

# Impact of COVID-19 Pandemic on the number of births in the Caribbean

## Abstract

**Introduction:** The COVID-19 pandemic has brought about unprecedented global health, economic, and social crises, which has had a significant impact on the world's population, with a surge in maternal deaths in both developing and developed countries. However, there remains a paucity of data on the impact of the pandemic on fertility and reproductive function, especially among low- and middle-resource countries.

**Methods:** This retrospective study examines the impact of the pandemic on birth rates in Trinidad and Tobago and Barbados, two middle-resource countries. Birth data was gathered from three major hospitals in these countries, covering a period of nine years (2015-2023),

**Findings:** Our analysis of birth data reveals a significant decline in births during the pandemic, with an 11.7% decrease in mean births per year (11,063.0 vs 9,846.7);  $p < 0.001$ . The decline in births was more pronounced in Barbados, with a 13.7% decrease, compared to 10.3% and 10.2% at the two hospitals in Trinidad.

**Conclusion:** The greatest impact on birth rates resulted from the peak of the Omicron variant in Trinidad and the Delta variant in Barbados. Furthermore, this study suggests that the pandemic has had a negative impact on fertility, with the decline in births persisting even after the pandemic. The findings are consistent with historical crises, such as the Great Depression and the 2008 economic downturn, which also had a negative impact on fertility rates.

**Keywords:** COVID-19, pandemic, birth rates, omicron and delta variants, middle-resource countries

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**Abbreviations:** SFGH, San Fernando General Hospital; MHW, Mount Hope Women's Hospital; QEH, Queen Elizabeth Hospital; MCOS, medical chief of staff; UNFPA, United Nations population fund; STFF, short term fertility fluctuation

## Introduction

During the last few months of the 2019 and early 2020, there was a ballooning of cases of respiratory illnesses initially confined to the Wuhan district in China which then spread exponentially throughout the world, leading to the proclamation of the COVID-19 pandemic by the World Health Organization in February 2020.<sup>1</sup> This pandemic rapidly created a global health crisis, economic depression, lockdowns, closure of educational centres, airports, areas of worship and recreational activities, and formulation of public health legislations including a ban on public gatherings. Many workers were furloughed, and others were requested to work from home.<sup>2</sup>

The death toll escalated quickly from hundreds to thousands and finally it exceeded seven (7) million.<sup>3</sup> For Trinidad and Tobago, it reached almost 5,000 whereas Barbados recorded slightly less than 500 deaths. The health system became overwhelmed with shortages of staff and intensive care unit beds, and inadequate mortuary facilities with temporary centres opened using containers. Among the hardest hit were elderly, and pregnant woman were not spared the wrath of the disease with a surge in maternal deaths in both developing and developed countries. In the USA maternal mortality rate jumped from 18.8 to 25.1 per 100,000 births during the first nine months into the pandemic.<sup>4</sup>

Public health crises and economic shocks altered public behaviour, for example, the Spanish flu pandemic between 1918 to 1920 resulted in a plunge in fertility rates which continued even after the peak's morbidity and mortality. Similarly, the Great Depression impacted negatively on fertility in the USA, where the total fertility rate fell from 2.5 in 1929 to 2.2 births per 1,000 women in 1939, more than 5 years after the end of the crisis.<sup>5</sup> With the subsequent economic recovery, fertility peaked in 1957 with a 'baby boom'.<sup>6</sup>

Some workers suggested that the early days of this pandemic, there would have been a surge in births ascribed to the non-availability of contraceptive services especially in low resource countries as well as work-from-home policies,<sup>7</sup> while others postulated that the sense of malaise, fear, anxiety and the economic fallout on the population may have had an opposite effect.<sup>8</sup>

Despite a relative plethora of research papers emanating on the COVID-19 pandemic, there remains a paucity of data on the effect of the pandemic on fertility and reproductive function, especially among low- and middle-resource countries.

With this in mind, we embarked on this nine-year retrospective study from 2015 to 2023 to enquire into the possible impact of the COVID-19 pandemic on the number of births at two hospitals which together account for approximately 60% of births in Trinidad, and one centre in Barbados, which does about 75% of the national births in that country. Trinidad and Barbados are middle resource countries with high literacy rates.<sup>9</sup>

## Materials and methods

This nine (9) year retrospective study for the period commencing 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2023 was undertaken at two Trinidad based hospitals: San Fernando General Hospital (SFGH) and Mt. Hope Women's Hospital (MHWH), and the Queen Elizabeth Hospital (QEH) in Barbados after the institutions gave ethical approval. All three hospitals are tertiary teaching institutions affiliated to The University of the West Indies at the St. Augustine Campus, Trinidad and the Cave Hill Campus, Barbados. SFGH serves about 40% of the population in the southern half of Trinidad, and MHWH is one of the two main delivery sites in the northern side of the country.

These three hospitals have a rigorous system of record keeping of all births with cross checking on a daily basis by the matron, and the Medical Chief of Staff (MCOS) each month. Delivery of either a live or stillbirth after 28 weeks of gestation, which is the legal definition of viability, is considered a birth. Immediately following the delivery, the midwife enters the information in the birth registration book under the supervision of the shift's head nurse.

The total number of births at each centre for the pre-pandemic period from 2015 to 2019 and in the pandemic from 2020 to 2022, and during the first year after the pandemic, was collated and analysed in order to identify the possible impact of the COVID-19 pandemic on numbers of births.

In addition, the possible effects of the COVID-19 waves on the

**Table 1** Birth data per year at each hospital

Hospital	PRE - COVID					INTRA - COVID				POST -COVID	Total 2015 – 2023
	2015	2016	2017	2018	2019	2020	2021	2022	2023		
SFGH	4667	4866	4529	4593	4143	4175	4459	3636	3494	38562	
MHWH	4103	4012	4041	4269	4130	3842	3782	3450	3347	34976	
QEH	2596	2387	2311	2276	2392	2188	2102	1906	2042	20200	
Total Per Year	11366	11265	10881	11138	10665	10205	10343	8992	8883	93738	
Mean Per Year	3789	3755	3627	3713	3555	3402	3448	2997	2961		

During the pre-pandemic years a total of 55,315 births were observed whereas in the pandemic and post pandemic era, 29,540 and 8,883 births, respectively were recorded. The mean births per year in the pre-pandemic and pandemic years were 11,063.0 and 9,846.7 respectively, which represent a significant decline of 1,216.3 (11.7%) births ( $p < 0.001$ ) in the pandemic.

The mean births per year during the pre-pandemic period at SFGH, MHWH and QEH were 4,559.6, 4,111.0 and 2,392.4, respectively. The corresponding means during the pandemic years were 4090.0, 3691.3 and 2,065.3, respectively. This illustrates that the decline observed at SFGH, MHWH and QEH were 10.3%, 10.2% and 13.7%, respectively.

**Table 2** Mean births during the Pre-COVID and Intra-COVID periods

Hospital	Mean births (2015-2022)	Pre-COVID (2015 – 2019)	Intra-COVID (2020 – 2022)	Decline percentage
SFGH	4383.5	4559.6	4090	10.30%
MHWH	3953.6	4111	3691.3	10.20%
QEH	2269.8	2392.4	2065.3	13.70%

Figure 1 depicts the trend in births at the three hospitals per year before the pandemic and in the pandemic period. It can be seen that at SFGH, there was a fairly steady drop in births from 2015 to 2019 except with a rise of about 200 births in 2016 over 2015, and an

number of births were analysed. The first wave in Trinidad was evident from August to October 2020 whereas the country faced a much larger second wave from April to September 2021. In Barbados, the main wave was realized from February to August 2022. Between December 2021 to March 2022, cases soared with the death toll reaching thirty-seven (37) in Trinidad in December at the peak of the wave. It was assumed that an effect of a wave on fertility, especially conception, would have resulted in an alteration on births approximately 12 months after the peak. With this in mind, we assessed the number of births 12 months after the peak of the waves and compared that to the mean for the corresponding month between 2015 to 2019.

Statistical analysis was performed using parametric methods of determination and comparisons made between birth rates pre-pandemic and post-pandemic. This method of analysis utilized the independent/unpaired *t test* to compare the difference in mean birth data in the pre-pandemic, pandemic and post-pandemic periods. A *p*-value  $< 0.05$  was used to indicate statistical significance.

## Results

A total of 93,738 births (mean per year = 10,415.3) was recorded at the three sites from 2015 to 2023, with SFGH and MHWH accounting for approximately 80% of the births and the remainder occurred at QEH. Among the 73,538 births seen at the two hospitals in Trinidad, SFGH had 38,562 (41.1%) and MHWH had 34,976 (37.3%) and at QEH, there were 20,200 births (21.6%) (Table 1).

In 2015 at the three hospitals, 11,366 births were documented which were 701 more than in 2019, a difference of 6.2% whereas between 2020 and 2022, the number of births decreased by 1,213 (11.9%). It is evident that the decay in births during the pandemic was almost double that before the pandemic. This suggests that the COVID-19 pandemic impacted significantly on the total births ( $p < 0.05$ ).

Table 2 illustrates that the greatest decline in the mean births per year during the pandemic period was evident at QEH (13.7%) whereas there was a smaller drop at SFGH and MHWH.

increase of approximately 300 births in 2021 compared to 2020, but in 2022, 823 (18.4%) less births occurred. At MHWH, the number per year was fairly constant from 2015 to 2019 and then there was a sharp drop from 2020 to 2022. A similar picture was seen at QEH.

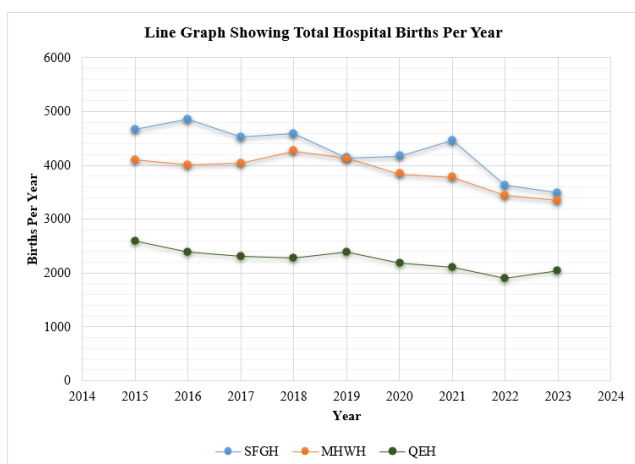


Figure 1 Line Graph showing trend of hospital births per year.

The decline observed at SFGH and MHW continued in 2023 but this was not the case at QEH where an uptick of 136 births was noted.

In June 2022, which was 12 months after the peak of the Omicron variant in Trinidad, there was a fall of 20.9% of births compared to the mean births in June between 2015-2019. The much milder first wave seen in September 2020 resulted in only a 2% decline in births in September 2021 compared to the corresponding number from 2015-2019 (Figure 2).

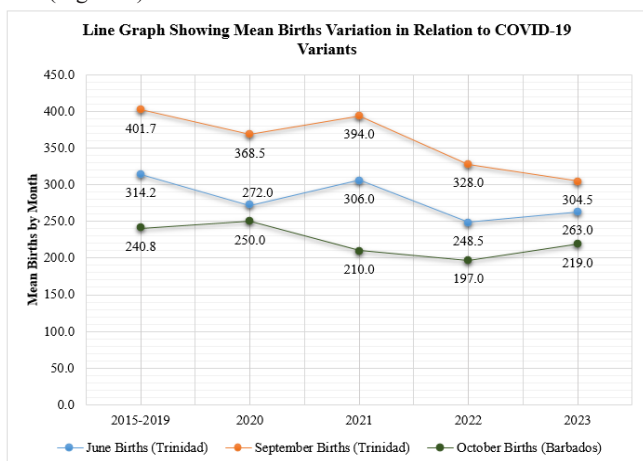


Figure 2 Line Graph showing birth variations with COVID-19 variants.

A similar picture emerged in Barbados where in October 2022, which was 12 months after the peak of the Delta variant, the number of births was 18.2% lower than the October’s mean seen in 2015-2019. This suggests that the greatest impact on births resulted from the peak of the Omicron variant in Trinidad and the Delta variant in Barbados.

## Discussion

This retrospective study examined the possible impact of the recent COVID-19 pandemic on the total number of births at the three centres in Trinidad and Barbados. Although a plethora of research articles on the effects of the recent pandemic on pregnancy has emerged, particular attention on its effects on birth rates did not surface.

During the pre-pandemic period (2015-2019) and in the pandemic (2020-2023), we observed in excess of 93,000 births, which

represented over 60% of all births in both countries. At MHW and QEH, annual births remained fairly constant from 2015 to 2019, but at SFGH there was an uptick in 2016 and a precipitous drop in 2019. A possible confounder for this observation at the SFGH is the decline in revenue from about 2015 from the oil and gas industries located in the south of Trinidad.

An overall decrease of approximately 14% in births occurred during the pandemic especially during 2022 when roughly 1,300 fewer births were observed compared to 2021. This decline in births during the pandemic is depicted by a similar fall in home births and deliveries at adjacent private hospitals (H. Persad, 2024, personal communication). Our observation differs from that of the United Kingdom, where after an initial temporary decline in births conceived during the first three months of the first lockdown in 2020, a rebound was seen in March 2021, followed by an exacerbation of births.<sup>10</sup> No dramatic change in fertility during the pandemic was documented based on data which emerged from the UNFPA and the Short Term Fertility Fluctuation (STFF) study.<sup>6</sup> Short term effects were observed in a range of highly developed countries, but these reverted to pre-pandemic levels and trends shortly thereafter. Initial findings out of Australia revealed an immediate increase in birth rates in the first year versus the pandemic, which align with the trends in the USA and various North European countries.<sup>11-14</sup> It was suggested that this upward trend may have resulted from low infection rates alongside extensive income support programmes that mitigated economic strains.<sup>15</sup>

Data from low- and middle-income countries suggest similar trends to those of many developed countries, with short term declines in births and subsequent recoveries. In our case, this was not evident as the number of births continued to fall at all three sites in 2022. Whereas there was a levelling of births in Barbados in 2023, this was not the case in Trinidad.

The economic decline observed in the 2008 Depression in North America and Europe may have had a subsequent negative impact on Barbados’ tourism and service industries which may have contributed to the fall in births before and during the pandemic. The turnaround in the Barbadian economy in the last year or so may have played a role for the uptick in births in 2023 compared to the previous years.

Our findings of a decline in births is consistent with other historical crises, such as the Great Depression and more recently, the 2008 economic downturn that rocked the world, causing widespread insecurity from a financial collapse. We observed a substantial decline in births in the second year of the pandemic which is in keeping with the reports of the negative effects on pregnancy and childhood by adversity, such as the Spanish flu pandemic approximately 100 years ago, the Great Recession, the Dutch famine, the humanitarian crisis in Yemen and the Ebola epidemic in West Africa.<sup>6</sup>

Following the economic downturn in 2008 which led to major financial strain, fertility recoveries were uneven across many countries with factors such as age, sex and level of education appeared to have contributed. For example, less educated women were more likely to maintain or increase their fertility during economic uncertainty, whereas highly educated women reacted to employment uncertainty by postponing pregnancy.<sup>16</sup>

In England and Wales, during the COVID-19 pandemic, fertility rates fell initially, and it continued to fall in 2021 among women aged under 25 but a different trend emerged in older women with a recovery of fertility rates.<sup>17</sup>

Our population in these two middle resource countries carries a high literacy rate of over 98%<sup>9</sup> and a sizeable portion of reproductive age women possesses secondary and/or tertiary education. This may have contributed to the decline in births in the pandemic, despite lockdowns and the inaccessibility of contraceptive methods. Furthermore, many families suffered loss of loved ones from the disease while others are still struggling to restore the quality of life which they enjoyed prior to the pandemic.

The major decline in births which occurred in 2022 appears to have been a consequence of the Omicron variant in Trinidad and the Delta variant in Barbados. Both variants led to a surge in hospital admissions and crowded Intensive Care Units and a spike in deaths. It is postulated that the resultant fear and anxiety in the minds of women led them to desist from becoming pregnant. An effect on the hypothalamic-pituitary-ovarian axis by the psychological trauma may have also affected ovulation in some women resulting in lowered fertility.

Among the strengths of this study are the standardization of the definition of the term birth at the three sites as well as the high accuracy and completeness of the data which were cross-checked at several fronts prior to our analysis. Limitations of the study included our data were hospital-based rather than national based, the latter would have allowed for analysis on a much larger dataset and may have provided a better reflection of the impact of the pandemic across the entire countries. However, a national based study carries the possibility of inaccurate data submission and reporting, and a delay in timely collection and analysis of the statistics. That this study addresses the possible impact on births rather than number of pregnancies is a possible weakness, but it is problematic to analyse pregnancies since many end before a missed period, and others lead to miscarriages which may be treated expectantly or medically outside hospitals, and hence data collection on these pregnancies may not likely to be accurate. Furthermore, we do not have data on the prevalence of termination of pregnancy. Our study was extended to the end of 2023 and hence, it would be premature to make generalizations on the full impact of the pandemic on births at this time.

## Conclusion

In conclusion, our findings may prove instructive in health system planning, in the formulation of national policies and in the implementation of strategies to better equip medical institutions to handle a subsequent pandemic. This study suggests that the COVID-19 pandemic had a negative effect on the number of births that appears to persist after the end of the pandemic. Further long term studies are suggested to better understand the impact of the pandemic on births and reproduction among humans in general.

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## Conflicts of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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