

# Determinantes sociais, big data e epidemiologia aplicada: evidências para políticas públicas em saúde.

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COMO OS DADOS NOS AJUDAM A MELHORAR A SAÚDE

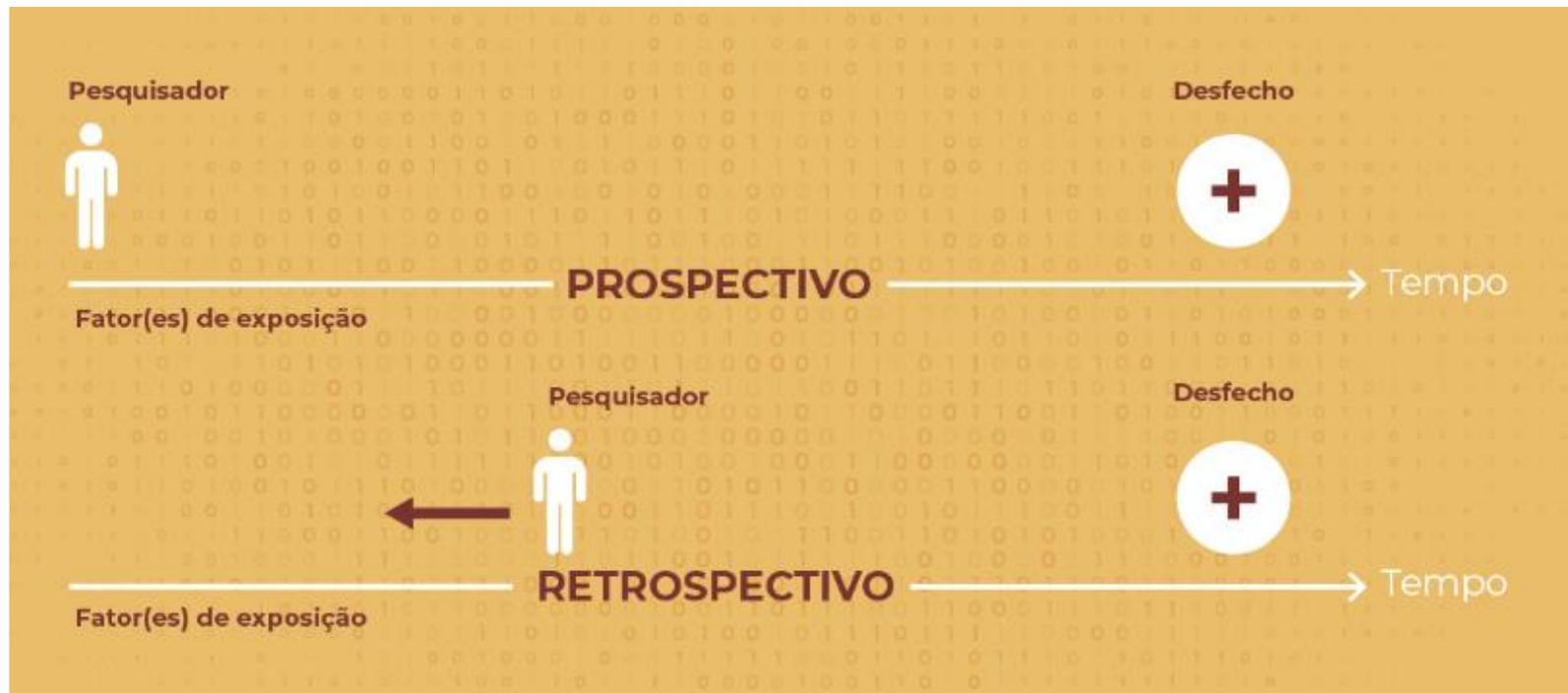
Mauricio L. Barreto



# Cohort studies

Cohort studies are a type of observational research that follows a group of individuals (a cohort) over time to observe exposures and, in sequence, health outcomes.

Researchers could compare an exposed group to an unexposed one to determine whether exposure is associated with the incidence of one or more health outcomes.



# *Cohorts* **Advantages**

- Clarity of Temporal Sequence
- Allow Calculation of Incidence: Relative risk (risk ratio or rate ratio), Risk difference, Attributable proportion (attributable risk %)
- Facilitate Study of Rare Exposures:
- Allow Examination of Multiple Effects of a Single Exposure
- Avoid Selection Bias at Enrolment

# Personal Data for Research

## Made Data Experimental

- Data are collected to investigate a fixed hypothesis.
- Usually relatively small in size.
- Usually relatively uncomplex.
- Highly systematic.
- Known sample / population.

## Made Data Observational (e.g. Social Surveys)

- Data may be used to address multiple research questions.
- Data may be very large and complex (but usually smaller than big data).
- Highly systematic.
- Known sample / population.

## Found Data Administrative Data

- Data are not collected for research purposes.
- May be large and complex.
- Semi-systematic.
- May be messy (i.e. may involve extensive data management to clean and organise the data).
- Multidimensional (i.e. may involve multiple fragments of data which have to be brought together through data linkage).
- Usually a known sample / population.

## Found Data Other Types of Big Data

- Data are not collected for research purposes.
- May be very large and very complex.
- Some sources will be very unsystematic (e.g. data from social media posts).
- Very messy / chaotic.
- Multidimensional (i.e. may involve multiple fragments of data which have to be brought together through data linkage).
- Sample / population usually unknown.

# Brazil Data Ecosystem

**Administrative data generated by government agencies have the potential to support research initiatives in a variety of areas, including health.**

## Social and Health Policies

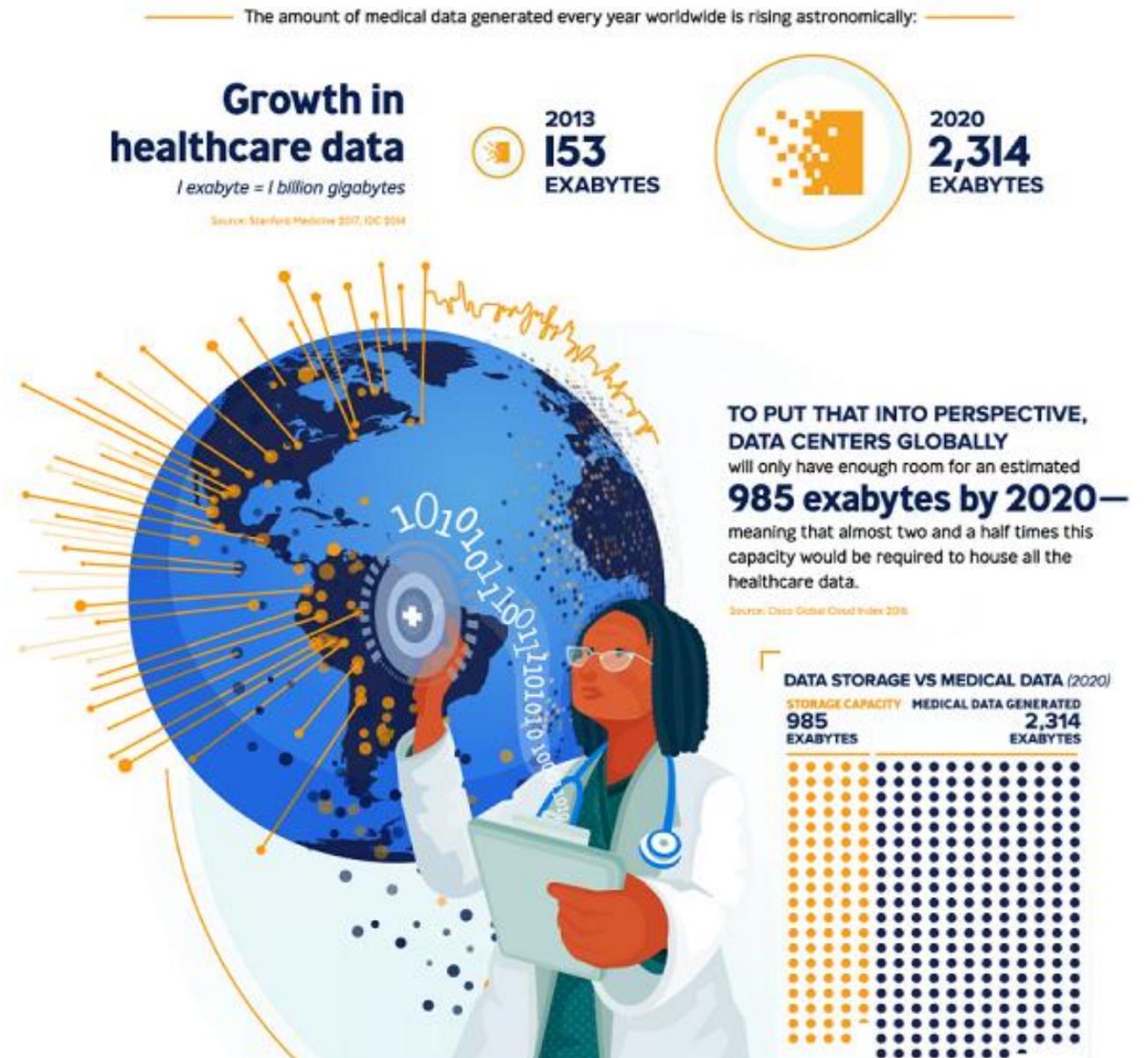


## Health Outcomes



Large volume of administrative data is generated in routine for different purposes: policy guidance, event monitoring (programs, surveillance), official records (deaths and births), audit (hospitalizations) among others;

How can we transform this growing amount of data into valuable knowledge that serves the common good?



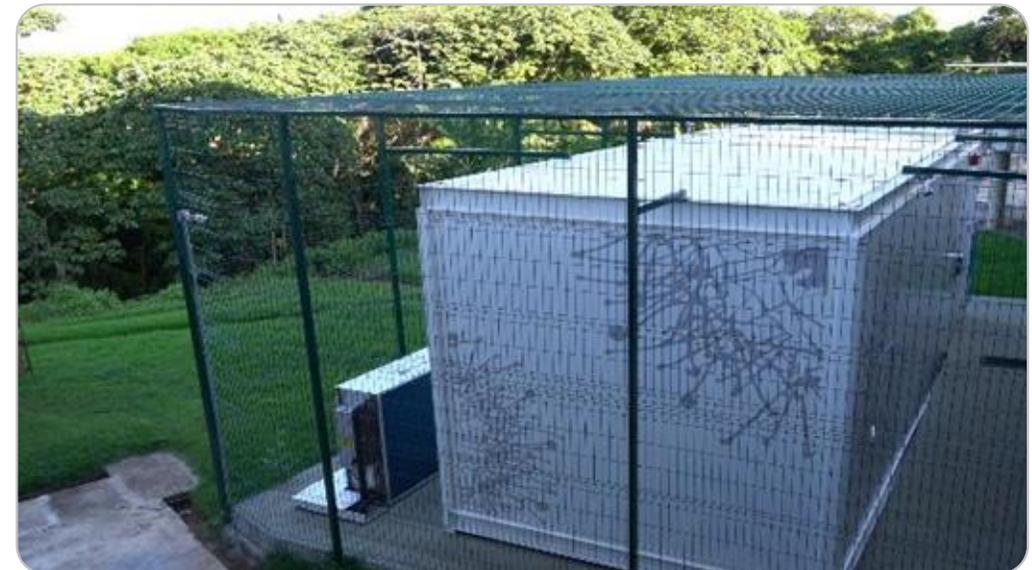
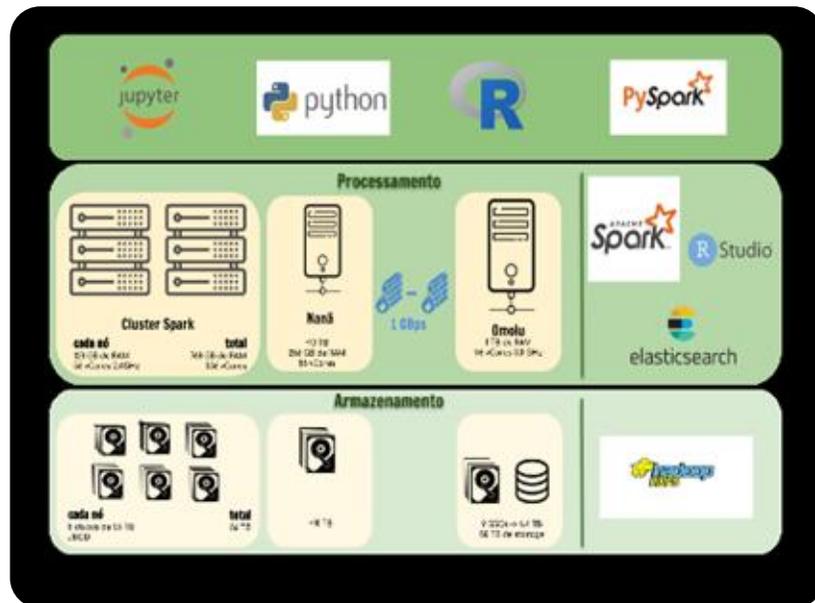
# Many challenges to integrate these data “silos”

- ✓ **Data heterogeneity** (accuracy, format);
- ✓ **Data fragmentation** (multiple databases, multiple owners/stakeholders);
- ✓ **Data availability** (protection for commercial or cultural reasons, or related to personal privacy);
- ✓ **Data handling** (data management, data access, data quality, data querying, data sharing);
- ✓ **Data privacy and integrity** (prevention of corruption and hacking);

# Computational resources



Datacenter Container



# Data Governance

European Journal of Epidemiology (2022) 37:1215–1224  
<https://doi.org/10.1007/s10654-022-00934-w>

## METHODS



### Biases arising from linked administrative data for epidemiological research: a conceptual framework from registration to analyses

Richard J. Shaw<sup>1</sup> · Katie L. Harron<sup>2</sup> · Julia M. Pescarini<sup>3,4</sup> · Elzo Pereira Pinto Junior<sup>3</sup> · Mirjam Allik<sup>1</sup> · Andressa N. Siroky<sup>3,5</sup> · Desmond Campbell<sup>1</sup> · Ruth Dundas<sup>1</sup> · Maria Yury Ichihara<sup>3</sup> · Alastair H. Leyland<sup>1</sup> · Mauricio L. Barreto<sup>3,6</sup> · Srinivasa Vittal Katikireddi<sup>1</sup>

### Data challenges for international health emergencies: lessons learned from ten international COVID-19 driver projects



Sally Boylan, Catherine Arseneault, Marcos Barreto, Fernando A Bozza, Adalton Fonseca, Eoghan Forde, Lauren Hookham, Georgina S Humphreys, Maria Yury Ichihara, Kirsty Le Doare, Xiao Fan Liu, Edel McNamara, Jean Claude Mugunga, Juliane F Oliveira, Joseph Ouma, Neil Postlethwaite, Matthew Retford, Luis Felipe Reyes, Andrew D Morris, Anne Wozencraft



The COVID-19 pandemic highlighted the importance of international data sharing and access to improve health outcomes for all. The International COVID-19 Data Alliance (ICODA) programme enabled 12 exemplar or driver

Lancet Digit Health 2024; 6: e354-66

## International Journal of Population Data Science

Journal Website: [www.ijpds.org](http://www.ijpds.org)



### CIDACS' efforts towards an inclusive and dialogic data governance in Brazil: a focused literature review

Bethânia de A. Almeida<sup>1,\*</sup>, Roberto P. Carreiro<sup>1</sup>, Maíra L. de Souza<sup>1</sup>, and Mauricio L. Barreto<sup>1</sup>

## International Journal of Population Data Science



Journal Website: [www.ijpds.org](http://www.ijpds.org)

### The Centre for Data and Knowledge Integration for Health (CIDACS): Linking Health and Social Data in Brazil

Barreto, ML<sup>1,2\*</sup>, Ichihara, MY<sup>1,2</sup>, Almeida, BA<sup>1</sup>, Barreto, ME<sup>1,3</sup>, Cabral, L<sup>1</sup>, Fiaccone, RL<sup>1,4</sup>, Carreiro, RP<sup>1</sup>, Teles, CAS<sup>1</sup>, Pitta, R<sup>1</sup>, Penna, GO<sup>1,5,6</sup>, Barral-Netto, M<sup>1</sup>, Ali, MS<sup>1,7,8</sup>, Barbosa, G<sup>1</sup>, Denaxas, S<sup>9</sup>, Rodrigues, LC<sup>1,8</sup>, and Smeeth, L<sup>1,8</sup>

Hall de Entrada

## Datacenter Container



Guia Rápido de Governança de Dados

Guias

Ano: 2025

CONTINUE LENDO

O Pioneirismo e a Experiência do Cidacs/Fiocruz Bahia na Governança de Dados Administrativos Integrados para Pesquisa no Brasil

Relatórios

Ano: 2025

CONTINUE LENDO

RESEARCH ARTICLE

Open Access

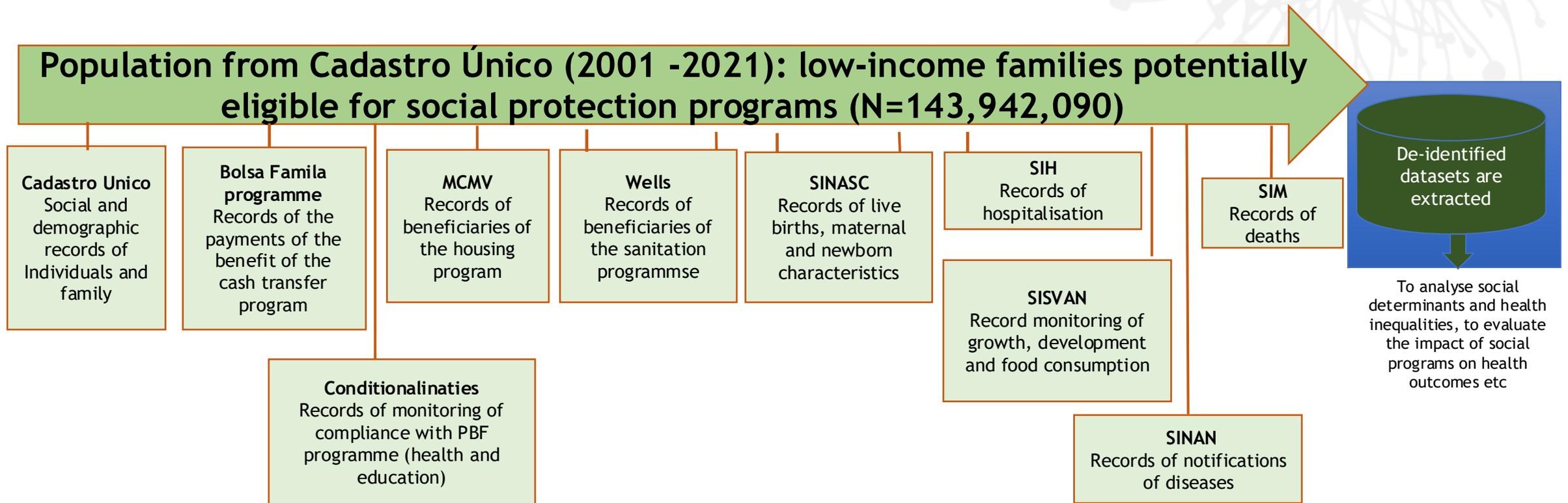
## CIDACS-RL: a novel indexing search and scoring-based record linkage system for huge datasets with high accuracy and scalability



George C. G. Barbosa<sup>1\*</sup> , M. Sanni Ali<sup>1,2,3</sup>, Bruno Araujo<sup>1</sup>, Sandra Reis<sup>1</sup>, Samila Sena<sup>1</sup>, Maria Y. T. Ichihara<sup>1</sup>, Julia Pescarini<sup>1</sup>, Rosemeire L. Fiaccone<sup>1,4</sup>, Leila D. Amorim<sup>1,4</sup>, Robespierre Pita<sup>1</sup>, Marcos E. Barreto<sup>1,6,7</sup>, Liam Smeeth<sup>2</sup> and Mauricio L. Barreto<sup>1,5</sup>

a novel iterative **deterministic** record linkage algorithm based on a combination of indexing search and scoring algorithms (provided by Elasticsearch) [...] for huge datasets, with higher accuracy, improved scalability, and substantially shorter execution time compared to other existing linkage tools.

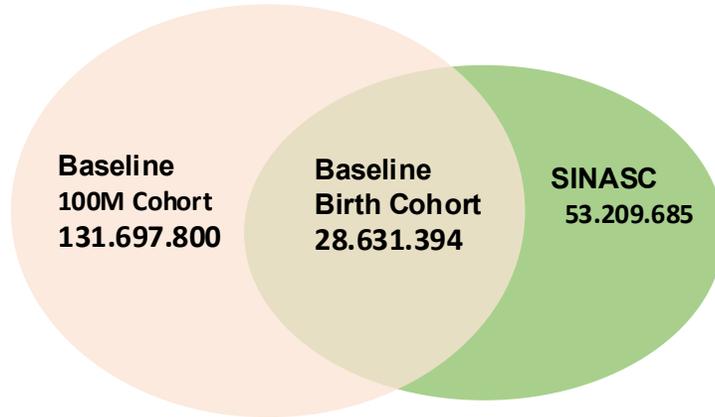
# The 100 million Brazilians Cohort



# Cidacs Birth Cohort

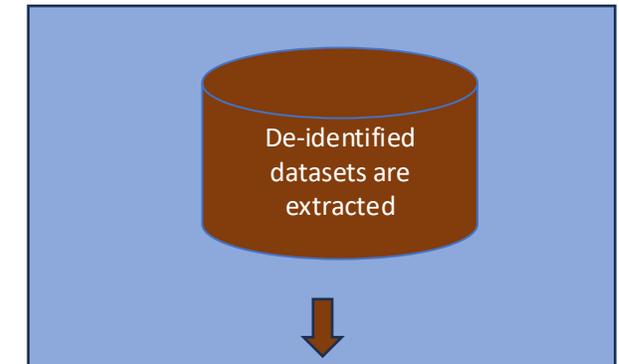
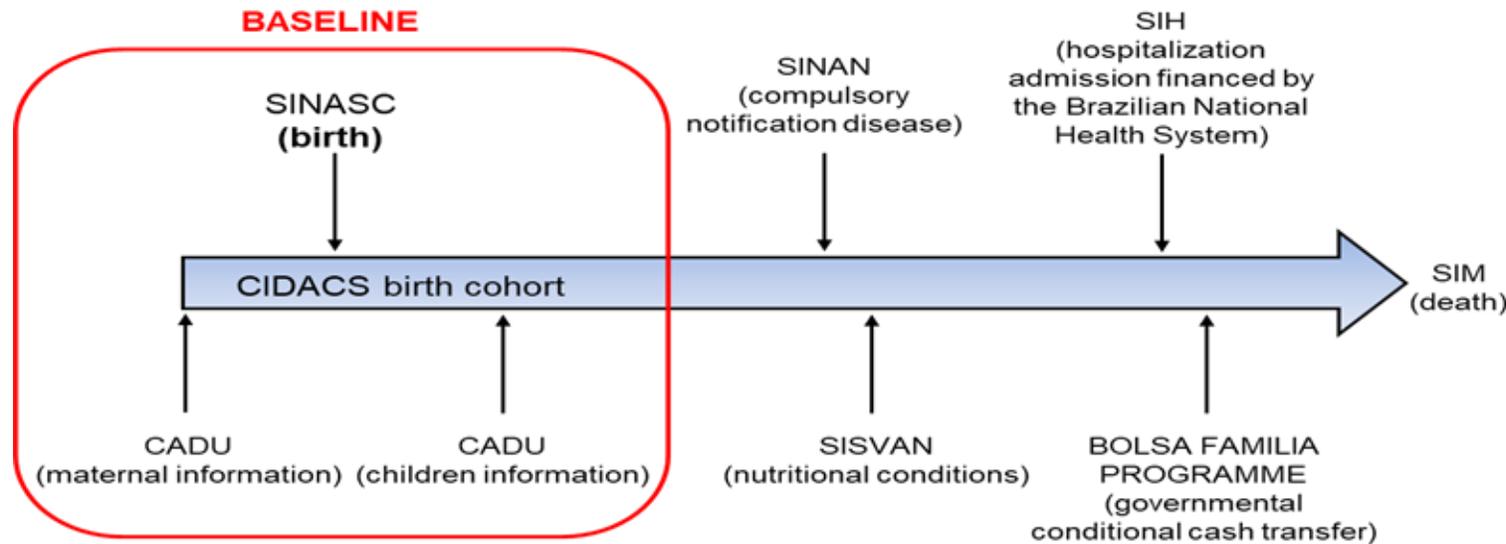


International Journal of Epidemiology, 2021, 50(1), 1-11  
doi: 10.1093/ije/dyaa255  
Advance Access Publication Date: 30 December 2020  
Cohort Profile



Cohort Profile

Cohort Profile: Centro de Integração de Dados e Conhecimentos para Saúde (CIDACS) Birth Cohort



Describe the relationships between prenatal events and early childhood development and examine key factors that influence child and maternal well-being over time

# Center for Data and Knowledge Integration for Health (Cidacs) Fiocruz Bahia

O CIDACS foi criado em 7 de dezembro de 2016, na cidade de Salvador (Bahia, Brasil), com o objetivo de realizar pesquisas interdisciplinares em saúde, utilizando bases de dados brasileiras (nacionais) integradas, para gerar conhecimento científico e fornecer evidências que apoiem

International Journal of  
Population Data Science

Journal Website: [www.ijpds.org](http://www.ijpds.org)



The Centre for Data and Knowledge Integration for Health (CIDACS): Linking Health and Social Data in Brazil

Barreto, ML<sup>1,2\*</sup>, Ichihara, MY<sup>1,2</sup>, Almeida, BA<sup>1</sup>, Barreto, ME<sup>1,3</sup>, Cabral, L<sup>1</sup>, Fiaccone, RL<sup>1,4</sup>, Carreiro, RP<sup>1</sup>, Teles, CAS<sup>1</sup>, Pitta, R<sup>1</sup>, Penna, GO<sup>1,5,6</sup>, Barral-Netto, M<sup>1</sup>, Ali, MS<sup>1,7,8</sup>, Barbosa, G<sup>1</sup>, Denaxas, S<sup>9</sup>, Rodrigues, LC<sup>1,8</sup>, and Smeeth, L<sup>1,8</sup>





STUDY PROTOCOL



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version 2; peer review: 3  
Enny S. Paixao <sup>1,2</sup>,  
Orlagh Carroll <sup>1,1</sup>,  
Rita de Cássia Ribe  
Mauricio L. Barreto

Original Investigation | Psychiatry  
Mortality Risk Following a Household Suicide

Flávia Alves, PhD, Eliângela da Silva Rodrigues, PhD, Lidiane Toledo, PhD, Julia M. Pescarini, PhD, Rodrigo Lins Rodrigues, PhD, John A. Naslund, PhD,  
Mauricio L. Barreto, MD, PhD, Vikram Patel, MD, PhD, Daiane B. Machado, PhD



The NEW ENGLAND  
JOURNAL of MEDICINE

ORIGINAL ARTICLE

## Mortality from Congenital Zika Nationwide Cohort Study in Bra

Recent changes in growth trajectories: a population-based  
cohort study of over 5 million Brazilian children born between  
2001 and 2014



Carolina Santiago-Vieira, <sup>1,2,3</sup> Gustavo  
Leah L<sup>4</sup>

<sup>1</sup>School of Nursing, Universidade  
<sup>2</sup>School of Nutrition, Federal Uni  
<sup>3</sup>Center of Data and Knowledge  
<sup>4</sup>Health Sciences Center, Federal  
<sup>5</sup>Population, Policy and Practice R  
London, London, UK



## Pathways to suicide prevention: a population-based cohort study of the mediating role of Bolsa Família in psychosocial stressors in the 100 million Brazilian cohort

Patrícia Fortes Cavalcanti de Macêdo <sup>1</sup>, Gilciane Ceolin, <sup>1,2</sup>  
Flávia Jôse Oliveira Alves, <sup>1,3</sup> Rumenick Pereira Silva, <sup>1</sup> Mauricio Lima Barreto <sup>1,4</sup>,  
Luis F S Castro-de-Araujo, <sup>1,4,5</sup> Daiane B Machado <sup>1,3</sup>

Summary  
Background There is limited  
evidence on the role of Bolsa Família in

## Interpregn: Outcomes: Register-Ba

Aline S. Rocha <sup>1,2</sup>, Thais Rangel Bousquet Carrilho <sup>3</sup>, Priscila R. F. Costa <sup>1,2</sup>, Enny S. Paix  
Helena B. M. da Silva <sup>1,2</sup>, Ila R. Falcao <sup>1,2</sup>, Rosemeire L. Fiaccone <sup>3,4</sup>, Mauricio L. Barreto <sup>3,7</sup>, Rita

<sup>1</sup>Center of Data and Knowledge Integration for Health (CIDACS), Oswaldo Cruz Foundation, Salvador, Brazil | <sup>2</sup>School  
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> JAMA Pediatr. 2025 Dec 1. doi: 10.1001/jamapediatrics.2025.4935. Online ahead of print.

## Prenatal Exposure to Zika Virus and Risk of Epilepsy- Related Hospitalization During Early Childhood

João Guilherme G Tedde <sup>1,2</sup>, Thiago Cerqueira-Silva <sup>3,4</sup>, Orlagh Carroll <sup>3</sup>, Laura C Rodrigues <sup>3</sup>,  
Maria Gloria Teixeira <sup>1,5</sup>, Nuria Sanchez Clemente <sup>3</sup>, Mauricio L Barreto <sup>1,5</sup>, Enny S Paixão <sup>1,3</sup>

linkage of 3.  
birth cohort



## Risk of death following chikungunya virus disease in the 100 Million Brazilian Cohort, 2015–18: a matched cohort study and self-controlled case series



Thiago Cerqueira-Silva, Julia M Pescarini, Luciana L Cardim, Clémence Leyrat, Heather Whitaker, Carlos Alexandre Antunes de Brito,  
Elizabeth B Brickley, Manoel Barral-Netto, Mauricio L Barreto, Maria G Teixeira, Vivivane S Boaventura, Enny S Paixão

Summary

Background Chikungunya virus outbreaks have been associated with excess deaths at the ecological level. Previous  
studies have assessed the risk factors for severe versus mild chikungunya virus disease. However, the risk of death

Lancet Infect Dis 2024;  
24: 504–13

/NEJMoa2101195

Journal of Clinical Nutrition 119 (20

AMERICAN JOURNAL OF  
NUTRITION

https://ajcn.nutrition.org/

## Lowbirths: a longitudinal study of 2 million Brazilians using routine register-based linked data

Aline S. Rocha <sup>1,2,\*</sup>, Rita de Cássia Ribeiro-Silva <sup>1,2,3</sup>, Juliana F.M. Silva <sup>1</sup>, Elizabete J. Pinto <sup>1,4</sup>,  
Nataanael J. Silva <sup>1,5</sup>, Enny S. Paixao <sup>1,8,\*</sup>, Rosemeire L. Fiaccone <sup>1,6</sup>, Gilberto Kac <sup>7</sup>,  
Laura C. Rodrigues <sup>1,8</sup>, Craig Anderson <sup>9</sup>, Mauricio L. Barreto <sup>1,3</sup>

<sup>1</sup>Center of Data and Knowledge Integration for Health (CIDACS), Oswaldo Cruz Foundation, Salvador, Brazil | <sup>2</sup>School  
Bahia (UFBA), Salvador, Brazil | <sup>3</sup>Department of Obstetrics and Gynecology, Faculty of Medicine, University of Brazil

## S MEDICINE

PEER-REVIEWED

in children under 5 years of age with congenital  
Brazil: A nationwide cohort study  
tuberculosis among

## 420 854 household contacts of patients with tuberculosis in the 100 Million Brazilian Cohort (2004–18): a cohort study



Priscila F P S Pinto, Camila S S Teixeira, Maria Yury Ichihara, Davide Rasella, Joilda S Nery, Samila O L Sena, Elizabeth B Brickley,  
Mauricio L Barreto\*, Mauro N Sanchez\*, Julia M Pescarini\*

Summary

Background Although household contacts of patients with tuberculosis are known to be particularly vulnerable to  
tuberculosis, the published evidence focused on this group at high risk within the low-income and middle-income

## Association of interpregnancy interval with adverse pregnancy outcomes according to the outcomes of the preceding pregnancy: a longitudinal study with 4.7 million live births from Brazil

João Guilherme G. Tedde, <sup>1,2</sup> Thiago Cerqueira-Silva, <sup>3</sup> Sidney A. Lagrosa Garcia, <sup>4</sup> Brenda V. Amim, <sup>5</sup> Laura C. Rodrigues, <sup>6</sup> Mauricio L. Barreto, <sup>7</sup>  
Aline S. Rocha, <sup>1,2</sup> Rita de Cássia Ribeiro-Silva, <sup>3</sup> Ila R. Falcao, <sup>4</sup> and Enny S. Paixão\*

<sup>1</sup>School of Medicine, Federal University of Grande Dourados, Brazil  
<sup>2</sup>Center of Data and Knowledge Integration for Health (CIDACS), Oswaldo Cruz Foundation, Salvador, Brazil  
<sup>3</sup>Faculty of Medicine of São José do Rio Preto (FAMERP), Children's Hospital, São Paulo, Brazil  
<sup>4</sup>School of Nutrition, Federal University of Bahia, Salvador, Brazil  
<sup>5</sup>Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, UK

Summary

Background Earlier studies have proposed a link between the Interpregnancy Interval (IPI) and unfavorable birth  
outcomes. However, it remains unclear if the outcomes of previous births could affect this relationship. We aimed to



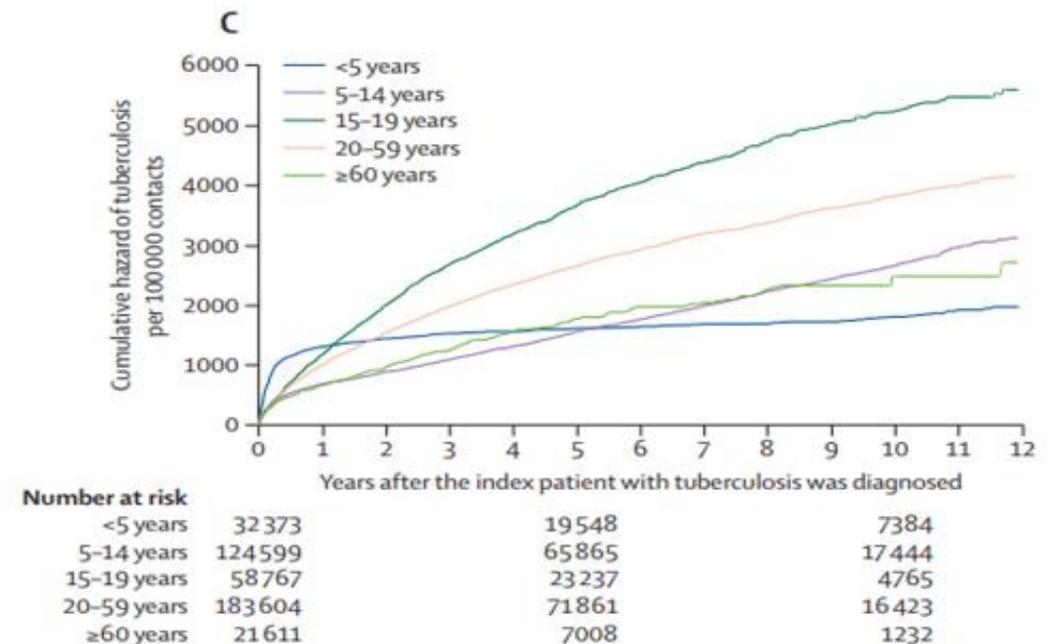
# INVESTIGATING RARE, BUT RELEVANT HEALTH EVENTS

# What is the incidence and clinical determinants of tuberculosis among household contacts?

- The tuberculosis incidence among household contacts was **16-times** higher than the incidence in the general population.
- For children younger than 5 years, the incidence was **62-times** higher among household contacts than in the general population.

## Incidence and risk factors of tuberculosis among 420 854 household contacts of patients with tuberculosis in the 100 Million Brazilian Cohort (2004–18): a cohort study

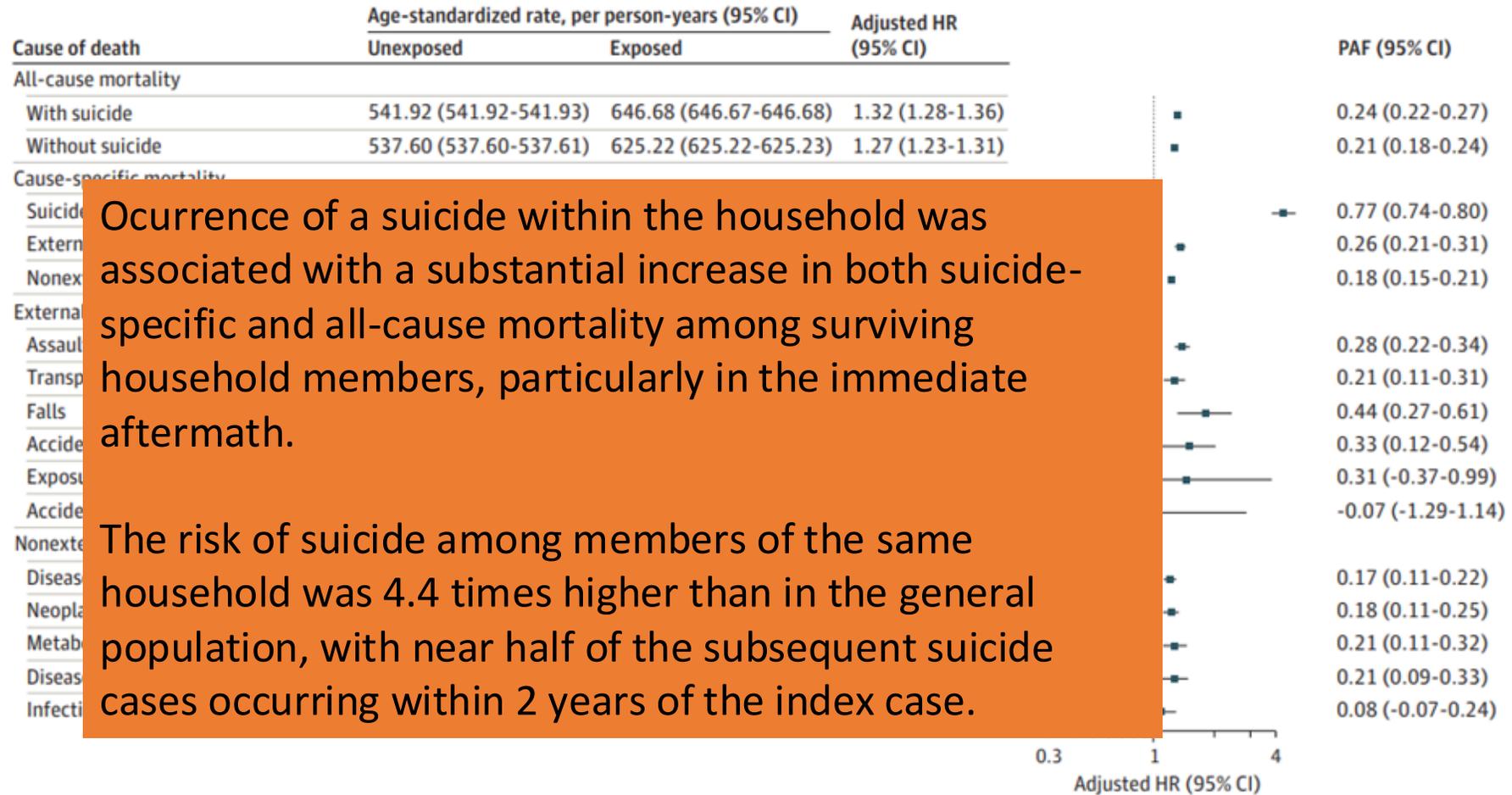
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Original Investigation | Psychiatry

Mortality Risk Following a Household Suicide

Figure 1. Cox Multivariate Model of the Association Between Suicide Index Case and the Risk of Mortality



Occurrence of a suicide within the household was associated with a substantial increase in both suicide-specific and all-cause mortality among surviving household members, particularly in the immediate aftermath.

The risk of suicide among members of the same household was 4.4 times higher than in the general population, with near half of the subsequent suicide cases occurring within 2 years of the index case.

Model adjusted for sex, age cohort, race, region, location residence, unemployed, construction materials, water supply, and waste. HR indicates hazard ratio; PAF, population attributable fraction.

# What is the risk of death following a Chikungunya infection?

- The risk death within the 1st week of chikungunya symptoms onset was **8.40** (95% CI 4.83-20.09) and was **2.26** (1.50-3.77) at the 3rd month.
- Increased the risk of death by **diabetes** 3.74 (95% CI 1.33-16.93), **ischaemic heart disease** 3.66 (1.25-13.96) in the first 28 days.

## Risk of death following chikungunya virus disease in the 100 Million Brazilian Cohort, 2015–18: a matched cohort study and self-controlled case series

Thiago Cerqueira-Silva, Julia M Pescarini, Luciana L Cardim, Clémence Leyrat, Heather Whitaker, Carlos Alexandre Antunes de Brito, Elizabeth B Brickley, Manoel Barral-Netto, Maurício L Barreto, Maria G Teixeira, Viviane S Boaventura, Enny S Paixão

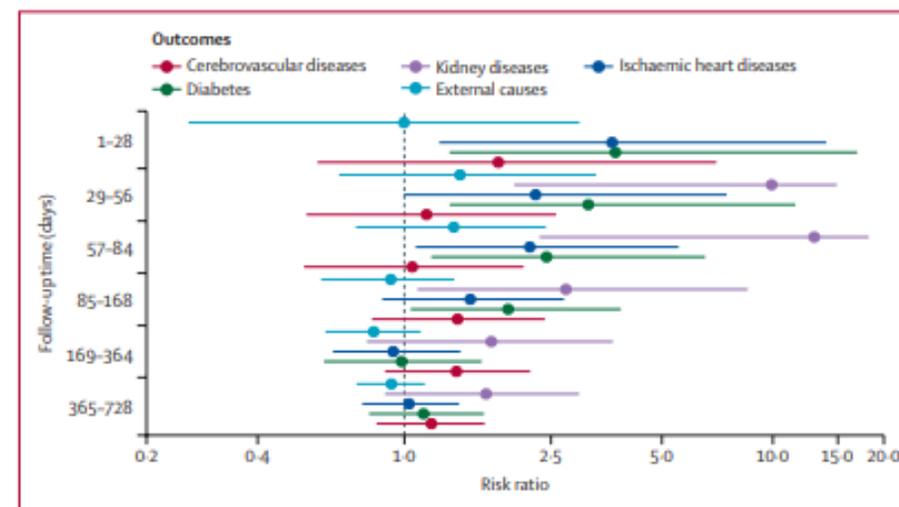


Figure 2: Estimated risk ratios for deaths due to specific causes, comparing groups exposed and unexposed to chikungunya virus disease in each risk period

The risk ratio for kidney diseases within 28 days of symptom onset could not be estimated because there were no events in the unexposed group. Deaths due to external causes, which are not causally associated with chikungunya virus disease, were used as an outcome-negative control.<sup>18</sup> The x axis is plotted on a logarithmic scale.

# Mortality from Congenital Zika Syndrome — Nationwide Cohort Study in Brazil

Enny S. Paixao, Ph.D., Luciana L. Cardim, Ph.D., Maria C.N. Costa, M.D., Ph.D., Elizabeth B. Brickley, Ph.D., Rita C.O. de Carvalho-Sauer, M.Sc., Eduardo H. Carmo, M.D., Ph.D., Roberto F.S. Andrade, Ph.D., Moreno S. Rodrigues, Ph.D., Rafael V. Veiga, Ph.D., Larissa C. Costa, Ph.D., Cynthia A. Moore, M.D., Ph.D., Giovanny V.A. França, Ph.D., et al.



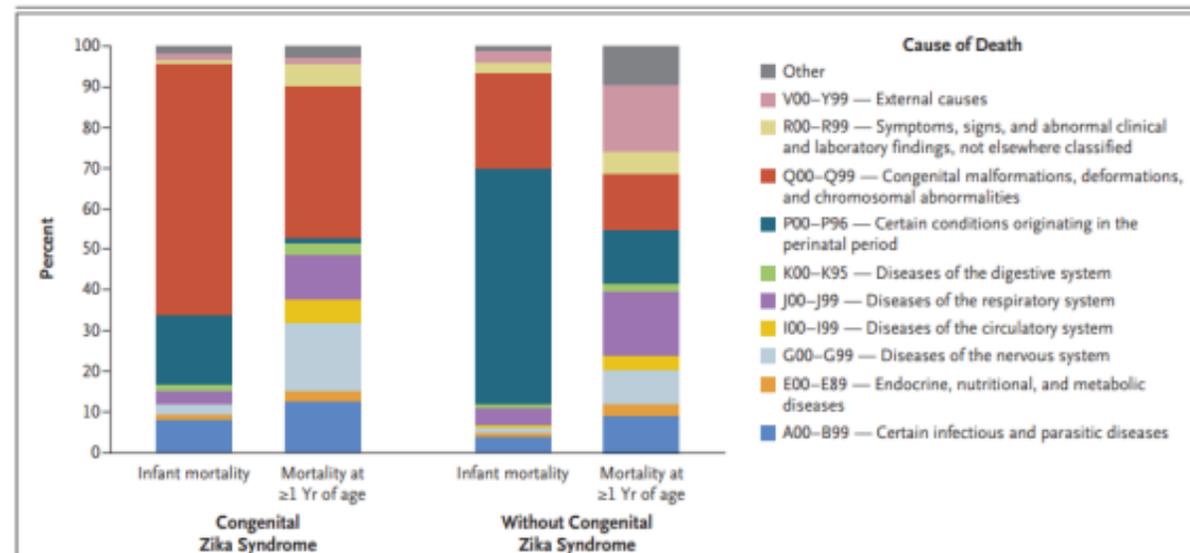
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**11.5 million** live births, of which, **3,308** babies born with confirmed or probable CZS.



Babies born with CZS were at **>11x greater risk** of death during first three years of life than those born without.



**Figure 3. Causes of Death, According to Congenital Zika Syndrome Status, in Brazil (2015–2018).**

Causes of death were categorized according to chapter in the *International Classification of Diseases, 10th Revision*. The analysis of infant mortality included deaths at or before 364 days of age.

# Risk of death for small newborns

The Lancet Regional Health - Americas 3 (2021) 100045

Contents lists available at ScienceDirect

The Lancet Regional Health - Americas

Journal homepage: [www.elsevier.com/locate/lanam](http://www.elsevier.com/locate/lanam)

Research paper

**Risk of mortality for small newborns in Brazil, 2011-2018: A national birth cohort study of 17.6 million records from routine register-based linked data**

Enny S. Paixao, Ph.D.<sup>1,2,\*</sup>, Hannah Blencowe, MD, Ph.D.<sup>3</sup>, Ila Rocha Falcao, Ph.D.<sup>1,3</sup>, Eric O. Ohuma, Ph.D.<sup>2</sup>, Aline dos Santos Rocha<sup>1,3</sup>, Flávia Jôse Oliveira Alves<sup>1,4</sup>, Maria da Conceição N. Costa, MD, Ph.D.<sup>1,5</sup>, Lorena Suárez-Idueta<sup>3</sup>, Naiá Ortelan, Ph.D.<sup>1</sup>, Liam Smeeth, MD, Ph.D.<sup>2</sup>, Laura C. Rodrigues, MD, Ph.D.<sup>1,2</sup>, Joy E Lawn, MB BS, Ph.D.<sup>2</sup>, Marcia Furquim de Almeida, MD, Ph.D.<sup>6</sup>, Maria Yury Ichihara, MD, PhD<sup>6</sup>, Rita de Cássia Ribeiro Silva, Ph.D.<sup>1,3</sup>, Maria Gloria Teixeira, MD, Ph.D.<sup>1,4</sup>, Mauricio L. Barreto, MD, Ph.D.<sup>1,3</sup>

<sup>1</sup>Center for Data and Knowledge Integration for Health (CIDACS), Gonçalo Moniz Institute, Oswaldo Cruz Foundation, Salvador, Bahia, Brazil  
<sup>2</sup>Maternal, Adolescent, Reproductive & Child Health (MARCH) Centre, London School of Hygiene & Tropical Medicine, London WC1E 7HT, UK  
<sup>3</sup>Escola de Saúde Pública, Universidade Federal da Bahia, Salvador, Brazil  
<sup>4</sup>Instituto de Saúde Coletiva, Federal University of Bahia, Salvador, Bahia, Brazil  
<sup>5</sup>Mexican Society of Public Health, Hirschel 308, Anáhuac, Miguel Alemán, Tijuana, Mexico City  
<sup>6</sup>Faculdade de Saúde Pública, Universidade de São Paulo, Brazil

**17,64 million live births were included (2011-2018)**  
**Detailed evidences of vulnerable newborn phenotypes by combining preterm, SGA, and LBW**

ity risk was for preterm-LBW phenotypes (HR=36.2(95%CI 35.6-36.8) preterm-AGA-LBW, HR=62.0(95%CI 60.8-63.2) preterm-SGA-LBW). The increased mortality risk associated with vulnerable newborn phenotypes was highest in the first month of life, with attenuated but continued high risk in the post-neonatal period and 1-4 years of age.

\* Corresponding author: Enny S. Paixao, Koppel St, London, WC1E 7HT.  
E-mail address: [Enny.paixao@lshtm.ac.uk](mailto:Enny.paixao@lshtm.ac.uk) (E.S. Paixao).

<https://doi.org/10.1016/j.lanam.2021.100045>  
2667-193X/© 2021 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)

Prevalence of **preterm birth**, low birth weight (**LBW**) and small for gestational age (**SGA**) were 9.4%, 9.6% and 9.2%, respectively.

Neonatal mortality risk was 16-fold higher for preterm (vs term), 3 times higher SGA (vs AGA), and 25 times higher for LBW (vs weight (NBW).

**Neonatal Mortality was 62 times higher for the 1% babies (182,202) born preterm-SGA-LBW compared to babies born term-AGA-NBW.**

Our findings support the value of using more detailed phenotypes to identify those at highest risk. More granular data can inform care at the individual level, advance research, especially for prevention,



# INVESTIGATING THE EFFECTS OF SOCIAL INEQUALITIES ON HEALTH

**For five centuries, the structure that generates inequality and injustice has operated continuously in our country.**

**At the start of the colonial period (1500), ~3 million indigenous people lived in the Brazilian territory .**

## **Indigenous Genocide**

**Diseases (smallpox, measles, Influenza),  
enslavement, massacres**

**Nowadays, the indigenous population is less than 1 million (0.5% of the Brazilian Population), living under the continuous threat of land invasions, increasing mineral exploitation, deforestation and forest fires, and escalating land insecurity and violence.**



reserves  
Areas under demarcation by FUNAI  
Proposed indian reserves

# OVER FIVE CENTURIES LATER - Health Inequalities



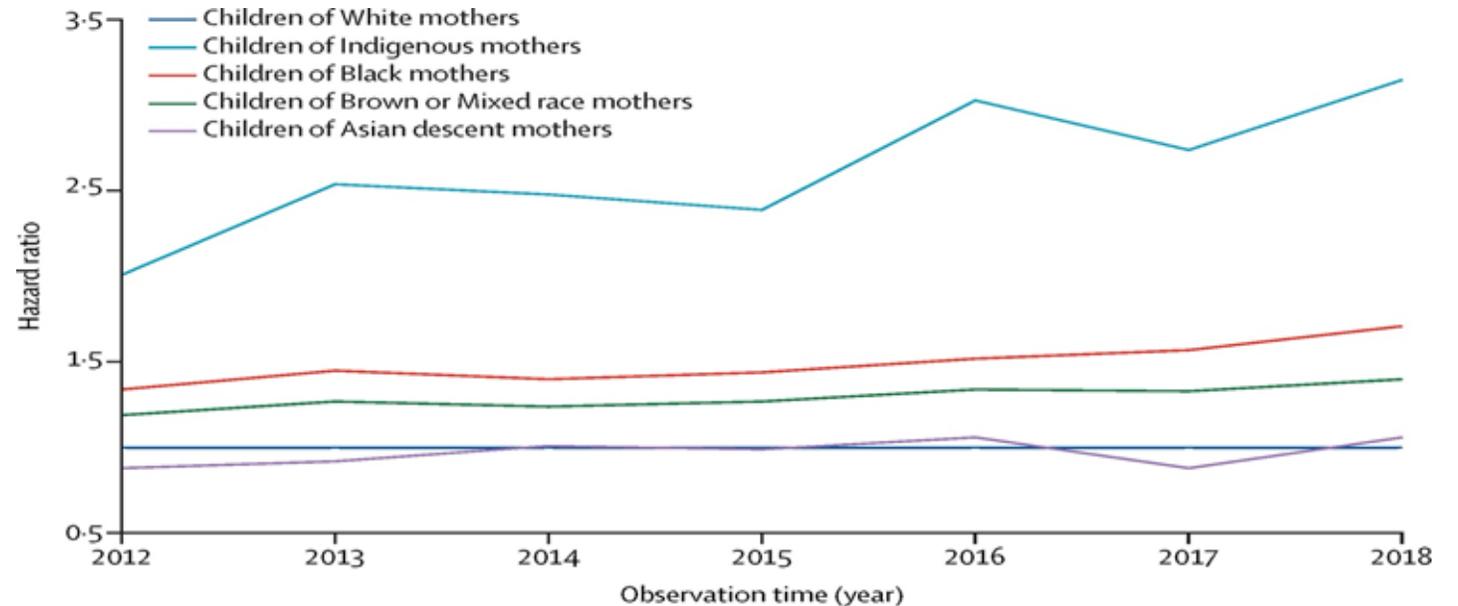
THE LANCET  
Global Health

ARTICLES | VOLUME 10, ISSUE 10, E1453-E1462, OCTOBER 01, 2022

## Ethnoracial inequalities and child mortality in Brazil: a nationwide longitudinal study of 19 million newborn babies

Poliana Rebouças, PhD • Emanuelle Goes, PhD • Julia Pescarini, PhD • Dandara Ramos, PhD • Maria Yury Ichihara, PhD • Samila Sena, MSc • Rafael Veiga, PhD • Laura C Rodrigues, PhD • Prof Maurício L Barreto, MD PhD • Enny S Paixão, PhD • [Show less](#)

[Open Access](#) • Published: October, 2022 • DOI: [https://doi.org/10.1016/S2214-109X\(22\)00333-3](https://doi.org/10.1016/S2214-109X(22)00333-3)



	Children of White mothers	Children of Indigenous mothers	Children of Black mothers	Children of Brown or Mixed race mothers	Children of Asian descent mothers
<b>Diarrhoea</b>					
Participants	528/2971 (17.8%)	361/2971 (12.2%)	171/2971 (5.8%)	1906/2971 (64.2%)	5/2971 (0.2%)
Deaths per 100 000 person-years at risk (95% CI)	2.27 (2.08–2.47)	73.85 (66.61–81.88)	5.02 (4.33–5.84)	5.51 (5.27–5.77)	1.99 (0.83–4.79)
HR (95% CI)	1 (ref)	31.62 (27.66–36.14)	2.19 (1.84–2.60)	2.40 (2.18–2.65)	0.87 (0.36–2.09)
Adjusted HR (95% CI)	1 (ref)	14.28 (12.25–16.65)	1.72 (1.44–2.05)	1.78 (1.61–1.98)	0.81 (0.33–1.94)
<b>Influenza and pneumonia</b>					
Participants	1787/8118 (22.0%)	450/8118 (5.5%)	557/8118 (6.9%)	5297/8118 (65.3%)	27/8118 (0.3%)
Deaths per 100 000 person-years at risk (95% CI)	7.68 (7.22–8.04)	82.06 (82.02–100.07)	16.27 (15.06–17.78)	15.22 (14.01–16.74)	10.77 (7.20–15.71)



Indigenous Yanomami child: 8 years old and 26 lbs

## CHILDREN OF INDIGENOUS MOTHERS

16X HIGHER RISK OF DEATH FROM MALNUTRITION

14X HIGHER RISK OF DEATH FROM DIARRHEA

6,5X HIGHER RISK OF DEATH FROM LRI

<b>Ill-defined causes</b>					
Participants	1382/6211 (22.3%)	242/6211 (3.9%)	560/6211 (9.0%)	4007/6211 (64.5%)	20/6211 (0.3%)
Deaths per 100 000 person-years at risk (95% CI)	5.94 (5.63–6.26)	49.51 (43.64–56.15)	16.45 (15.14–17.88)	11.59 (11.24–11.96)	7.98 (5.15–12.37)
HR (95% CI)	1 (ref)	8.08 (7.05–9.26)	2.73 (2.48–3.01)	1.93 (1.81–2.05)	1.32 (0.85–2.06)
Adjusted HR (95% CI)	1 (ref)	4.26 (3.67–4.94)	2.29 (2.07–2.53)	1.58 (1.48–1.68)	1.29 (0.83–2.00)

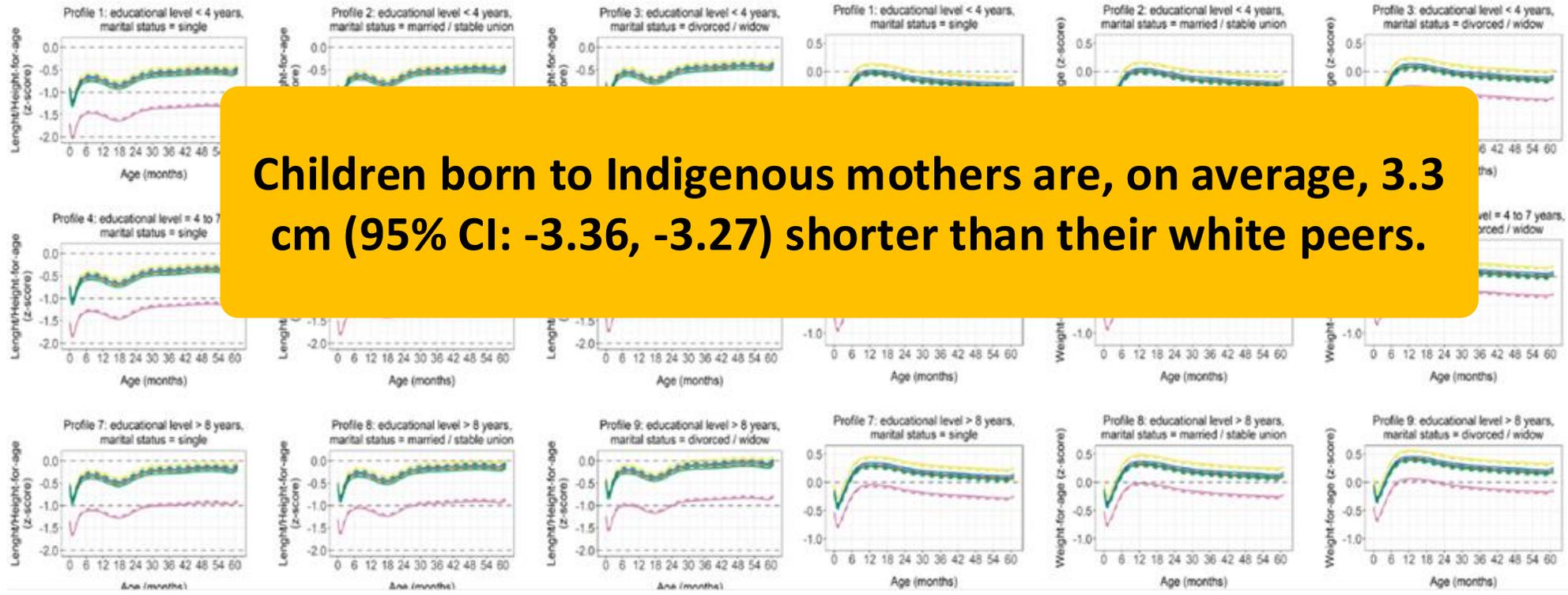
Data are n/N (%) or HR (95% CI), unless otherwise specified. Model adjusted for the variables: region, mother's education, and year of birth. HR=hazard ratio. \*The selected accidental causes refer to deaths from drowning and falls.

Table 3: Crude and adjusted HRs for the association between maternal race and skin colour and mortality younger than age 5 years, according to the main causes of death

# Ethnoracial disparities in childhood growth trajectories in Brazil



A total of 4,090,271 children were included in the study (2008-2017)



Children born to Indigenous mothers are, on average, 3.3 cm (95% CI: -3.36, -3.27) shorter than their white peers.



# **INVESTIGATING EFFECTS OF SOCIAL PROTECTION INTERVENTIONS ON HEALTH**

# Bolsa Família Programme

## Conditional cash transfers



### Eligibility

- i. Extremely poor ( $\leq 89$  BRL monthly per capita income in 2019)
- ii. Poor ( $\leq 178$  BRL monthly per capita income in 2019) and at least one child/adolescent (0-17yrs) or pregnant woman.

### Benefits

- I. i. Fixed: R\$ 89 BRL per family
- I. ii. Variable:
  - i. Per breastfeeding women or children up to 15 years old
  - ii. Per adolescents 16-17yrs
- I. Supplement: to overcome extreme poverty threshold

### Conditions

- I. School attendance
- I. Health uptake (children and pregnant woman)
- I. Social services

# Key studies on the health effects of BFP using the 100 Million Brazilians Cohort - 1

## Bolsa Familia Programme

The screenshot displays three research articles. The first article, from BMJ Global Health, is titled 'Brazil's Bolsa Família conditional cash transfer and child malnutrition: a nationwide birth cohort study' and lists authors including Ila R Falcão, João Guilherme G Tedde, Enny Paixao, Thiago Cerqueira-Silva, Aline dos Santos Rocha, Rosemeire L Fiaccone, Natanael J Silva, Juliana Freitas de Mello e Silva, Maria Y Ichihara, Julia M Pescarini, Rita de Cássia Ribeiro-Silva, and Mauricio Lima Barreto. The second article, from BMC Public Health, is titled 'Evaluating the relationship between conditional cash transfer programme on preterm births: a retrospective longitudinal study using the 100 million Brazilian cohort' and lists authors including Naiã Ortelan, Márcia Furquim de Almeida, Elzo Pereira Pinto Júnior, Nivea Bispo, Rosemeire L. Fiaccone, Ila Rocha Falcão, Aline dos Santos Rocha, Dandara Ramos, Enny S. Paixão, Rita de Cássia Ribeiro-Silva, Laura C. Rodrigues, Mauricio L. Barreto, and Maria Yury T. Ichihara. The third article, from BMC Public Health, is titled 'Participation in Conditional Cash Transfer Program During Pregnancy and Birth Weight-Related Outcomes' and lists authors including Ila R. Falcão, Rita de Cássia Ribeiro-Silva, Rosemeire L. Fiaccone, Flávia José Oliveira Alves, Aline dos Santos Rocha, Naiã Ortelan, Natanael J. Silva, Poliana Reboças, Elzo Pereira Pinto Júnior, Marcia Furquim de Almeida, Enny S. Paixao, Julia M. Pescarini, Laura C. Rodrigues, Maria Yury Ichihara, and Mauricio L. Barreto.

**Nutritional status of under 5 children (stunting)**  
- 17%

**Preterm births**  
- 30%

**Low birth weight**  
- 11%

# Key studies on the health effects of BFP using the 100 Million Brazilians Cohort - 2

## Bolsa Familia Programme

THE LANCET  
Infectious Diseases

Effect of a conditional cash transfer programme on leprosy treatment adherence and cure in patients from the nationwide 100 Million Brazilian Cohort: a quasi-experimental study

[Julia M. Pescarini, PhD](#)<sup>1,2</sup> · [Elizabeth Williamson, PhD](#)<sup>3,4</sup> · [Jolida S. Nery, PhD](#)<sup>1</sup> · [Anna Ramond, PhD](#)<sup>5</sup> · [Maria Yury Ichihara, PhD](#)<sup>3</sup> · [Rosemeire L. Fiaccone, PhD](#)<sup>3,4</sup> · [Prof Maria Lucia F. Penna, PhD](#)<sup>3</sup> · [Prof Liam Smeeth, PhD](#)<sup>6,7</sup> · [Prof Laura C. Rodrigues, PhD](#)<sup>8</sup> · [Prof Gerson O. Penna, PhD](#)<sup>1,2</sup> · [Elizabeth B. Brickley, PhD](#)<sup>9,10</sup> · [Prof Mauricio L. Barreto, PhD](#)<sup>1,11</sup> [Show less](#)

**Leprosy**  
**+26% cure rate**

 American Journal of Epidemiology  
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Vol. 00, No. 00  
DOI: 10.1093/aje/kwaa127  
Advance Access publication:

Original Contribution

Conditional Cash Transfer Program and Leprosy Incidence: Analysis of 12.9 Million Families From the 100 Million Brazilian Cohort

[Julia M. Pescarini](#)<sup>\*</sup>, [Elizabeth Williamson](#), [Maria Y. Ichihara](#), [Rosemeire L. Fiaccone](#), [Laura Forastiere](#), [Anna Ramond](#), [Jolida Silva Nery](#), [Maria Lucia F. Penna](#), [Agostino Strina](#), [Sandra Reis](#), [Liam Smeeth](#), [Laura C. Rodrigues](#), [Elizabeth B. Brickley](#), [Gerson O. Penna](#), and [Mauricio L. Barreto](#)

**Leprosy**  
**-14% incidence**

nature communications

Article

<https://doi.org/10.1038/s41467-024-44975-z>  
**Income determines the impact of cash transfers on HIV/AIDS: cohort study of 22.7 million Brazilians**

Received: 4 September 2023

Accepted: 10 January 2024

Published online: 12 February 2024

[Check for updates](#)

[Andréia F. Silva](#)<sup>1,2</sup>, [Inês Dourado](#)<sup>1</sup>, [Inacoma Lus](#)<sup>1,2</sup>, [Gabriela S. Jesus](#)<sup>1,2</sup>, [Nathalia S. Guimarães](#)<sup>1</sup>, [Gabriel A. S. Moraes](#)<sup>3</sup>, [Rodrigo V. R. Andorlo](#)<sup>1</sup>, [Julia M. Pescarini](#)<sup>2</sup>, [Dalane B. Machado](#)<sup>2,4</sup>, [Carlos A. S. T. Santos](#)<sup>5</sup>, [Maria Y. Ichihara](#)<sup>2</sup>, [Mauricio L. Barreto](#)<sup>1,2</sup>, [Laio Magno](#)<sup>1,5</sup>, [Luís E. Souza](#)<sup>1</sup>, [James Macinko](#)<sup>6</sup> & [Davide Rasella](#)<sup>1,2,7</sup> 

# Key studies on the health effects of BFP using the 100 Million Brazilians Cohort - 3

## Bolsa Familia Programme



International Journal of Epidemiology, 2022, 1447-1461  
https://doi.org/10.1093/ije/dyab188  
Advance Access Publication Date: 28 September 2022  
Original article

Cardiovascular Risk Factors

### Impact of Brazil's Bolsa Família Programme on cardiovascular and all-cause mortality: a natural experiment study using the 100 Million Brazilian Cohort

Julia M Pescarini <sup>1,2\*</sup>, Desmond Campbell,<sup>3</sup> Leila D Amorim,<sup>4</sup> Ila R Falcão,<sup>1</sup> Andréa JF Ferreira,<sup>1</sup> Mirjam Allik,<sup>3</sup> Richard J Shaw <sup>3</sup>, Deborah C Malta,<sup>5</sup> M Sanni Ali,<sup>2</sup> Liam Smeeth,<sup>2,6</sup> Mauricio L Barreto,<sup>1,7</sup> Alastair Leyland <sup>3</sup>, Peter Craig,<sup>3†</sup> Estela ML Aquino<sup>7†</sup> and Srinivasa Vittal Katikireddi <sup>3†</sup>

CVD mortality  
-4%

## PLOS MEDICINE

RESEARCH ARTICLE

### Conditional cash transfer program and child mortality: A cross-sectional analysis nested within the 100 Million Brazilian Cohort

Dandara Ramos <sup>1,2\*</sup>, Nívea B. da Silva<sup>1,3\*</sup>, Maria Yury Ichihara <sup>1,2</sup>, Rosemeire L. Fiaccone<sup>1,3</sup>, Daniela Almeida <sup>1,4</sup>, Samila Sena<sup>1</sup>, Poliana Rebouças <sup>1,2</sup>, Elzo Pereira Pinto Júnior <sup>1</sup>, Enny S. Paixão <sup>1,5</sup>, Sanni Ali <sup>1,5</sup>, Laura C. Rodrigues<sup>1,5</sup>, Mauricio L. Barreto<sup>1,2</sup>

Under 5 children mortality  
-17%

JAMA Network | Open



Original Investigation | Public Health

### Association of Conditional Cash Transfers With Maternal Mortality Using the 100 Million Brazilian Cohort

Flávia José O. Alves, PhD; Dandara Ramos, PhD; Enny S. Paixão, PhD; Ila R. Falcão, PhD; Rita de Cássia Ribeiro Silva, PhD; Rosemeire Fiaccone, PhD; Davide Rosella, PhD; Camila Teixeira, PhD; Daiane Borges Machado, PhD; Aline Rocha, PhD; Marcia F. de Almeida, PhD; Emanuelle F. Goes, PhD; Laura C. Rodrigues, PhD; Maria Yury Ichihara, PhD; Estela M. L. Aquino, PhD; Mauricio L. Barreto, PhD

Maternal Mortality  
- 18%

# Key studies on the health effects of BFP using the 100 Million Brazilians Cohort - 4

## Bolsa Familia Programme

PLOS MEDICINE

RESEARCH ARTICLE

Relationship between the Bolsa Família national cash transfer programme and suicide incidence in Brazil: A quasi-experimental study

Daiane Borges Machado<sup>1,2\*</sup>, Elizabeth Williamson<sup>3</sup>, Julia M. Pescarini<sup>1,2</sup>, Flávia J. O. Alves<sup>1</sup>, Luis F. S. Castro-de-Araujo<sup>1,4</sup>, Maria Yury Ichihara<sup>1</sup>, Laura C. Rodrigues<sup>1,3</sup>, Ricardo Araya<sup>5</sup>, Vikram Patel<sup>2,6</sup>, Mauricio L. Barreto<sup>1,7</sup>

**Suicide Rates**  
-56%

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Global Health

Associations between the Bolsa Familia conditional cash transfer programme and substance use disorder hospitalisations: a quasi-experimental study of the 100 Million Brazilian Cohort

Lidiane Toledo, Erika Fialho, Flávia Alves, Mauricio L. Barreto, Vikram Patel, Daiane B. Machado

Summary

Background Although low socioeconomic status is a recognised risk factor for substance use disorders (SUDs), the potential of socioeconomic interventions, such as conditional cash transfer programmes, to mitigate this burden



Lancet Glob Health 2025; 13: e508-16

**Substance used disorders hospitalizations**  
-17%

PLOS MEDICINE

RESEARCH ARTICLE

Conditional cash transfers and mortality in people hospitalised with psychiatric disorders: A cohort study of the Brazilian Bolsa Família Programme

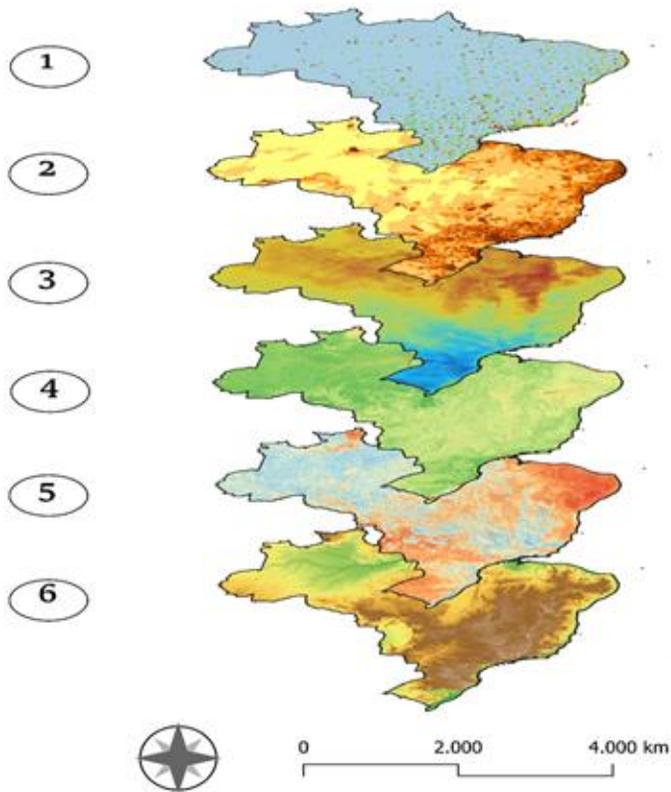
Camila Bonfim<sup>1\*</sup>, Flávia Alves<sup>1,2</sup>, Érika Fialho<sup>1</sup>, John A. Naslund<sup>3</sup>, Mauricio L. Barreto<sup>1</sup>, Vikram Patel<sup>2</sup>, Daiane Borges Machado<sup>1,2</sup>

**Mortality among patients with psychiatric disorders**  
-11%



# INVESTIGATING THE EFFECTS OF CLIMATE CHANGES ON HEALTH

# Plataforma CIDACS-CLIMA



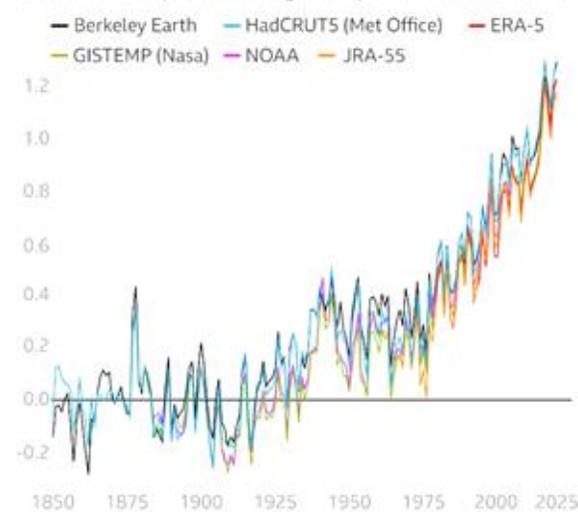
Location Map	Legend	Map 3D Layers
	<b>Weather Stations</b> ● INMET (aut.) ● INMET (conv.) ● DECEA  <b>Regions of Brazil</b> ■ Central-West ■ Northeast ■ North ■ Southeast ■ South	1 - Weather Stations 2 - Population Density 3 - ERA5-land 4 - NDVI 5 - Temperature Surface 6 - SRTM



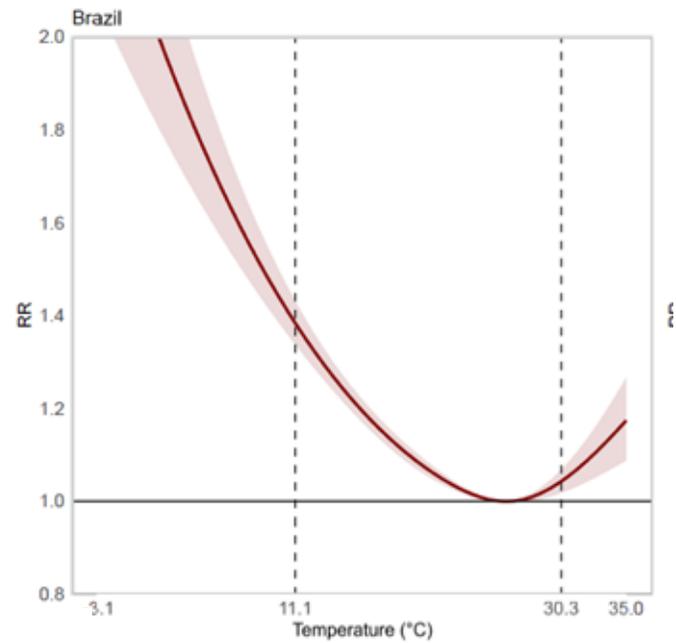
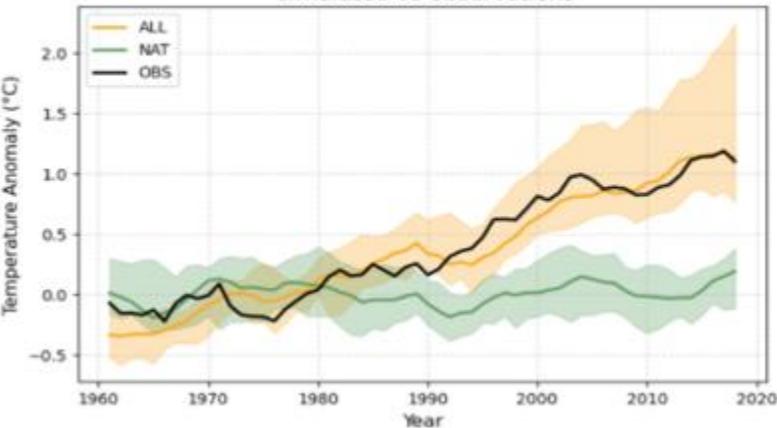
# Ambient temperature and non-accidental mortality in Brazil

## Temperature rise since 1850

Global mean temperature change from pre-industrial levels, °C



## Mean surface temperature over Brazil simulated vs observations



Full length article  
**Ambient temperature and non-accidental mortality: A nationwide space-time-stratified case-crossover study within the 100 million Brazilian Cohort**

Taisa R. Cortes<sup>a</sup>, Julia M. Pescarini<sup>a,b</sup>, Otavio T. Ranzani<sup>c,d,e</sup>, Enny S. Paixão<sup>a,b</sup>, Danielson J.D. Neves<sup>a</sup>, Poliana Rebouças<sup>a</sup>, Rita de Cássia Ribeiro-Silva<sup>a,c</sup>, Andréa J.F. Ferreira<sup>a</sup>, Luiz A.C. Galvão<sup>a</sup>, Elizabeth B. Brickley<sup>b</sup>, Liam Smeeth<sup>b</sup>, Ludmilla V. Jacobson<sup>f</sup>, Ismael H. Silveira<sup>g,h</sup>, Mauricio L. Barreto<sup>a,h,i</sup>

## Heat-related mortality

**8%**

**Increased risk for older adults**

**45%**

**Increased risk for Indigenous individuals**

**169%**

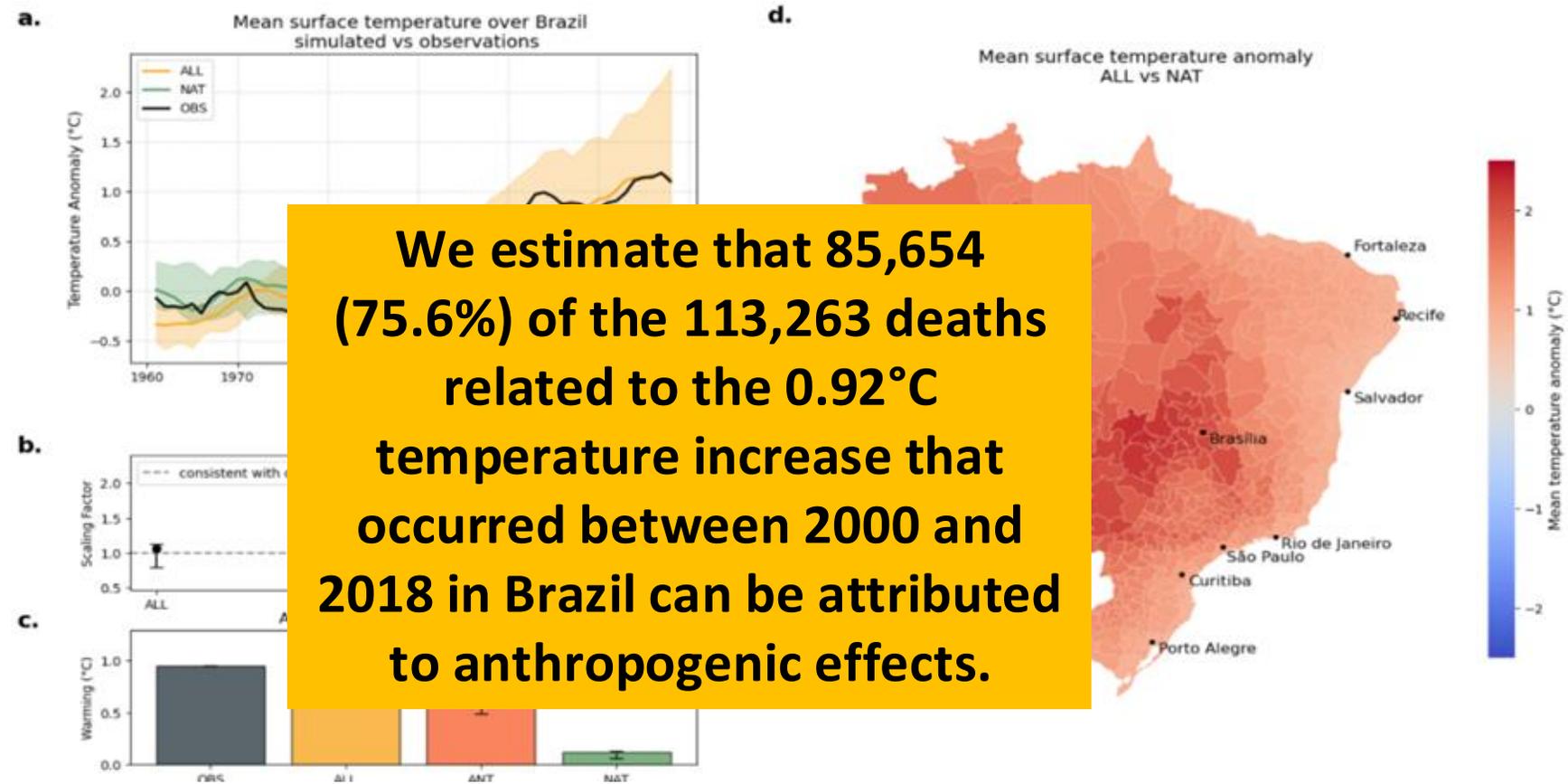
**Increased risk for Indigenous in South**

**102%**

**Increased risk for poor-quality homes**

# Heat-related mortality attributable to climate change induced by human activity.

**Objective:** To quantify the impact of anthropogenic climate change on heat-related mortality in vulnerable populations in Brazil.



We estimate that 85,654 (75.6%) of the 113,263 deaths related to the 0.92°C temperature increase that occurred between 2000 and 2018 in Brazil can be attributed to anthropogenic effects.

**Attributable heating over Brazil.** Panel a. represents the observed temperature change (in black, OBS) and the fingerprints used in the optimal fingerprinting. Panel b. depicts the best-estimate multi-model scaling factors calculated from TLS of the observations onto the model fingerprints with 90% confidence range. Panel c. shows the observed warming (grey, OBS), and the amount of warming attributable to each forcing. Panel d. shows the difference in mean surface temperature between the factual (ALL) and counterfactual (NAT) climate scenarios for each of the immediate geographical regions in Brazil.



# Effects of ambient temperature on under-five mortality: a nationwide space-time-stratified case-crossover study in Brazil

Ismael H. Silveira <sup>a</sup>, Poliana Rebouças <sup>b</sup>, Julia Pescarini <sup>b c</sup>, Taísa R. Cortes <sup>b</sup>, Beatriz F.A. Oliveira <sup>d</sup>, Danielson J.D. Neves <sup>b</sup>, Aline dos Santos Rocha <sup>b e</sup>, Rita de Cássia Ribeiro-Silva <sup>b e</sup>, Mauricio L. Barreto <sup>b</sup>, Otavio T. Ranzani <sup>f g</sup>, Enny S. Paixão <sup>c</sup>  

Climatic Change (2025) 178:152  
<https://doi.org/10.1007/s10584-025-03989-2>

## REVIEW ARTICLE



## Projections of extreme weather events according to climate change scenarios and populations at-risk in Brazil

Leydson Galvêncio Dantas <sup>1</sup>  · Andréa Jacqueline Fortes Ferreira <sup>2</sup>  · Jony Arrais Pinto Junior <sup>3</sup>  · Taísa Rodrigues Cortes <sup>2</sup>  · Danielson Jorge Delgado Neves <sup>2</sup>  · Beatriz Fátima Alves de Oliveira <sup>4</sup>  · Ismael Henrique da Silveira <sup>1</sup> 

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## REVISÉ Impact of Heat on Birth Outcomes and Child Nutrition: Study Protocol using the CIDACS Birth Cohort

[version 2; peer review: 1 approved, 2 approved with reservations]

Rita de Cássia Ribeiro-Silva, Maxine Pepper , Priscila Ribas de Farias Costa, Taisa Rodrigues Cortes, Lais Sacramento, Lais Helena Ribeiro , Lisianne Passos Luz , Otavio T. Ranzani, Liam Smeeth , Elizabeth B. Brickley, Aline dos Santos Rocha, Julia M. Pescarini, Ila Falcão, Poliana Rebouças, Danielson Delgado, Ismael Silveira , Enny S Paixão , Mauricio Barreto 

## Extreme Weather Events and Food Insecurity: Systematic Review and Meta-analysis Protocol

Emanuelle Cruz da Silva Santiago <sup>1</sup>, Nathalia Sernizon Guimarães<sup>2</sup>, Andréa Jacqueline F. Ferreira<sup>1</sup>, Priscila da Silva<sup>1,3</sup>, Priscila Ribas de Farias Costa<sup>1,3</sup>, Rita de Cássia Ribeiro-Silva<sup>1,3</sup>, Aline dos Santos Rocha<sup>1</sup>, Sofia Rafaela Maito Velasco<sup>1</sup>, Luis Augusto Cassanha Galvão <sup>1</sup>, Maurício L. Barreto<sup>1</sup>

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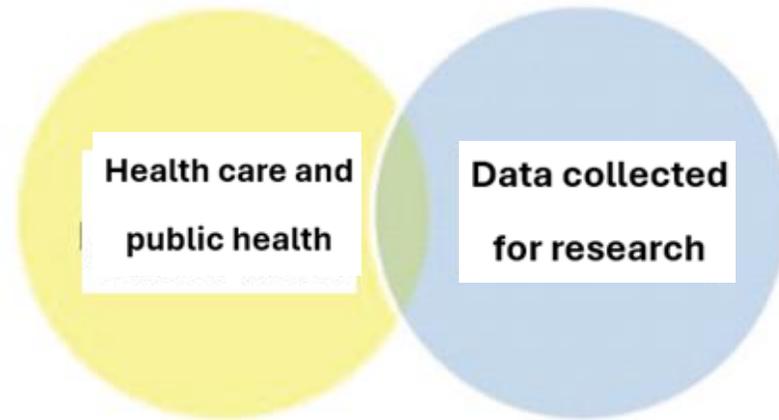
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## Short-term ambient heat exposure and low APGAR score in newborns: A time-stratified case-crossover analysis in São Paulo state, Brazil (2013–2019)

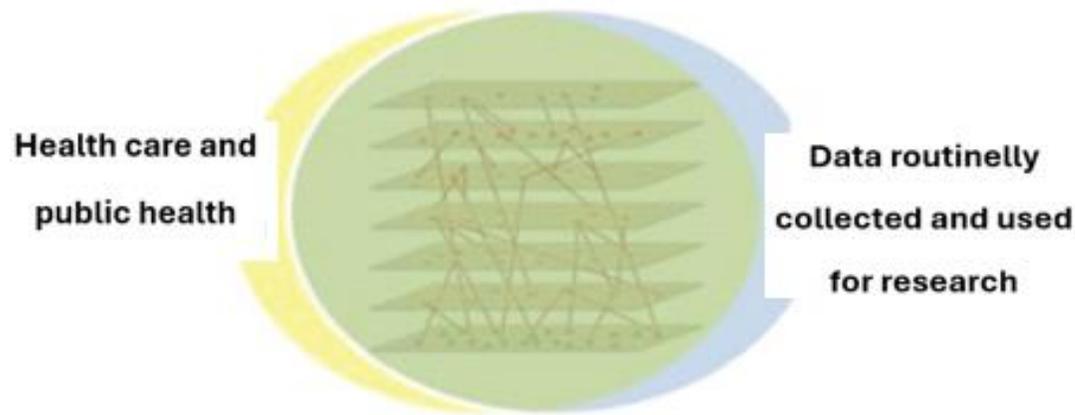
Michelle Del Carretto, Audrey Godin, Danielson Neves, Enny S. Paixão, Kai Wan, Julia Pescarini, Andréa Ferreira, Taísa R. Cortes, Liam Smeeth, Mauricio L. Barreto , Elizabeth B. Brickley , Chérie Part 

Published: September 5, 2025 • <https://doi.org/10.1371/journal.pgph.0004557>

# Integrating data generated by routine procedures creates opportunities for greater integration of health research with health practices.



**TRADITIONAL MODEL**



**ALTERNATIVE MODEL**



**Gracias,  
Thank you,  
Obrigado!**



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APOIADORES:



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