Pandemic and Fertility: Lessons from the Brazilian Zika virus epidemic

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Take away:

Thinking about human behavior is important (there are common patterns) but there are vast differences between Zika epidemic and Covid-19 pandemic!

But maybe some insights from Zika: human response is large, fast, and possibly long lasting – it may be contributing to a long-term recognition of rising costs of raising kids in the developing world (specially to those that have kids already)

Independent of “quantity”, composition plays a key role – it reveals inequality in ability to respond and possibly in exposure to risk and exacerbates inequality transmission across generations
Take away:

In Zika scenario I focused on separating economic conditions from the health crisis, but considering with the current epidemics the economic impact and health crisis are way more connected and likely have complimentary effects – any prediction needs to take them both into account.

It is important to be rigorous in evidence analysis – extrapolation from past trends is likely the wrong contrast to draw in these situations.

Open question: Is there a Zika-Covid exposure interaction in decision making for family planning – “scarring”? 
Geographic concentration as a function of mosquito suitability

Widespread, goes with humans
Relatively limited economic consequences of containment

Large economic consequences of containment (including costs of raising children!)
Low mortality across all ages (except maybe fetal death) – mild symptoms common to well-known dengue

Mortality among elderly and (by now) serious hospitalization issues among working-age adults
Pregnant women are not more exposed but consequences for fetal development are clear and were made salient to general public.

Pregnant women are at an increased risk for severe illness from COVID-19 compared to non-pregnant women. Additionally, pregnant women with COVID-19 might have an increased risk of adverse pregnancy outcomes, such as preterm birth. (But no clear warning here)
Questions answered in Zika work:

Turning to population...we want to think about biological and behavioral channels and holding constant the impact of economic factors

It is also essential to think about heterogeneity...

How good is individual health risk assessment?

Do people respond?

Who is at health risk?

And...who is “better able” to respond?
Results on Zika:
Year to year change

Zika virus arrives in Brazil
Zika virus arrives in Brazil

Peak infection in NE-Brazil
Zika virus arrives in Brazil

Peak infection in NE-Brazil

Health emergency declared
Year to year change

Zika virus arrives in Brazil

Peak infection in NE-Brazil

Health emergency declared

Live births
Year to year change

- Zika virus arrives in Brazil
- Peak infection in NE-Brazil
- Health emergency declared

Live births
Cost-of-living
Country-level CRUDE BIRTH RATES

Crude 12-month Birth Rates (per 1,000)

Year-Month

2006m12 2007m6 2007m12 2008m6 2008m12 2009m6 2009m12 2010m6 2010m12 2011m6 2011m12 2012m6 2012m12 2013m6 2013m12 2014m6 2014m12 2015m6 2015m12 2016m6 2016m12 2017m6 2017m12 2018m6 2018m12 2019m6 2019m12 2020m6 2020m12
Country-level CRUDE BIRTH RATES

Provisional data
Emergency declared

Peak Zika infection

Difference-in-differences (~ p.p. change)

2015 m1-m3 2015 m4-m6 2015 m7-m9 2015 m10-m12
2016 m1-m3 2016 m4-m6 2016 m7-m9 2016 m10-m12
2017 m1-m3 2017 m4-m6 2017 m7-m9 2017 m10-m12
2018 m1-m3 2018 m4-m6 2018 m7-m9 2018 m10-m12
2019 m1-m3 2019 m4-m6 2019 m7-m9 2019 m10-m12
2020 m1-m3 2020 m4-m6 2020 m7-m9 2020 m10-m12

Year-month (moving average)

Contrast PE and Non-NE, Before and After
Emergency declared
Peak Zika infection
Difference-in-differences (~ p.p. change)
Year-month (moving average)
Contrast PE and Non-NE, Before and After
First year
Emergency declared

Peak Zika infection

Difference-in-differences (~ p.p. change)

2015 m1-m3
2015 m4-m6
2015 m7-m9
2015 m10-m12
2016 m1-m3
2016 m4-m6
2016 m7-m9
2016 m10-m12
2017 m1-m3
2017 m4-m6
2017 m7-m9
2017 m10-m12
2018 m1-m3
2018 m4-m6
2018 m7-m9
2018 m10-m12
2019 m1-m3
2019 m4-m6
2019 m7-m9
2019 m10-m12
2020 m1-m3
2020 m4-m6
2020 m7-m9
2020 m10-m12

Year-month (trimester moving average)

Contrast PE and Non-NE, Before and After

First year

Five-years since
Heterogeneous exposure/response
Emergency declared
Peak Zika infection
-10
-7.5
-5
-2.5
0
2.5
5
7.5
10

Difference-in-differences coefficient (p.p.)

Year-month (moving trimester)
Percentage of live births to mothers with more than High-School Education
Maternal education falls in the peak of response
Emergency declared

Peak Zika infection

Average maternal age

Difference-in-differences coefficient (ln scale)

Year-month (moving trimester)
Emergency declared
Peak Zika infection

Average maternal age

Maternal age falls in the peak of response
In sum:

Behavioral response to public health crisis seems...

- large,
- relatively fast,
- and fairly heterogeneous

For COVID-19 these effects are likely augmented by adult-risk and economic shock – which are themselves heterogeneous.

Open question: Not clear how COVID-19 may have impacted supply side of family planning.