Booms, busts and trend reversals? Shifts in births and fertility rates across the highly developed countries during the COVID-19 pandemic

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Past evidence: the impact of shocks on fertility

- **Economic shocks and recessions**: mostly negative impact, including the Great Recession around 2008-12 (e.g., Sobotka et al. 2011; Goldstein et al. 2013); severity of the recession and welfare setting matter
- **Spanish flu**: fertility reduction & some later rebound (Boberg-Fazlic et al. 2017; Wagner et al. 2020), partly due to fetal loss
- **Large seasonal flu outbreaks**: short-term negative impact (Sardon 2014)
- **Zika epidemic in Brazil and other parts of Latin America in 2015-16**: strong negative effect on pregnancies and births (Rangel et al. 2020; Marteleto et al. 2020)
Will the coronavirus lockdown lead to a baby boom?

Deadly epidemics seem to depress birth rates in the short term.

Pregnantpause

Birth rate, change from seasonal average, %

SARS (Hong Kong, 2002)

Zika (Brazil, 2015)

Ebola (West Africa, 2014)

The baby boom that never was: France sees sharp decline in ‘lockdown babies’

The coronavirus effect: Spain sees sharp decline in births

There was a 23% fall in registered newborns in the December-January period compared with the previous year, mirroring similar trends in neighboring countries.

Coronavirus baby boom or bust? How the pandemic is affecting birthrates worldwide.

Coronavirus baby boom: Will global lockdown see massive jump in Australia's birth rate?

We Expect 300,000 Fewer Births Than Usual This Year

Signs are pointing to a sizable pandemic baby bust in the United States, with implications that will be with us for years to come.
COVID-19 and fertility: early evidence

Evidence on short-term fertility intentions
• Many individuals and couples reported delaying or giving up their pregnancy plans (Luppi et al 2020 in 5 countries; Arpino et al. 2021 in Italy; Lindberg et al. 2020 in the US; Emery et al. 2021 for Moldova; Malicka et al. 2021 for Poland)

Early evidence from online searches:
• Wilde et al. (2020): expected sharp downturn in births (by up to 16%) in the US from November 2020 to February 2021 based on fertility and pregnancy-related Google searches
• Smaller disruption expected from Berger et al.’s (2021) analysis of European and US data

Initial work on birth trends
The Pandemic Caused a Baby Bust, Not a Boom

Birth rates in many high-income countries declined in the months following the first wave, possibly because of economic uncertainty

By Tanya Lewis on August 30, 2021

BRIEF REPORT

Early assessment of the relationship between the COVID-19 pandemic and births in high-income countries

Arnstein Aassve, Nicolò Cavalli, Letizia Mencarini, Samuel Plach, and Seth Sanders

PNAS September 7, 2021 118 (36) e2105709118. https://doi.org/10.1073/pnas.2105709118

Edited by Mary C. Waters, Harvard University, Cambridge, MA, and approved June 20, 2021 (received for review March 28, 2021)
What is the latest evidence?

*Does the baby bust story hold?*
Data: The STFF (short-term fertility fluctuations) Data Series under the Human Fertility Database

The Human Fertility Database

Short-Term Fertility Fluctuations

In response to the COVID-19 pandemic, the HFD team established a new data resource: Short-Term Fertility Fluctuations (STFF) data series. The STFF series complements the HFD by providing up-to-date data on live births by month for selected countries and by facilitating thereby scientific analysis of short-term fertility fluctuations. This project thus contributes to timely data availability, which is key for monitoring and examining the consequences of the ongoing pandemic for the population-level fertility trends.

Before using the data, please consult the STFF Methodological Note, which provides a more comprehensive description of this data project, including important aspects related to data collection and data processing. We also recommend that you read the STFF Metadata. This document includes country-specific information about data availability, completeness, data sources, as well as specific features of included data.

Data will be frequently updated and new countries will be added. Data are published under CC BY 4.0 license.

For citing STFF data, please follow the HFD data citation guidelines.

We invite you to explore these data using our online STFF visualization toolkit.

Here you can download the following data and documentations:

- STFF Metadata: concise description of country-specific data and data sources.
- STFF Methodological Note: description of input and output data formats and methodology.
- STFF output file (xlsx or pooled csv): monthly counts of live births and TFR for selected countries.

These indicators do not allow direct comparison across countries and over time as they are affected by seasonality in childbearing. To provide comparable indicators, we publish seasonally and calendar adjusted data.

- STFF seasonally- and calendar-adjusted output file (xlsx or pooled csv): monthly counts of live births and TFR for selected countries.
- Original data (country-specific csv files in one zip file): original birth counts in standardized format.

Note: Data on monthly TFR are preliminary. We are still working on the methodology and may revise it soon.

Data availability

<table>
<thead>
<tr>
<th>Country</th>
<th>STFF output</th>
<th>STFF adjusted</th>
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<tbody>
<tr>
<td>Austria</td>
<td>January 2000 - September 2021</td>
<td>January 2012 - September 2021</td>
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<tr>
<td>Belgium</td>
<td>January 2000 - August 2021</td>
<td>January 2012 - August 2021</td>
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<td>Bulgaria</td>
<td>January 2000 - December 2020</td>
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<tr>
<td>Canada</td>
<td>January 2000 - December 2020</td>
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<tr>
<td>Canada: Quebec</td>
<td>January 2010 - August 2021</td>
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<td>Chile</td>
<td>January 2000 - March 2021</td>
<td>-</td>
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<td>Croatia</td>
<td>January 2000 - September 2021</td>
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<td>Czechia</td>
<td>January 2000 - June 2021</td>
<td>January 2012 - June 2021</td>
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<tr>
<td>Denmark</td>
<td>January 2000 - September 2021</td>
<td>January 2012 - September 2021</td>
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</tbody>
</table>
STFF Data series

The Short-Term Fertility Fluctuations (STFF) Data Series

• Joint project of the Max Planck Institute for Dem Res. (Rostock) and the Wittgenstein Centre (VID, Vienna)
• Monthly number of births, from Jan 2000 to most recent (Sept 2021); estimates of monthly Total Fertility Rates for 19 countries just added
• Highly developed countries with good quality data
• Regularly updated (39 countries/areas at present)
• Metadata: 50+page document with all information about the data, sources, coverage, notes, warnings
• Methodological Note
• STFF visualization toolkit in Shiny

https://www.humanfertility.org/cgi-bin/stff.php
STFF Visualisation Toolkit (Shiny)

https://mpidr.shinyapps.io/stfertility/

STFF visualisation toolkit created by Laszlo Nemeth, MPIDR
Data and methods

Monthly birth data: issues, adjustments, data selection

Adjusting monthly birth numbers for seasonality and calendar effects (*no. of days and weekdays by month*)

- R package seasonal (Sax and Eddelbuettel, 2018), which provides an interface to the seasonal adjustment software X-13ARIMA-SEATS (US Census Bureau, 2021)

Estimating monthly Total fertility rate (TFR)

- 2. Compute monthly General Fertility Rate for women ages 15-44:
  \[
  (GFR(m) = B(m) / POP_{F(15-44)}(m))
  \]
- 3. Extrapolate the observed Ratio of TFR/GFR in 2016 to 2019 to 2020-2021, then use the estimated TFR/GFR ratios to derive monthly TFRs in 2020-2021
Data and methods: adjusted monthly trends

- Observed and seasonally-adjusted monthly number of births, Spain, Jan 2010 to Sep 2021
- Monthly number of births, Spain, Jan 2020 to Jan 2022

Calendar and seasonal adjustments using the seasonal adjustment software X-13ARIMA-SEATS & visualisation by Maria Winkler-Dworak
Data issues & adjustments

• Data by month of occurrence vs. registration (e.g. South Korea, Russia; also recent data for Germany)
• Preliminary vs. final data (also incomplete data for the latest months; e.g. Switzerland)
• Fluctuations, irregularities (also due to small N in some countries)
• Monthly data: impact of seasonality
• Main comparisons and indicators:
  – Total live births compared to the same month in the previous year (relative change in %; with an adjustment for 29 days in 02-2020)
  – Estimated monthly live births adjusted for seasonality and calendar effects
  – Estimated monthly TFRs adjusted for seasonality and calendar
• Expected impact of the COVID-19: from November 2020 onwards (pregnancies started in early March, based on average pregnancy duration of 266 days or 8.7 months from ovulation to delivery; Jukic et al. 2013)
Pandemic birth trends in the highly developed countries: an overview
Western Europe: France

Relative year-on-year change in the number of births (%):
France, Jan 2020-Sep 2021
Southern Europe: Spain

Relative year-on-year change in the number of births (%): Spain, Jan 2020-Sep 2021
Nordic countries: Finland

Relative year-on-year change in the number of births (%): Finland, Jan 2020-Sep 2021
Central Europe: Germany

Relative year-on-year change in the number of births (%): Finland, Jan 2020-Aug 2021

DEUTNP – Germany

Births in the previous year

Births in 2020-21

Relative change in the number of births (%)

Number of births per month (thousands)

-1 1.2 0.6 6.5 7.3 3.1 -0.9 -1.8 -1.2

I-X XI XII I II III IV V VI VII VIII IX

2020 2021
European Union (13 countries)

Relative year-on-year change in the number of births (%): European Union, Jan 2020-Aug 2021

Countries covered: Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Latvia, Netherlands, Portugal, Slovenia, Spain, Sweden
Relative year-on-year change in the number of births (%): United States, Jan 2020-Jun 2021
East Asia: Japan

Relative year-on-year change in the number of births (%): Japan, Jan 2020-May 2021
East Asia: South Korea

Relative year-on-year change in the number of births (%): Japan, Jan 2020 - July 2021
Average relative year-on-year change in the number of births (%): 16 countries with data until at least August 2021

*Figure excludes countries with large fluctuations in data or with incomplete data: Lithuania, Russia, Ukraine, Chile; Croatia, Taiwan, Switzerland, Estonia*
Summary: pandemic birth trends across 29 countries:
Pre-pandemic (Jan-Oct 2020) vs. Pandemic (Dec 2020+) period

Average relative year-to-year change in the number of births before and during the pandemic (%)
Summary: pandemic birth trends across 29 countries:
A detailed look at the pandemic period since Dec 2020

Average relative year-to-year change in the number of births during the pandemic (since Dec. 2020), %
Monthly trends in Total Fertility Rate
Western, Northern and Southern Europe
Other regions including US, Japan
European Union
14 countries with available data until September 2021

Countries covered:
Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Latvia, Netherlands, Portugal, Slovenia, Spain, Sweden
Pandemic births surprises: birth recovery after the baby bust?

The biggest surprises:

1. Concentrated trend reversal in Feb-Mar 2021
   - Consistent across countries, regions and contexts
   - Mostly short-lived
   - Peak mostly in March 2021: huge upturn from Jan. 2021 in all countries ex. Portugal, but also a jump compared with Mar. 2020
   - Estimated TFR jump from January to March up to 0.3 (Spain), +0.13 in the EU
   - More upturns in the making in Autumn 2021?

2. Bust and boom compensating each other: In most countries only a minor overall pandemic effect so far

3. Surprising COVID-19 baby boom in Netherlands and Finland (smaller one in Norway and Denmark)

4. So far, very small or no impact visible of the 2nd (Autumn 2020) wave
Discussion

Longer-term trends: stable trend or minor waves of booms and busts?

• Why did birth trends stabilise since Spring 2021 (late Summer/Autumn conceptions)? What was the impact of economic stabilisation?

• Will birth trends respond to the new waves of the pandemic and lockdowns? Or did people “get used” to live with the pandemic?

• Longer-term fertility downturns more likely if COVID-19 leaves long-lasting scars in economy, labour market and if it affects government spending
Thank you! ➔ also to the fantastic HFD team at the MPIDR!

STFF (Short-Term Fertility Fluctuations) dataset: https://www.humanfertility.org/cgi-bin/stff.php

STFF Visualisation Toolkit: https://mpidr.shinyapps.io/stfertility/

Early report on monthly birth trends (to be updated soon, 😊) https://osf.io/preprints/socarxiv/mvy62

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