

# Making obstetrics more environmentally sustainable during and beyond the COVID-19 pandemic

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## Abstract

The climate crisis has increased the burden of obstetrical care due to the negative impact of environmental disruption on the health of pregnant women, new mothers, foetuses and neonates. During the COVID-19 pandemic, the ecological footprint of obstetrical care has significantly increased due to the use of personal protective equipment and the provision of large-scale testing and vaccination of pregnant women and healthcare personnel against COVID-19. The situation calls for coordinated action to make obstetrics more resource efficient. To achieve this goal, obstetricians need to rationalise the use of electricity, water, paper and plastic, adopt green surgical practices and integrate environmental sustainability in their working culture and personal life at large. The present article discusses the main sources of environmental pollution in obstetrical care and proposes evidence-based solutions.

## KEYWORDS

carbon footprint, climate change, environmental sustainability, gynaecology, obstetrics

## Highlights

- Obstetric care includes several waste generating and energy-intensive procedures, which constitute a burden to the environment.
- The COVID-19 pandemic has increased the ecological footprint of obstetrical services due to the extensive use of personal protective equipment, diagnostic tests and vaccination kits for pregnant individuals.

- To make obstetrics greener it is essential to rationalize the use of electricity, water, paper and plastic, as well as to adopt green surgical practices.
- Obstetrician-gynecologists can optimize the long-term and short-term health of pregnant individuals, fetuses and newborns by implementing environmentally sustainable practices.

## 1 | INTRODUCTION

The current climate crisis constitutes an environmental emergency. As reported by the World Health Organization (WHO) and The Lancet Countdown, climate change can have a great impact on human health.<sup>1</sup> Particularly vulnerable populations are pregnant women, children, foetuses, the elderly, and disadvantaged populations. In fact, epidemiologic evidence suggests the direct effect of climate change on fertility, perinatal outcomes, reproductive and mental health.<sup>2</sup> The American College of Obstetricians and Gynaecologists (ACOG) recognises that "climate change is an urgent women's health concern as well as a major public health challenge." Unfortunately, healthcare is a significant contributor to climate change.<sup>3</sup> In fact healthcare facilities in the United States are the second greatest source of waste in the country, producing more than 6600 tons of waste each day.<sup>4</sup>

The COVID-19 pandemic has enormously added on healthcare waste. Since the spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in early 2020, extensive use of personal protective equipment, testing and vaccination materials has been deemed necessary.<sup>5</sup> According to the World Health Organization (WHO), thousands of tons of excess medical waste, used in the context of the COVID-19 pandemic, has created great instability in healthcare waste management systems, posing a great danger on human and environmental health. WHO has estimated that over 140 million test kits, being able to create 2600 tons of waste and 731,000 L of chemical waste have been shipped. In addition to these, the more than 8 billion doses of vaccines, which have been globally administered, have produced 144,000 tons of additional waste in the form of syringes, needles, and safety boxes.<sup>6</sup> Therefore, the COVID-19 pandemic is considered as a major global health concern and a significant source of healthcare waste.

The coronavirus disease, a respiratory infection with multisystem inflammatory manifestations constitutes a dire challenge for obstetricians and gynaecologists. Research has shown that pregnant individuals as well as people who were recently pregnant are at higher risk for more severe illness from COVID-19 in comparison to non-pregnant individuals. These groups are more likely to need admission to an intensive care unit or hospitalisation, to need a ventilator and to show severe symptomatology compared to the healthy population. Pregnant individuals with a COVID-19 infection are, in fact, more likely to have preeclampsia, stillbirth, and preterm birth.<sup>7</sup> Neonates born to COVID-19 positive mothers, have an increased risk for neonatal intensive care unit admission.<sup>8</sup> On these grounds, hygienic measures need to be strictly observed during all the stages of care for pregnant women and new mothers.<sup>7</sup> For the same purpose frequent testing and booster COVID-19 vaccine doses have been deemed necessary for this population.<sup>9</sup> Thus, the carbon footprint of obstetrical care has grown significantly during the COVID-19 pandemic.

In this short communication, we discussed the common obstetric practices during the COVID-19 pandemic from an environmental perspective and we proposed recommendations for environmentally sustainable obstetrical care.

### 1.1 | The carbon footprint of obstetrical practice during the COVID-19 pandemic

The protection of pregnant individuals during the COVID-19 is of outmost importance and various preventative measures have been implemented in order to protect this vulnerable population. Nonetheless, the COVID-19 pandemic has put unprecedented pressure on the existing environmental problem and waste management.<sup>5</sup>

The American College of Obstetricians and Gynaecologists, as well as the Centre for Disease Control and Prevention (CDC) have made a series of recommendations for pregnant individuals.<sup>10,11</sup> ACOG strongly recommended COVID-19 vaccination as well as booster vaccination during pregnancy and breastfeeding. Hygienic measures including washing hands frequently with soap for 20 s at least, using a hand sanitiser, which contains 60% alcohol at least, and always having available essential supplies have also been recommended. Pregnant women were also strongly encouraged to always wear a face mask, oftentimes surgical or filtering face pieces (FFP) masks, in order to prevent the spread of the virus. Hospitals, hospital based-facilities and other accredited birth-centres were encouraged to follow strict procedures to control infections; pregnant women needed to be tested for COVID-19 before the arrival at the hospital for delivery. The health-care team were recommended to wear masks, goggles, face shields and other protective breathing equipment during labour and delivery. Rubber gloves and aprons were also recommended, as well as the frequent testing of hospitalised or unvaccinated patients who visited the hospital for routine pregnancy examinations. Support people of pregnant hospitalised individuals also needed to be frequently screened for symptoms every day.<sup>10,11</sup> Another essential measure is the appropriate referral direction and patient transportation of pregnant individuals who were tested positive for COVID-19, aiming to facilitate screening and isolation of these patients. Ambulances that transport suspected or confirmed cases of COVID-19 pregnant individuals for obstetric emergencies needed and need to be thoroughly washed and disinfected. This includes both the patient care and driver cabins as well as the safe disposal of personal protective equipment (PPE) and used materials. Positive COVID-19 mothers who chose to breastfeed their newborn were encouraged to use protective equipment, while feeding the baby, or a breast pump.<sup>10,11</sup> It is worth mentioning that during the COVID-19 pandemic the rate of cesarean sections performed was increased. Moreover, the threshold to perform emergency caesarean sections was decreased.<sup>12</sup>

Overall, it is estimated that the COVID-19 situation has increased the carbon footprint of obstetric healthcare. PPE used for protection, vaccines and COVID-19 test kits have undoubtedly added an additional burden to the environment, their use however, is essential for the protection of public health. It is estimated, for example, that each self or rapid testing kit contains an average of 10 g of plastic.<sup>6</sup> Moreover, in a study by Klemes, it was estimated that one N-95 mask can cause a carbon footprint of 0.05 kg CO<sub>2</sub>-eq, and a surgical mask causes 0.059 kg CO<sub>2</sub>-eq pollution.<sup>13</sup> The increase in cesarean sections during the pandemic added to operating room and labour-delivery waste, which alone already accounts for about 70% of hospital waste.<sup>4</sup> It is therefore high time to reconsider which domains of obstetric can still become more environmentally sustainable and the role of Gynaecologists-Obstetricians towards this end.

## 2 | RECOMMENDATIONS

The optimization of healthcare resources to reduce the generation of medical waste during the COVID-19 pandemic is essential. Making obstetrical services more environmentally sustainable is a necessary countermeasure to the increased generation of waste during the COVID-19 pandemic. Making obstetrics 'greener' can contribute to the creation of a sustainable future for women and children. Obstetricians should decrease their carbon footprint in their clinical practices, and secondly, they should raise awareness and educate women and their families about more sustainable practices.

Obstetricians should decrease the use of paper and plastic material. For example, keeping digital patients' records could be one measure to decrease the use of paper, with the exception of patients without access to devices and the Internet. While PPE and consumables such as syringes and other suturing materials cannot be avoided, obstetricians should try to make sure that they use either recyclable plastics or recyclable alternatives. The use of electricity should also be rationalised, including the use of electricity in the operation room.

There are other practical solutions contributing to safer and more environmentally sustainable management of healthcare waste in the context of COVID-19. These include the minimisation in the amount of unnecessary PPE which can be achieved through the safer and more rational use of such equipment, as well as through the uses of smaller quantities and more sustainable packaging. The reuse and disinfection of PPE, such as gloves, aprons, and masks, when

possible, could be another measure to decrease healthcare-related waste. Reducing the amount of waste generated and the amount of misused resources such as rubber gloves, is an effective way to reduce environmental pollution.<sup>6</sup>

As far as the surgical practice is concerned, it has been recommended that operating room waste must be reduced and segregated properly and that single-use medical devices such as retractors, laryngoscope blades and laryngeal masks airways should be reprocessed. Energy consumption management is also essential; It has been calculated that healthcare facilities are responsible for 9% of America's commercial energy use.<sup>4</sup> In this regard, performing regular life cycle assessments (LCA) for permanent surgical devices is essential. This way it is possible to replace devices with unsatisfactory performance and a high energy footprint.<sup>14</sup> Pharmaceutical waste management is important in order to decrease the environmental effect of pharmaceutical agents. In the long run, obstetricians can advocate for consumables based on bioplastics. In collaboration with anaesthesiologists, gynaecologists can also reduce the use of inhaled anaesthetic agents with high global warming potential (GWP) such as desflurane.<sup>15</sup>

On the grounds of the environmentally sustainable behaviour, obstetricians should be informed regarding toxic environmental agents and should be able to perform environmental risk assessment and relevant clinical counselling. In this sense, healthcare workers can gradually become sustainability communicators and advocates by advising both the public and decision makers about environmental issues affecting women, fetuses and newborns. This role includes educating women, children, and families about the impact of climate change on health and encouraging them to recycle and decrease their energy consumption. Obstetric healthcare practitioners should also adopt an environmentally sustainable lifestyle outside their practice, as they can set an example for women and their families. In fact, ACOG has proposed that environmental health should be a part of obstetrics and gynaecology training and practice and encourages all obstetricians to reduce harmful exposures to the environment to protect pregnant individuals, fetuses, and children.<sup>3</sup>

### 3 | DISCUSSION - CONCLUSIONS

Obstetric care physicians need to pay more attention to environmental disruption and its effect on pregnant individuals, fetuses, infants and children. A recent systematic review by Bekkar et al elucidated the association between common environmental exposures such as air pollutants and heat with adverse pregnancy outcomes in the US.<sup>16</sup> The crisis triggered by the COVID-19 pandemic has significantly increased the use of PPE and has raised the need for special attention.<sup>6</sup>

This paper does not provide a detailed account of the carbon footprint or the amount of healthcare waste produced at country or health system level. This would not be possible due to the lack of relevant studies. However, the authors point out the most significant sources of environmental pollution in obstetrical care and provide information about their environmental burden, in order to enable others to study how the practice or the healthcare system they work into contributes to this. The same information can be used to raise awareness among healthcare workers involved in obstetrics and gynaecologists and encourage environmentally sustainable behaviours in their professional and personal milieu.

Nonetheless, robust evidence from further research is needed to understand and better estimate the extent to which obstetrical practice contributes to environmental damage in order to guide clinical recommendations and improve decision making. Environmental health surveillance, which includes the measurement and tracking of pollutants in individuals and the environment, is critical to this effort, as well as carbon footprint measurements which should be performed for obstetric care clinics. To conclude, obstetric care physicians can optimise the long-term and short-term outcomes of pregnancies by implementing environmentally sustainable practices.<sup>3,16</sup>

### ACKNOWLEDGEMENTS

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## CONFLICT OF INTEREST

Authors declared no conflict of interest.

## ETHICS STATEMENT

Not applicable.

## DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

## REFERENCES

1. Giudice LC, Llamas-Clark EF, DeNicola N, et al. FIGO Committee on Climate Change and Toxic Environmental Exposures. Climate change, women's health, and the role of obstetricians and gynecologists in leadership. *Int J Gynaecol Obstet*. 2021;155(3):345-356. Epub 2021 Oct 25. PMID: 34694628. <https://doi.org/10.1002/ijgo.13958>
2. Roos N, Kovats S, Hajat S, et al. Maternal and newborn health risks of climate change: a call for awareness and global action. *Acta Obstet Gynecol Scand*. 2021;100(4):566-570. Epub 2021 Mar 4. PMID: 33570773. <https://doi.org/10.1111/aogs.14124>
3. Reducing prenatal exposure to toxic environmental agents. ACOG committee opinion No. 832. American college of obstetricians and gynecologists. *Obstet Gynecol*. 2021;138:e40-54.
4. Kwakye G, Brat GA, Makary MA. Green surgical practices for health care. *Arch Surg*. 2011;146(2):131-136. PMID: 21339421. <https://doi.org/10.1001/archsurg.2010.343>
5. Das AK, Islam MN, Billah MM, Sarker A. COVID-19 pandemic and healthcare solid waste management strategy - a mini-review. *Sci Total Environ*. 2021;778:146220. Epub 2021 Mar 5. PMID: 33711590; PMCID. <https://doi.org/10.1016/j.scitotenv.2021.146220>
6. World Health Organization. *Global Analysis of Healthcare Waste in the Context of COVID-19: Status, Impacts and Recommendations*; 2022. Licence: (CC BY-NC-SA 3.0 IGO).
7. Royal College of Obstetricians and Gynaecologists (RCOG). *Coronavirus (COVID-19) Infection and Pregnancy*; 2022. Updated Jan. 01.
8. American Academy of Pediatrics. *FAQs: Management of Infants Born to Mothers with Suspected or Confirmed COVID-19*. Accessed on October 26, 2020. <https://services.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/clinical-guidance/faqs-management-of-infants-born-to-covid-19-mothers/>
9. Simionescu AA, Streinu-Cercel A, Popescu FD, et al. Comprehensive overview of vaccination during pregnancy in europe. *J Personalized Med*. 2021;11(11):1196. Published 2021 Nov 13. <https://doi.org/10.3390/jpm11111196>
10. Centers for Disease Control and Prevention (CDC). *Pregnant and Recently Pregnant People*; 2022. Updated Feb. 25.
11. American College of Obstetricians and Gynecologists. *Coronavirus (COVID-19), Pregnancy, and Breastfeeding: A Message for Patients*; 2022. Updated Jan. 26.
12. Arab W, Atallah D. Cesarean section rates in the COVID-19 era: false alarms and the safety of the mother and child. *Eur J Midwifery*. 2021;5:14. PMCID: PMC8135601; PMID: 34046560. <https://doi.org/10.18332/ejm/134998>
13. Klemeš JJ, Fan YV, Jiang P. The energy and environmental footprints of COVID-19 fighting measures - PPE, disinfection, supply chains. *Energy*. 2020;211:118701. Epub 2020 Aug 27. PMID: 32868962; PMCIDPMC7450254. <https://doi.org/10.1016/j.energy.2020.118701>
14. McGinnis S, Johnson-Privitera C, Nunziato JD, Wohlford S. Environmental life cycle assessment in medical practice: a user's guide. *Obstet Gynecol Surv*. 2021;76(7):417-428. PMID: 34324694. <https://doi.org/10.1097/OGX.0000000000000906>
15. Yeoh CB, Lee KJ, Coric V, Tollinche LE. Simple green changes for anesthesia practices to make a difference. *EC Clin Med Case Rep*. 2020;3(12):1-6.
16. Bekkar B, Pacheco S, Basu R, DeNicola N. Association of air pollution and heat exposure with preterm birth, low birth weight, and stillbirth in the US: a systematic review. *JAMA Netw Open*. 2020;3(6):e208243. <https://doi.org/10.1001/jamanetworkopen.2020.82438243>

**How to cite this article:** Eleftheriades A, Tsagkaris C, Gozderesi Y, Panagopoulos P. Making obstetrics more environmentally sustainable during and beyond the COVID-19 pandemic. *Int J Health Plann Mgmt*. 2022; 37(5):2992-2996. <https://doi.org/10.1002/hpm.3493>