Center for the Integration of Data and Knowledge for Health (CIDACS):

Leveraging social, climate, environmental and health routine/administrative data for global health research and evaluation

Mauricio L Barreto

Cidacs: Center for the Integration of Data and Knowledge for Health

Cidacs is a center created to conduct and promote **interdisciplinary research** to produce **knowledge**, develop new scientific **methodologies** and promote professional **training** using linked large-scale databases and high-performance computational resources in a secure environment.

- Founded: 2016
- TWO Cohorts of <u>millions</u> of Brazilian individuals

International Journal of Population Data Science (2019) 4:2:04

International Journal of Population Data Science

IJPDS
International Journal of Population Data Science

Swansea University
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Journal Website: www.ijpds.org

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

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

CIDACS Data Ecosystem and the use of real-world data to evaluate social and health policies

Administrative data generated by government agencies are received, processed, linked and used to create specific cohorts, which may later support research initiatives in a variety of areas related to public health
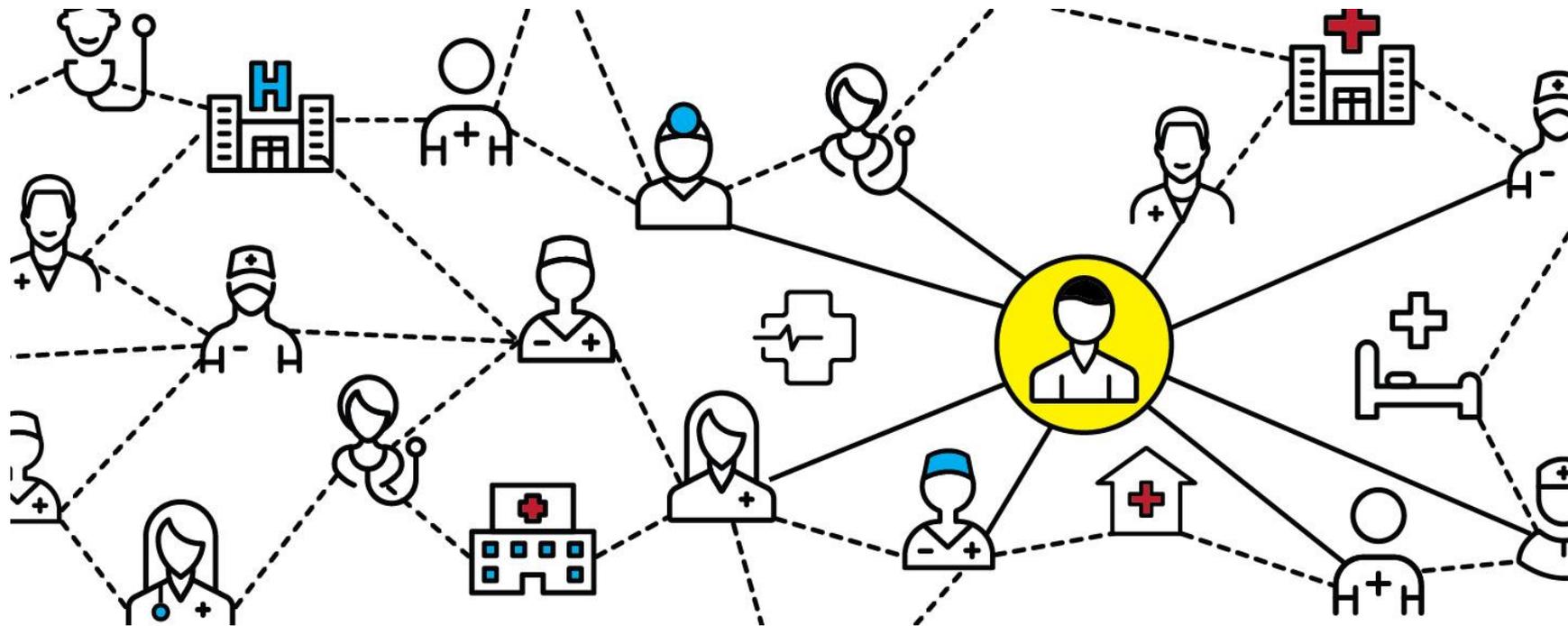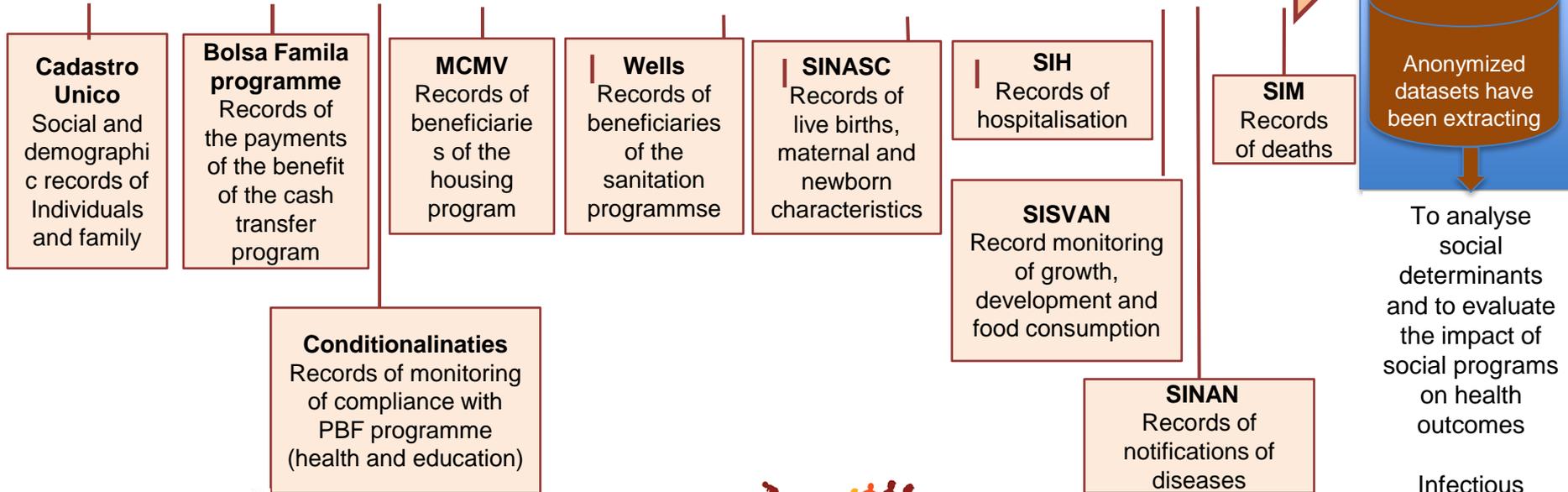
Fragmentation

The 100 million Brazilians Cohort

Population from Cadastro Único (2001 -2018): low-income families potentially eligible for social protection programs (N=131.697.800)

Cadastro Unico
Social and demographic records of Individuals and family

Bolsa Famila programme
Records of the payments of the benefit of the cash transfer program

MCMV
Records of beneficiaries of the housing program

Wells
Records of beneficiaries of the sanitation programmse

SINASC
Records of live births, maternal and newborn characteristics

SIH
Records of hospitalisation

SIM
Records of deaths

Conditionalinaties
Records of monitoring of compliance with PBF programme (health and education)

SISVAN
Record monitoring of growth, development and food consumption

SINAN
Records of notifications of diseases

Anonymized datasets have been extracting

To analyse social determinants and to evaluate the impact of social programs on health outcomes

Infectious disease, Mortality under 5, prematurity, low birth weigh, homicide

Coorte de 100 milhões de brasileiras

Cidacs Birth Cohort

Cohort Profile

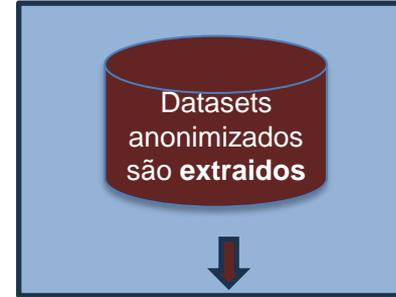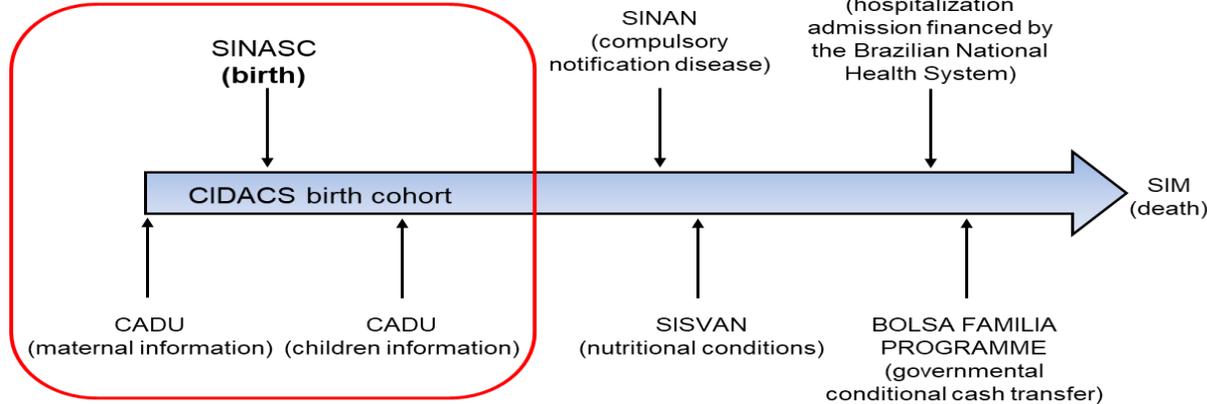**Cohort Profile: Centro de Integração de Dados e Conhecimentos para Saúde (CIDACS) Birth Cohort**

Baseline 100M Cohort 131.697.800

Baseline Birth Cohort 28.631.394

SINASC 53.209.685

Datasets anonimizados são **extraidos**

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

Strategic research agenda

- **Social and Environmental Determinants of Health**
- **Assessment of the Impact of Social Policies on Health**
- Assessment of the Impact of Health Programs and Interventions
- Data Science and Analysis Methodologies applied to Health
- Biological Computing and Genomic Epidemiology
- Digital Surveillance and Public Health Emergencies
- Data Governance, Science and Society
- Knowledge Dissemination and Societal Engagement
- **Climate Change and Health**

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Estudos sobre determinantes sociais e desigualdades

DADOS PARA INVESTIGAÇÃO DOS DETERMINANTES SOCIAIS DA SAÚDE

Risco de morte é 200% maior para filhos de mães indígenas

+ VEJA MAIS

Abandono do tratamento da hanseníase é maior nas regiões Norte e Nordeste

+ VEJA MAIS

Estudo do Cidacs aponta fatores que influenciam para o nascimento prematuro
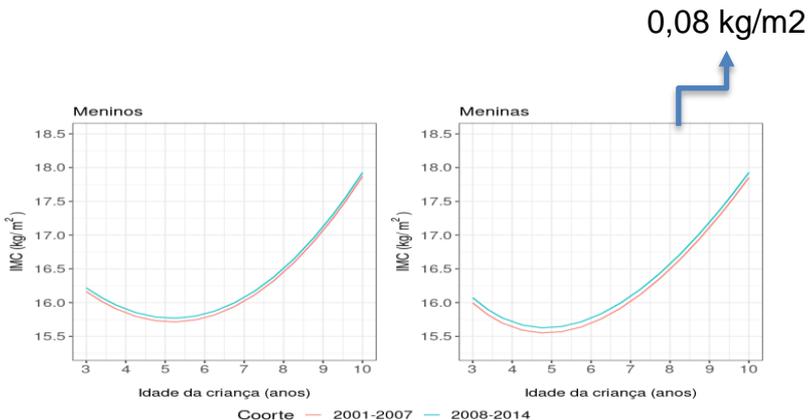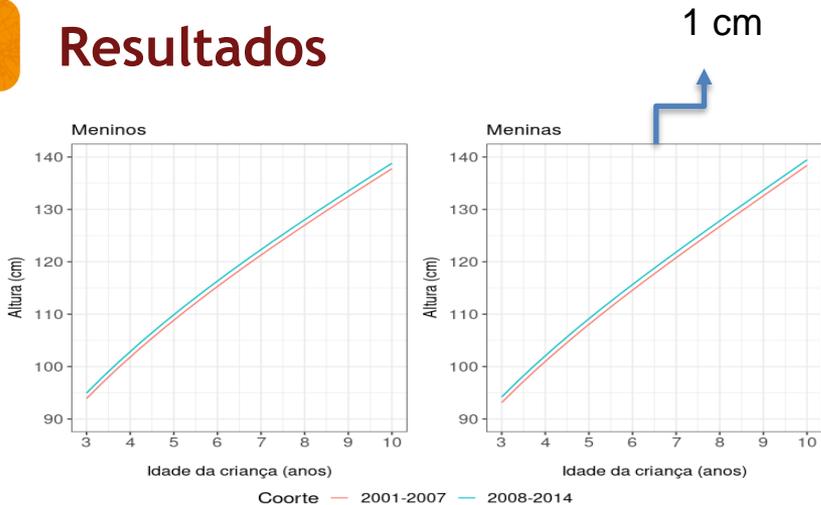
+ VEJA MAIS

Pesquisa confirma associação entre menor escolaridade e maior risco de mortalidade por doenças cardiovasculares

+ VEJA MAIS

Resultados

1 cm

0,08 kg/m2

Prevalência da obesidade

2001-07	2008-14	
4%	4.5%	3-4 anos
11,9%	13,8%	5-9 anos

2001-07	2008-14	
3.6%	3.9%	3-4 anos
9,1%	11,2%	5-9 anos

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

	Children of White mothers	Children of Indigenous mothers	Children of Black mothers	Children of Brown or Mixed race mothers	Children of Asian descent mothers
Deaths per 100 000 person years at risk (95% CI)	0·71 (0·00–0·62)	36·29 (33·14–44·35)	2·47 (1·39–3·65)	2·33 (2·13–2·34)	0·60 (0·26–3·69)
HR (95% CI)	1 (ref)	52·82 (42·83–65·14)	3·46 (2·66–4·50)	3·30 (2·79–3·90)	1·12 (0·28–4·51)
Adjusted HR (95% CI)	1 (ref)	16·39 (12·88–20·85)	2·34 (1·78–3·06)	2·05 (1·71–2·45)	0·98 (0·24–3·94)

Selected accidental causes*
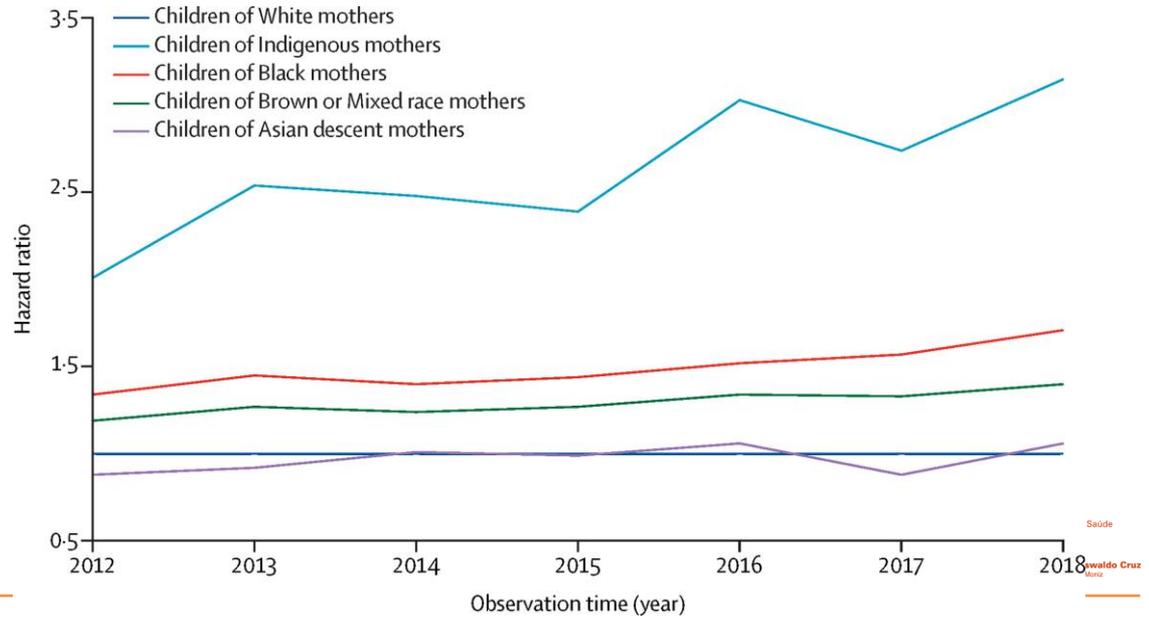
Indigenous Yanomami child: 8 years old and 26 lbs

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

CHILDREN OF BLACK MOTHERS

1.8X HIGHER RISK O DEATH FROM MALNUTRITION

1.7X HIGHER RISK OF DEATH FROM DIARRHEA

1.7X HIGHER RISK OF DEATH FROM LRI

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 longitudinal nationwide study of four million children

Helena Benes Matos da Silva[1,2*†], Rita de Cássia Ribeiro-Silva[1,2], Juliana Freitas de Mello e Silva[2†], Irina Chis Ster[3], Poliana Rebouças[2], Emanuelle Goes[2], Maria Yury Ichihara[2], Andrêa Ferreira[2,4], Julia M. Pescarini[5], Rosemeire Leovigildo Fiaccone[6], Enny S. Paixão[5] and Maurício L. Barreto[2]
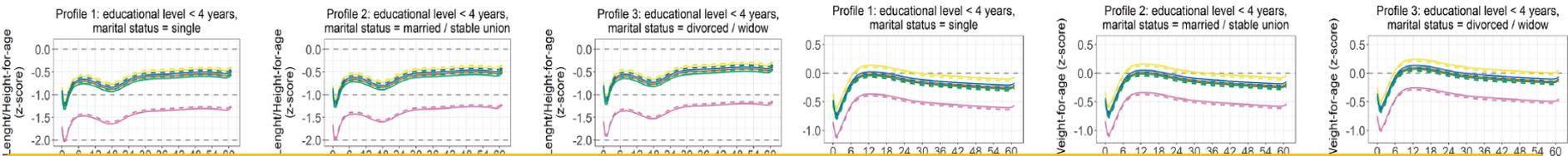
Children born to Indigenous mothers were on average 3.3 cm (95% CI: −3.36, −3.27) shorter than their White counterparts.
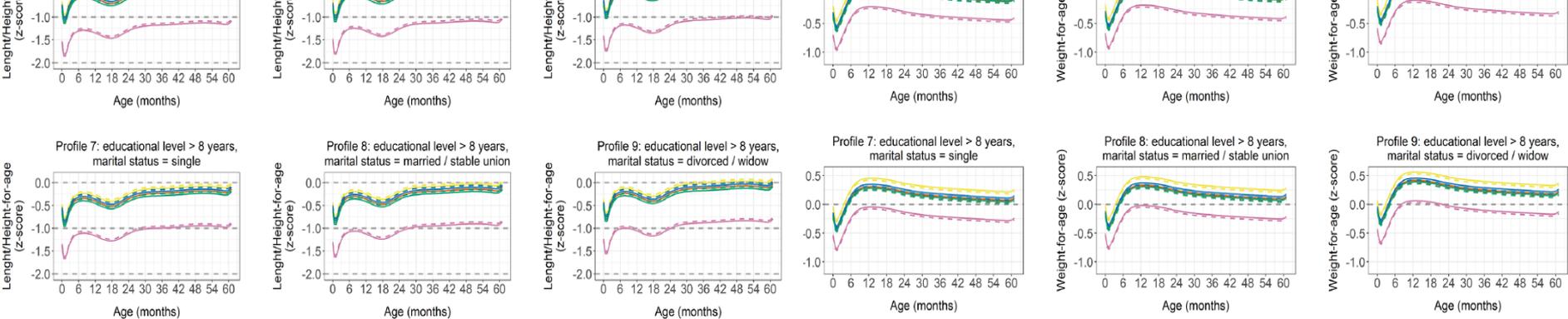
Fig. 5 Estimated mean curves for length/height-for-age z-scores, according to mother's age, educational level, and marital status. Brazil, 2008–2017

4 Estimated mean curves for weight-for-age z-scores model, according to mother's age, educational level, and marital status. Brazil, 2008–2017

Intersection of race/ethnicity and socioeconomic status and woman´s health

Taylor & Francis
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The intersection of race/ethnicity and socioeconomic status: inequalities in breast and cervical cancer mortality in 20,665,005 adult women from the 100 Million Brazilian Cohort

Cervical cancer mortality rates were higher among Indigenous (adjusted Mortality rate ratio = 1.80, 95%CI 1.39-2.33), Asian (1.63, 1.20-2.22), 'Parda'(Brown) (1.27, 1.21-1.33) and Black (1.18, 1.09-1.28) women vs White women

René Rachou/FIOCRUZ Minas; ʰFaculty of Epidemiology and Population Health, London School of Hygiene & Tropical Medicine, London, UK

ABSTRACT
Objectives: There is limited evidence regarding the impact of race/racism and its intersection with socioeconomic status (SES) on breast and cervical cancer, the two most common female cancers globally. We investigated racial inequalities in breast and cervical cancer mortality and whether SES (education and household conditions) interacted with race/ethnicity.
Design: The 100 Million Brazilian Cohort data were linked to the Brazilian Mortality Database, 2004–2015 (n = 20,665,005 adult women). We analysed the association between self-reported race/ethnicity (White/'Parda'(Brown)/Black/Asian/Indigenous) and cancer mortality using Poisson regression, adjusting for age, calendar year, education, household conditions and area of residence. Additive and multiplicative interactions were assessed.
Results: Cervical cancer mortality rates were higher among Indigenous (adjusted Mortality rate ratio = 1.80, 95%CI 1.39–2.33), Asian (1.63, 1.20–2.22), 'Parda'(Brown) (1.27, 1.21–1.33) and Black (1.18, 1.09–1.28) women vs White women. Breast cancer mortality rates were higher among Black (1.10, 1.04–1.17) vs White women. Racial inequalities in cervical cancer mortality were larger among women of poor

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Migration and Health

Mortality among over 6 million internal and international migrants in Brazil: a study using the 100 Million Brazilian Cohort

Julia M. Pescarini,[a,b,*] Emanuelle F. Goes,[b,c] Priscila Fernanda Porto Scaff Pinto,[b] Beatriz Pinheiro Schindler Dos Santos,[b] Daiane B. Machado,[b,d] Ibrahim Abubakar,[e] Laura C. Rodrigues,[a] Elizabeth B. Brickley,[a,g] Liam Smeeth,[a,f,g] and Mauricio L. Barreto[b,c,g]

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[b]Centre of Data and Knowledge Integration for Health (CIDACS), Gonçalo Moniz Institute, Oswaldo Cruz Foundation, Salvador, Bahia, Brazil
[c]Instituto de Saúde Coletiva, Universidade Federal da Bahia, Salvador, Brazil
[d]Department of Global Health and Social Medicine, Harvard Medical School, Boston, MA, USA
[e]Faculty of Population Health Sciences, University College London (UCL), London, UK
[f]Health Data Research (HDR), London, UK

Summary

Background To understand if migrants living in poverty in low and middle-income countries (LMICs) have mortality advantages over the non-migrant population, we investigated mortality risk patterns among internal and international migrants in Brazil over their life course.

Methods We linked socio-economic and mortality data from 1st January 2011 to 31st December 2018 in the 100 Million Brazilian Cohort and calculated all-cause and cause-specific age-standardised mortality rates according to individuals' migration status for men and women. Using Cox regression models, we estimated the age- and sex-adjusted mortality hazard ratios (HR) for internal migrants (i.e., Brazilian-born individuals living in a different Brazilian state than their birth) compared to Brazilian-born non-migrants; and for international migrants (i.e., people born in another country) compared to Brazilian-born individuals.

Findings The study followed up 45,051,476 individuals, of whom 6,057,814 were internal migrants, and 277,230 were international migrants. Internal migrants had similar all-cause mortality compared to Brazilian non-migrants (aHR = 0.99, 95% CI = 0.98–0.99), marginally higher mortality for ischaemic heart diseases (aHR = 1.04, 95% CI = 1.03–1.05) and higher for stroke (aHR = 1.11, 95% CI = 1.09–1.13). Compared to Brazilian-born individuals, international migrants had 18% lower all-cause mortality (aHR = 0.82, 95% CI = 0.80–0.84), with up to 50% lower mortality from interpersonal violence among men (aHR = 0.50, 95% CI = 0.40–0.64), but higher mortality from avoidable causes related to maternal health (aHR = 2.17, 95% CI = 1.17–4.05).

Interpretation Although internal migrants had similar all-cause mortality, international migrants had lower all-cause mortality compared to non-migrants. Further investigations using intersectional approaches are warranted to understand the marked variations by migration status, age, and sex for specific causes of death, such as elevated maternal mortality and male lower interpersonal violence-related mortality among international migrants.
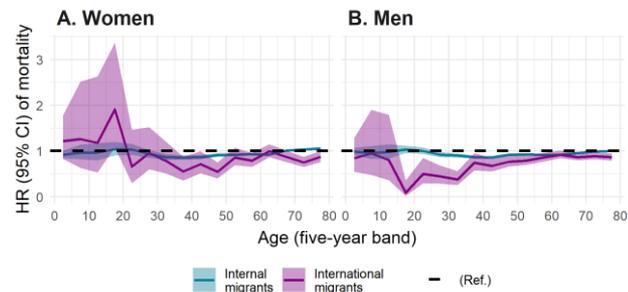
Fig 1. Age specific crude HR for all-cause mortality

Impacto de Políticas Sociais na saúde da população

Bolsa Familia Program (BFP) Impact on Population´s Health

RESEARCH ARTICLE

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

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

Overall, BFP was associated with lower odds of child mortality (weighted OR =0.83; 95% CI: 0.79 to 0.88; p<0.001);

Coefficients on weighted logistic regressions of PBF receivement on mortality between ages one and four

IMPACT OF BFP ON UNDER-5 MORTALITY OVERALL = -17%

	Weighted Odds Ratio	Robust std. error
Treatment status (PBF=1)[1]	0.83 (0.79-0.88)	0.0231
constant	0.0024	0.0001
N [2]	5,306,171	

[1] Model adjusted for number of prenatal visits, birth weight, gestational age, type of delivery
[2] Sample size after kernel matching

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Table 3. Suicide IRR for BFP participation in the matched and original cohorts from 2004–2015.

Confounder adjustment	Data	N	Estimated IRR (95% CI) from a Poisson regression model	p-Value
Unadjusted	Entire cohort	76,532,158	0.50 (0.49, 0.52)	<0.001
Unadjusted with IPTW	Entire cohort (after exc. missing data)	62,766,964	0.43 (0.41, 0.44)	<0.001
Adjusted[1]	Entire cohort (after exc. missing data)	62,766,964	0.44 (0.43, 0.45)	<0.001
Adjusted with IPTW[2]	Entire cohort (after exc. missing data)	62,766,964	0.44 (0.42, 0.45)	<0.001
PS-matching[3]	PS-matched cohort	69,707,312	0.39 (0.37, 0.41)	<0.001

IMPACT OF BFP ON SUICIDE = -56%

RESEARCH AR

Relatio
national cash transfer programme and suicide
incidence in Brazil: A quasi-experimental
study

Daiane Borges Machado[1,2*], Elizabeth Williamson[3], Julia M. Pescarini[1,3], Flavia J. O. Alves[1], Luís F. S. Castro-de-Araujo[1,4], Maria Yury Ichihara[1], Laura C. Rodrigues[1,3], Ricardo Araya[5], Vikram Patel[2,6], Maurício L. Barreto[1,7]

Why was this study done?

- Socioeconomic factors have been consistently associated with suicide, but there is limited evidence on the impact of socioeconomic interventions to reduce suicide rate.

What did the researchers do and find?

- This study investigates the association of the world's largest conditional cash transfer programme on suicide rates in a cohort comprising half of the Brazilian population.

- We observed that beneficiaries of the cash transfer program had a lower suicide rate than nonbeneficiaries, and that this association was stronger among women and individuals aged between 25 and 59.

What do these findings mean?

- Targeting social determinants using cash transfer programmes could be important in limiting suicide, which is predicted to rise with the economic recession consequent to the COVID-19 pandemic and war in Ukraine.

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

Flávia Jôse O. Alves, PhD; Dandara Ramos, PhD; Enny S. Paixão, PhD; Ila R. Falcão, PhD; Rita de Cássia Ribeiro-Silva, PhD; Rosemeire Fiaccone, PhD; Davide Rasella, PhD; Camila Teixeira, PhD; Daiane Borges Machado, PhD; Aline Rocha, PhD; Marcia F. de Almeida, PhD; Emanuelle F. Goes, PhD; Laura C. Rodrigues, PhD; ... L. Barreto, PhD

Table 2. Kernel-Weighted Regression and Other Strategies for Associations Between BFP Receipt and Maternal Death[a]

	Kernel-weighted rate, % (95% CI)		OR (95% CI)	
	Non-BFP[b]	BFP[b]	Nonadjusted	Adjusted[c]
Rate or OR	71.59 (62.87-81.53)	60.63 (58.46-62.89)	0.84 (0.73-0.96)	0.82 (0.71-0.93)
No. of women				

Abbreviations BF...

[a] Data are from th...

[b] Non-BFP and BFP correspond to kernel-weighted maternal rates per 100 000 parturients of the live birth information system (*Sistema de Informações sobre Nascidos Vivos*) to nonbeneficiaries and beneficiaries, respectively.

[c] Adjusted by prenatal care, gestational age, type of delivery, and multiple pregnancy.

IMPACT OF BFP ON MATERNAL MORTALITY = -18%

CONCLUSIONS AND RELEVANCE This cross-sectional analysis nested within the 100 Million Brazilian Cohort found an association between BFP receipt and maternal mortality. This association was of greater magnitude in women with longer exposure to BFP and in the most vulnerable groups. These findings reinforce evidence that programs such as BFP, which have already proven effective in poverty reduction, have great potential to improve maternal survival.

Income determines the impact of cash transfers on HIV/AIDS: cohort study of 22.7 million Brazilians

Andréa F. Silva [1,2], Inês Dourado[1], Iracema Lua[1,2], Gabriela S. Jesus[1,3], Nathalia S. Guimarães[1], Gabriel A. S. Morais [1], Rodrigo V. R. Anderle[1], Julia M. Pescarini[2], Daiane B. Machado[2,4], Carlos A. S. T. Santos[2], Maria Y. Ichihara[1,2], Mauricio L. Barreto[1,2], Laio Magno [1,5], Luis E. Souza[1], James Macinko [6] & Davide Rasella [1,2,7]

Living with extremely low-income is an important risk factor for HIV/AIDS and can be mitigated by conditional cash transfers. Using a cohort of 22.7 million low-income individuals during ... largest conditional cash tran... related outcomes. Exposure ... reduced AIDS incidence by ... (RR:0.61; 95%CI:0.57-0.64), ... 0.85) in the cohort, and Pro... stronger among individuals ... incidence (RR:0.45, 95% CI:0.42-0.47), 54% mortality (RR:0.46, 95% CI:0.42-0.49), and 37% case-fatality (RR:0.63, 95% CI:0.51 −0.76)], decreasing gradually until having no effect in individuals with higher incomes. Similar effects were observed on HIV notification. Programa Bolsa Família impact was also stronger among women and adolescents. Several sensitivity and triangulation analyses demonstrated the robustness of the results. Conditional cash transfers can significantly reduce AIDS morbidity and mortality in extremely vulnerable populations and should be considered an essential intervention to achieve AIDS-related sustainable development goals by 2030.

Programa Bolsa Família reduced AIDS incidence by 41% (RR:0.59; 95%CI:0.57-0.61) mortality by 39% (RR:0.61; 95%CI:0.57-0.64), and case fatality rates by 25% (RR:0.75; 95%CI:0.66-0.85)

Forest plot values:

- HIV Notification — 0.64 (0.62, 0.66)
- AIDS Incidence — 0.59 (0.57, 0.61)
- AIDS Mortality — 0.61 (0.57, 0.64)
- AIDS Case-Fatality — 0.75 (0.66, 0.85)
- Wealth Subp. - HIV Notification - Quartile 1 — 0.43 [0.41, 0.45]
- Wealth Subp. - HIV Notification - Quartile 2 — 0.63 [0.59, 0.67]
- Wealth Subp. - HIV Notification - Quartile 3 — 0.80 [0.76, 0.85]
- Wealth Subp. - HIV Notification - Quartile 4 — 1.00 [0.92, 1.10]
- Wealth Subp. - AIDS Incidence - Quartile 1 — 0.45 [0.42, 0.47]
- Wealth Subp. - AIDS Incidence - Quartile 2 — 0.63 [0.59, 0.67]
- Wealth Subp. - AIDS Incidence - Quartile 3 — 0.84 [0.77, 0.91]
- Wealth Subp. - AIDS Incidence - Quartile 4 — 1.00 [0.86, 1.15]
- Wealth Subp. - AIDS Mortality - Quartile 1 — 0.46 [0.42, 0.49]
- — 0.65 [0.58, 0.73]
- — 0.84 [0.72, 0.96]
- — 0.98 [0.77, 1.25]
- — 0.63 [0.51, 0.76]
- — 0.77 [0.60, 0.98]
- — 1.05 [0.80, 1.38]
- — 0.93 [0.60, 1.42]

Fig. 3 | The samples size for each adjusted IPTW Poisson models. Comparison of the average effect of the Programa Bolsa Família (PBF), obtained through adjusted IPTW Poisson models with robust standard errors, on HIV notification, AIDS incidence, AIDS mortality, and AIDS case-fatality rate, 2007–2015, in the overall study population (first four lines) and by quartiles of wealth for each outcome.

The samples size for each adjusted IPTW Poisson models: HIV Notification (n = 5,983); HIV Notification - Quartile 1 (n = 1,959); HIV Notification - Quartile 2 (n = 1,263); HIV Notification - Quartile 3 (n = 1,398); HIV Notification - Quartile 4 (n = 1,349). AIDS Incidence (n = 19,577,629); AIDS Incidence - Quartile 1 (n = 5,503,505); AIDS Incidence - Quartile 2 (n = 3,868,703); AIDS Incidence - Quartile 3 (n = 5,051,629); AIDS Incidence - Quartile 4 (n = 5,158,593). AIDS Mortality (n = 19,577,649); AIDS Incidence - Quartile 1 (n = 5,503,510); AIDS Incidence - Quartile 2 (n = 3,868,708); AIDS Incidence - Quartile 3 (n = 5,051,636); AIDS Incidence - Quartile 4 (n = 5,158,596). AIDS Case-Fatality (n = 9,965); AIDS Incidence - Quartile 1 (n = 4,059); AIDS Incidence - Quartile 2 (n = 2,398); AIDS Incidence - Quartile 3 (n = 1,880); AIDS Incidence - Quartile 4 (n = 1,629).

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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 🔾 ,[1,2]* Desmond Campbell,[3] Leila D Amorim,[4] Ila R Falcão,[1] Andrêa JF Ferreira,[1] Mirjam Allik,[3] Richard J Shaw 🔾 ,[3] Deborah C Malta,[5] M Sanni Ali,[2] Liam Smeeth,[2,6] Maurício L Barreto,[1,7]

Key Messages

- This is the first study to estimate the effect of a conditional cash transfer programme on cardiovascular and all-cause premature and all-ages mortality in a low- or middle-income country using individual-level data.

- The Bolsa Família Programme (BFP) was weakly and inconsistently associated with short-term cardiovascular and all-cause mortality in the general population.

- Associations between BFP and lower cardiovascular and all-cause mortality in more deprived municipalities persisted after robustness checks and should be better investigated.

- Longer follow-up, more consistent death registration in more deprived municipalities and further information on unmeasured confounding are needed to better estimate the full effects of BFP on mortality in Brazil.

Figure 2 Estimation of the marginal structural model effect of Bolsa Familia Programme receipt on cardiovascular and all-cause mortality for individuals living in municipalities with high-low material deprivation and high-low coverage of the Family Health Strategy IBP, Brazilian Deprivation Index (divided into quintiles); FHS, Family Health Strategy (divided into terciles); CVD, cardiovascular diseases; q1, quintile 1; q2, quintile 2; q3, quintile 3; q4, quintile 4; q5: quintile 5. For the 30–69 years age group, 709 premature all-cause mortality and 180 CVD premature mortality missing values for IBP levels and 196 premature all-cause mortality and 52 CVD premature mortality missing values for FHS coverage. For the 0–100 years age group, 1274 all-cause mortality and 280 CVD mortality missing values for IBP levels and 316 all-cause mortality and 69 CVD mortality missing values for FHS coverage. For the 30–69 years age group, FHS coverage is divided into terciles of high (>83%), medium (44–83%) or low coverage (<44%). For the 0–100 years age group, FHS coverage is divided into terciles of high (>87%), medium (44–87%) or low coverage (<44%).

CONCLUSION FROM THE BFP STUDIES

THE EVIDENCE ACCUMULATED FROM CIDACS STUDIES STRONGLY SUGGEST THAT A POLICY TARGETED AND EFFECTIVE TO DECREASE POVERTY (BRAZILIAN CONDITIONAL CASH TRANSFER PROGRAM - BOLSA FAMILIA) HAS SIGNIFICANT IMPACT ON DIFFERENT AND RELEVANT POPULATIONS HEALTH OUTCOMES

Platform to study environmental and climate effects on Health

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Plataforma de Dados Climáticos, Ambientais e de Saúde

Objective 3. Expand and update the *100 Million Brazilian* and *CIDACS Birth Cohorts* and develop the *CIDACS Climate and Environmental Platform*

- Extend and expand the geocoding of data in the *100 Million Brazilian* and *CIDACS Birth Cohorts*
- Update the the *100 Million Brazilian* and *CIDACS Birth Cohorts* to include new data up to 2023.
- Develop a fully functional *CIDACS Climate and Environmental Platform*
  - Hydrometeorological, reanalysis, and satellite imagery data

Plataforma de dados climáticos ambientais no CIDACS: Exemplos

Dados medidos in situ pelo INMET	Modelo de Reanálise ERA 5 LAND	Modelo de Reanálise VAN DONKELLAR	MAPBIOMAS
Período: 2000-presente (diário).	Período: 2000-presente (diário).	Período: 2000-presente (mensal).	Período: 2000-presente (mensal/anual).
Download: município e UF.	Download: município e UF.	Download: munício e UF.	Download: município e UF.
Variáveis:	Variáveis:	Modelo: V5GL01.HybridPM25	Variáveis:
• Temperatura: max - mín - média - ponto orvalho	• Temperatura: max - mín - média - ponto orvalho	Variável:	Uso e ocupação do solo
• Precipitação Total	• Precipitação Total	• PM2.5	Cicatriz de fogo
• Vel e direção do vento	• Comp do vento: u e v	• NO2	Cobertura de água
• Pressão à Superfície	• Pressão à Superfície		
• Umidade Relativa	• Umidade Relativa		

Agnes Soares, coordenadora geral de Vigilância em Saúde Ambiental do Ministério da Saúde

Summary of data colection and processing:

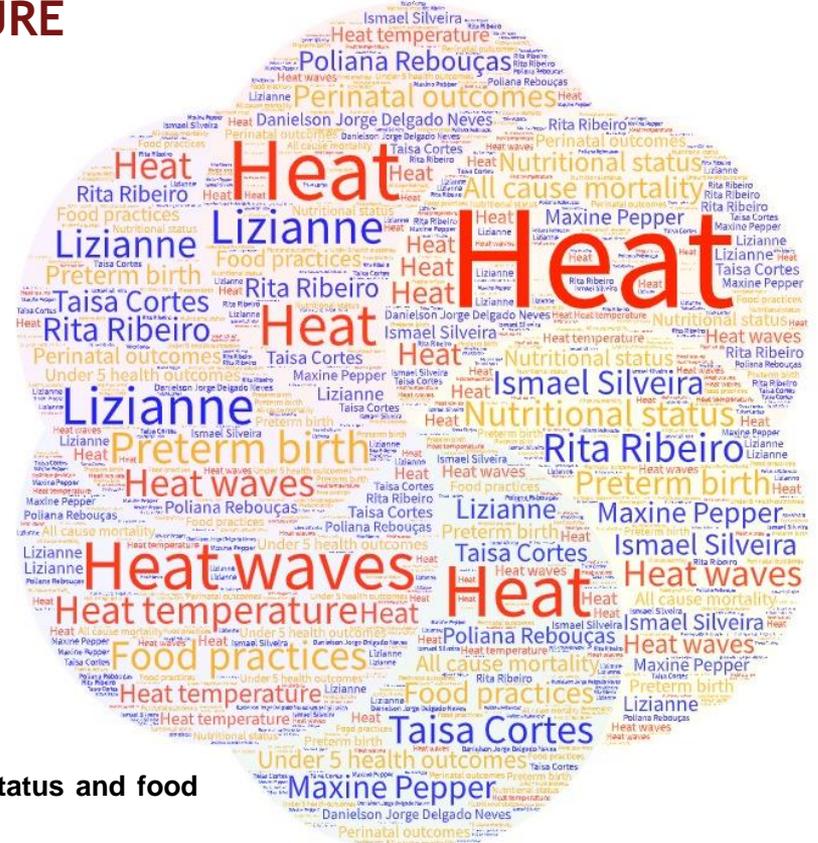| Data type	Database (Agency)	Scale	Period	Main variables	Status
Weather Stations	BDMEP (INMET)	381 conventional and 635 automatic	2000-present, daily	Precipitation, atmospheric pressure, temperature, relative humidity, wind, evaporation, insolation, cloudiness, and evapotranspiration	Collected and Processed
	CEMADEN	Automatic and rain gauge stations	2013-present, daily	Precipitation and disasters records	In progress
	ANA	Rain gauge stations	2000-present, daily	Precipitation	In progress
Reanalysis Models	ERA5-LAND (ECMWF)	Resol: 0.1° x 0.1°	2000-2022, daily	2m air temperature (maximum, minimum, mean, dew point, wet bulb, DTR), wind speed and direction, surface pressure, relative humidity and precipitation.	Collected and processed
	CAMS (ECMWF)	Resol: 0.75° x 0.75°	2003-2022, daily	Particulate Material ($PM_{1.0}$, $PM_{2.5}$, PM_{10}), total aerosol optical depth (TAOD), carbon monoxide (CO), nitrogen dioxide (NO_2), nitrogen monoxide (NO), and ozone (O_3)	Collected and processed
Satellite Image	Mapbiomas	30 m x 30 m	Annual	Land use and Land change	In progress

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Summary of data colection and processing:

Data type	Database (Agency)	Scale	Period	Main variables	Status
Satellite Image	Land/Aqua (CPTEC/INPE)	Sensor: MODIS	2000-present, daily	Fires and deforestation, urban growth, land occupation	**In queue**
	Combined Land/Aqua (NASA)	Sensor: MODIS	2000-present, daily	Normalized difference vegetation index (NDVI), albedo, land surface temperature, sea surface temperature	**In queue**
	SUOMI-NPP (NASA)	Sensor: VIIRS	2000-present, daily	Electric light at night	**In queue**
Blended datasets	Surface PM2.5 and NO2 (WUSTL)	Resol: 0.01° x 0.01°	2000-2019, monthly	$PM_{2.5}$, NO_2	**Partially Collected and Processed**
	MERGE (CPTEC)	Resol: 0.1° x 0.1°	2000-present, daily	Precipitation	**In progress**
Gridded station	BR-DWGD	Resol: 0.1° x 0.1°	2000-2022, daily	Total precipitation, Maximum, minimum and mean air temperature, Solar radiation, Relative Umidity, Wind speed at 2 meters, Evapotranspitarion.	**Collected and processed**

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HEAT WAVES AND EXTREME TEMPERATURE

- **Map the Existing Evidence and Identify Research Gaps**

  - Global South or South America
  - Theoretical aspects
  - Methodological challenges/issues

- **Proposals**

  - Study protocols

i.e. Rita et al. **Heat waves and extreme temperature on nutritional status and food practices of under five children in the 100 million Brazilian Cohort.**

DROUGHTS

- Ila et al. **Association between drought and health outcomes in pregnant women and children under 5 years of age**: a systematic review and meta-analysis.

- Ila et al. **The impact of drought on birth-related outcomes and the mitigating effects of a conditional cash transfer program**

- Firmino et al. **The effect of the One Million Cistern Program on under-five mortality in the semi-arid region within the 100 million Brazilian cohort.**

Review article

Drought exposure as a risk factor for child undernutrition in low- and middle-income countries: A systematic review and assessment of empirical evidence

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ABSTRACT

Background: Droughts affect around 52 million people globally each year, a figure that is likely to increase under climate change.
Objectives: To assess the strength of empirical evidence on drought exposure as a risk factor for undernutrition in children < 5 years of age in low- and middle-income countries (LMICs).
Methods: Systematic review of observational studies published between 1990 and 2018 in English and reporting undernutrition outcomes in children < 5 years of age in relation to droughts in LMICs. The search was performed

PROPOSALS:

Disasters

Mapping and characterization

Frequency and typology

Flooding (Bahia, 2021) → Early Nutrition Development

Income household Segregation

- **Implication of extreme weather events on health outcomes in Latin American Countries: a soping review**

  - Focus on **specific extreme weather events** (including types of disasters)

  - Focus on **regionally relevant public health outcomes**

  - Include **a perspective on the Social Determinants of Health (SDOH)**

Epidemic anticipation system with pandemic potential

Developed by Fiocruz and COPPE/UFRJ, with support from SVS-A/MS, SAPS/MS

In Bahia-Brazil, CIDACS experience shows that using Health and Social Administrative Databases for research and evaluation is a unique tool to improve the understanding of the health problems of the Brazilian Population and to develop technologies to health prevention in large scale!

Obrigado   Gracias   Thank you

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