Suicide risk associated with a prior family history of suicide: A population-based linkage study using the 100 Million Brazilian Cohort

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Background

Family history of complete suicide and suicide attempts have been associated with the occurrence of suicidal behavior

Factors associated with recurrence of suicide in the family:
- Relationship with the lost person
- Family and personal history of psychiatric disorders
- Genetic factors
- Social characteristics

Despite this knowledge:
- Lack of epidemiological studies
- Majority of the studies performed in high-income settings and covered periods before 2010
- Small samples

A large population study can provide estimates for the knowledge of mechanisms underlying the occurrence of suicide within the same family group

Brent and Melhem, 2008, Agerbo, Nordentoft and Mortensen,2002;Qin, Agerbo and Mortensen, 2002; Roy, 2011; Rodante et al, 2016;Sheftall et al, 2020)

Summary

Background

Familial clustering of suicidal behaviour ha
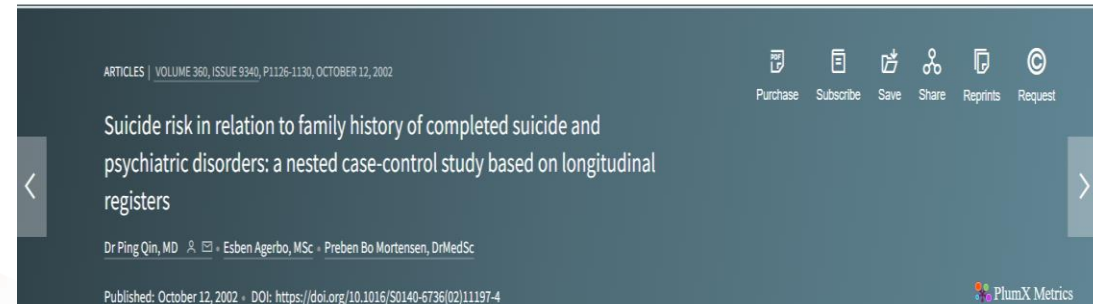
Familial, psychiatric, and socioeconomic risk factors for suicide in young people: nested case-control study

Abstract

Objective To estimate the risk of suicide in young people related to family and individual psychiatric and socioeconomic factors.
Design Population based nested case-control study.
Setting Data from longitudinal Danish registers. **Cases and controls** 496 young people aged 10-21 years who had committed suicide during 1981-97 in Denmark and 24 800 controls matched for sex, age, and time.
Main outcome measures All suicides in Denmark compared with controls; parents and siblings identified from population based registers; inpatient information from discharge registers of national hospitals; and socioeconomic data from administrative registers.
Results Parental factors associated with an increased risk of suicide in young people were suicide or early death, admission to hospital for a mental illness, unemployment, low income, poor schooling, and divorce, as well as mental illness in siblings and mental illness and short duration of schooling in the young people themselves. The strongest risk factor was mental illness in the young people. The effect of the parents' socioeconomic factors decreased after adjustment for a family history of mental illness and a family history of suicide.
Conclusions Recognising mental illness in young people and dealing with it appropriately could help prevent suicides. The high relative risk associated with a low socioeconomic status of the parents may be confounded and overestimated if not adjusted for mental illness and suicide in the family.

Several countries have developed preventive strategies for suicide, and in some of these countries young people are considered an important target group.⁸ Preventive strategies cannot, however, be based on empirical evidence as this does not exist.⁹ Current knowledge of risk factors for suicide in young people stems from either studies of risk factors in people that have attempted suicide or studies of psychological autopsy (information collected on the deceased through interviews with family members, relatives, friends, and healthcare staff), in which recall bias cannot be excluded. We aimed to determine the effect of familial, psychiatric, and socioeconomic factors in young people who had committed suicide.

Methods

Sources of data
We obtained data from Danish population based registers on the basis of the unique identification number assigned to everyone living in Denmark, thus ensuring accurate linkage of information between registers.¹⁰ We identified the biological mother, father, and siblings— defined as people sharing a biological parent—from the Danish civil registration system.¹⁰ Some data were missing for fathers, as they had not been identified by the mothers when registering their children. We considered people as immigrants who were born after 1960 and who had no reference to a mother.¹¹

The Danish medical register on vital statistics contains the dates and causes of all deaths in Denmark since 1976 and for

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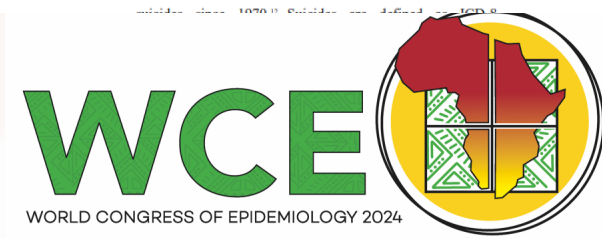
Method

- **Study design:** cohort – <u>individual level</u>

- **Population:** individuals over 10 years of age registered in the 100 Million Brazilian Cohort

100 Million Brazilian Cohort

Coorte de 100 milhões de brasileir@s

100 Million Brazilian Cohort

Coorte de 100 milhões
de brasileiræas

100 Million Brazilian Cohort

Linkage and harmonization of several big datasets

Coorte de 100 milhões de brasileiros

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100 Million Brazilian Cohort

Linkage and harmonization of several big datasets

Population from Cadastro Unico (2001 - 2018): low-income families potentially eligible for social protection programs (N=131.687.800)

Cadastro Unico
Individual and family records: demographic and socioeconomic data

Bolsa Familia
Records of the income transfers

MCMV
Records of beneficiaries of the housing programmee

SINASC
Records of live births: maternal and newborn characteristics

AIH
Records of hospitalisations

SINAN
Records of 52 diseases or health events of compulsory notification

Conditionalities
Records on monitoring of compliance with PBF (health and education)

Cisternas
Records of beneficiaries of the sanitation programme

SISVAN
Records of growth monitoring, development and food consumption

SIM
Records of deaths

Anonymized datasets have been extracting

To analyse social determinants and to evaluate the impact of social programs on health outcomes
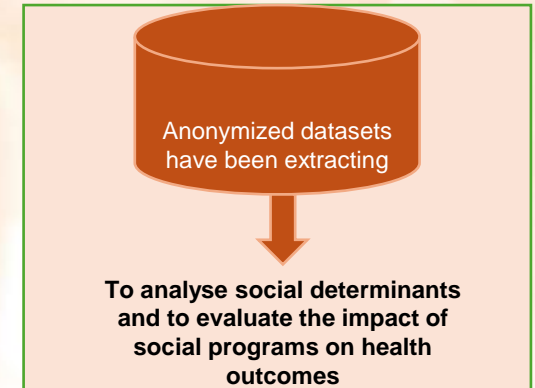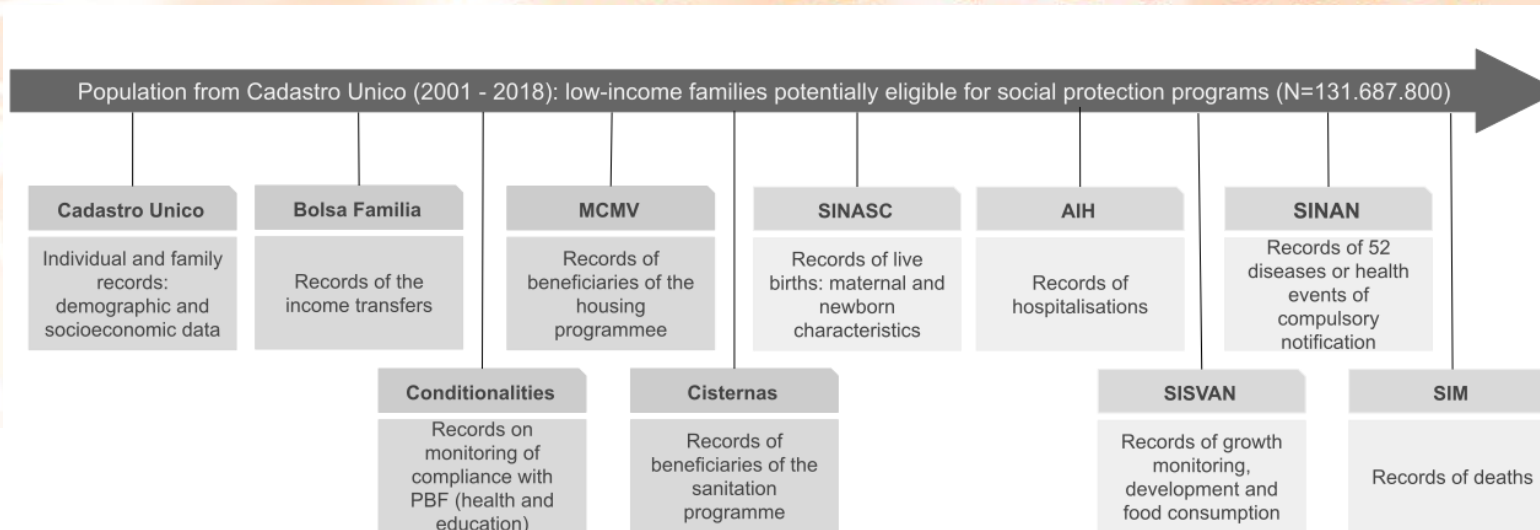
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100 Million Brazilian Cohort

Hosted at CIDACS/FIOCRUZ in Brazil with information regarding health and governmental programs

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100 Million Brazilian Cohort

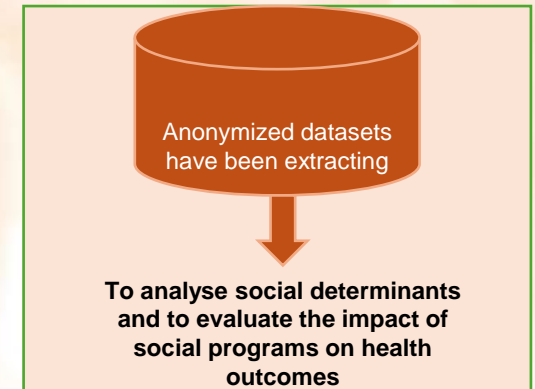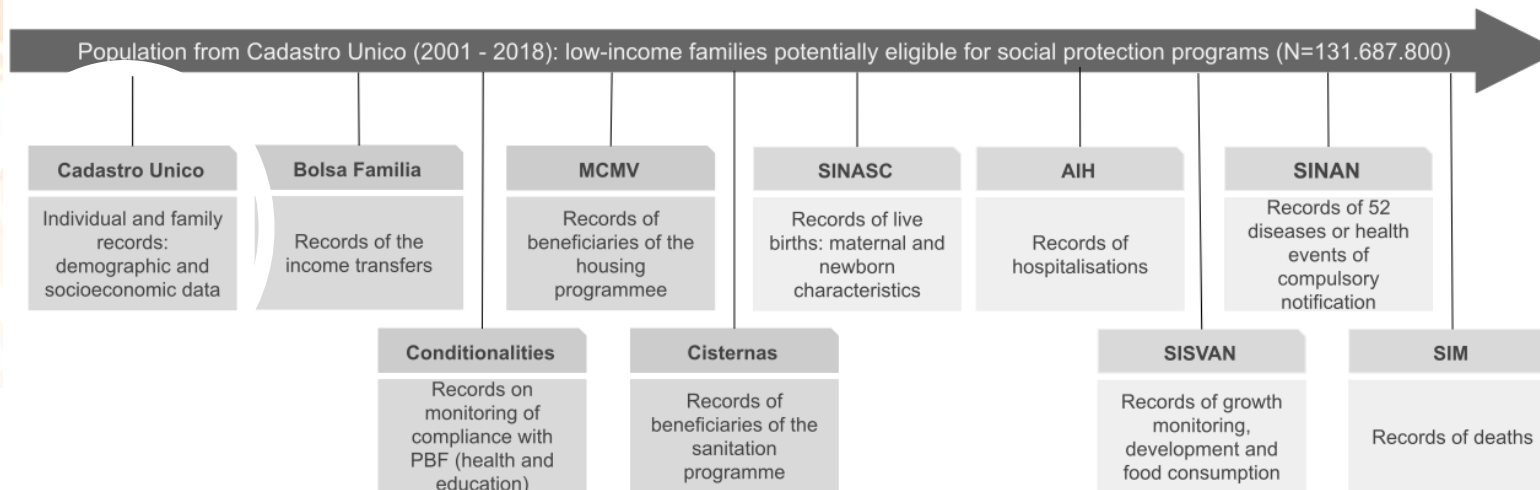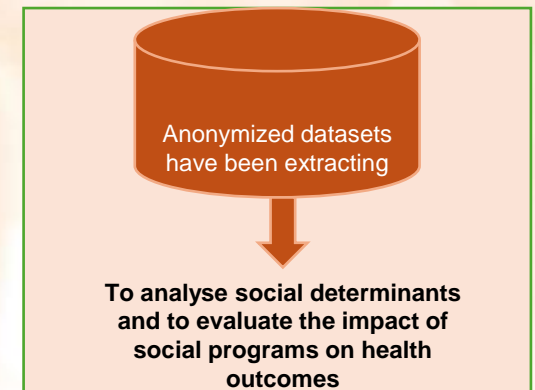Hosted at CIDACS/FIOCRUZ in Brazil with information regarding health and governmental programs

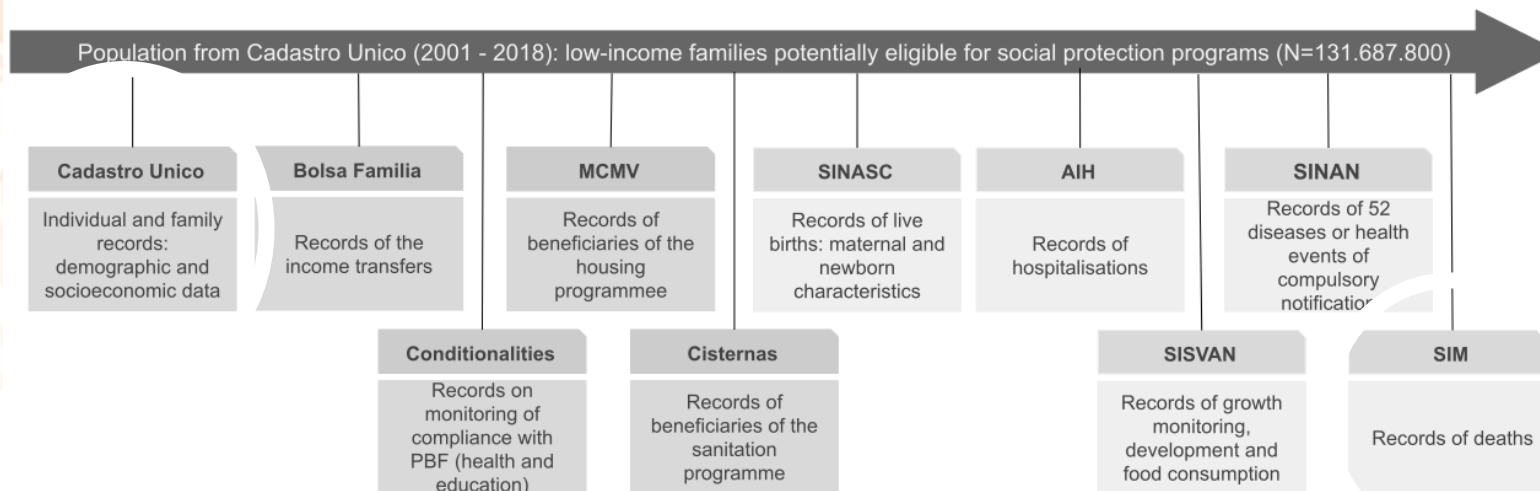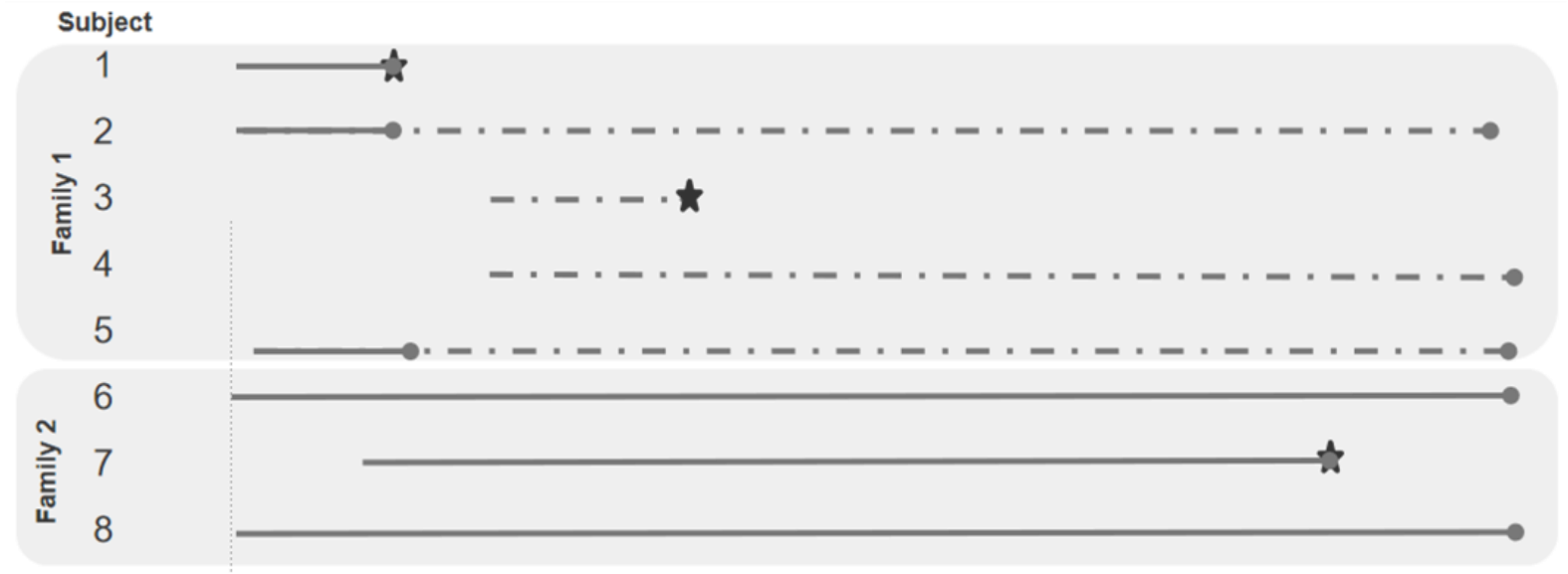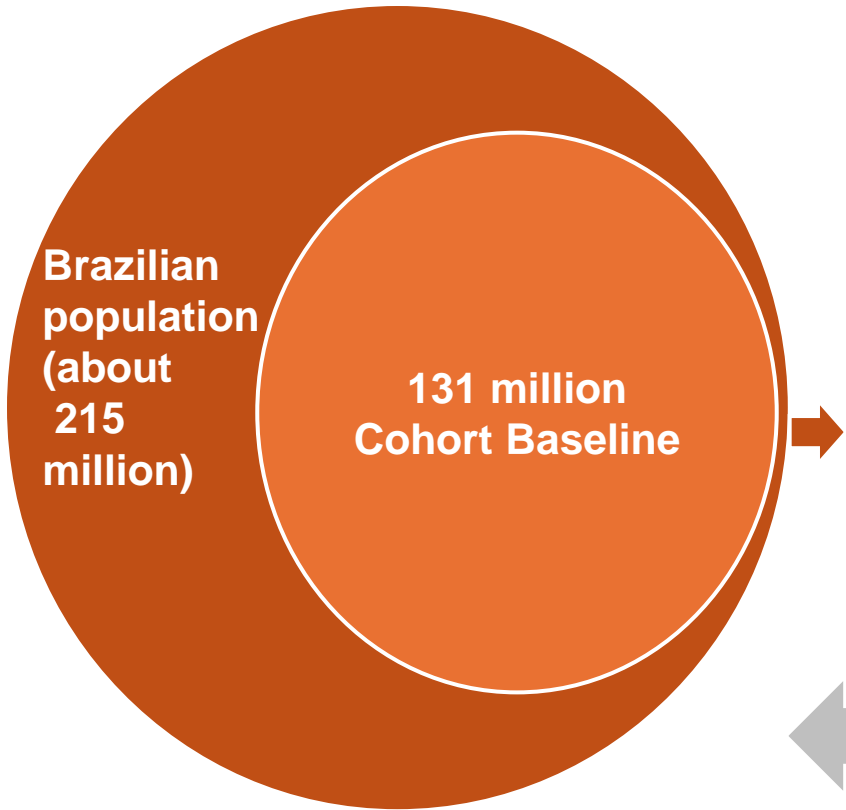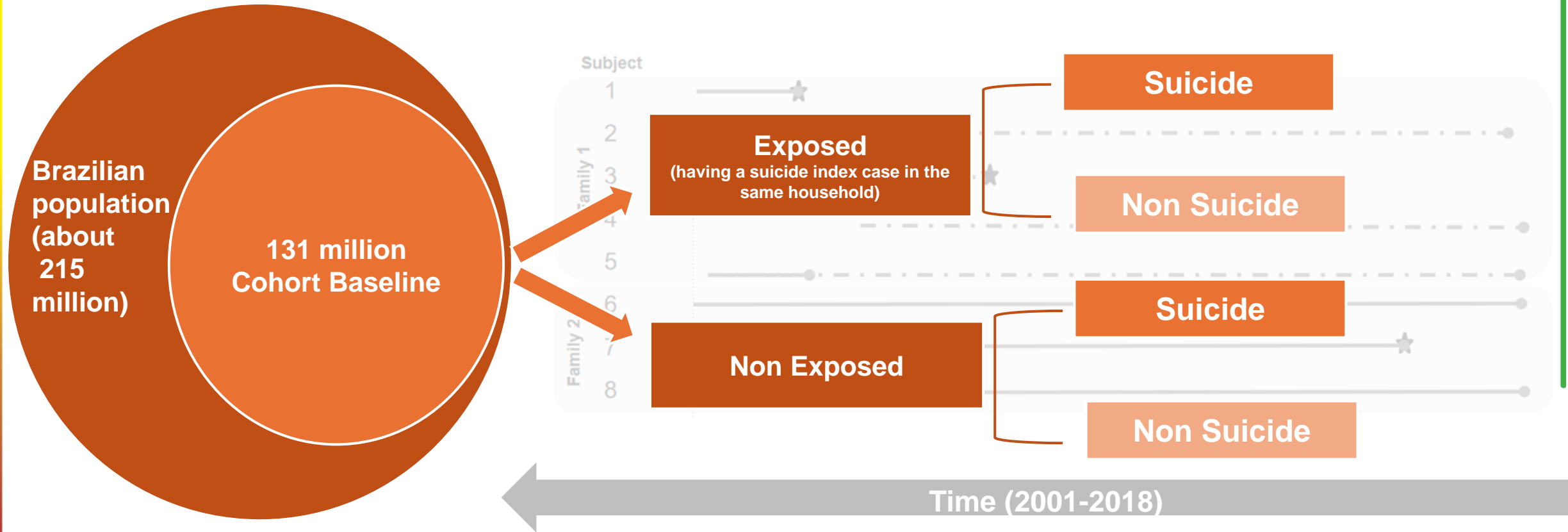**Linkage and harmonization of several big datasets**

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Method

Method

Statistical analysis: Multivariate time-varying Cox regression model

Results

Table 1: Description of study population by exposure to an index suicide case in the same household (N= 101,346,622)

Characteristic	Non-Exposure, N = 101,179,194[1]	Exposure, N = 167,428[1]	p-value[2]
Sex			<0.001
Male	47,658,742 (47%)	77,043 (46%)	
Female	53,520,452 (53%)	90,385 (54%)	
Age cohort			<0.001
10-24	58,804,961 (58%)	111,759 (67%)	
25-59	37,278,090 (37%)	50,795 (30%)	
60-110	5,096,143 (5.0%)	4,874 (2.9%)	
Race/color			<0.001
White	31,068,881 (33%)	57,714 (37%)	
Black	7,036,884 (7.5%)	11,067 (7.1%)	
Asian descendants	372,702 (0.4%)	506 (0.3%)	
Brown	55,370,996 (59%)	82,377 (53%)	
Indigenous	538,453 (0.6%)	3,627 (2.3%)	
Unknown	6,791,278	12,137	
Region			<0.001
Northeast	40,065,572 (40%)	61,722 (37%)	
North	10,465,502 (10%)	16,459 (9.8%)	
Southeast	32,322,337 (32%)	45,739 (27%)	
South	11,522,233 (11%)	31,120 (19%)	
Central-West	6,710,100 (6.6%)	12,210 (7.3%)	
Unknown	93,45	178	
Location residence			<0.001
Urban	73,144,808 (74%)	113,128 (69%)	
Rural	25,327,550 (26%)	51,574 (31%)	
Unknown	2,706,836	2,726	

Unemployed				<0.001
Yes	96,309,167 (95%)	162,869 / (97%)		
No	4,870,027 (4.8%)	4,559 (2.7%)		
Construction materials				<0.001
Uninformed	3,630,860 (3.6%)	3,644 (2.2%)		
Bricks/cement	72,657,604 (72%)	109,100 (65%)		
Wood, Vegetal materials, and other	24,890,730 (25%)	54,684 (33%)		
Sanitation				<0.001
Uninformed	4,301,559 (4.3%)	4,391 (2.6%)		
Public network	42,391,809 (42%)	59,243 (35%)		
Septic tank	14,932,195 (15%)	27,545 (16%)		
Homemade septic tank	24,675,659 (24%)	45,441 (27%)		
Ditch or other	14,877,972 (15%)	30,808 (18%)		
Water supply				<0.001
Uninformed	3,630,469 (3.6%)	3,634 (2.2%)		
Public network (running water)	68,163,602 (67%)	107,519 (64%)		
Well, natural sources or other	29,385,123 (29%)	56,275 (34%)		
Waste				<0.001
Uninformed	3,630,901 (3.6%)	3,642 (2.2%)		
Public collection system	71,129,518 (70%)	108,860 (65%)		
Burned, buried, outdoor disposal or other	26,418,775 (26%)	54,926 (33%)		

- 101,346,622 individuals (28,190,481 households)
- 47,982 suicide index cases
- 232 subsequent suicides

Answering our main Questions

1st- Having a case of suicide in the same household is associated with an increase in Suicide among the remaining members?

Table 1: Incidence of suicide rate overall, by sex, age group and race among those exposed and unexposed to a suicide case in the family, 2001–2018

Caracteristics	Unexposure				Exposure			
	Suicide	Person/Years	Rate/100,000	95% CI		Suicide	Person/Years	Rate/100,000	95% CI
Overall	48967	9.994e+08	4.9	4.8 4.9	232	988007.61	23.5	20.6 26.7
Age								
10-24	20532	3.942e+08	5.2	5.1 5.2	144	510266.49	28.2	24.0 33.2
25-59	32661	5.068e+08	6.4	6.3 6.5	136	447409.74	30.3	25.7 36.0
60 years old or older	3980	67670226	5.9	5.7 6.1	11	69503.346	15.8	8.8 28.6

Table 1: Incidence of suicide rate overall, by sex, age group and race among those exposed and unexposed to a suicide case in the family, 2001–2018

Sex	Unexposure				Exposure				
	Suicide	Person/Years	Rate/100,000	95% CI		Suicide	Person/Years	Rate/100,000	95% CI	
Male	37454	4.500e+08	8.3	8.2 8.4	174	454762.8	38.3	33.0 44.4
Female	11513	5.494e+08	2.1	2.0 2.1	58	533244.82	10.9	8.4 14.1

Table 1: Incidence of suicide rate overall, by sex, age group and race among those exposed and unexposed to a suicide case in the family, 2001–2018

Race Color	Unexposure				Exposure			
	Suicide	Person/Years	Rate/100,000	95% CI	Suicide	Person/Years	Rate/100,000	95% CI
White	17473	2.932e+08	5.9	5.9 6.0	85	343822.47	24.7	20.0 30.6
Black	3329	73098992	4.5	4.4 4.7	7	66234.76	10.6	5.0 22.2
Asian descendants	144	3467532.6	4.1	3.5 4.9	1	3044.7885	32.8	4.6 233.1
Brown	22651	5.364e+08	4.2	4.2 4.3	87	479533.87	18.1	14.7 22.4
Indigenous	728	4975634.2	14.6	13.6 15.7	29	20627.945	140.6	97.7 202.3

Table 2: Associations between Suicide Index in Same Household and Subsequent Suicides: Multivariate Time-Varying Cox Regression Analysis

		Hazard Ratio (HR)	(95%IC)
		Crude	Adjusted
HR		4.45(3.91-5.06)	4.39(3.83-5.03)
n		101,346,622	101,151,091

Adjusted to age, sex, race/color/ethnicity, employment, region of residence, urban/rural residence, house construction material, electricity, water supply, sewage, garbage collection, and household density
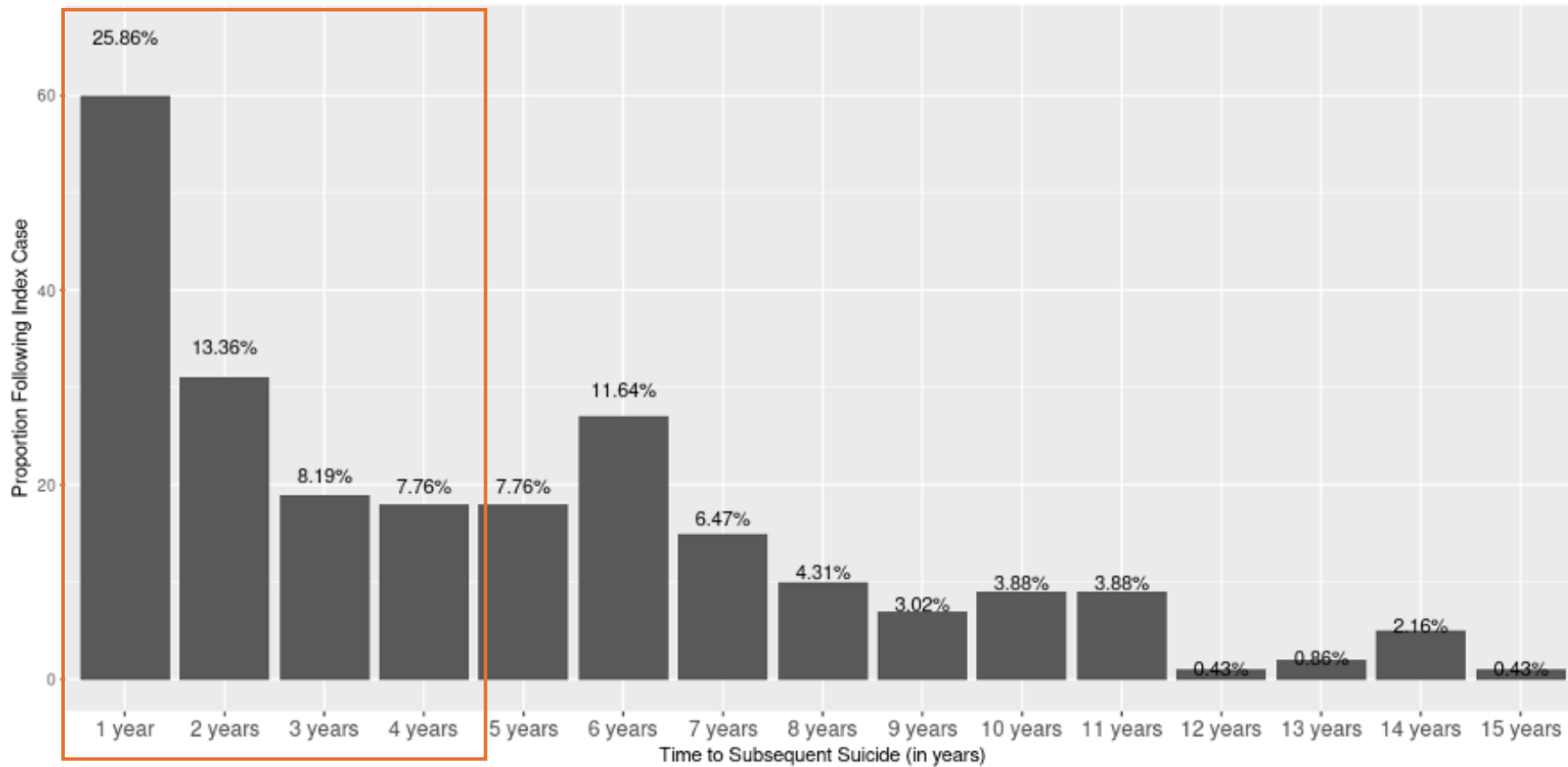
Answering our Main Questions

2nd- What is the time between the index case and the subsequent suicide in the family?

Time Between Index Case and Subsequent Suicide

> **55.17% of recurrent suicides in the family ocurred in the first 4 years**

- 25.86% within 1 year

- 13.36% within 2 years

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2	294	1108	1425	2158	5199

In sum:

Individuals from families with a suicide index case have a 4.39-fold increased risk of suicide

- **55.17% of subsequent suicides in the family ocurred in the first 4 years**

Family members of individuals who have died by suicide have a significantly higher risk and should be followed up for early identification and receive family-based preventive and therapeutic interventions

Team:

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