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Navigating women's reproductive health and childbearing during public health crises: Covid-19 and Zika in Brazil

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When Ana,[1] a 33-year-old woman from Recife, Brazil, learned that she was pregnant with her first child in 2016, during the Zika virus (ZIKV) epidemic, she recounted crying with fear and worry during what would have otherwise been a joyous occasion. If she were to become pregnant again now, during the Covid-19 pandemic, "I would cry twenty times more with desperation. . .then I think I would be afraid." Although Ana delivered a healthy baby during the ZIKV epidemic, the thought of navigating another pregnancy during an outbreak of another emerging infectious disease—about which much is still unknown—triggered stressful memories from her first pregnancy. Her poignant expression of concern underscores the urgent need for increased support of women's reproductive health during the pandemic.

Although Covid-19 and ZIKV are distinct viruses with different modes of transmission, symptoms, and effects, the experiences of Brazilian women like Ana, who have only recently emerged from the ZIKV epidemic of 2015–2017, offer important insights about women's reproductive health during a major public health crisis. On March 11, 2020, four years after declaring Zika an epidemic of international proportions, the World Health Organization (WHO) declared the coronavirus outbreak a pandemic. The specific risk of Covid-19 to pregnant women and their infants, who are typically high-risk groups during infectious disease threats, is not yet entirely clear (Kimberlin & Stagno, 2020). We argue that the uncertainty and disruption brought on by Covid-19 may have particularly profound implications on childbearing and reproductive health in Brazil, as the country has now experienced back-to-back novel public health crises of dramatic proportions.

Brazil, the world's sixth most populous country and eighth largest economy, was the center of the ZIKV epidemic and its accompanying surge in congenital Zika syndrome, of which microcephaly is the most common birth malformation (Rasmussen et al., 2016). The ZIKV epidemic brought about devastating consequences for child development and overwhelmed families in affected areas (Diniz, 2017). Today, Brazil is one of the countries most afflicted by the Covid-19 pandemic; at the time of writing (August 2020), Brazil's number of confirmed cases is second only to that of the United States (Johns Hopkins University Coronavirus Resource Center, 2020; NPR, 2020). Erratic water supply, dense urban metropolises, inadequate testing and prevention measures, an overwhelmed health care system, and political instability will almost certainly facilitate the continued spread of the virus and its devastating health and social consequences. How are Brazilian women—who faced a dramatic epidemic with reproductive consequences less than three years ago—navigating reproductive health and childbearing during this crisis?

Since 2016, our team has been studying this question, examining the impacts of the ZIKV epidemic—and now, the Covid-19 pandemic—on women's reproductive health, behavior, and intentions in Ana's home state of Pernambuco, one of Brazil's poorest and most severely affected states during the Zika epidemic, with almost a fifth of the country's confirmed cases of microcephaly (Brasil, 2017). The first study of its kind in Brazil, our innovative mixed methods study integrates longitudinal survey data collection from a sample of 2,382 Pernambucan women[2] of childbearing ages (18 to 34) with in-depth interviews and follow-ups over a two-year period. Findings from preliminary baseline survey data, focus

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[1] We use pseudonyms to protect the confidentiality of all respondents.

[2] We used list-assisted random digit dialing procedure, in which 1000-banks were selected with probability proportionate to the number of listed phones from a commercial telephone directory and all numbers from the selected 1000-banks were sampled, to recruit a probability sample of women ages 18–34 living in Pernambuco to participate in a phone survey and subsequent follow-ups over a two-year period. We also stratify the 1000-banks into three strata to make sure that we included some phone numbers from banks with no listed phones. Importantly, 94% of women in this age group own a cell phone in the metropolitan region of the capital, Recife. At the time of writing (August 2020), data collection for the first wave of the survey is still ongoing. We are following respondents over a period of two years via a combination of Whatsapp, SMS, email, and phone calls.

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groups with women during the Zika epidemic (Marteleto et al., 2017), and in-depth interviews with fifty-six women[3] in the early stages of the Covid-19 pandemic (April and May 2020) highlight four takeaways that advance understanding of reproductive health during large-scale outbreaks of emerging infectious diseases.

First, uncertainty about a *new* disease leads to worry about getting pregnant, contraception, and sexual behavioral change to avoid pregnancy. Like ZIKV at the early stages of the epidemic, the novel coronavirus is an emerging infectious disease about which scientific knowledge is still evolving while misinformation about the disease proliferates on social media networks. In our recent in-depth interviews with women about their childbearing experiences and intentions during the pandemic, the majority—more than 75% – of the women in our sample cited the enormous amounts of fear and worry about Covid-19 and its health and economic consequences as reasons for wanting to delay or avoid pregnancy during the pandemic. Given their recent memory of the deleterious in-utero effects of ZIKV, women in our study found it particularly disconcerting that findings are not yet clear about fetal transmission of Covid-19 and its effects on pregnancy (Baud et al., 2020), birth outcomes (Chen et al., 2020; Zhu et al., 2020), and infants (Dong et al., 2020).

Second, women's confidence in their ability to manage risk of infection and of pregnancy varies dramatically by socioeconomic status (SES). The divide across social and economic lines is particularly significant in Brazil, which is characterized by persistently high levels of inequality. Such high levels of social and economic inequality have had important implications for women's fertility prior to the ZIKV epidemic (Potter et al., 2010). Our earlier work on women's experiences with the ZIKV found that although nearly all the women we interviewed expressed concern about infection during the ZIKV epidemic, their perspectives about their risk of infection and their ability to manage the risk varied by SES (Marteleto et al., 2017). Women with higher levels of education felt that they could take measures to mitigate the risk of infection and of pregnancy whereas women with lower levels of education did not express this same level of confidence and believed that the risks were mostly out of their control. These findings reinforce what patterns of infection of both viruses show: that neither virus is "democratic," as one woman in our recent interviews noted; both viruses disproportionately impact women with low SES (Rollston & Galea, 2020; Gardner et al., 2018). Thus, despite the different modes of transmission of ZIKV (mosquito-borne and sexually transmitted) and Covid-19 (through respiratory droplets), low SES appears to be a strong risk factor for both viruses.

Third, these findings portend potentially dramatic and enduring changes in women's reproductive health and fertility in response to the Covid-19 pandemic, which in turn have population-level demographic consequences. Our work and that of other colleagues found significant declines in live births in Brazil following the ZIKV epidemic (Castro et al., 2018; Marteleto et al., 2020; Rangel et al., 2020), with the highest declines in the state of Pernambuco (Marteleto et al., 2017). In line with the aforementioned SES patterns, the decline in live births was largely driven by declines in births to women with higher levels of education, suggesting that higher SES women have more agency to avoid pregnancy, as well as means to do so. Although it is still early to tell whether the pandemic will lead to a decline in live births as it did in Brazil after the ZIKV epidemic, or an increase in live births, as was the case following uncertainty brought about by natural disasters and other epidemics in other countries (Nobles et al., 2015; Trinitapoli & Yeatman, 2011) it is critical to monitor whether and how the pandemic will impact live births and fertility.

Fourth, pregnant women faced unique risks during the ZIKA epidemic and now also confront unique risks during the pandemic. Pregnancy suppresses the immune system, making pregnant women more susceptible to respiratory illnesses (Rasmussen et al., 2008). The diversion of health care workers to address Covid-19 and temporary clinic closures might lead to shortages of clinicians to address "non-emergency" health issues and to inadequate pre-natal care for pregnant women, which is associated with a higher risk of adverse pregnancy outcomes (Khalil et al., 2020). Indeed, one of our study participants, Patricia, age 26, currently pregnant with her second child, told us "I haven't even started pre-natal care... I should go there but they are only treating coronavirus. I wasn't able to find the health agent." In addition to this report of delaying pre-natal care for pandemic-related reasons, about half of the women in our sample reported difficulties with health care access even prior to the pandemic. Further, most of the 28 women we interviewed and who were pregnant during the ZIKV epidemic reported the high level of stress, anxiety and uncertainty that they faced during the pregnancy. The majority of these women report that they would rather not get pregnant during the pandemic given the obstacles they faced during the ZIKV epidemic.

In fact, preliminary results from our survey data[4] show that the vast majority of respondents (90.2%) thinks that women should not get pregnant during the pandemic. Half of the women also reported being concerned with Covid-19 infection if she got pregnant; this proportion is 55% for Zika, despite the fact that the ZIKV epidemic ended three years ago. Important for understanding the extent of the consequences of both the ZIKV epidemic and the Covid-19 pandemic for reproductive behaviors, the majority of the respondents in our preliminary data reported knowing at least one person who suspected or who had Zika (67%) or Covid-19 (89%).

Collectively, these takeaways suggest that without adequate support in place for women who wish to delay childbearing, the pandemic might increase the risk of unintended pregnancy, particularly among the most marginalized women, further disadvantaging them during a time of extreme vulnerability. In a country where more than half of the pregnancies are unintended (Schuck-Paim et al., 2016), the pandemic threatens to further increase the prevalence of unintended pregnancies. In addition, without enhanced care for pregnant women, the pandemic threatens access to regular and quality prenatal care and might increase the risk of stressful pregnancies that could lead to adverse birth outcomes. In fact, there is recent evidence of increase in stillbirth and preterm delivery during the pandemic that also results in more stress and uncertainty around pregnancy (Khalil et al., 2020).

Moreover, these four implications for reproductive health and childbearing are taking place within a unique context of social risks. The Covid-19 pandemic has exacerbated women's economic vulnerability, heightened their childcare and housework burdens, and increased their risks of food insecurity, poverty, domestic violence, and depression and anxiety—all of which impact women's real and perceived ability to care for a baby. For example, Carolina,

[3] We used snowball sampling to recruit women to participate in the in-depth interviews. By design we include equal numbers of women of low and high schooling, versus those who had a pregnancy and birth during the Zika epidemic and those who did not. A team of three local interviewers, who live in the same community as the participants and who were already part of the Decode Zika project team, started with nine participants and then followed snowball sampling techniques to recruit contacts suggested by the participants themselves. To be eligible to participate, women needed to be between 18 and 34 years old and living in Pernambuco currently. In total, we recruited 64 women to participate in Zoom interviews. We offered a monetary incentive to participants (R$75 or U$15 at the time of field work). A Decode Zika field director provided a four-hour training and support throughout the duration of the fieldwork.

[4] Note that the baseline survey data collection started in May 2020, and data cleaning of the baseline wave is still ongoing. The numbers reported are based on a preliminary sample of 2,382 respondents.

a mother of two in Recife, expressed the impact of losing the ability to have her mother provide child care for her children during the pandemic. "The children, the older one used to go to his grandmother's house, so I had that moment without children. Now we are all stuck at home and watching the news. . ..so. . ..it has become very difficult to live." The constellation of these risk factors compounds women's vulnerability and threatens to leave the most marginalized women and their children even further behind in a post-pandemic world.

These four takeaways point to the urgent need for public health and research responses to support women's reproductive health during the pandemic everywhere. From a health and social policy perspective, concrete efforts to ensure accessible contraception during the pandemic are critical, especially if disruptions in the global supply chain lead to shortages in contraceptives (UNFPA, 2020). Information campaigns about virus prevention methods should target women with low SES and include information about access to and use of contraceptives as well as prenatal and infant care. From a research perspective, more data collection efforts are needed to ensure that we understand what is needed and how policymakers and practitioners can best distribute and deliver resources. Supporting reproductive health is not solely incumbent upon individual women; it requires a collective and consistent effort, especially during times of crisis.

Although many of these insights from our study are likely applicable to reproductive health contexts in many countries, we argue that in Brazil in particular, the timing of two successive infectious disease crises configures a chronic stressor for women's reproductive health and childbearing experiences. The recent ZIKV epidemic has already left imprints on women's reproductive health and childbearing. These circumstances likely impinge most drastically for women already disadvantaged by their SES. The chronic experience of living with frequent and large-scale infectious disease outbreaks during childbearing years may permanently alter the childbearing intentions and behaviors of Brazilian women in ways that might further reproduce inequality.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Baud, D., Greub, G., Favre, G., Gengler, C., Jaton, K., Dubruc, E., et al. (2020). Second-trimester miscarriage in a pregnant woman with SARS-CoV-2 infection. *JAMA*. https://doi.org/10.1001/jama.2020.7233.

Brasil Ministério da Saúde (2017). Boletim Epidemiológico Secretaria de Vigilância em Saúde [Epidemiological Report from the National Health Secretariat]. 48 (15).

Castro, M., Han, Q., Carvalho, L., Victora, C., & França, G. (2018). In *Proceedings of the national academy of sciences* (pp. 6177–6182).

Chen, H., Wang, G., et al. (2020). Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: A retrospective review of medical records. *Lancet, 395*(10226), 809–815. https://doi.org/10.1016/S0140-6736(20)30360-3.

Dong, Y., Mo, X., Hu, Y., & et al. (2020). Epidemiological characteristics of 2143 pediatric patients with 2019 coronavirus disease in China. Pediatrics doi: 10.1542/peds.2020-0702

Diniz, D. (2017). *Zika: From the Brazilian Backlands to Global Threat*. London: Zed Books Ltd.

Gardner, L. M., Bóta, A., Gangavarapu, K., Kraemer, M. U., & Grubaugh, N. D. (2018). Inferring the risk factors behind the geographical spread and transmission of Zika in the Americas. *PLoS Neglected Tropical Diseases, 12*(1) e0006194.

Johns Hopkins University Coronavirus Resource Center (2020). https://coronavirus.jhu.edu/map.html

Khalil, A., von Dadelszen, P., Draycott, T., Ugwumadu, A., O'Brien, P., Magee, L. (2020). Change in the Incidence of Stillbirth and Preterm Delivery During the COVID-19 Pandemic. JAMA [Internet]. 2020 Jul 10 [cited 2020 Jul 20]; https://doi.org/10.1001/jama.2020.12746.

Kimberlin, DW, & Stagno, SW (2020). Can SARS-CoV-2 Infection Be Acquired In Utero? More Definitive Evidence Is Needed.. *JAMA, 323*(18), 1788–1789. https://doi.org/10.1001/jama.2020.4868.

Marteleto, L., Guedes, G., Coutinho, R., & Weitzman, A. (2020). Live births and fertility amidst the Zika virus epidemic in Brazil. *Demography, 57*(3), 843–872. https://doi.org/10.1007/s13524-020-00871-x.

Marteleto, L., Weitzman, A., Coutinho, R., & Valongueiro, S. (2017). Women's reproductive intentions and behaviors during the Zika epidemic in Brazil. *Population and Development Review, 43*(2), 199–227. https://doi.org/10.1111/padr.12074.

National Public Radio (2020). https://www.npr.org/sections/coronavirus-live-updates/2020/05/29/864736407/as-brazils-covid-19-cases-continue-to-climb-some-areas-prepare-to-ease-restricti

Nobles, J., Frankenberg, E., & Thomas, D. (2015). The effects of mortality on fertility: population dynamics after a natural disaster. *Demography, 52*(1), 15–38.

Potter, J. et al. (2010). Mapping the timing, pace, and scale of the fertility transition in Brazil. *Population and Development Review, 36*(2), 283–307.

Rangel, M. J. N., & Hamoudi, A. (2020). Brazil's Missing Infants: Zika risk changes reproductive behavior" Demography 57(5), 1647–1680.

Rasmussen, S. A. et al. (2016). Zika virus and birth defects — Reviewing the evidence for causality. *New England Journal of Medicine, 374*(20), 1981–1987.

Rasmussen, S. A., Jamieson, D. J., & Bresee, J. S. (2008). Pandemic influenza and pregnant women. *Emerging Infectious Diseases, 14*(1), 95–100.

Rollston, R., & Galea, S. (2020). Covid-19 and the social determinants of health. *American Journal of Health Promotion, 34*(6), 687–689. https://doi.org/10.1177/0890117120930536b.

Schuck-Paim, C. et al. (2016). Unintended pregnancies in Brazil - A challenge for the recommendation to delay pregnancy due to Zika. *PLOS Current Outbreaks*.

Trinitapoli, J., & Yeatman, S. (2011). Uncertainty and Fertility in a Generalized AIDS Epidemic. *American Sociological Review, 76*(6), 935–954.

UNFPA (2020). https://www.unfpa.org/resources/sexual-and-reproductive-health-and-rights-modern-contraceptives-and-other-medical-supply.

Zhu, H., Wang, L., Fang, C., et al. (2020). Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Translational Pediatrics, 9*(1), 51–60. https://doi.org/10.21037/tp.2020.02.06.