Early-Stage Investigator Lecture

Cardiometabolic Health and Cardiovascular Prevention in Latino Population

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Early-Stage Investigator Lecture (ESIL)

June 7th, 2023

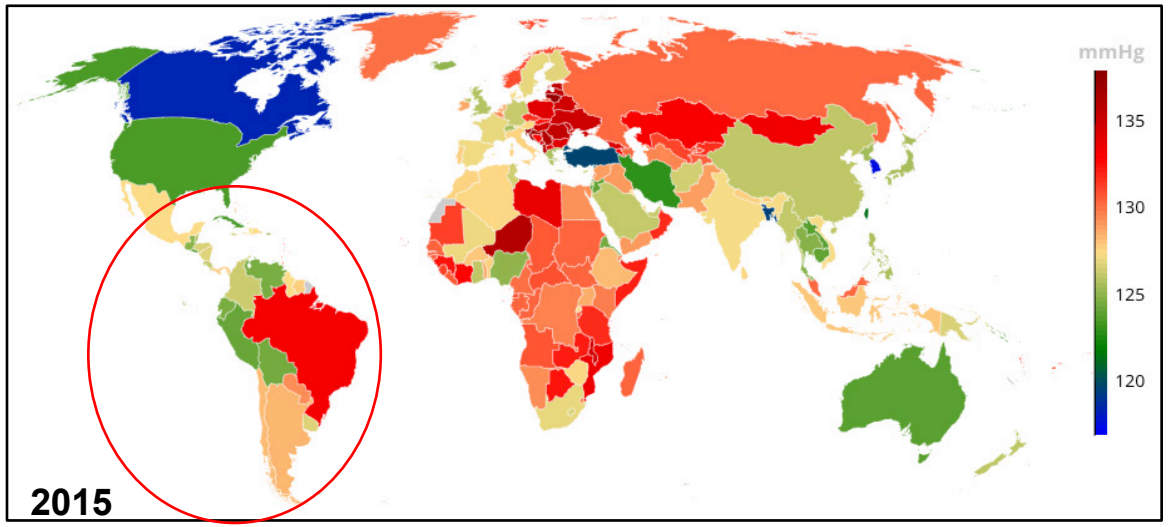
EMORY UNIVERSITY

Disclosures

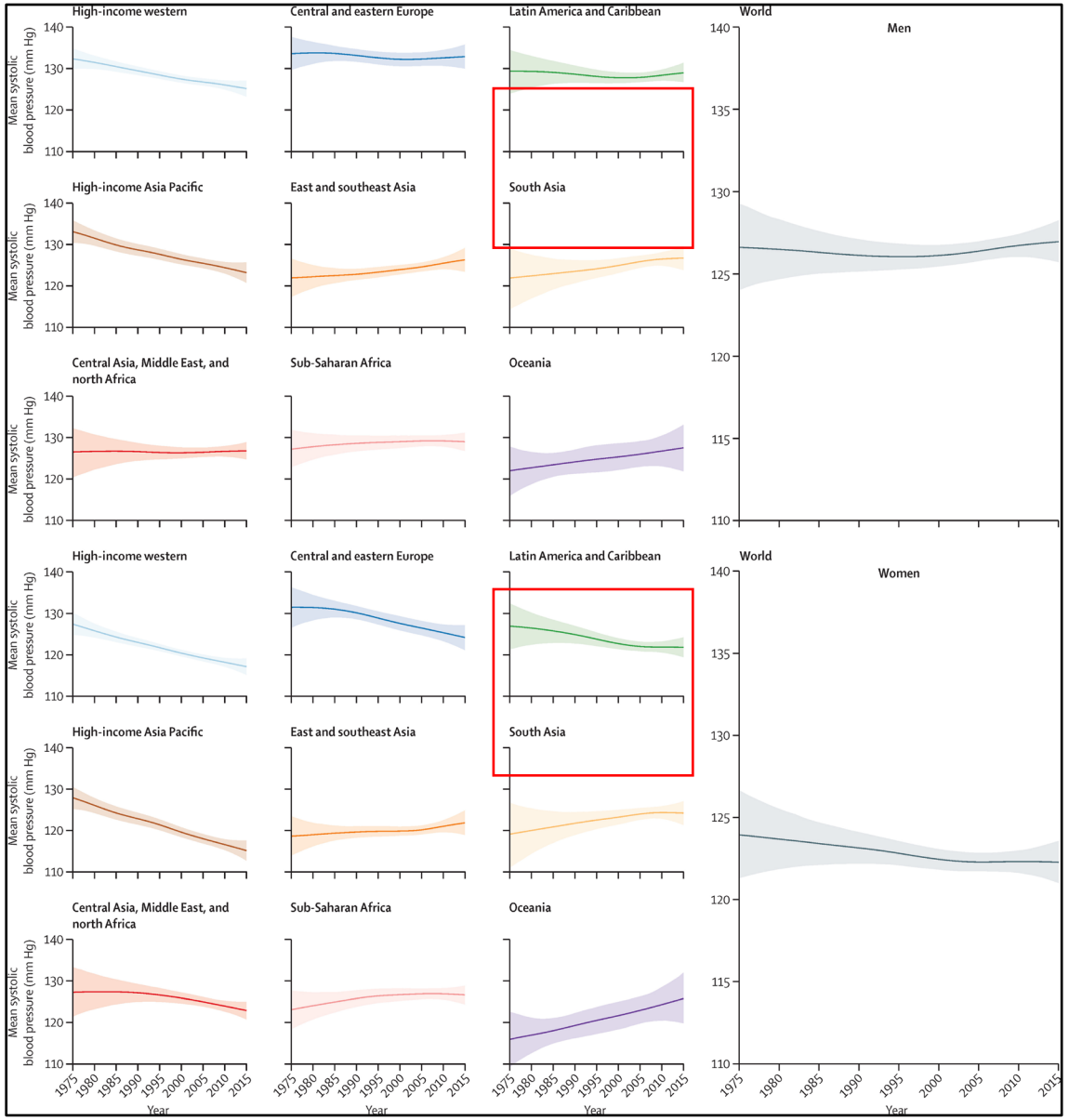
- No conflict of interests.
- Work primarily funded by **Wellcome Trust** (UK).
- Thanks to all members and steering committees of CC-LAC and NCD-RisC.

Cardiovascular risk factors

- Unfavourable trends.
- Diversity or heterogeneity.



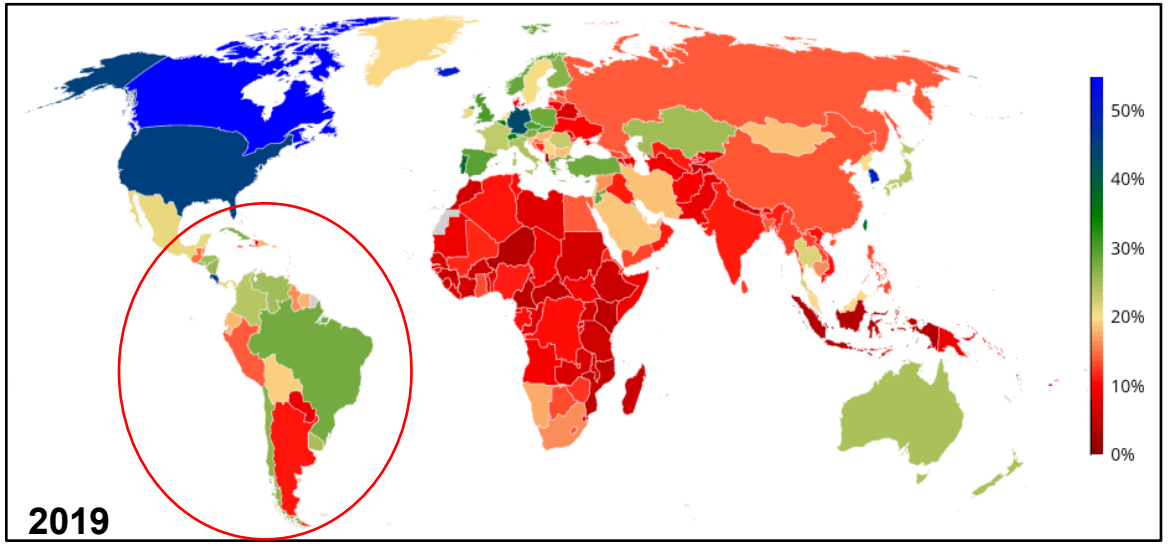
Age-standardized mean systolic blood pressure, men, 18+ years.



https://ncdrisc.org/index.html Lancet 2017;389:37-55.

Cardiovascular risk factors

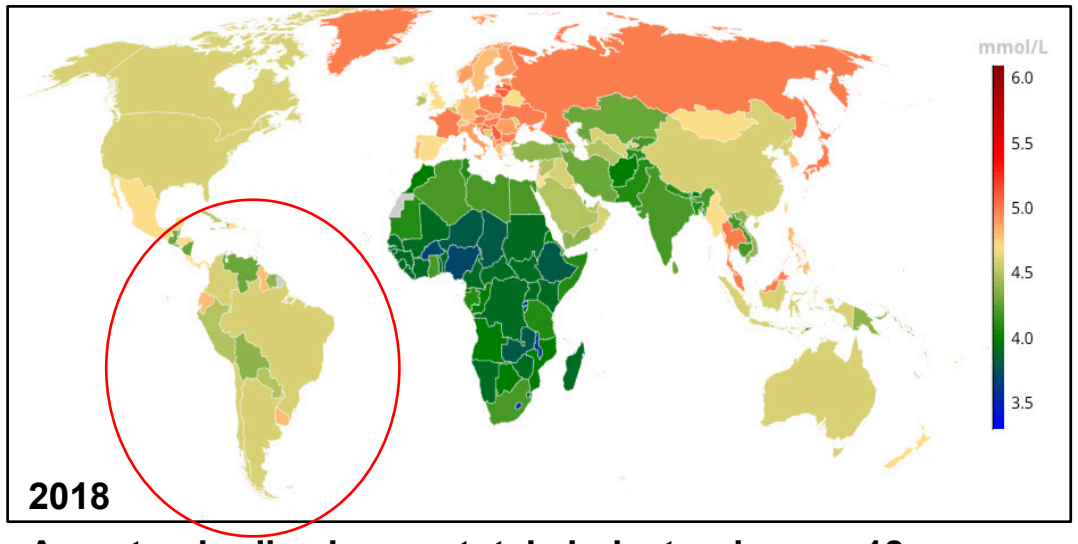
- Diversity or heterogeneity.
- Unfavourable trends.



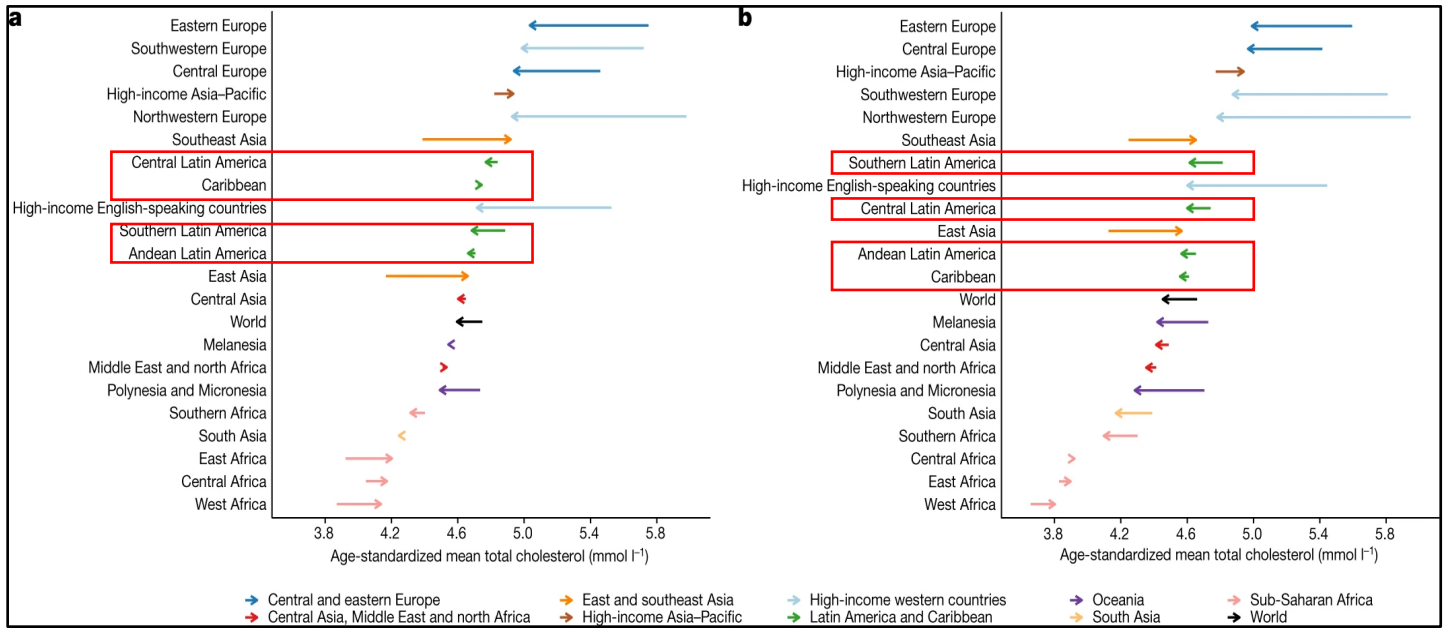
Age-standardized prevalence hypertension control, men, 35-79 years.

https://ncdrisc.org/index.html // Lancet 2021, 398:957-980.

Cardiovascular risk factors



Age-standardized mean total cholesterol, men, 18+ years.



Change age-standardized mean total cholesterol between 1980-2018, women (A) and men (B), 18+ years

- Diversity or heterogeneity.
- Mostly little change.
- **Need instruments to promote good lipids.**

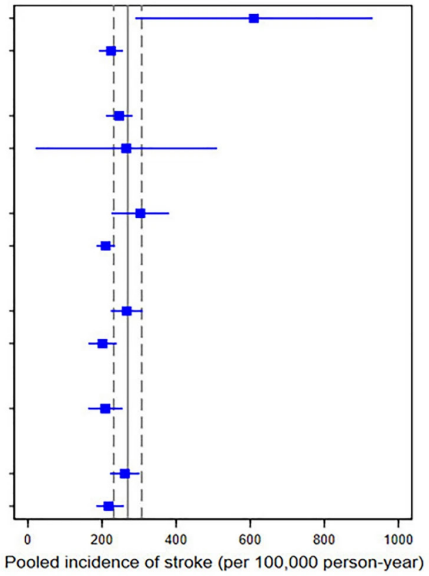
https://ncdrisc.org/index.html // Nature 2020, 582:73–77.

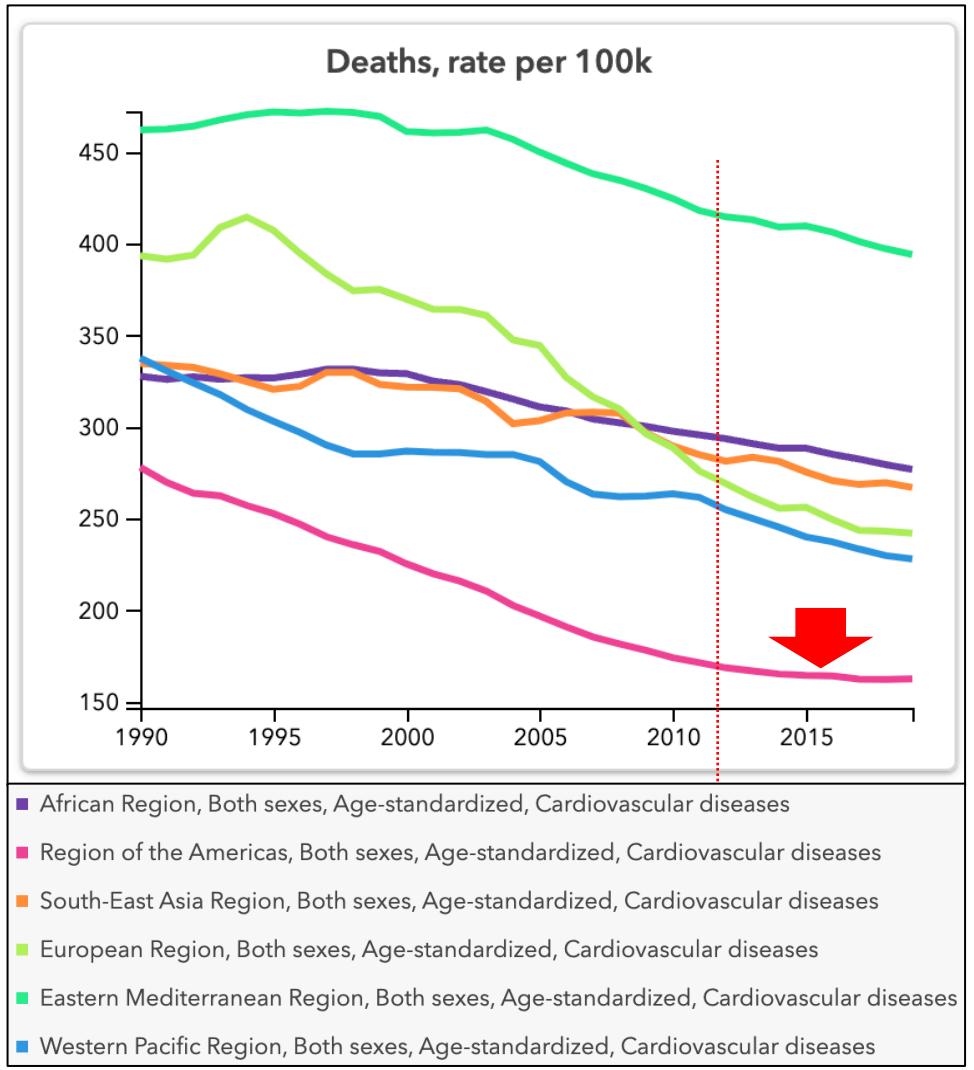
Cardiovascular outcomes

- Deaths rates for CVDs have decreased through the world.
- In the Americas it has stagnated over the last ~10 years.

- **Need further push to keep the decreasing trend.**

Variables	Nº studies	Pooled incidence per 100,000 person-years	Heterogeneity (I^2)
Study type			
Cohort	4	610 (95% CI: 290 – 931)	89.1%
Registry	11	224 (95% CI: 192 – 257)	99.2%
Diagnosis			
WHO method	12	247 (95% CI: 211 – 283)	99.1%
Other methods	3	266 (95% CI: 21– 510)	99.8%
Scope			
National	4	303 (95% CI: 226 – 381)	99.3%
Sub-national	11	210 (95% CI: 185 – 235)	97.7%
Risk of bias			
Low risk	13	267 (95% CI: 224 – 310)	99.4%
High risk	2	201 (95% CI: 163 – 240)	92.6%
Age			
35+ years	9	209 (95% CI: 163 – 255)	99.4%
Sex			
Men	11	261 (95% CI: 222 – 301)	98.7%
Women	11	218 (95% CI: 185 – 259)	98.5%

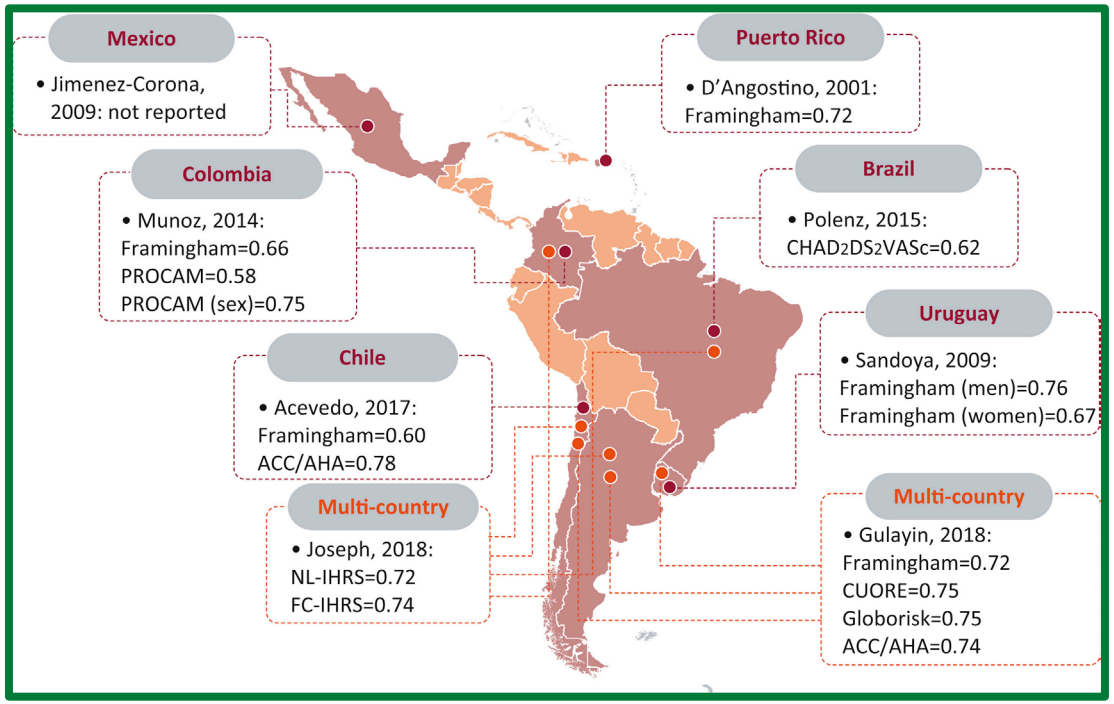


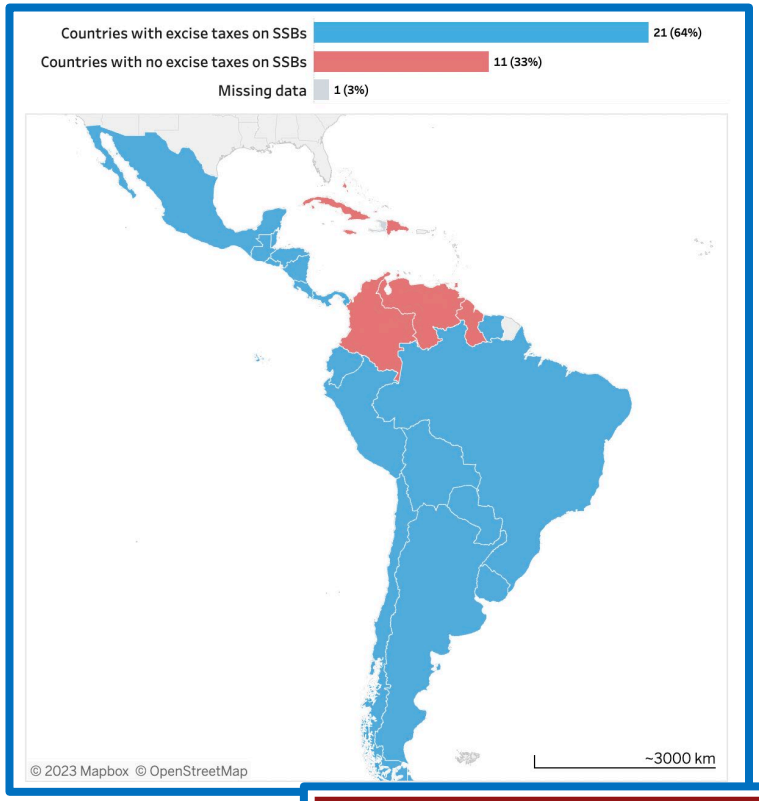


https://vizhub.healthdata.org/gbd-results/ // Sci Rep 2023;13(1):6809.

Potential solutions

- CVDs can be effectively prevented (delayed) with population-based and risk-based interventions.
- Complementary approaches.

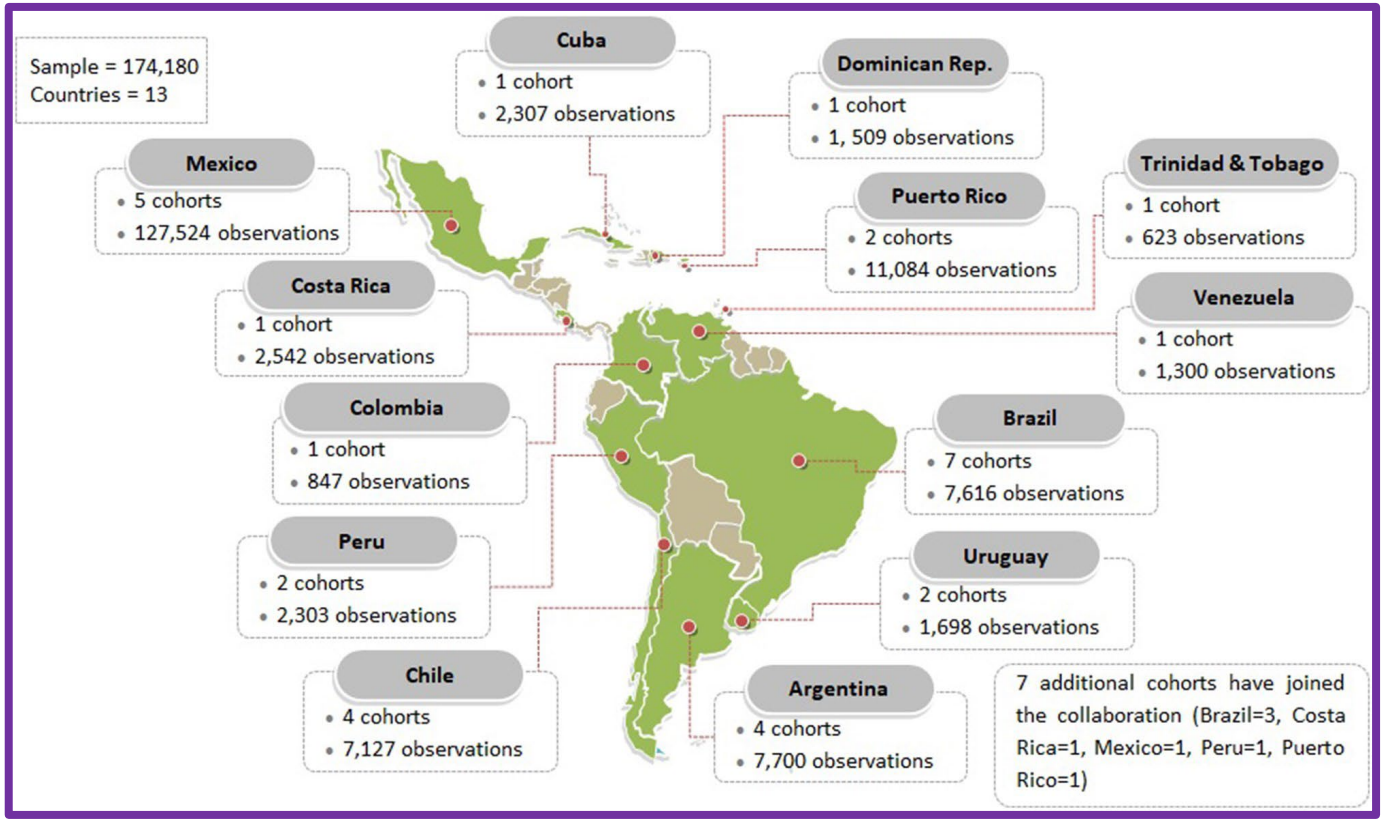




https://www.paho.org/en/enlace/sugar-sweetened-beverage-tax-indicators-latin-america-and-caribbean // Nat Med 2020;26(3):374-378. // Glob Heart 2019;14(1):81-93.

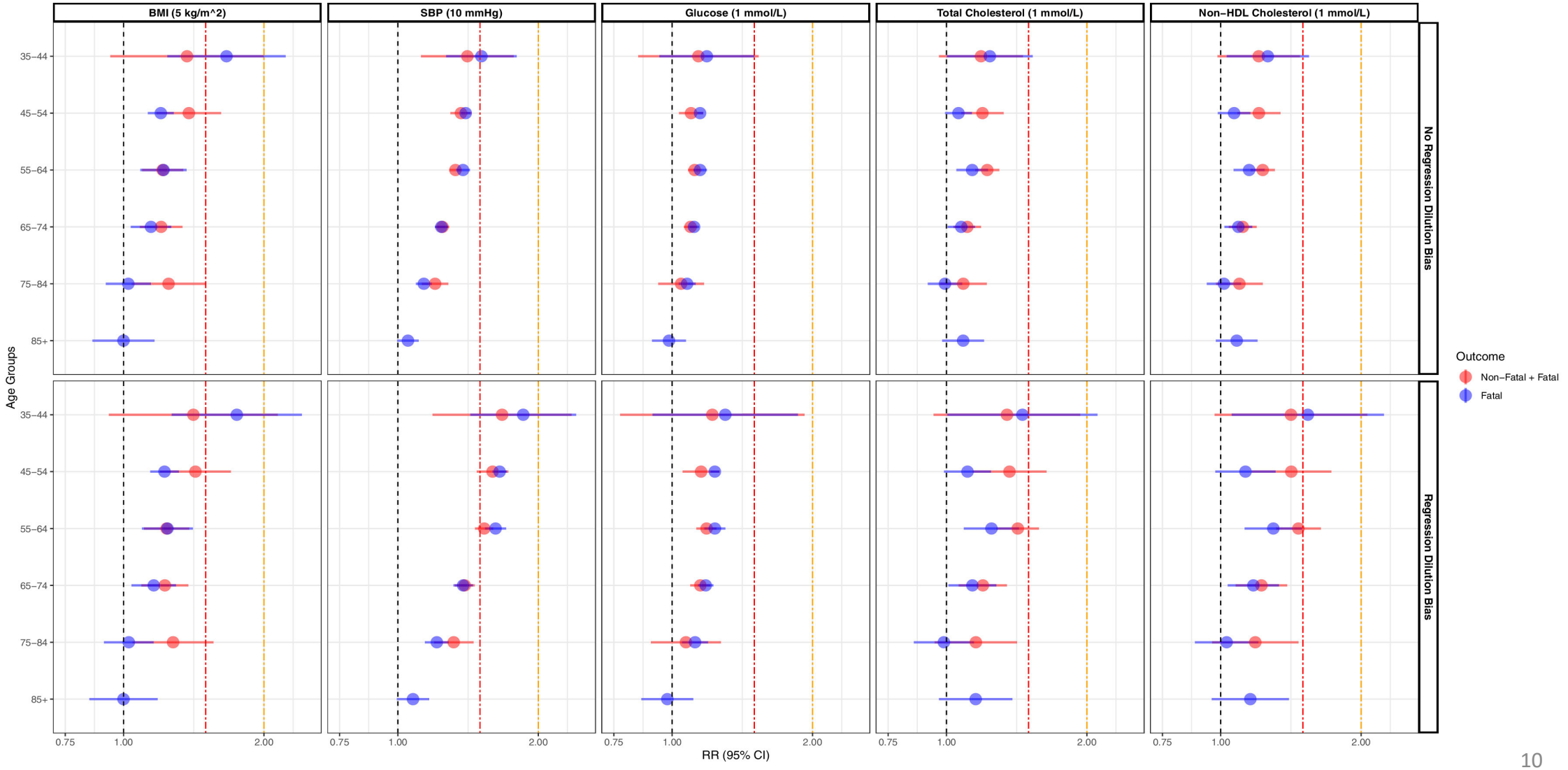
Data pooling

- Cohorts Consortium of Latin America and the Caribbean **(CC-LAC)**.
- Risk estimates for disease burden metrics.
- Cardiovascular risk score.



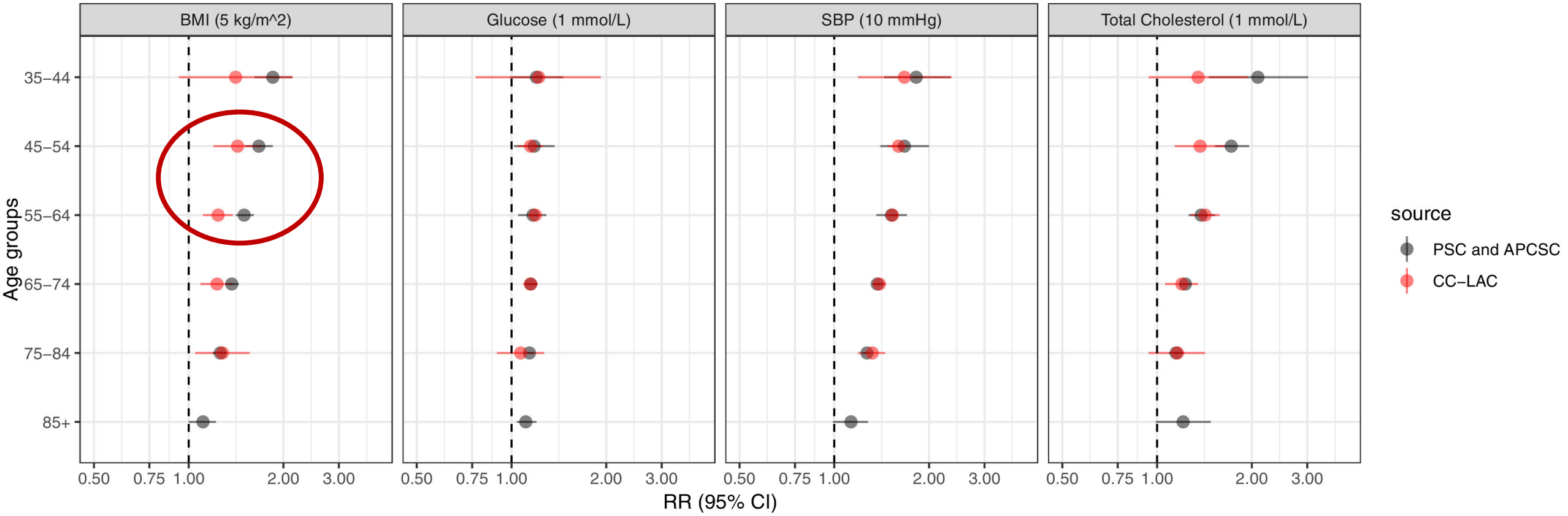
Int J Epidemiol 2020;49(5):1437-1437g.

Risk estimates



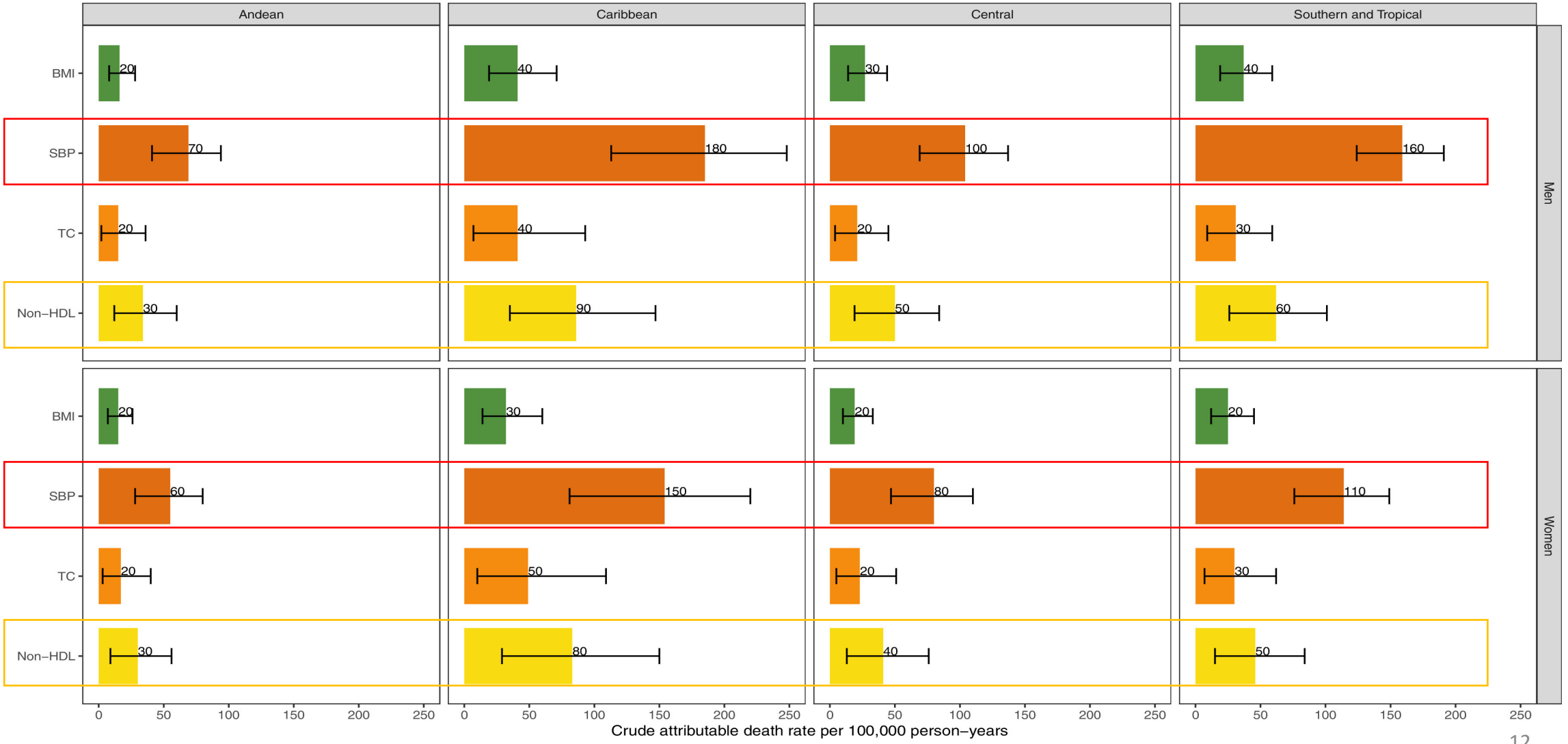
Lancet Reg Health Am 2021;4:None.

Risk estimates



Lancet Reg Health Am 2021;4:None.

Cardiometabolic risk factors ASCVDs



Lancet Reg Health Am 2021;4:None.

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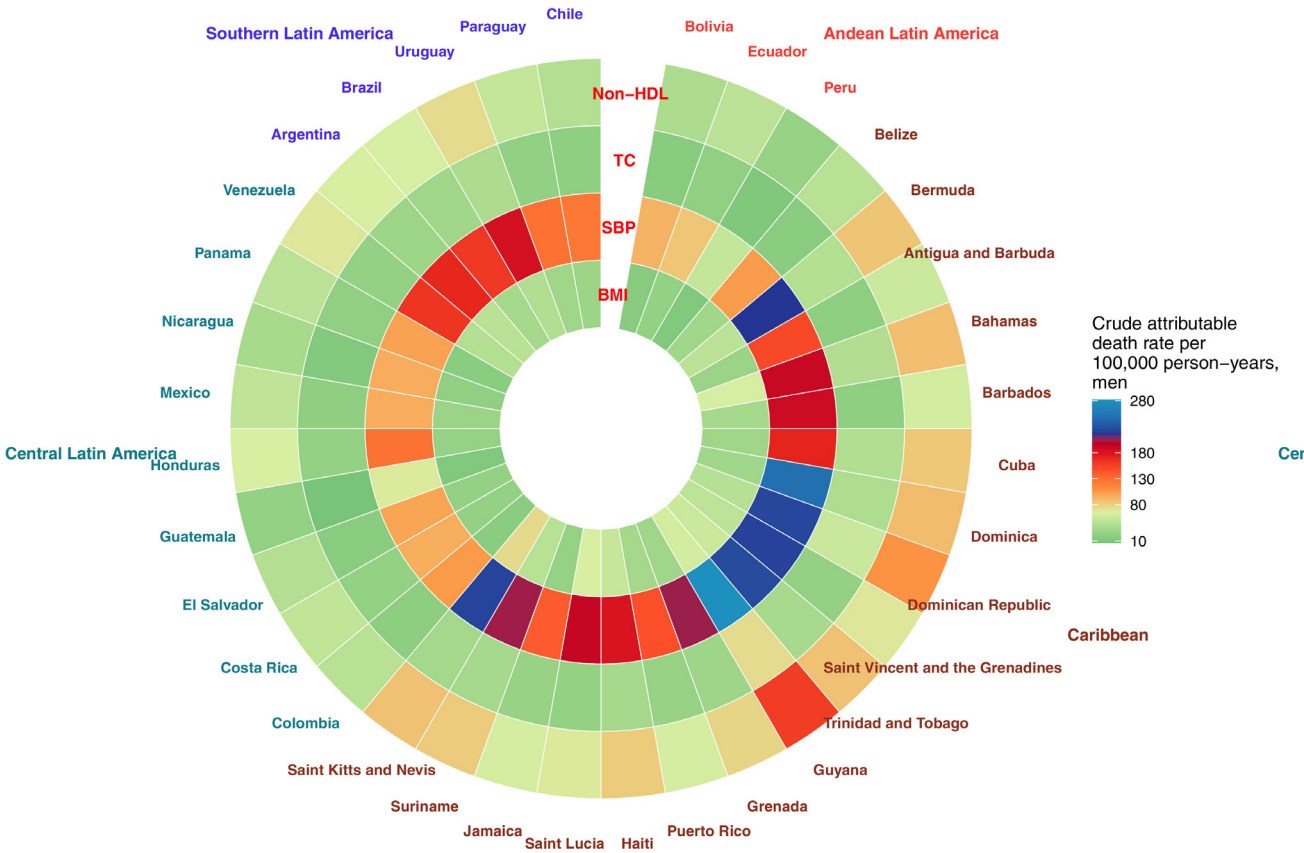

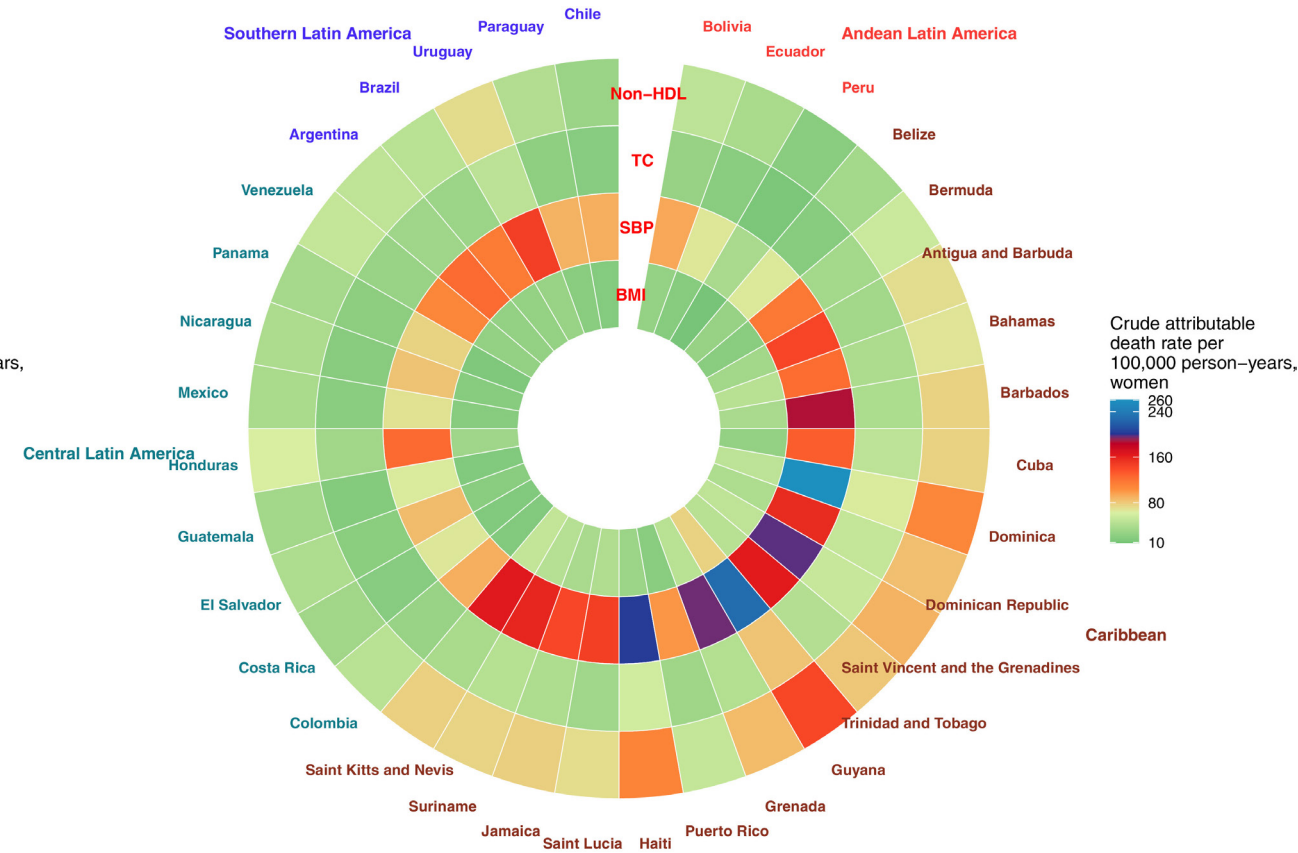

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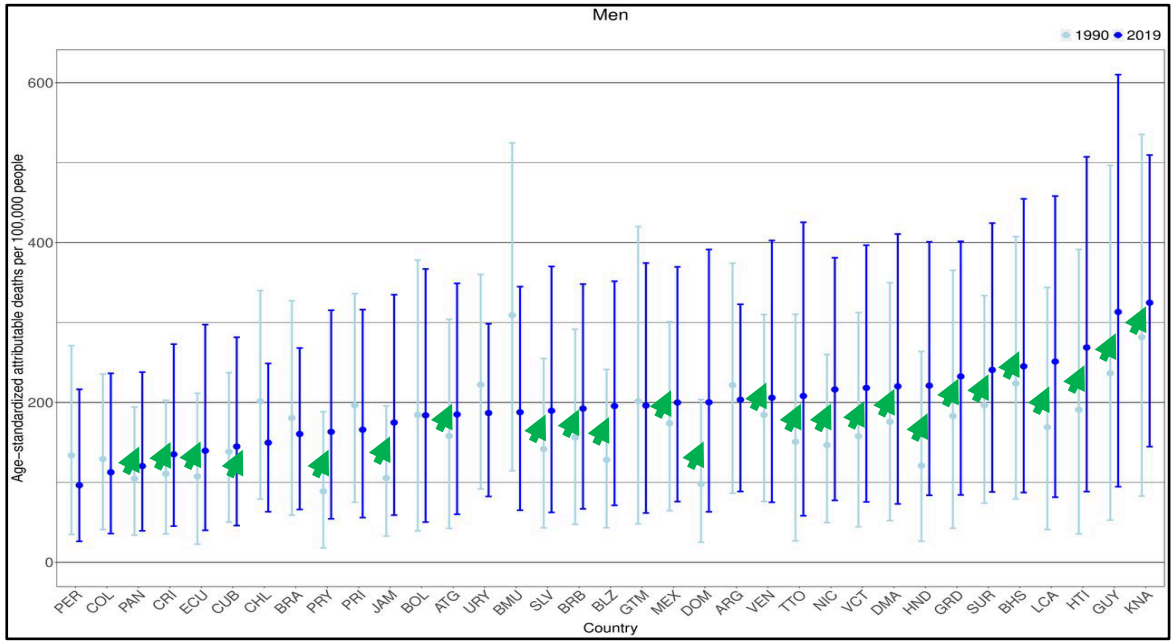
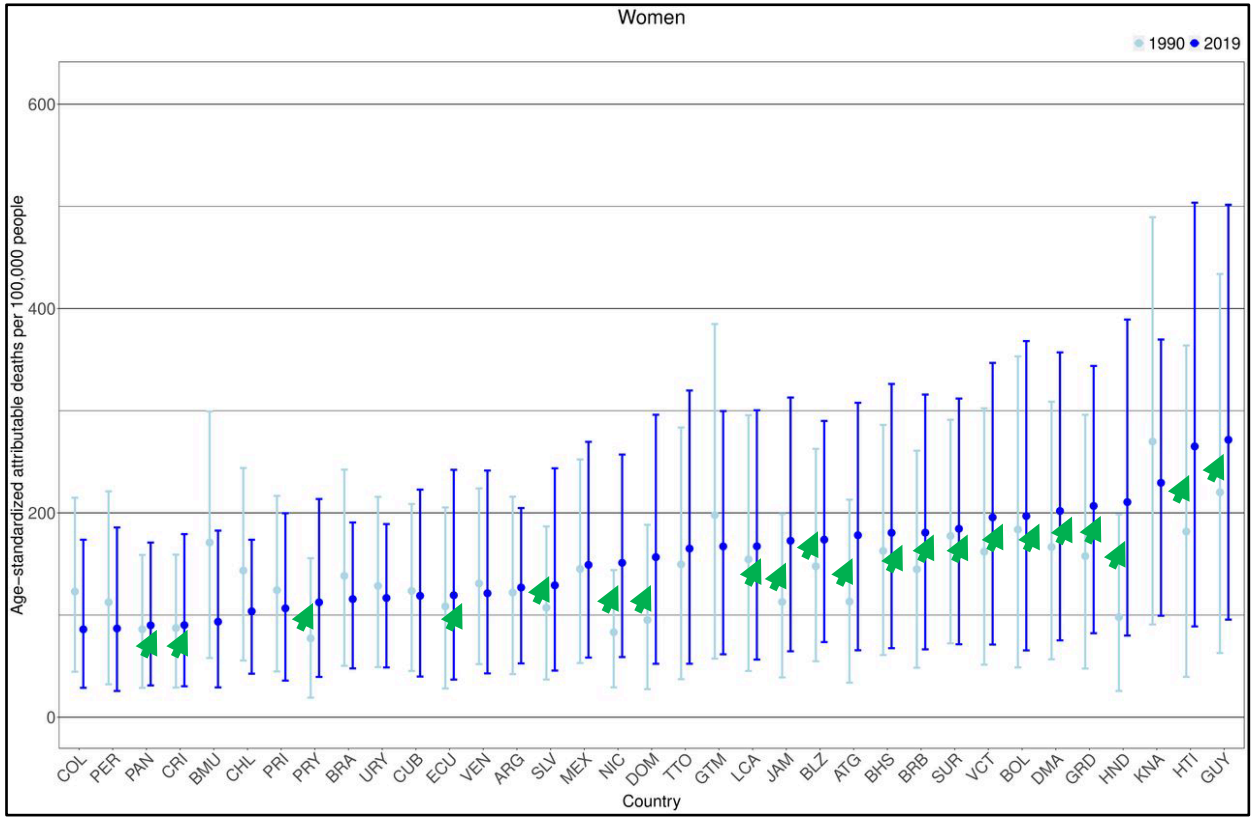




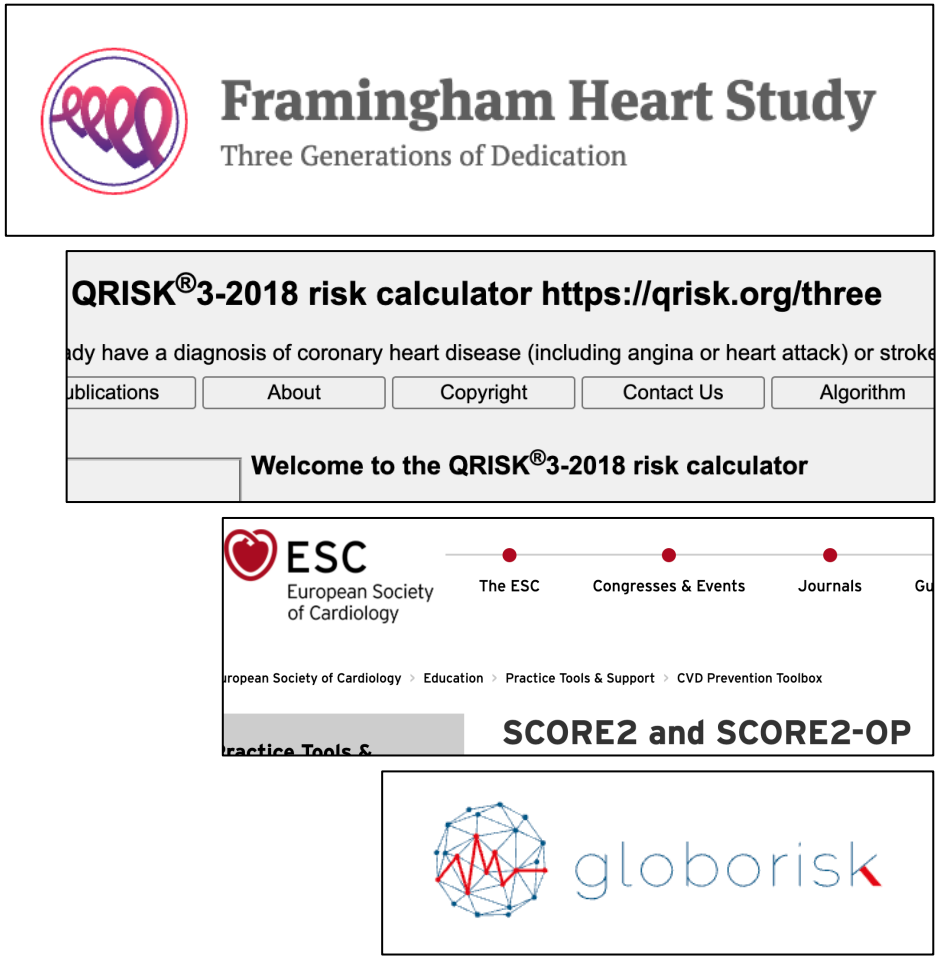
BMJ Open Diabetes Res Care 2022;10(1):e002673.

Cardiovascular risk score (1 of 2)

- Not a recent invention.
  - 1967 first Framingham version
  - 1991 and 1998 most used versions of Framingham
  - 2003 SCORE 1
  - 2014 Pooled Cohorts Equation
  - 2015 Globorisk
  - 2017 QRISK 3
  - 2019 WHO Cardiovascular Risk Charts
  - 2021 SCORE 2

- 363 predictions models (2013).

- No risk score for Latin America and the Caribbean:
  - Why? Needed?



BMJ 2016;353:i2416 // Glob Heart 2019;14(1):81-93

Cardiovascular risk score for LAC – Development

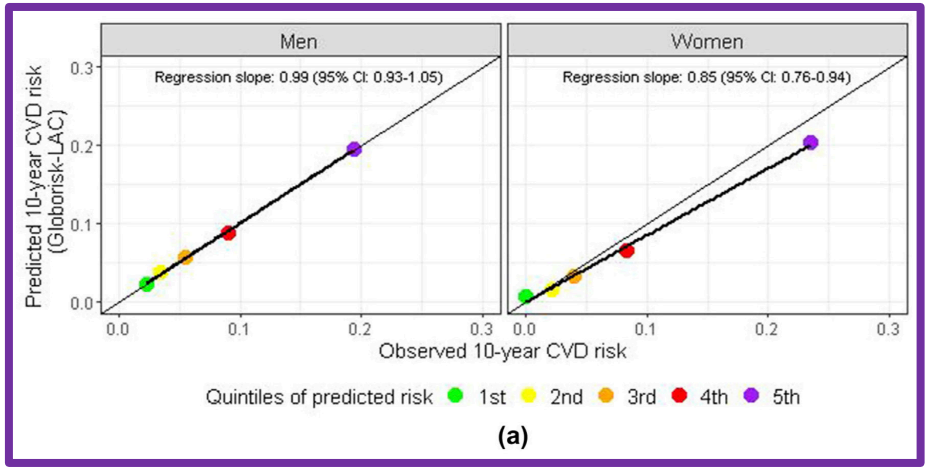
- New cardiovascular risk score for LAC: **Globorisk-LAC**.
- Two models:
  - Laboratory-based (total cholesterol)
  - Office-based (body mass index)

Predictors (unit/reference group)	Globorisk-LAC	
	Laboratory-based model	HR
SBP (per 10 mmHg)	0.4189 (0.2562; 0.5815)	1.227
Interaction between SBP and age (per 10 mmHg for 1 year)	-0.0034 (-0.0058; -0.0009)	
Total cholesterol (per 1 mmol/l)	0.1203 (0.0743; 0.1662)	1.128
Interaction between total cholesterol and age (per 1 mmol/l for 1 year)		
Diabetes	0.6691 (0.5080; 0.8303)	1.952
Interaction between diabetes and age		
Interaction between diabetes and sex (female)	0.1024 (-0.2857; 0.5825)	1.108
Smoker (current)	0.3268 (0.2014; 0.4521)	1.387
Interaction between smoker and age		
Interaction between smoker and sex (female)	0.1469 (-0.2887; 0.5825)	1.158

Lancet Reg Health Am 2022;9:None.

Cardiovascular risk score for LAC – Internal validation

Iteration	C-statistic (95% CI)	Calibration regression slope (95% CI)	
		Men	Women
		Laboratory-based	
Iteration 1	71% (67–75%)	1.020 (0.826–1.214)	0.406 (0.217–0.596)
Iteration 2	73% (69–77%)	0.973 (0.838–1.109)	1.371 (0.672–2.070)
Iteration 3	73% (69–76%)	0.890 (0.742–1.039)	0.840 (0.610–1.070)
Iteration 4	74% (70–78%)	1.078 (0.548–1.608)	0.559 (0.371–0.747)
Iteration 5	69% (64–73%)	1.067 (0.782–1. 523)	0.747 (0.588–0.907)
All observations	72% (70–74%)	0.994 (0.934–1.055)	0.852 (0.761–0.942)



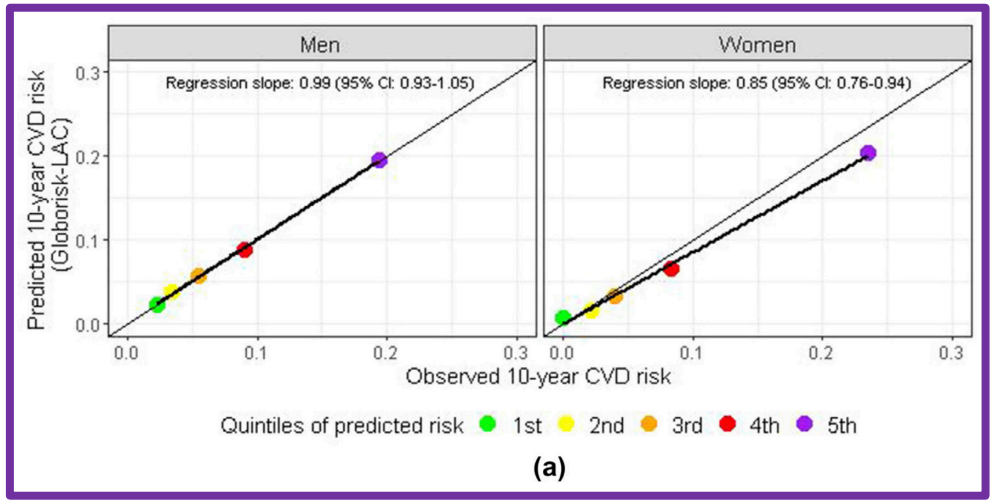
Discrimination: how well it separated positive vs negative.
[random chosen two people, the one with the outcome will have higher risk].

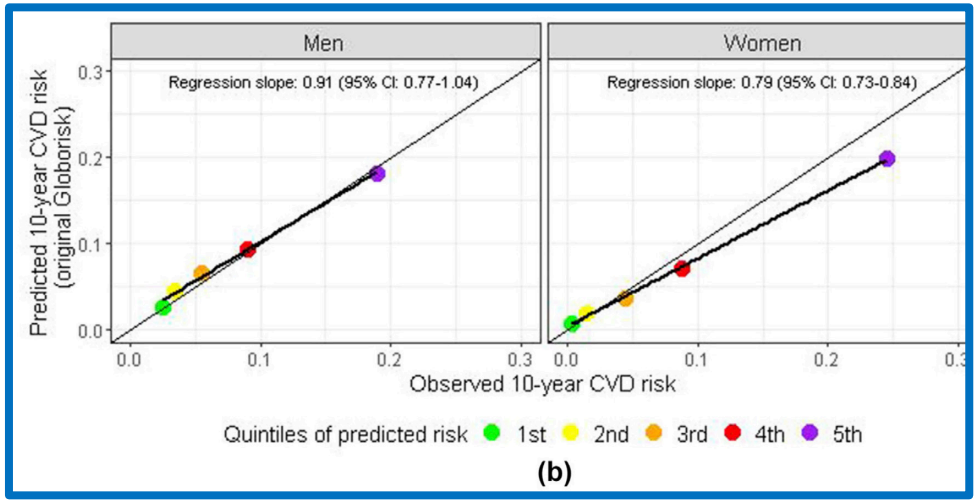
Calibration: agreement between observed and predicted risk.

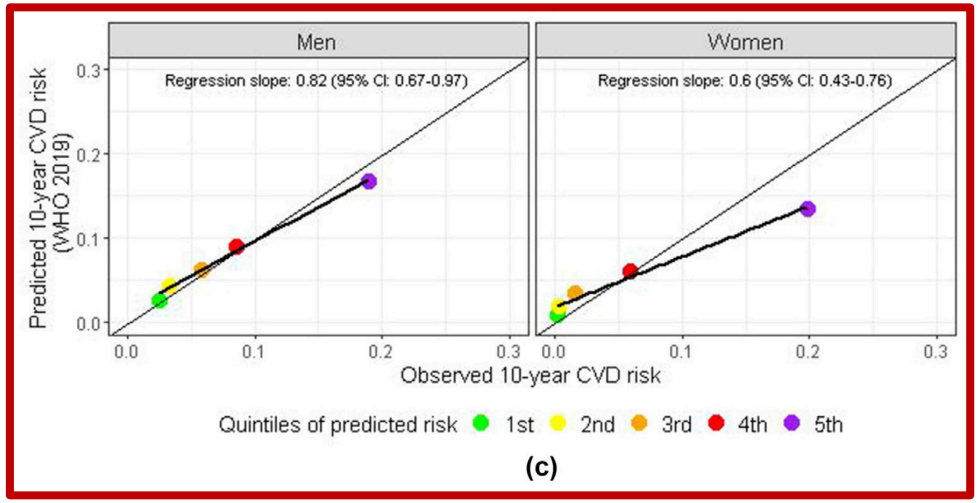
Lancet Reg Health Am 2022;9:None.

Cardiovascular risk score for LAC – Comparisons

- Globorisk-LAC had adequate discrimination (>70%) and calibration **(a)**.
- Better calibration than original Globorisk **(b)** and 2019 WHO Cardiovascular Risk Charts **(c)**.



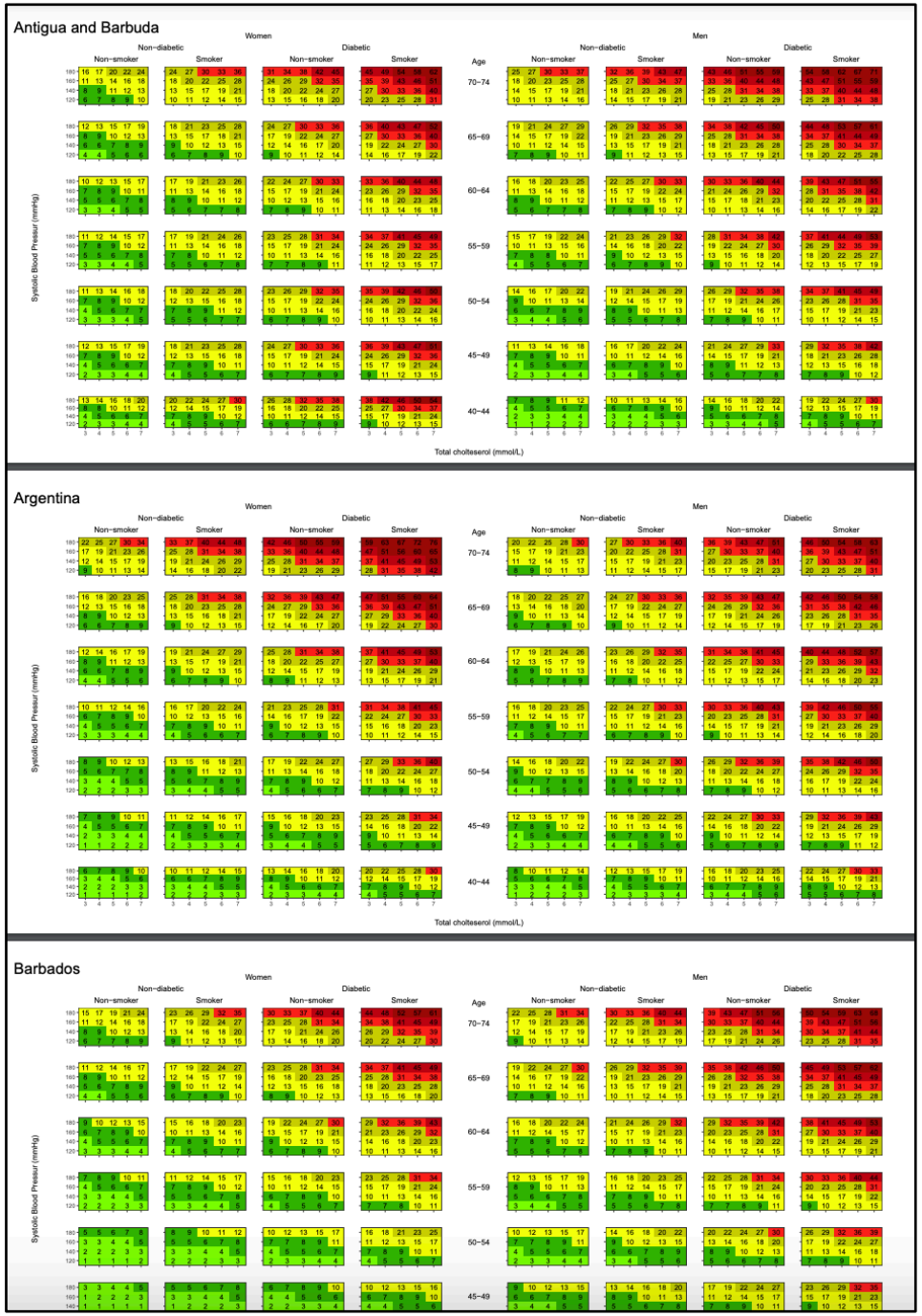




Lancet Reg Health Am 2022;9:None.

Cardiovascular risk score (2 of 2)

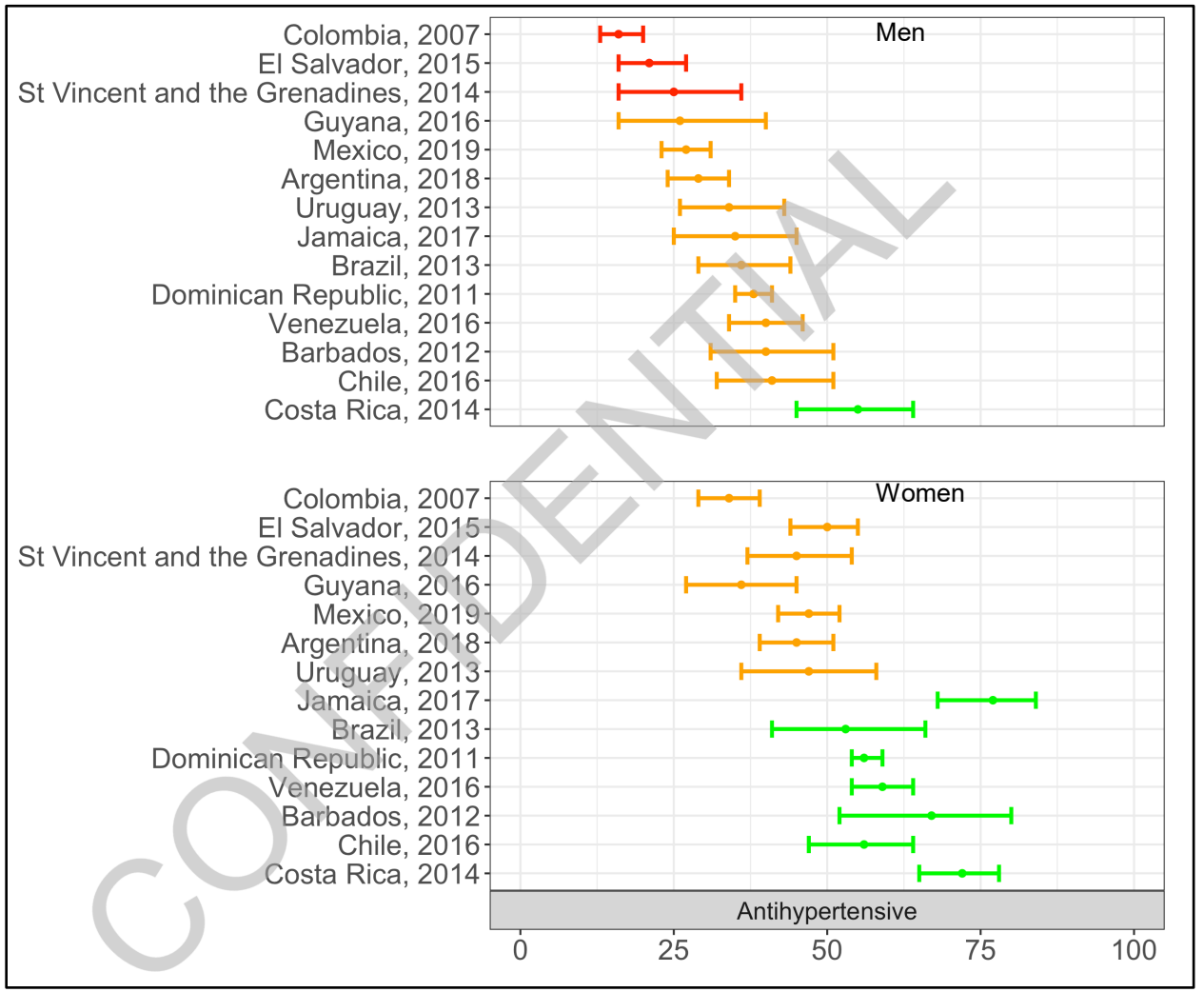
- Two models:
  - Laboratory-based (total cholesterol)
  - Office-based (body mass index)
- Recalibration for 31 countries
  - Risk charts
- Available as a package for R.



Lancet Reg Health Am 2022;9:None. // https://christopherbboyer.com/globorisk/

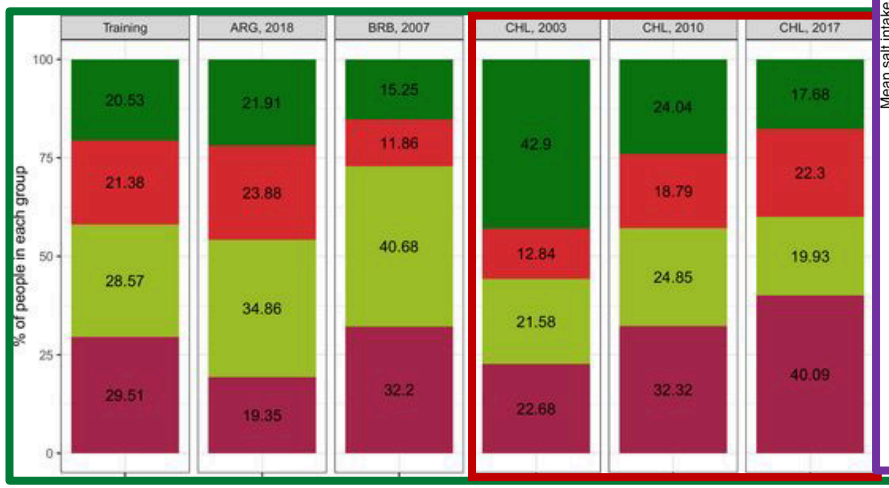
Treatment coverage

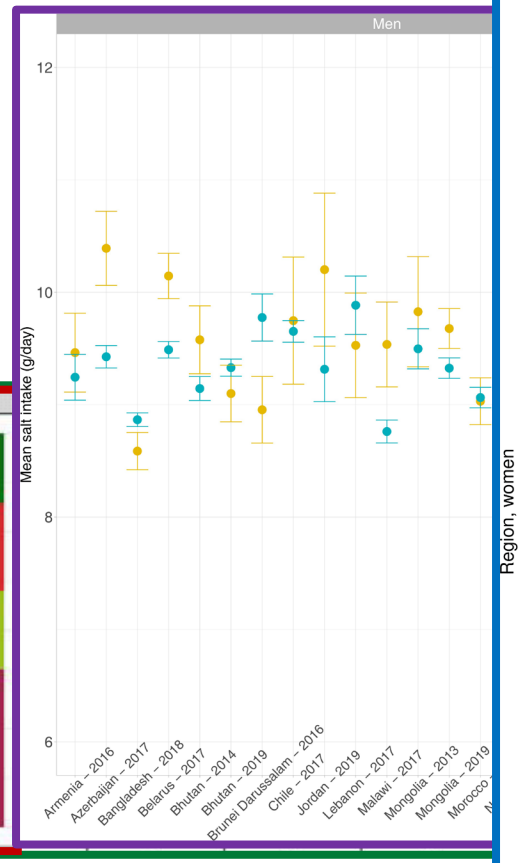
- Cardiovascular risk scores have clear use at the individual level.
- Can inform about the prevalence of high cardiovascular risk and treatment coverage and gap.
- Few countries, <25% antihypertensive treatment coverage and men disadvantage.

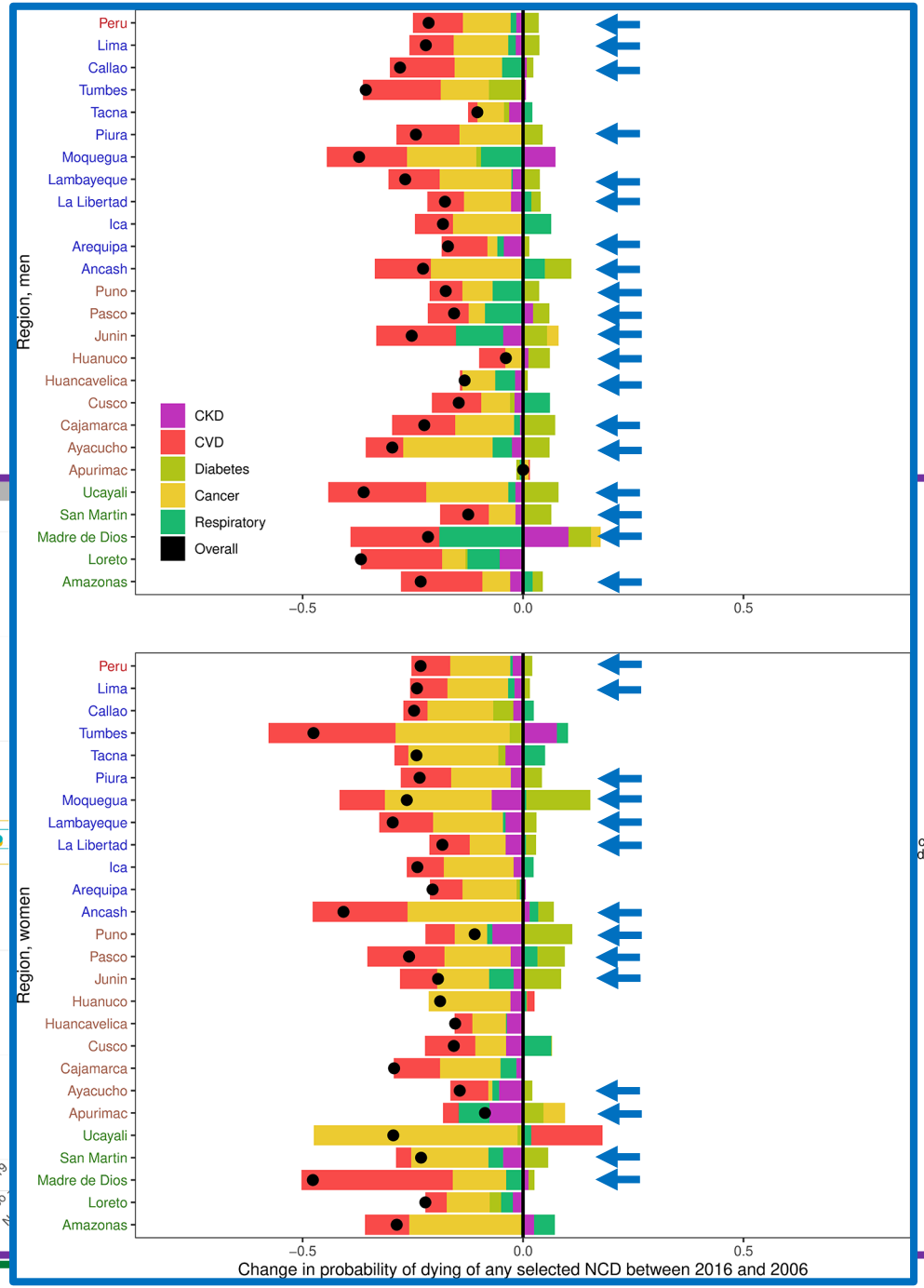


New challenges

- Population-based phenotypes.
- Digital biomarkers for population-based surveillance.
  - Leveraging “new” data sources.
- SDGs.







BMJ Open Diabetes Res Care 2021;9(1):e001889. // Elife 2022;11:e72930. // PLoS One 2020;15(10):e0240494.

Conclusions

- Latin America is an heterogenous region (between-countries, within-regions); same applied to people from this region.
- Still missing “simple” and standard tools for risk stratification - clinical practice and disease surveillance.
- Large data pooling consortia is feasible and provide valuable scientific evidence and actionable tools.
- Emerging approaches offer new opportunities.

I am happy to take any questions

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