interventions. First, policymakers should prioritize pregnant women for COVID-19 vaccination, with a target of 100% coverage. Second, empirically supported public health campaigns should be sustainably implemented to inform and support pregnant women and their healthcare providers in overcoming vaccine hesitancy. Third, COVID-19 vaccination for pregnant women should be expanded to include antenatal care, obstetrics/gynecology, and targeted mass vaccination campaigns. Fourth, national monitoring and evaluation of COVID-19 vaccine uptake, safety, surveillance, and prospective outcomes assessment should be conducted.

**Keywords.** pregnancy; COVID-19; SARS-CoV-2; vaccination; sub-Saharan Africa.

Early data on severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in pregnancy, largely derived from the Global North, indicated that coronavirus disease 2019 (COVID-19) significantly increased the risk of poor maternal and infant outcomes [1–5]. More recently, a multi-national prospective cohort study of the effects of COVID-19 in pregnancy and neonatal period (INTERCOVID) (including Ghana, Nigeria, and 16 countries outside Africa) found that SARS-CoV-2 infection among pregnant women was associated with higher rates of intensive care unit (ICU) admission, pre-eclampsia, eclampsia, cesarean delivery, and maternal mortality compared to those in pregnant women without infection. Furthermore, considering birth outcomes, pregnant women

with SARS-CoV-2-infection had higher rates of preterm birth and stillbirth [6].

Following the INTERCOVID study findings, data on COVID-19 and pregnancy have become available from more African countries. The African Forum for Research and Education in Health (AFREhealth) Research Collaboration on COVID-19 and Pregnancy conducted a retrospective cohort study across 22 health facilities in 6 African countries [7]. Among SARS-CoV-2-infected women, being pregnant was associated with a 2.4 times higher risk of ICU admission and about a 2 times higher risk of mortality. Furthermore, SARS-CoV-2-infected (vs uninfected) pregnant women had a 5 times greater hazard of in-hospital death. These data highlight the potentially devastating consequences of COVID-19 in pregnant women and demonstrate the importance of preventive measures for both maternal and infant health [7].

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## SAFETY AND EFFICACY OF COVID-19 VACCINE IN PREGNANT WOMEN

Although pregnancy was an exclusion criterion in the earliest trials of COVID-19 vaccine and treatment candidates [8,9], more recent trials have enrolled pregnant women [10,11].

Initial studies provided preliminary evidence for the safety, immunogenicity, and effectiveness of messenger RNA (mRNA) vaccines in pregnant women [12,13] and reported no adverse effects of vaccination related to pregnancy or neonatal outcomes [14–16]. A systematic review by Girardi et al found that COVID-19 vaccination in pregnant and lactating individuals is immunogenic, safe with respect to vaccine-related adverse events and obstetrical and neonatal outcomes, and effective in preventing COVID-19 disease [17]. In a recent population-based study from Sweden and Norway, among pregnant women, vaccination against SARS-CoV-2 compared with no vaccination was not significantly associated with an increased risk of adverse pregnancy outcomes [18]. The majority of COVID-19 vaccines used in this study were mRNA vaccines; however, 2% of vaccinees received the Oxford-AstraZeneca adenovirus vector vaccine, and most were vaccinated during the second and third trimesters. Albeit limited, published data on the safety of adenovirus vector vaccines (Oxford/AstraZeneca ChAdOx1nCoV-19 and Johnson & Johnson/Janssen JNJ-7836735 vaccines) and the inactivated virus CoronaVac vaccine are also reassuring [19–21]. Continued postapproval monitoring of vaccine safety in pregnancy for all available COVID-19 vaccines should remain a priority.

Additionally, maternal vaccination studies have shown efficient postvaccination transfer of maternal SARS-CoV-2 antibodies across the placenta and into breastmilk, suggesting a degree of protection for breastfeeding neonates and infants [22–25]. In the United States, maternal completion of a 2-dose primary mRNA vaccine series during pregnancy was associated with a 61% decrease in COVID-19–related hospitalization among infants aged <6 months [26]. Furthermore, COVID-19 vaccine is safe and poses no additional risk to breastfeeding women or breastfed infants [27,28]. SARS-CoV-2–specific immunoglobulin G and immunoglobulin A antibodies have been shown to be present in breastmilk following vaccination of breastfeeding women, which could provide protection of infants should they be exposed to infection [29,30]. Therefore, the potential benefits of maternal vaccination while breastfeeding appears to greatly outweigh the risks [27].

While future COVID-19 vaccine trials should strongly consider increasing the inclusion of pregnant women and monitor their outcomes, current evidence suggests that these vaccines are safe and protective for both women and infants.

### **BARRIERS TO COVID-19 VACCINATION AMONG PREGNANT WOMEN IN SUB-SAHARAN AFRICA**

There are notable geographic variations in COVID-19 vaccination recommendations for pregnant women. According to the COVID-19 Maternal Immunization Tracker (<https://www.comitglobal.org/>), Australia and most countries in North America, Europe, South America, and South and Southeast Asia are now recommending COVID-19 vaccination for

some or all pregnant women. By contrast, as of 23 February 2022, only 10 of 54 African countries are recommending COVID-19 vaccines for some or all pregnant women [31]. These findings mirror larger global patterns of vaccine inequity, with failure of national vaccine recommendations to consistently include pregnancy. These policy gaps, along with other factors such as misinformation, negatively affect uptake of COVID-19 vaccination in pregnancy [32]. As of 23 February 2022, full primary series COVID-19 vaccine coverage in general populations across Africa was just 12%, with rates in two-thirds (67%) of countries <20% [33]. Clearly, the World Health Organization (WHO) target of 70% vaccine coverage by June 2022 will not be attained in most African countries [34]. Data on COVID-19 vaccine coverage in pregnancy are scarcely available, even in African countries with permissive policy recommendations [35]. Although policies regarding COVID-19 vaccine use in pregnancy have evolved over time, imbalances in recommendations between jurisdictions exacerbate prevailing inequities in access and use of COVID-19 vaccines [36].

Vaccine hesitancy may pose an additional barrier to preventing COVID-19 and its consequences in women and infants. In a meta-analysis of 12 studies totaling >16 000 people, only 47% (95% confidence interval [CI], 38%–57%) of pregnant women planned to receive the COVID-19 vaccine [37]. Notably, the lowest intent was seen in Africa at 19% (95% CI, 17%–21%). Prior uptake of other vaccines (influenza and/or tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis [Tdap]) during pregnancy was associated with higher intent to receive the COVID-19 vaccine (odds ratio, 3.03 [95% CI, 1.37–6.73];  $P=.006$ ) [38]. The most common reasons for COVID-19 vaccine hesitancy and low vaccine uptake in pregnancy include misinformation and disinformation disseminated on social media and other platforms, which mislead the public about maternal side effects (eg, infertility), presumed lack of safety data among pregnant women, and inaccuracies about the potential for fetal harm [39–41]. It is critical to evaluate and implement evidence-based educational and counseling interventions that address misinformation and disinformation to reassure pregnant women and their families and increase their confidence in proven effectiveness and safety of COVID-19 vaccines.

### **PROPOSED FACILITATORS FOR AND SOLUTIONS TO ENSURE PROMOTION, UPTAKE, AND EQUITY OF COVID-19 VACCINATION IN PREGNANCY IN AFRICAN COUNTRIES**

The strong evidence of potentially severe effects of SARS-CoV-2 infection on pregnant women and infant outcomes supports the prioritization and scale-up of maternal COVID-19 vaccination. Given the adverse consequences of COVID-19 during pregnancy and the increasing data supporting a favorable safety profile of the Pfizer-BioNTech BNT162b2 vaccine in pregnancy, WHO recommends the use of

COVID-19 vaccines for pregnant women in its updated 2022 recommendations [42,43]. The recommendations put emphasis on informing pregnant women that they can receive the vaccine and providing them with information about the increased risks of COVID-19 in pregnancy and the likely benefits of vaccination, in line with strong recommendations from other international societies [44,45]. There is evidence to show that vaccination is beneficial even for individuals with a history of SARS-CoV-2 infection; that postinfection maternal SARS-CoV-2 humoral immunity wanes rapidly during pregnancy, resulting in low or absent protective antibody titers for a significant proportion of pregnant women (depending on time of infection); and that a single boosting dose of BNT162b2 mRNA vaccine induced a robust increase in protective antibody titers for both mother and newborn [46]. Additionally, for immunization programs to succeed, target populations must have confidence in the benefits and safety of the vaccines. Fear of vaccines may be pronounced among pregnant women and their healthcare providers, and effective

communications are needed for both [47,48]. For example, the American College of Obstetricians and Gynecologists has developed tools to assist obstetricians in discussing COVID-19 vaccination with their pregnant patients [50]. Finally, potential facilitators of COVID-19 vaccination in pregnant women in low- and middle-income countries include access to the wide network of community-based antenatal care clinics where routine maternal vaccines are administered, such as hepatitis B, and Tdap or tetanus toxoid. To help close the vaccination gap in pregnant African women, we recommend the following actions. First, policymakers and programs should prioritize pregnant women for COVID-19 vaccination and accelerate scale-up and 100% coverage. Second, empirically supported public health campaigns should be sustainably implemented to inform and support pregnant women and their healthcare providers in overcoming vaccine hesitancy [44]. Third, COVID-19 vaccination availability should be expanded to include antenatal care, obstetrics/gynecology, and community clinics where other vaccines (eg, tetanus) are routinely

**Table 1. Barriers and Solutions to Ensure Promotion and Equity of Coronavirus Disease 2019 Vaccination Among Pregnant Women in Sub-Saharan Africa**

Area of Focus	Barriers	Solutions/Recommendations
Policy-making	<ul style="list-style-type: none"> <li>Many national guidelines in African countries are equivocal or lack recommendations on COVID-19 vaccination among pregnant women</li> </ul>	<ul style="list-style-type: none"> <li>Urgent update of national guidelines in African countries for stronger recommendation of COVID-19 vaccination for pregnant and lactating women based on currently available efficacy and safety data</li> </ul>
Vaccination communication and education	<ul style="list-style-type: none"> <li>Low acceptance of COVID-19 vaccination among pregnant women and women of childbearing age</li> <li>COVID-19 vaccine misinformation and disinformation disseminated on social media and other platforms</li> </ul>	<ul style="list-style-type: none"> <li>Evidence-based, locally tailored COVID-19 vaccine promotional campaigns to target pregnant women and their families, dispelling misinformation and extolling the benefits of vaccination for both mothers and infants</li> <li>COVID-19 vaccine promotional campaigns also targeting healthcare workers providing for pregnant women [48]</li> </ul>
Healthcare systems delivery	<ul style="list-style-type: none"> <li>Heterogeneity of Pfizer and Moderna mRNA COVID-19 vaccine supply in African countries and their requirement for ultra-cold storage of <math>-80^{\circ}\text{C}</math> and <math>-20^{\circ}\text{C}</math> (<math>-112^{\circ}\text{F}</math> and <math>-4^{\circ}\text{F}</math>, respectively)</li> <li>Low COVID-19 vaccine access for young women and women in rural and other underserved communities with very poor health infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Innovative solutions for cold chain, including use of high-tech insulated and reusable containers that can maintain temperatures of <math>-80^{\circ}\text{C}</math> for up to a week in the field [50]</li> <li>Need for additional safety data on use of non-mRNA COVID-19 vaccines with less cold-chain storage needs (eg, viral vector or inactivated vaccines) for pregnant women</li> <li>Integration of COVID-19 vaccination into routine pregnancy-related vaccination (eg, tetanus) and expansion of vaccine administration points to include antenatal care and obstetrics/gynecology clinics as well as community clinics and centers to increase access/uptake for pregnant women and those of childbearing age</li> <li>Mass campaigns for COVID-19 vaccination to include mobile clinics targeting pregnant women</li> </ul>
Monitoring and evaluation	<ul style="list-style-type: none"> <li>Lack of national COVID-19 uptake, coverage, and safety data for pregnant women to support policy and practice</li> </ul>	<ul style="list-style-type: none"> <li>Create national registries for vaccination in pregnancy</li> <li>Track COVID-19 vaccination uptake in pregnant women</li> <li>Conduct routine surveillance and prospective cohort studies of SARS-CoV-2 infection and outcomes in pregnant women</li> </ul>

Abbreviations: COVID-19, coronavirus disease 2019; mRNA, messenger RNA; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

administered to pregnant women (Table 1). Alternative approaches such as mass campaigns including mobile clinics should be considered. Although the mRNA vaccines require cold-chain storage, innovative solutions can be identified, such as use of highly insulated and reusable containers that can maintain temperatures at  $-80^{\circ}\text{C}$  for up to a week in the field even if the container is opened several times a day, as was done for Ebola virus vaccines [49]. Finally, it is critically important to collect, monitor, and evaluate COVID-19 vaccine uptake and safety in pregnant women (eg, in national registries), while continuing national SARS-CoV-2 infection surveillance and implementation of prospective cohort studies to accurately assess outcomes while minimizing bias.

## CONCLUSIONS

Accumulating evidence from African and non-African settings indicates that SARS-CoV-2 infection during pregnancy is associated with more severe COVID-19 disease and poorer maternal and infant outcomes. Studies also show that mRNA COVID-19 vaccines are safe and effective for use in pregnancy, but more data are warranted for other non-mRNA vaccines. Policymakers and public health institutions in African countries should prioritize pregnant women in COVID-19 vaccine programs and work to accelerate scale-up and move toward 100% coverage through evidence-based policy, tailored community messaging, and education of professional and traditional providers caring for pregnant women.

## Notes

**Author contributions.** J. B. N., N. A. S.-A., and M. J. S. conceptualized and drafted the manuscript. All coauthors provided substantial contributions in terms of critical revision of the draft and reviewed as well as approved the final version submitted for publication.

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