

Q&A: The intersection of fertility, Zika, COVID-19, climate conditions, urbanicity and inequality

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"Once one novel disease crisis starts, what we are seeing is that in a moment of extreme uncertainty, women use what they've learned from the past," says Leticia Marteleto, Presidential Penn Compact Professor of Sociology at Penn. Credit: University of Pennsylvania

In 2020, then a sociology professor at the University of Texas at Austin and principal investigator of Decode Zika, Letícia Marteleto was leading a team interviewing 4,000 women in Pernambuco, the Brazilian state hit hardest by the Zika epidemic. When COVID-19 hit, the researchers began to interview women via phone instead of at their homes, and the project expanded into Decode Zika and COVID (DZC).

Marteleto is now the Presidential Penn Compact Professor of Sociology at the University of Pennsylvania, a role she began in July. On her desk in the McNeil Building is a name plate with "Fearless Leader" underneath her name, a gift from the DZC team in Texas.

"The team gave me this because of our ability to pivot a data collection that was so massive and international, and still be able to do it. I carry this to remember those times and that we have to do good research even in times of crisis," Marteleto says. The team interviewed the women again in 2021 and 2022, as part of the first-ever panel on [reproductive health](#) and fertility in Brazil. They are getting ready to contact them in 2024 for nine more waves of [data collection](#).

"The concept that we are working with now is the idea that these women lived through back-to-back novel infectious disease crises; COVID started less than three years from when Zika ended," she says. "You can imagine the uncertainty right when a novel disease outbreak hits, the kinds of questions that women were asking themselves. Are we going to see something like Zika again? Is this going to have an effect on [pregnant women](#), fetuses, or babies?"

Marteleto published two papers this summer, "[Climate and fertility amid a public health crisis](#)", Zika being the [public health crisis](#) under study, and "[Scars from a Previous Epidemic: Social Proximity to Zika and](#)

[Fertility Intentions during the COVID-19 Pandemic.](#)" The papers were published in *Population Studies* and *Socius: Sociological Research for a Dynamic World*, respectively.

The first paper shows that increases in temperature and precipitation are associated with declines in births and that the Zika epidemic heightened [behavioral changes](#) in response to [climate conditions](#).

The latter paper looked at the impacts of women having [close proximity](#) to Zika, meaning they had or suspected they had Zika, knew people who had it, or knew kids with microcephaly, a condition when the baby's head is smaller than expected due to the mother's Zika infection.

The authors asked women about their pregnancy intentions, including whether they would delay or forego pregnancy completely, and found that women with closer proximity to Zika were more likely to choose not to get pregnant during the COVID-19 pandemic or ever. Women who wanted to have children postponed childbearing because of their experiences with Zika and worry about COVID.

"Once one novel disease crisis starts, what we are seeing is that in a moment of extreme uncertainty, women use what they've learned from the past," Marteleto says. This is an example of women stating their childbearing intentions not only based on their financial situation and relationship with their partner, but also based on their experiences with big-picture events in the world.

The work continues at Penn, with Marteleto making preparations for more waves of interviews.

"The excitement to be here is great because of how global Penn is. The amount of interest that this project has already gotten from graduate students, for example, is something that just tells me that I did the right

thing coming," Marteleto says. She sat down with Penn Today to talk about her work at the intersection of fertility, climate, Zika, COVID-19, urbanicity, and inequalities.

How did you first become interested both in studying fertility and studying Zika?

I have been studying fertility for more than two decades now. Initially my interest was in how fertility affects a bunch of outcomes—health, education—that are important in society. Then I started to be more interested in looking at fertility itself as the outcome and looking at what generates inequalities in fertility.

Very unequal societies have been the source of my interest, so mainly Latin America and African societies. Eight years ago, Zika hit, and Brazil was the epicenter of Zika. My thinking at the time was that this is going to change how women think about fertility—how to have kids, when to have kids—because it was discovered that Zika was associated with fetal abnormalities such as brain malfunction.

I wrote a grant proposal to the National Institute of Child Health and Human Development to collect data, to interview women to try to understand their perceptions and their intentions and their behavior. By the time we were awarded and got to the field, the epidemic had ended. One aspect of Zika that made women very concerned was that it was uncontrollable in that the vector was a mosquito.

Zika ended in 2017, but still, the mosquito *Aedes Aegypti* is there. Dengue is also transmitted by the same mosquito, and dengue is cyclical in Brazil. The thinking for this paper, "Climate and fertility amid a public health crisis," was you have climate acting almost as a conduit to women to perceive the threat of the mosquito.

What if we look at climate—specifically precipitation and temperature, which are the two that we have data for—from satellites across every municipality in this vast country? What if we look at whether changes in temperature and precipitation matter for births later? We got satellite data for every municipality in the country from 2013 to 2018, to see if shocks of precipitation and shocks of temperature mattered for births. We found that it did matter.

What did you find about how climate affects fertility in a public health crisis compared to conditions without a public health crisis?

The effect of temperature in declining fertility becomes stronger after Zika, and the effect of precipitation as well. The public health crisis strengthened the negative effect that already existed. One hypothesis that we work with is that women were perceiving this warmer and more wet climate as more of a threat for them, looking at not the biological mechanisms of how climate affects fertility, but their perceptions and their behavior.

Biological factors would be things like effects of climate on sperm count, or effects of climate on women menstruating more or menstruating less. (Behavioral factors would include)—in [rural areas](#), for example—there was a climate shock on the crop for that season, you lost everything, and then you decide not to get pregnant. Those would be more acute in rural areas, where people work more in agriculture.

A lot of research on climate and fertility has been done in rural areas. We wanted to address this gap in the literature by looking at urban areas as well. The spread of arboviruses is more acute in urban areas; that's where you have more mosquito breeding. We find the effect of climate on births stronger in urban areas.

What implications could your findings from Brazil have on other countries?

I don't know of one country that has not faced climate shocks, in one way or another, whether it be temperature or drought or strong rains or heat peaks. It's happening everywhere, and public health crises are happening everywhere as well.

So, I think the applicability of this lies in the fact that we are going to see more and more of this in all places, and the effects are lingering. Also, in the case of Brazil, it's a large, unequal, multiracial country, just like the U.S. So, looking at the implications of this for inequalities in these domains in light of climate change and novel infectious disease epidemics that keep emerging is key.

More information: Leticia J. Marteleto et al, Climate and fertility amid a public health crisis, *Population Studies* (2023). [DOI: 10.1080/00324728.2023.2228288](https://doi.org/10.1080/00324728.2023.2228288)

Leticia J. Marteleto et al, Scars from a Previous Epidemic: Social Proximity to Zika and Fertility Intentions during the COVID-19 Pandemic, *Socius: Sociological Research for a Dynamic World* (2023). [DOI: 10.1177/23780231231184767](https://doi.org/10.1177/23780231231184767)

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