Changes in Conception Rates, Not in Pregnancy-Related Behavior, Likely Caused Decline in Pre-Term Births During the First Year of the COVID-19 Pandemic

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May 23, 2023

Changes in Conception Rates, Not in Pregnancy-Related Behavior, Likely Caused Decline in Pre-Term Births in Developed Countries During the First Year of the COVID-19 Pandemic

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A series of studies, including recent work published in BJOG by Rusconi et al.[1], has highlighted the surprising fact that measures of birth outcomes such as pre-term birth and low birth weight improved nine months after the first wave (February-June 2020) of the COVID-19 pandemic across countries such as Italy, Spain, Ireland, and the United States (see Yang et al.[2] for recent meta study). This growing body of work has generated important knowledge on the children conceived and born during the pandemic, and how they as a cohort may differ from those born before and after the pandemic. Yet, we believe that this strand of literature has overlooked key demographic drivers behind the changes in birth outcomes observed during the pandemic. Here we describe why an improvement in birth outcomes observed during the pandemic is likely caused by decline in conception rate and changing selection into conception in the months following the onset of the pandemic rather than changing behaviors among pregnant women during the pandemic.

In their BJOG article, Rusconi et al.find that rates of pre-term births declined drastically in September-November 2020 relative to trend, and they ask researchers to consider what lessons the pandemic may teach about the "possible importance of lifestyle and environmental aspects related to the occurrence of pregnancies ending preterm"[1 p. 282]. Others have noted the non-causal nature of these studies[3], which should be kept in mind for future research to cover. We, however, suggest a more fundamental aspect of the pandemic's effect on pregnancies has been overlooked broadly in the literature, which can account for most, if not all, of the decline found by Rusconi et al. and many other studies. The cause of decline in pre-term births and other adverse birth outcomes should not necessarily be sought in changing behavior or services during pregnancy, but rather in changes in how many and who conceived during the early stages of the pandemic[4,5], as declines in conceptions and subsequent fertility rates have been observed across most developed countries.[6]

Figure 1 shows the monthly crude birth rate (CBR; number of births per 1,000 population) for Italy for 2020 and 2021 measured relative to the 2019 monthly CBR. As clearly seen from the figure, number of births declined drastically relative to 2019 starting September 2020 and until January 2021, with the CBR in January 2021 being 14% lower than what was observed in January 2019, which is the equivalent of 8.4 fewer births per 100,000 population that month. Rapidly declining birth rates are mostly caused by rapidly declining conception rates and are unlikely to be only explained by potential changes in pregnancy loss, abortion, maternal emigration, and stillbirth rates. Mechanically, a decline in conceptions will manifest first as a decline in preterm births 7-8 months after the number of conceptions dropped.[4] This is because (fewer) pre-term babies, which were conceived after the pandemic onset, are born at the same time as full-term babies conceived before the COVID-19 pandemic. Thus, the decline in pre-term rates can be seen as a demographic artifact caused by declining conceptions without any change to pregnancy-related behavior occurring. In recent work, we have shown that a similar trend in fertility can be observed in Spain for the same period.[4,7] In this work, we also show a similar decline in Spanish preterm births rates as observed in Italy by Rusconi et al.[4] Further, we demonstrate how this decline in preterm births can occur mechanically in the case of a rapid decline in conceptions right after the onset of the COVID-19 pandemic, which in turn leads to the observed lower birth rates beginning by September (fewer pre-term births) and carrying out all through to January 2021 (fewer at term births).

[Figure 1 about here.]

Further, we also analyze changes in who conceive. In the Spanish case the data allows us to examine which groups see the largest conception declines. In relative terms, the two groups that sees the largest decline are women at the beginning and end of the reproductive age—the two groups also at highest risk of giving birth to preterm babies because of, respectively, precarious and unplanned pregnancies occurring among the young[8] and higher rates of complications and medically assisted reproductive (MAR) conceptions among the older women.[9] During the first COVID-lockdown young people's risk for precarious and unplanned pregnancies declined drastically due to stay-at-home orders, and MAR clinics shut down services. Moreover, the COVID-19 pandemic has likely led to changes in the composition of parents in regards to other characteristics known to be associated with preterm birth.[5] For example, initial evidence is emerging that babies conceived in the Global North during the pandemic have, on average, more socioeconomically advantaged parents than babies conceived before the COVID-19 pandemic.[5,10] More advantaged parental socioeconomic circumstances, in turn, have consistently been shown to be associated with a lower probability of preterm birth.[11] Pandemic-induced compositional shifts in parental characteristics provide us with another plausible explanation for improved birth outcomes during the COVID-19 pandemic in the Global North, whereas the situation in countries with less universal access to contraceptive measures may have seen different developments, as suggest by, e.g., Pesando and Abufhele[12] for Chile.

To conclude, the COVID-19 pandemic may have generated a pure demographic artifact driven by a population wide decline in conceptions discussed above as well as heterogenous conceptive responses across the affected populations. These two differential effects of the COVID-19 pandemic may also explain why babies conceived during the pandemic show improved birth outcomes compared with babies conceived before the pandemic. When interpreting the COVID-19 consequences on newborns health we thus advice to disentangle

the direct effect of in utero exposure to the COVID-19 pandemic and the consequences of lockdown measures on birth outcomes from a demographic artifact and pandemic-induced changes in composition of who became pregnant. Importantly, the latter determinants and the former ones may have different clinical implication for the population of newborn and their long-term development trajectories.

Acknowledgements

Peter Fallesen was a visiting fellow at Department of Political and Social Sciences, European University Institute during the writing of this commentary.

Disclosure of Interests

The authors have no interest to declare.

Contribution to Authorship

PF, MO, and MC conceived, planned, carried out, analyzed, and wrote up the manuscript. All authors approved final version.

Details of Ethics Approval

Only publicly available secondary data used for analysis so exempt for ethical approval.

Funding

PF's work was supported by ROCKWOOL Foundation (1227) and the Swedish Research Council for Health, Working Life and Welfare (2016–07099). MO's work was supported by the Medical Research Council (MC_UU_00022/2) and the Scottish Government Chief Scientist Office (SPHSU17). MC's work was supported by the Italian Ministry of the University and Research (PE8- B83C22004800006).

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Figure 1. Monthly Crude Birth Rate for Italy 2020-2021 Measured Relatively to the Monthly Crude Birth Rate in 2019.

Source: ISTAT.