Social environment characteristics related with self-rated health in four Latin America countries: evidence from SALURBAL Project

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Social and built environments as determinants of health in cities, July 8th 2021, 12:00 PM

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Introduction

- Latin America has high levels of urbanization
- Considered the region with the highest socioeconomic inequality in the world ⇒ manifested in cities

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Becerra-Posada, 2015; UNDP, 2010; UN Habitat, 2012; Diez-Roux *et al*., 2018

Introduction

- Choices about how cities develop and grow and the urban environment characteristics of the cities have profound consequences for the health of the residents in Latin America

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Becerra-Posada, 2015; UNDP, 2010; UN Habitat, 2012; Diez-Roux *et al*., 2018

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Introduction

- Scientific evidence has shown that people living in more deprived regions tend to have poor health when compared with those living in wealthier ones
- The relation of urban environment features to self-rated health across urban areas in Latin America has been infrequently examined
- Given large heterogeneity across cities in the region, examination of associations across a large number of cities may be especially informative

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Poortinga, Dunstan & Fone, 2008; Verhaeghe & Tampubolon, 2012; Becares *et al*., 2012; Höfelmann *et al*., 2015; Ou *et al*., 2018; Gomez *et al*., 2019

Objective

To investigate the association between social and built environment features of urban areas and self-rated health (SRH) among adults living in cities from four Latin American countries

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Methods

- Cross-sectional study that used data from *Salud Urbana en América Latina* (SALURBAL) Project
- The project has compiled and harmonized data on health as well as social and built environment for all cities with more than 100,000 residents in 11 countries: Argentina, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Mexico, Nicaragua, Panama, and Peru

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Quistberg *et al.*, 2019

Methods

- "City": defined as a single administrative unit (e.g., *municipio*) or combination of adjacent administrative units (e.g., several *municipios*) that are part of the urban extent as determined from satellite imagery
- "Sub-city": defined as a single component administrative units (*municipios*, *comunas* or similar depending on the country)
- In some cases, a city may include only one sub-city unit, in which case the definitions coincide

Quistberg *et al.*, 2019

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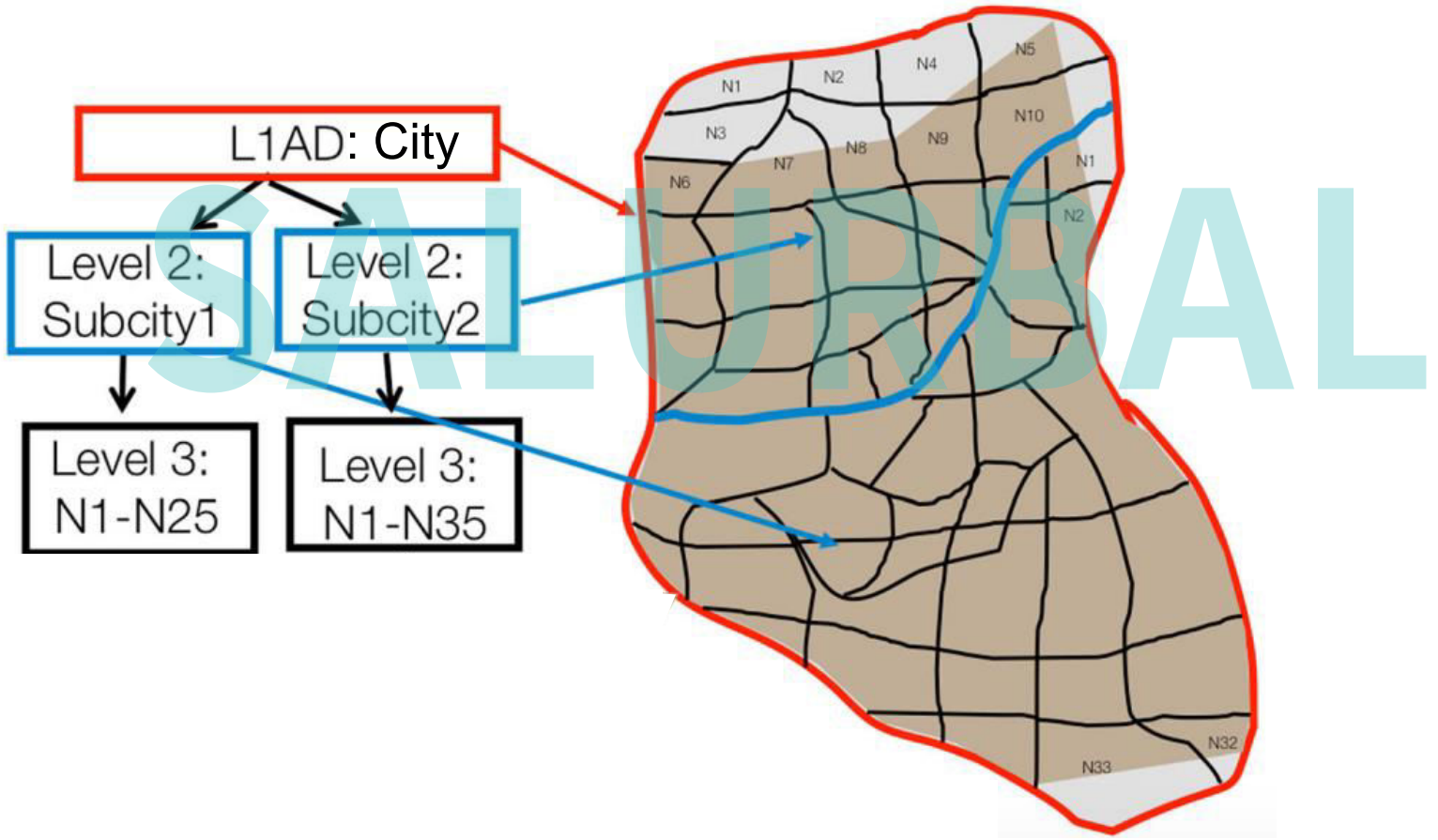
Methods



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Quistberg *et al.*, 2019

Methods

- Outcome: self-rated health ⇒ obtained from the harmonized health survey data of adults aged 18 or older from four countries in the SALURBAL database - Argentina (2013), Brazil (2013), Chile (2010), and Colombia (2007)
- Question: “In general, would you say your health is…”
- Using a 5-point Likert scale

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Methods

- Response options varied between countries
  - Argentina and Chile: excellent, very good, good, fair and poor
  - Brazil and Colombia: very good, good, fair, poor and very poor
- Categorized in 1 = poor (fair/poor/very poor) and 0 = good (excellent/very good/good)

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Methods

•Explanatory variables

- Social environment features: living conditions, services provision and population educational attainment, at “sub-city” level

- Built environment features: population density and intersection density at “sub-city” level, and fragmentation of urban development and isolation at “city” level

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Methods

- Covariates
  - Individual level: age, sex and education
  - “City" level: percentage of urban areas

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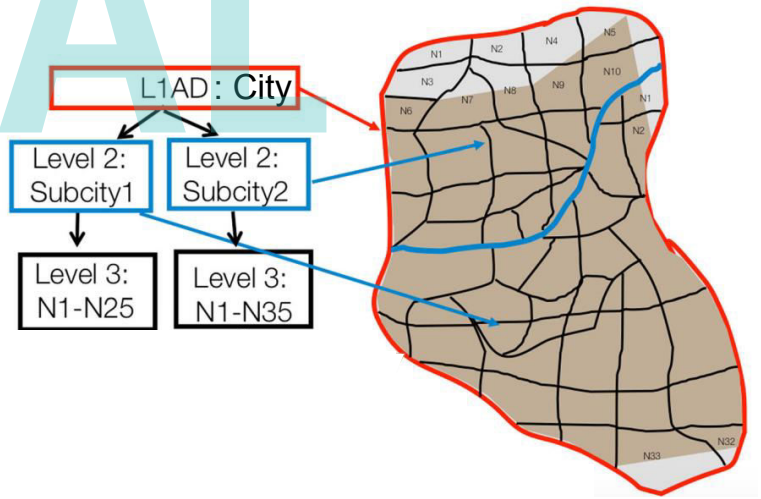

Methods

•Statistical analysis

- Descriptive analysis

- Multilevel Logistic regressions, with a random effect for "sub-city" and a fixed effect for each country

➢ Model 1: each exposure separately

➢ Model 2: all of the social environment exposures jointly

➢ Model 3: all of the built environment exposures jointly

➢ Model 4: all the exposures jointly

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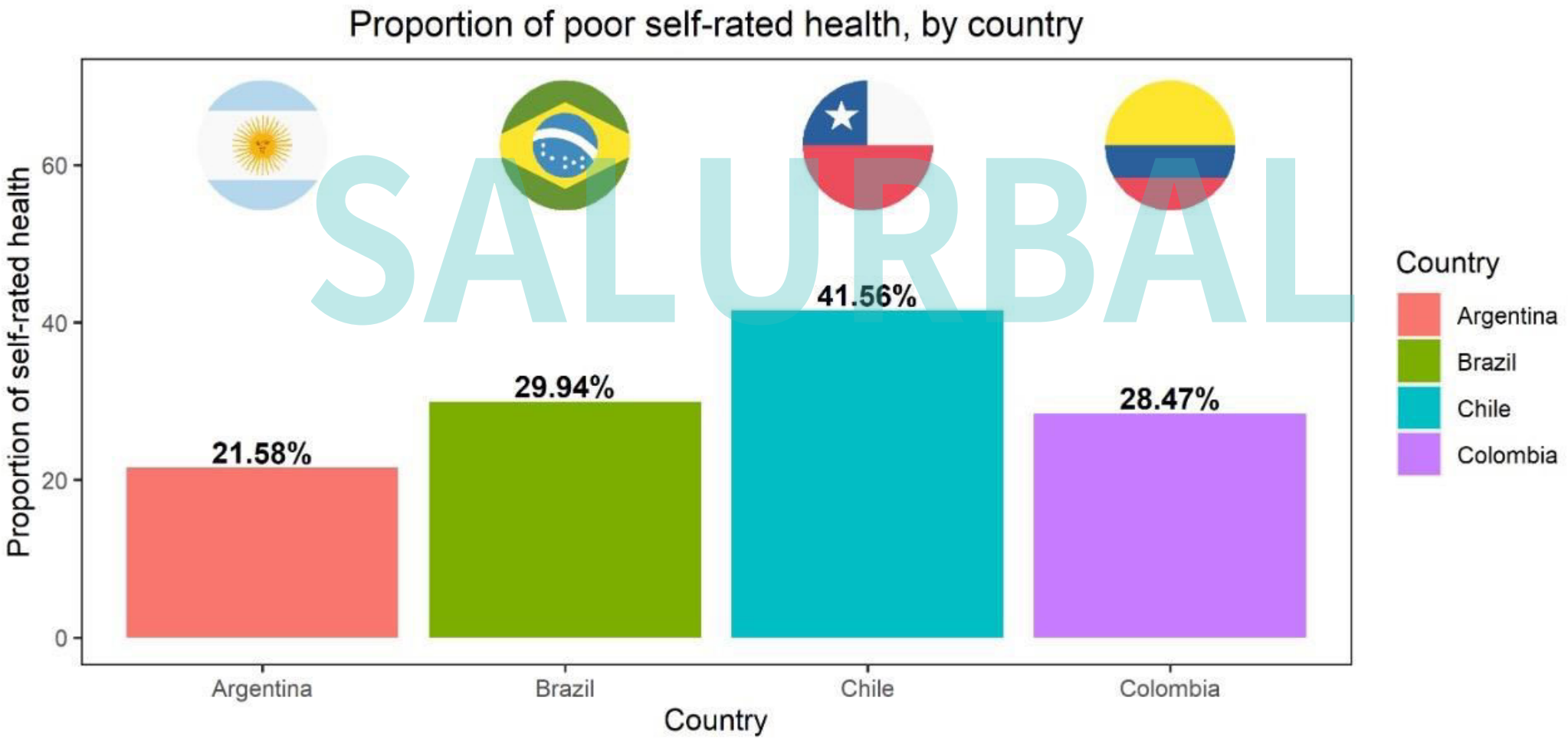
Results



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Results

Table 1: Descriptive analysis

VARIABLES	TOTAL	Argentina	Brazil	Chile	Colombia
Sample characteristics					
Number of participants	69,840	21,451	27,017	2,719	18,653
Number of "cities"	112	33	27	19	33
Number of “sub-cities”	262	108	27	70	57

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Results

Table 2: Descriptive analysis stratified by health status

VARIABLES	TOTAL	Self-rated health		p-value
		Poor	Good	
Participants' characteristics				
Age m (SD)	42.75 (16.62)	49.36 (17.18)	40.25 (15.71)	0.001
Sex (%)				<0.001
Male	29,535 (42.29)	6,560 (34.24)	22,975 (45.33)	
Female	40,305 (57.71)	12,598 (65.76)	27,707 (54.67)	
Education (%)[a]				<0.001
< primary school	11,303 (16.18)	5,647 (29.48)	5,656 (11.16)	
Primary school	21,293 (30.49)	6,811 (35.55)	14,482 (28.57)	
High school	26,880 (38.49)	5,318 (27.76)	21,562 (42.54)	
≥ University degree	10,363 (14.84)	1,382 (7.21)	8.981 (17.72)	

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Results

Table 3: Odds ratios of poor self-rated health associated with social and built environment characteristics. All models are adjusted for age, sex, individual education and country-level fixed effects.

	Modelo 1		Modelo 2	
VARIABLES	**OR (95%CI)**	**p-value**	**OR (95%CI)**	**p-value**
Social environment				
Living conditions	0.88 (0.85 - 0.92)	<0.001	0.95 (0.89 - 0.99)	0.047
Services provision	0.90 (0.88 - 0.93)	<0.001	0.93 (0.89 - 0.96)	<0.001
Population educational attainment	0.91 (0.87 - 0.96)	<0.001	0.99 (0.94 - 1.05)	0.805
Built environment				
Population Density	0.95 (0.89 - 1.01)	0.106		
Intersection density	0.97 (0.94 - 1.01)	0.205		
Fragmentation	1.03 (0.95 - 1.12)	0.479		
Isolation	1.06 (1.01 - 1.11)	0.029		

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Results

Table 3: Odds ratios of poor self-rated health associated with social and built environment characteristics. All models are adjusted for age, sex, individual education and country-level fixed effects.

	Modelo 3		Modelo 4	
VARIABLES	**OR (95%CI)**	**p-value**	**OR (95%CI)**	**p-value**
Social environment				
Living conditions			0.94 (0.88 - 0.99)	0.030
Services provision			0.93 (0.89 - 0.97)	<0.001
Population educational attainment			0.99 (0.94 - 1.04)	0.635
Built environment				
Population Density	0.96 (0.89 - 1.03)	0.241	1.04 (0.97 - 1.12)	0.283
Intersection density	0.98 (0.93 - 1.05)	0.616	1.00 (0.95 - 1.06)	0.912
Fragmentation	1.06 (0.97 - 1.15)	0.218	1.08 (0.88 - 1.05)	0.069
Isolation	1.07 (1.01 - 1.14)	0.021	1.05 (0.99 - 1.10)	0.100

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Conclusion

- In rapidly urbanizing low- and middle-income countries, it is urgent to identify which urban policies are necessary to improve health population

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- Using harmonized data from four Latin America countries, with a large sample size, it was the first investigation examining the influence of social and built environments features on self-rated health across multiple cities in the region

Conclusion

- Comparisons between countries should be made with caution due to the discrepancy between survey and census years

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- These findings highlight the importance of prioritizing urban policies and interventions related to improving living conditions and sanitary services in order to improve health population and to decrease health inequity in the region

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- Current co-authors:

  - Débora Moraes Coelho, Amanda Cristina de Souza Andrade, Uriel Moreira Silva, Ana Victoria Diez-Roux, Amélia Augusta de Lima Friche, Waleska Teixeira Caiaffa

- SALURBAL Team

- OSUBH Team

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SALUD URBANA EN AMÉRICA LATINA

Maternal mortality in Latin America: the influences of the social and built environment, from the urban perspective

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Introduction

- Maternal death: death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from unintentional or incidental causes

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- Main causes are: hemorrhage, pregnancy-induced hypertension, sepsis, complications associated with unsafe abortion, and embolism

- Maternal mortality ratio (MMR): the number of maternal deaths in a population per 100,000 live births

WHO, 2019; Say *et al.*, 2014

Introduction

- MMR is an important health indicator → reveals dramatic inequalities between countries and across cities within countries, since from 88 to 98% of the maternal deaths are preventable

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Related to a particularly vulnerable environment for women that result not only of poorer access to health care but also in a greater exposure to environmental conditions hazardous to health

WHO, 1986; Jaitman, 2015

Introduction

- Role of the social and built environment features in this indicator remains uncertain, especially in LA countries

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- Understanding how social and built environment features affect MMR is paramount to identify actions and policies to improve maternal health and promote health equity in the context of LA countries

Objective

To investigate the association between social and built environment features of urban areas and MMR in Latin American and the Caribbean countries

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Methods

- Harmonized data from the *Salud Urbana en América Latina* (SALURBAL) project
- Comprising 339 cities
- 8 Latin America countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Guatemala, Mexico, and Panama

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Methods

•Outcome: the ratio between the aggregated maternal death counts and the aggregated number of live births for each year, at the city level

- Aggregation was performed over 2012-2016 and all age ranges

- GHE redistribution for misclassification correction of the maternal deaths

- Civil Registration and Vital Statistics method for incompleteness correction of the maternal deaths

WHO, 2017; WHO, 2019

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Methods

•Explanatory variables

- Social environment features: living conditions, services provision and population educational attainment, at “city” level

- Built environment features: area-weighted mean N.N.D. (isolation), population density (aggregation), presence of BRT or subway (transit availability), and total population (city size), at “city” level

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Methods

- Basic descriptive analysis
- Multilevel linear model with random intercept at the country level to determine how MMR varies between and within countries
- Multilevel Negative Binomial models (GLMM), with maternal deaths as the outcome, log-live births (downsized by 100k times the correction factor) as the offset and including country-level random intercepts

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Methods

•4 models were adjusted:

➢ Model A: each exposure separately

➢ Model B: all of the social environment exposures jointly (Living conditions, services provision, and educational achievement)

➢ Model C: all of the built environment exposures jointly (isolation, aggregation, transit availability, and city size)

➢ Model D: all of exposures (social and built environment) jointly

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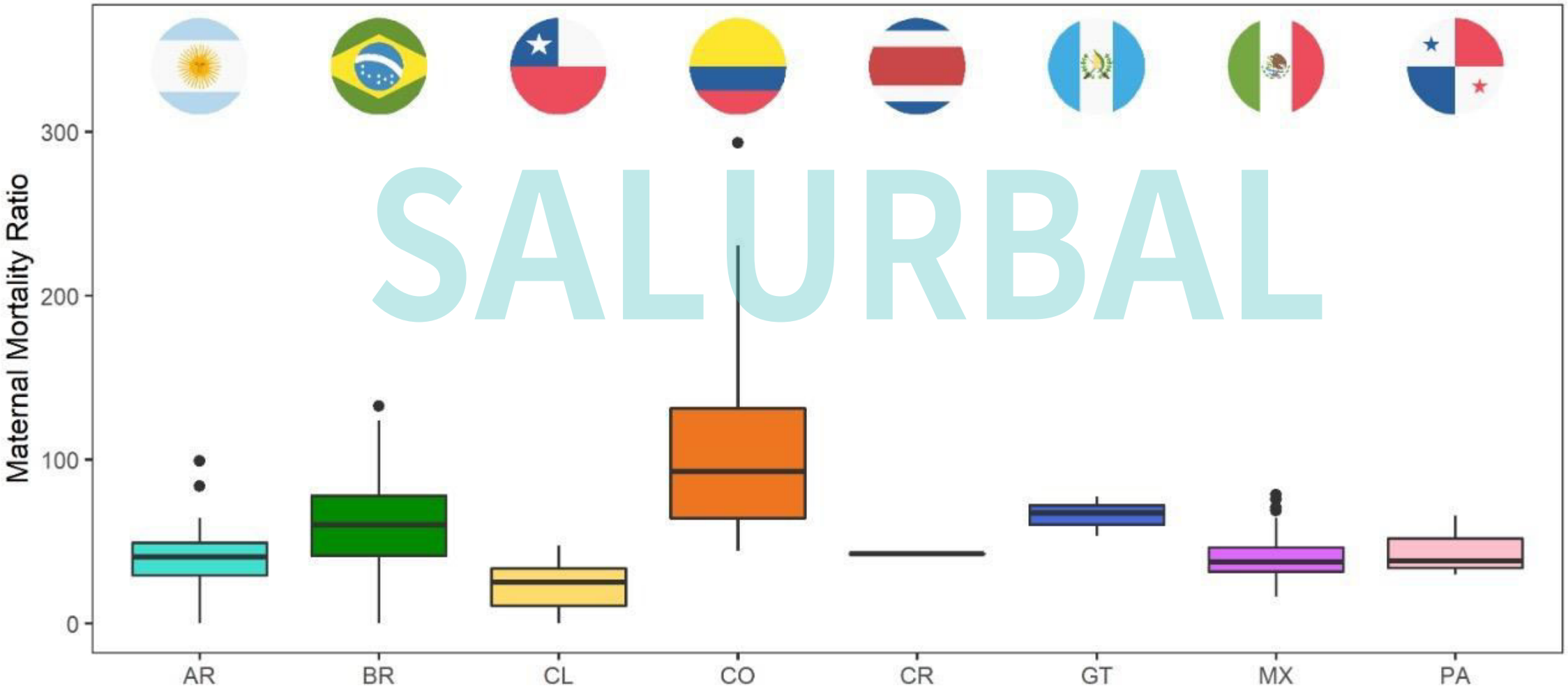
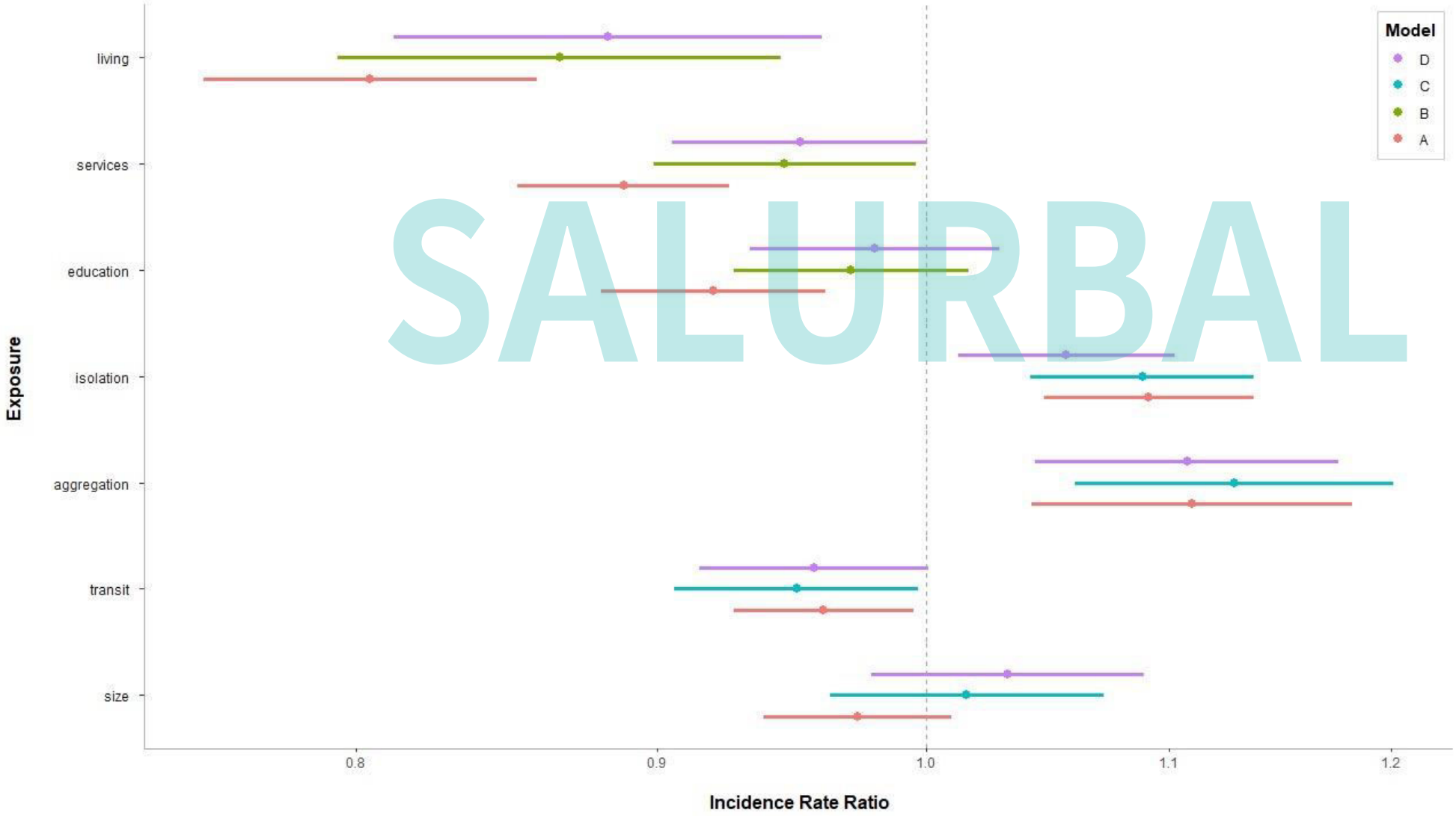
Results


Maternal Mortality Ratio
300
200
100
0
AR
BR
CL
CO
CR
GT
MX
PA
SALURBAL

Results



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Conclusion

- Monitoring progress in maternal mortality ration reduction in the region is important since the Sustainable Development Goals aimed to reduce this indicator to less than 70 per 100,000 live births, by 2030
- Using harmonized data from more than 300 cities in 8 Latin America countries, this study investigated the influence of social and built environments features on maternal mortality ratio
- Accounted for misclassification and incompleteness

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Conclusion

- Some limitations: no individual data (ecological study), secondary data, and inherent longitudinal nature of the data was ignored

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- Decreasing urban social inequality related to living conditions and population density and improving features of urbanistic integration may reduce maternal mortality ratio and improve maternal health

Acknowledgment

- Current co-authors:

  - Uriel Moreira Silva, Michelle Timóteo da Silva, Mariana Melo, Ana Ortigoza, Marcio Alazraqui, Alex Quistberg, Ariela Braverman Bronstein, Amélia Augusta de Lima Friche, Waleska Teixeira Caiaffa

- SALURBAL Team

- OSUBH Team

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Thank You!

Obrigada!

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