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Discussion

Unintended Pregnancies in Brazil - A Challenge for Recommendation to Delay Pregnancy Due to Zika

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Abstract

Because of the potential link between the ongoing Zika virus outbreak and a congenital microcephaly, officials in Latin America have recommended that v until this association is firmly established or the outbreak subsides. However, proportion of babies are still born out of unplanned pregnancies. Teenage girl they often lack access to preventive contraception methods, or the knowledge gauge the magnitude of the barriers preventing the implementation of such a country so far most affected by the Zika epidemic, we evaluated pregnancy r spatial heterogeneity in the country, in recent years (2012-2014). Nearly 20% today (~560,000 live births) are by teenage mothers. Birth incidence is far hig northern states. However, in absolute terms most births occur in the populous a large extent the geographic distribution of dengue (an indicator of suitable c conditions for the circulation of *Aedes* mosquitoes). These findings indicate t

pregnancy will leave over half a million pregnant adolescents in Brazil vulnerable, not accompanied by effective education and real access to prevention.

Keywords: Aedes, Brazil, microcephaly, pregnancy, teenagers, Zika

Unintended pregnancies in Brazil - A challenge for the recommendation to delay pregnancy due to Zika

The World Health Organization has recently declared the emerging Zika virus a public health emergency¹. The virus, which reached Brazil to cause a major epidemic, started to spread to over 28 countries² and may still reach many more considering the vector species (*Aedes aegypti* mosquitoes) and the high transmission rates observed. It also involves the possibility of a second vector of Zika transmission, *Aedes albopictus*, expanding its ecological niche globally^{3, 4}.

However, the biggest concern about the Zika outbreak is the potential link with microcephaly and other malformations of the central nervous system in newborns infected with the virus during pregnancy¹. The proposed link between Zika infection and congenital malformations is not yet conclusive^{1, 5}, but given the long-term consequences of this birth defect (which include developmental delays to severe, lifelong motor and cognitive impairment), a number of countries in Latin America have recommended that women avoid or defer pregnancy, giving them access to family planning and therapies to develop⁶. Among these were representatives of the Health Ministers of Jamaica and El Salvador. In Brazil the recommendation to postpone pregnancy was issued by the director of the Surveillance Department at the Ministry of Health - Cláudia Vasconcelos, but she stated that women from high-risk areas who can wait to conceive should do so².

The implementation of such a recommendation requires, however, that women be clearly informed about the risks posed by infection, but also have control over their reproductive choices. There are few reasons to doubt that most women will be aware and informed about the consequences through the widespread media. Yet ensuring control over the timing of pregnancy is a daunting challenge, especially considering that many babies are born out of wedlock, and when strong motives for avoiding them exist (e.g. age, economic, social, professional).

In Brazil, the country most affected by the Zika outbreak so far, data from a demographic survey indicate that approximately half of all births that happened five years prior to the outbreak occurred in a demographic group at particularly high risk is that of adolescents (defined as 15-19 years old).

old, following the World Health Organization definition⁸). Pregnancies in adolescents are often unplanned because this group often lacks access to contraception and the knowledge to use them appropriately. In such circumstances, the risk of congenital anomalies might not affect the likelihood of a pregnancy.

To gauge the magnitude of the barriers preventing the postponement of parenthood, we analyzed pregnancy rates in adolescent groups, and their spatial heterogeneity in the country where data are available (2012-2014). Data on live births were obtained from the Information System on Live Births (SINASC⁹). Population estimates for each state and age group were obtained from the Institute of Geography and Statistics¹⁰ and annual population data were calculated from census data. Analyses were conducted using the freely available analytical software R.

Although Brazil has experienced a substantial decline in fertility rate and a convergence towards older ages over the last decades, nearly 20% of children are born to teenage mothers, a proportion nearly twice as high as the world average (11% per year, over 560,000 children are born to adolescent mothers in Brazil ([Fig.1](#)).

The states with the highest incidence of births from adolescents in Brazil are Roraima (coinciding with a large part of the Amazon area) and Mato Grosso do Sul ([Fig.2a](#)) and 15-19 years ([Fig.2b](#)). When birth incidence among adolescent mothers (10-19y) is plotted against latitude ([Fig.3](#)), it is clear that it increases sharply towards the far higher in the tropical northern states. In absolute terms, however, most births occur in the southeastern states, most notably São Paulo ([Fig.1](#)). The distribution of dengue cases is shown in [Figure 1](#), as an indicator of those states with climatological and social conditions for the circulation of *Aedes* mosquitoes. As shown in [Fig.1](#), the highest incidence also occurs in populous states in the southeast (predominantly São Paulo), matching the spatial distribution of the absolute number of births from adolescent mothers.

The pre-existing high incidence of what are most likely unplanned births by adolescents in these areas emphasizes that the recommendation to delay pregnancy during the current outbreak is a solution to protect babies from the putative effects of infection. Unless accompanied by increased accessibility to contraception methods and a drastic change in health education towards family planning, the recommendation to delay pregnancy will leave adolescents vulnerable every year until effective interventions (including vaccines) are available¹³.

More complicated yet is the communication of risk at a time when microcephaly is linked to Zika infection. While we await the final verdict of the magnitude of risk and the recommendations related to conception in the time of Zika should be approached with caution and real access to prevention.

Competing Interest

The authors have declared that no competing interests exist.

Biography

• Lone Simonsen holds a PhD in population genetics from University of Massachusetts and is currently a senior research professor in the department of global health at George Washington University. She has mentored MPH, DrPH and PhD students in topics relating to global health epidemiology and health transitions. She is a Lundbeck visiting professor at the University of Copenhagen in 2014, to study epidemiology and health transitions. She is a senior fellow in the RAPIDD (Research and Analysis for Policy) network hosted at the Fogarty International Center at the National Institutes of Health, Princeton University. She is an elected member of the American Epidemiology Society and the Danish Royal Academy of Sciences & Letters. Over the past 20+ years she has worked at the CDC, World Health Organization (WHO) and NIH on issues including understanding the patterns of HIV/AIDS, TB drug resistance, SARS, pandemic influenza, e-health, and vaccine program evaluation. Before moving to academia in 2007, she worked at the National Institutes of Health-NIAID where she assisted the office of the director of emerging health issues, including work on rotavirus vaccine adverse events for the Department of Health & Human Services DHHS Secretary's Distinguished Scholars Program. She has published more than 150 well-cited peer-reviewed papers, book chapters, and articles in collaboration with a global network of researchers. Her research currently focuses on emerging and contemporary pandemics and emerging infectious diseases, population trends, the burden of influenza and other vaccine-preventable diseases, and evaluating health care and vaccine programs on a grant from the Gates Foundation. Simonsen is a frequent speaker at international meetings, she served on an influenza expert panel for the Council of Economic Advisors presented on pandemic surveillance issues at the President's Council of Advisors and Policy in 2009. She is currently also working with her RAPIDD collaborator

disaster in West Africa. She recently led a WHO-sponsored multi-country influenza pandemic burden, and is frequently called on by WHO to participate on pandemic preparedness, frameworks/policy issues for pandemic preparedness, disease surveillance, including monitoring and evaluation of vaccine programs (by 2008/ever): H-index: 44/55 and I10-index:98/111

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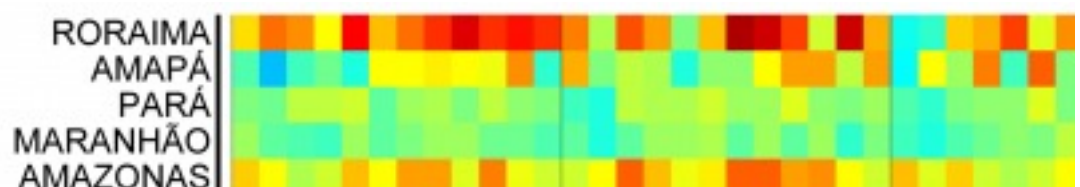
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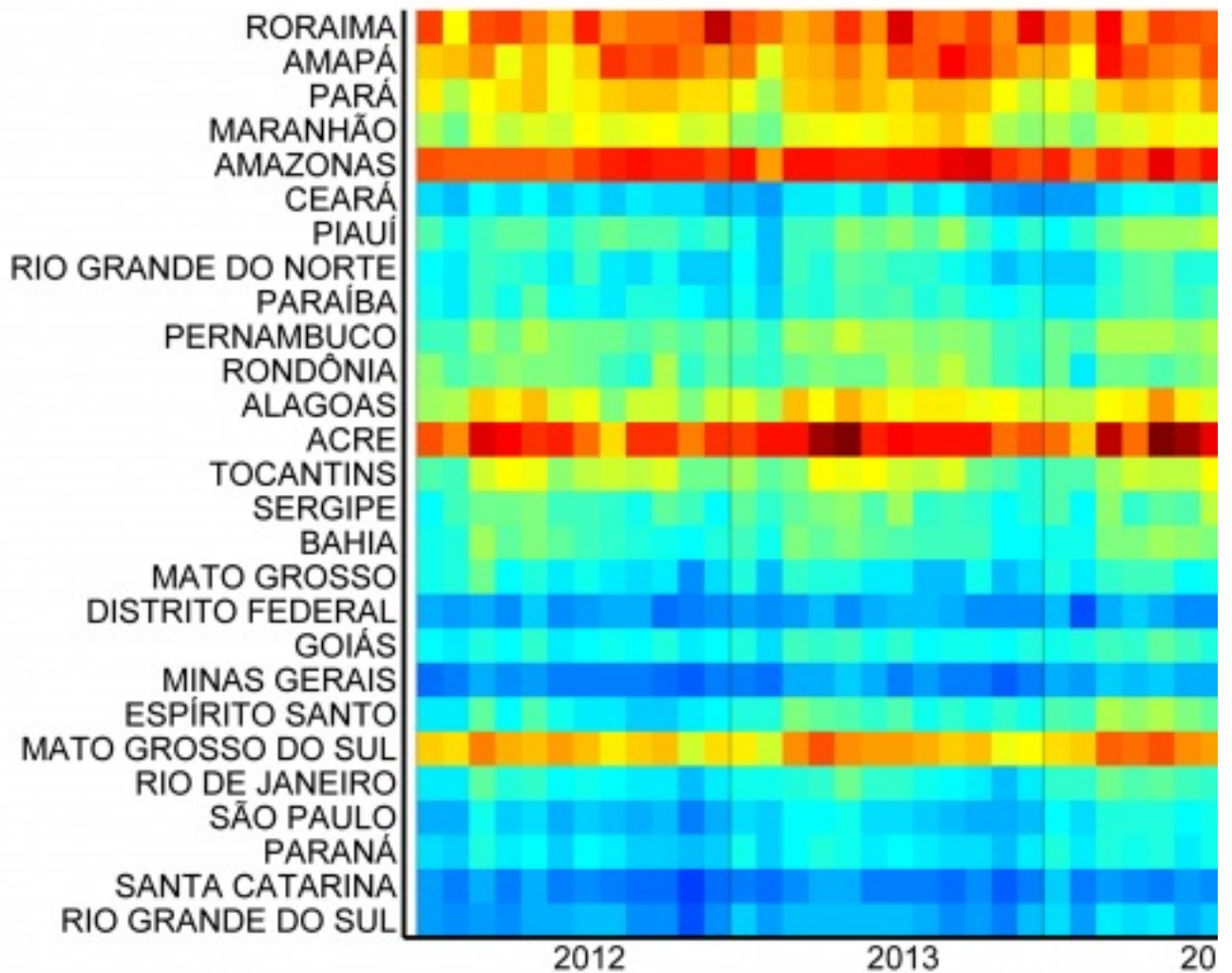
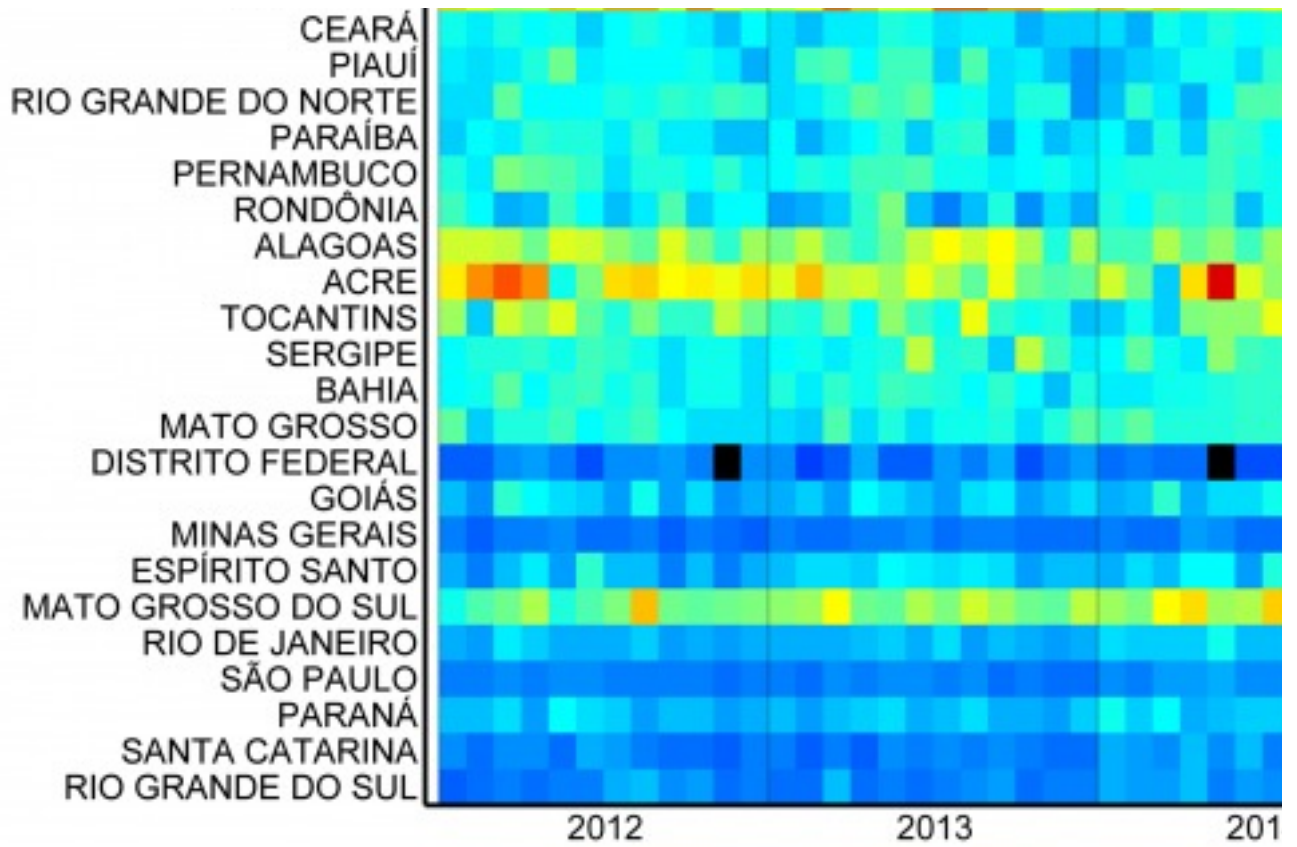
Figures and Tables

Mean number of live births per year (2012-2014) from adolescent state (source: Datasus: SINASC) and number of dengue cases in Brazilian Ministry of Health).

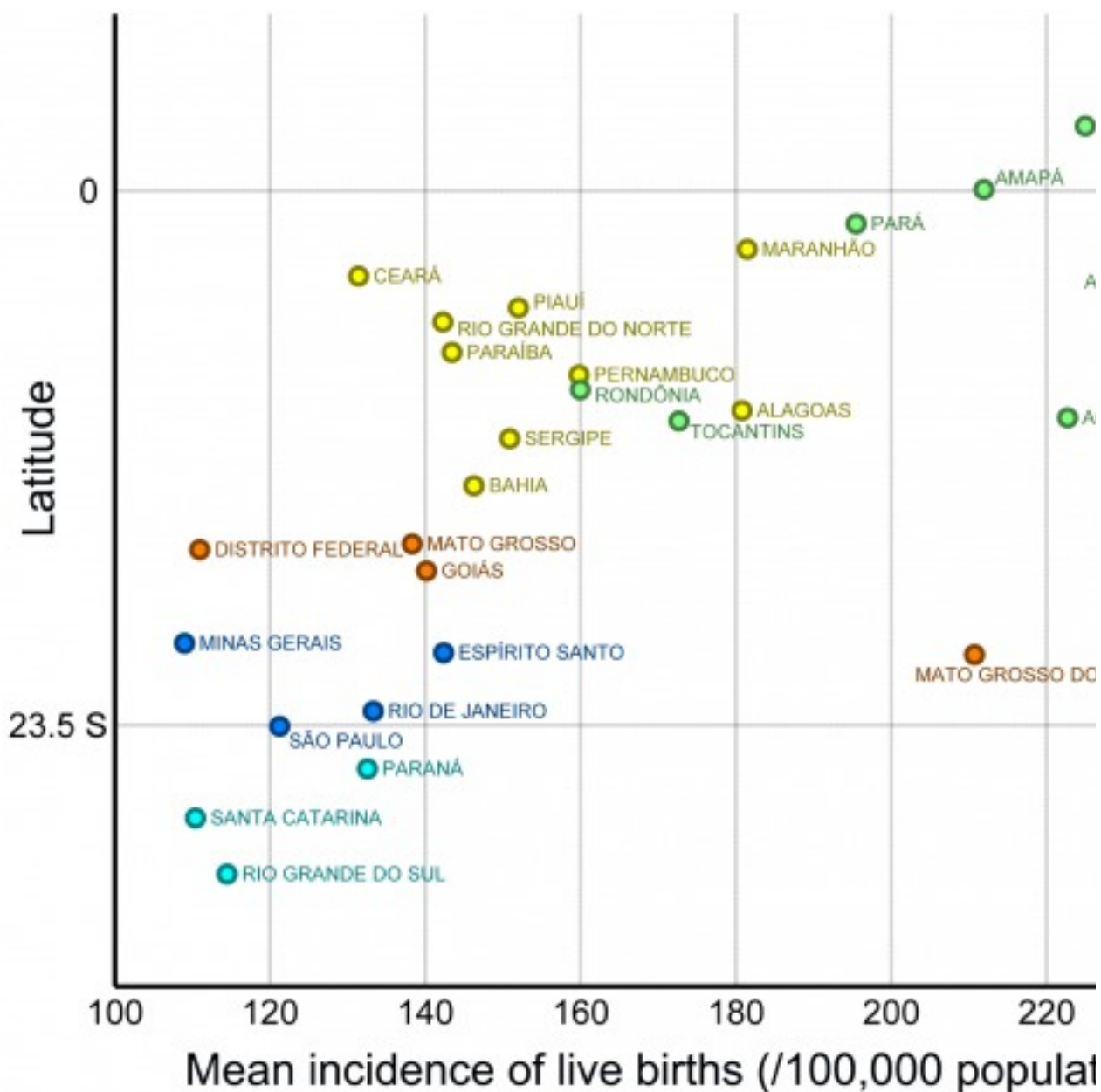
Region	State	No. Live Births by Mother's Age		
		10-14y	15-19y	Total
North	Acre	296	4,290	4,586
North	Amapá	257	3,809	4,065
North	Amazonas	1473	19,949	21,422
North	Maranhão	1,803	28,022	29,825
North	Pará	2,333	36,051	38,384
North	Rondonia	267	5,624	5,891
North	Roraima	221	2,554	2,776
North	Tocantins	344	5,524	5,868
Northeast	Alagoas	919	12,932	13,850
Northeast	Bahia	2,505	40,795	43,300
Northeast	Ceará	1,446	24,924	26,370
Northeast	Paraíba	589	10,895	11,483
Northeast	Pernambuco	1,650	28,981	30,632
Northeast	Piauí	539	9,830	10,369
Northeast	Rio Grande do Norte	535	9,142	9,677
Northeast	Sergipe	423	6,945	7,368
Southeast	Espírito Santo	451	9,252	9,702
Southeast	Minas Gerais	1,646	40,899	42,545
Southeast	Rio de Janeiro	1,895	39,422	41,317
Southeast	São Paulo	3,541	87,735	91,276
South	Paraná	1,305	27,438	28,743
South	Rio Grande do Sul	920	21,637	22,558
South	Santa Catarina	558	13,456	14,015
Center-West	Distrito federal	230	5,694	5,925
Center-West	Goiás	834	17,218	18,052
Center-West	Mato Grosso	543	8,813	9356
Center-West	Mato Grosso do Sul	613	10,711	11,324
National	Brazil	28,138	532,540	560,678

Monthly incidence of live births (per 100,000 age-specific popula (A) 10-14 years and (B) 15-19 years in each Brazilian state.





Average incidence of live births (per 100,000 age-specific population of mothers aged 10-19 years) in each Brazilian state by the latitude (degrees south)



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