



# Evaluation of death registrations in the Global Burden of Disease Study

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# Outline

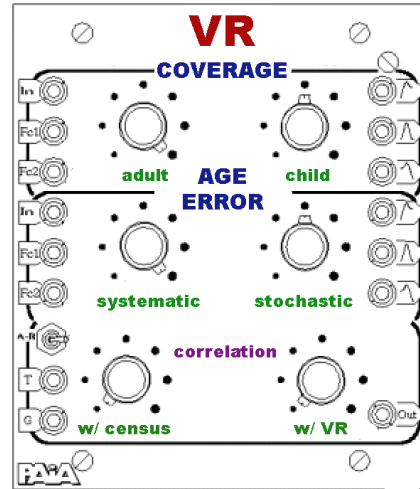
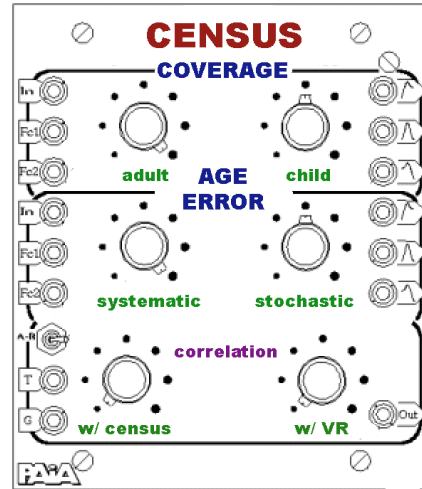
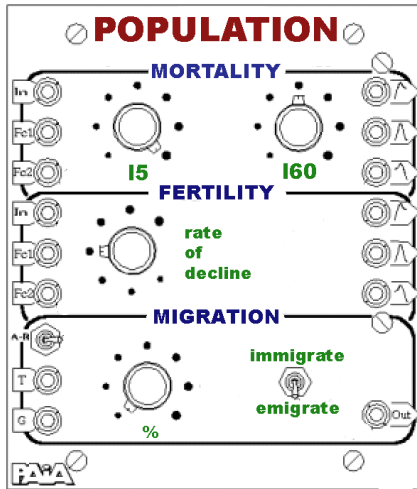
- DDM used in GBD
- Synthesis of completeness for death registration systems using DDM and completeness in the under-5 age group
- Some results from GBD2015
- Discussion

# Age trimmings

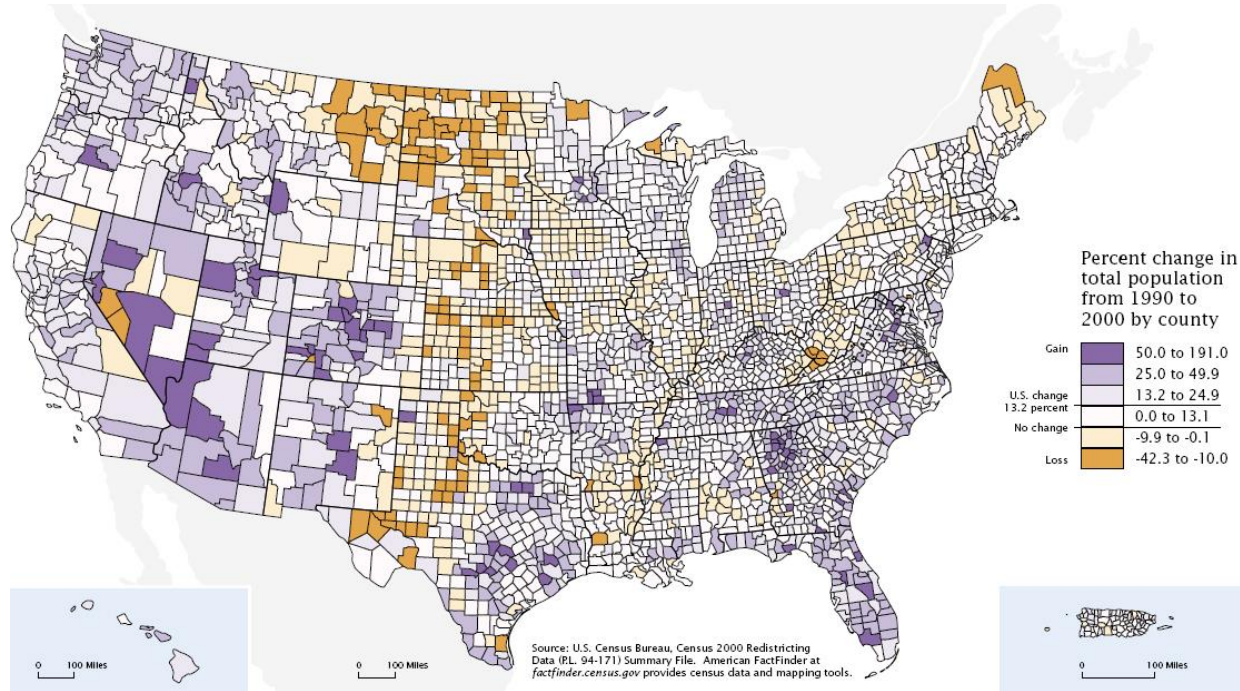
- The age groups used in the methods affect the results
- Solution: systematically evaluate age trimmings to find optimal for each method
- 78 different trimmings tested
- Minimum of 5 age groups in each

5 to 80	5 to 75	...	5 to 30	5 to 25
10 to 80	10 to 75	...	10 to 30	
15 to 80	15 to 75	...		
...	...	...		
50 to 80	50 to 75	...		
55 to 80	55 to 75			
60 to 80				

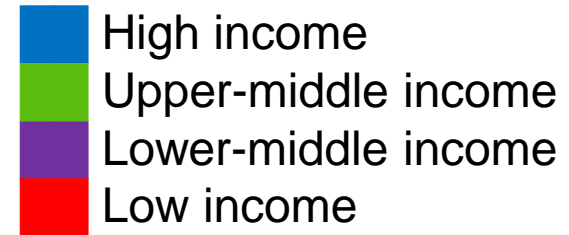
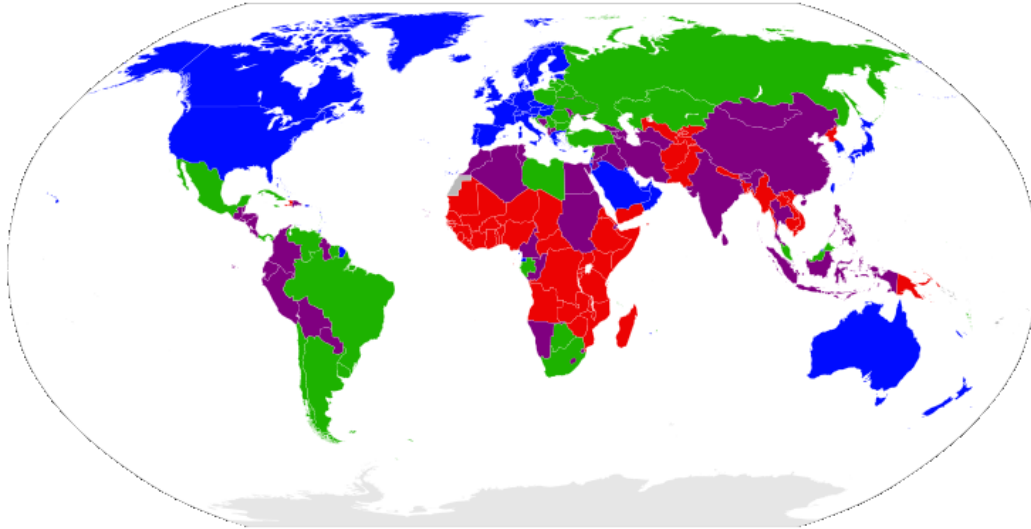
# Three testing environments to choose age-trims: simulation



# Three testing environments to choose age-trims: US Counties



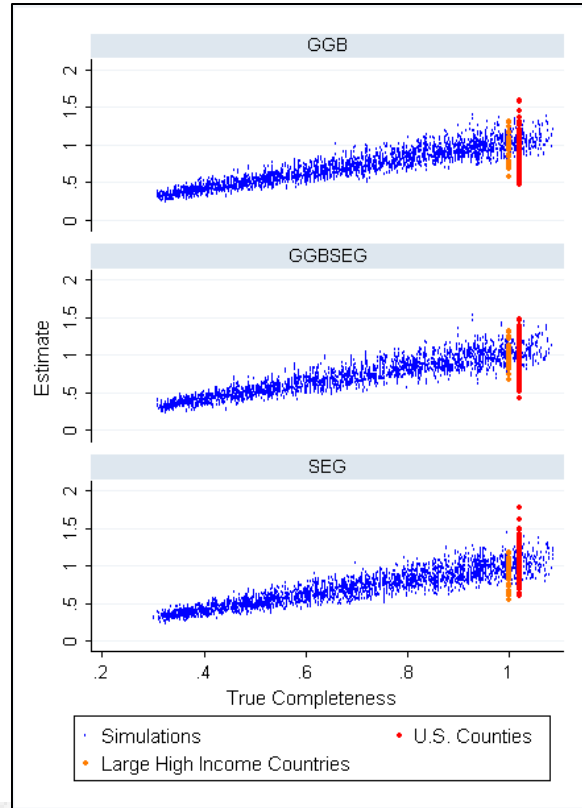
# Three testing environments to choose age-trims: Large High Income Countries



# Results

- Performance varies drastically across different trims
- Optimal trims based on a summary measure of performance in all three validation sets are:
  - GGB: 40 to 70
  - SEG: 55 to 80
  - GGBSEG: 50 to 70
- Large uncertainty even for best trims
- Age misreporting has significant effect on error
- Age heaping doesn't seem to have an appreciable impact.

# Large uncertainty even for the best trims





# Assessing completeness: data synthesis

- 1) What to do when multiple estimates of completeness are available through different methods?
- 2) What additional information could we use?

# Completeness synthesis in GBD

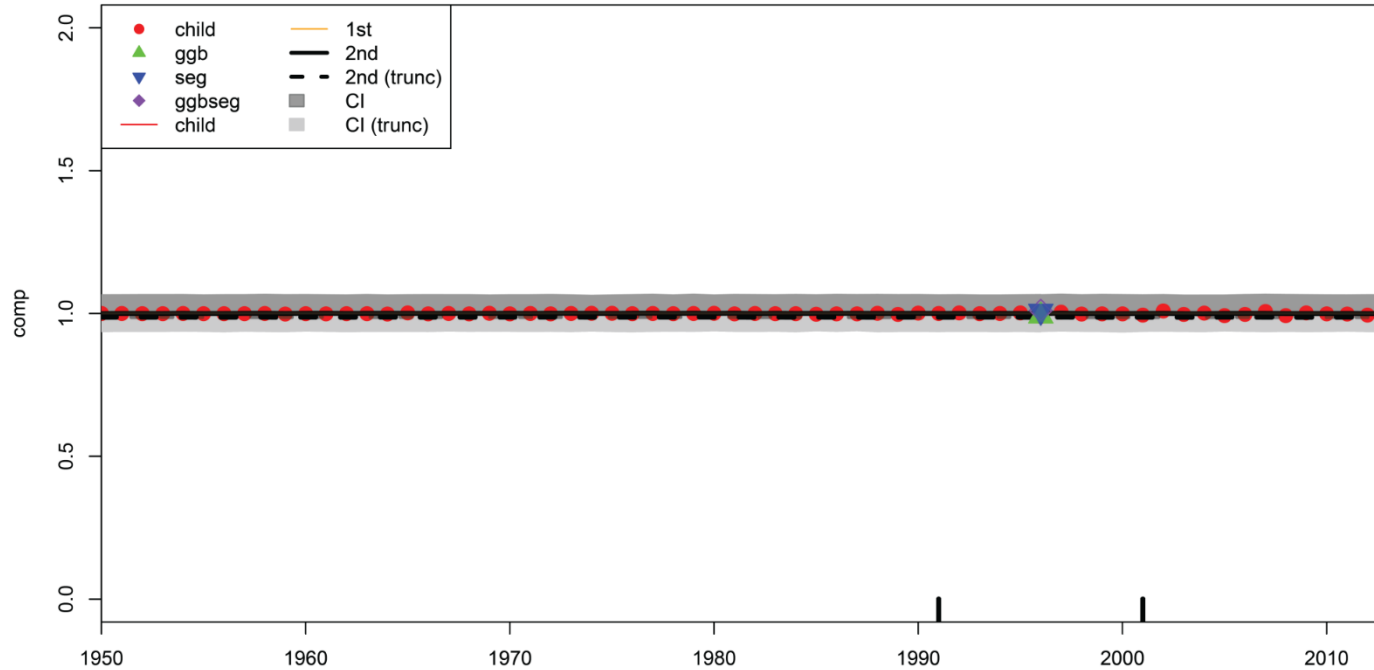
- In GBD, the process of estimating completeness of death registration for adults is based on estimates of adult completeness from DDM methods updated for GBD as well as completeness in the under-5 age group informed by estimates of U5MR in GBD.
- Two assumptions:
  1. Completeness changes gradually generally and assessment of completeness for a given year can be informed by estimates for past and future years.
  2. Completeness could be similar among countries in the same region.

# Completeness synthesis in GBD

- Based on the aforementioned assumptions, we want to apply a model that can borrow “strength” across countries and over time.
- In this two-stage model, we first predict adult completeness based on child completeness, we then use a spatial-temporal regression model to incorporate information about adult completeness from the aforementioned DDM methods.
- U5 completeness is calculated as the ratio between input 5q0 and the estimated 5q0 for the country using Spatial-temporal Gaussian process regression.

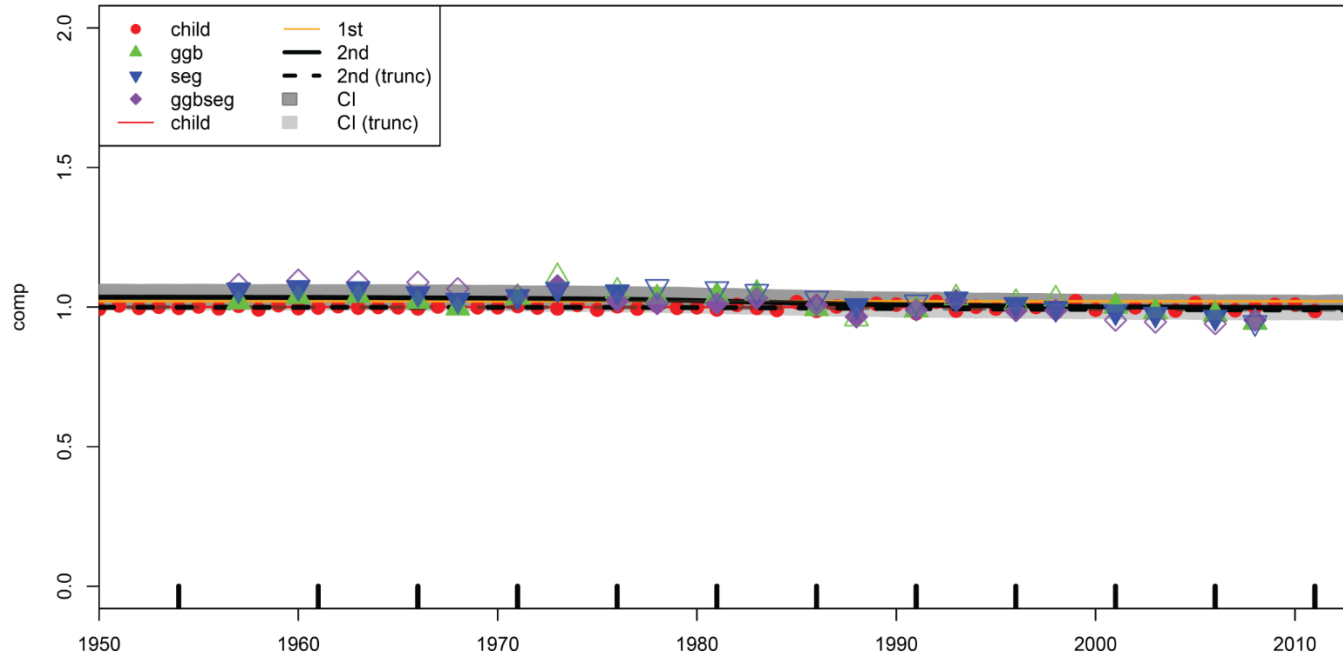
# Assessing completeness: data synthesis

CZE - Central Europe - Czech Republic  
both - VR



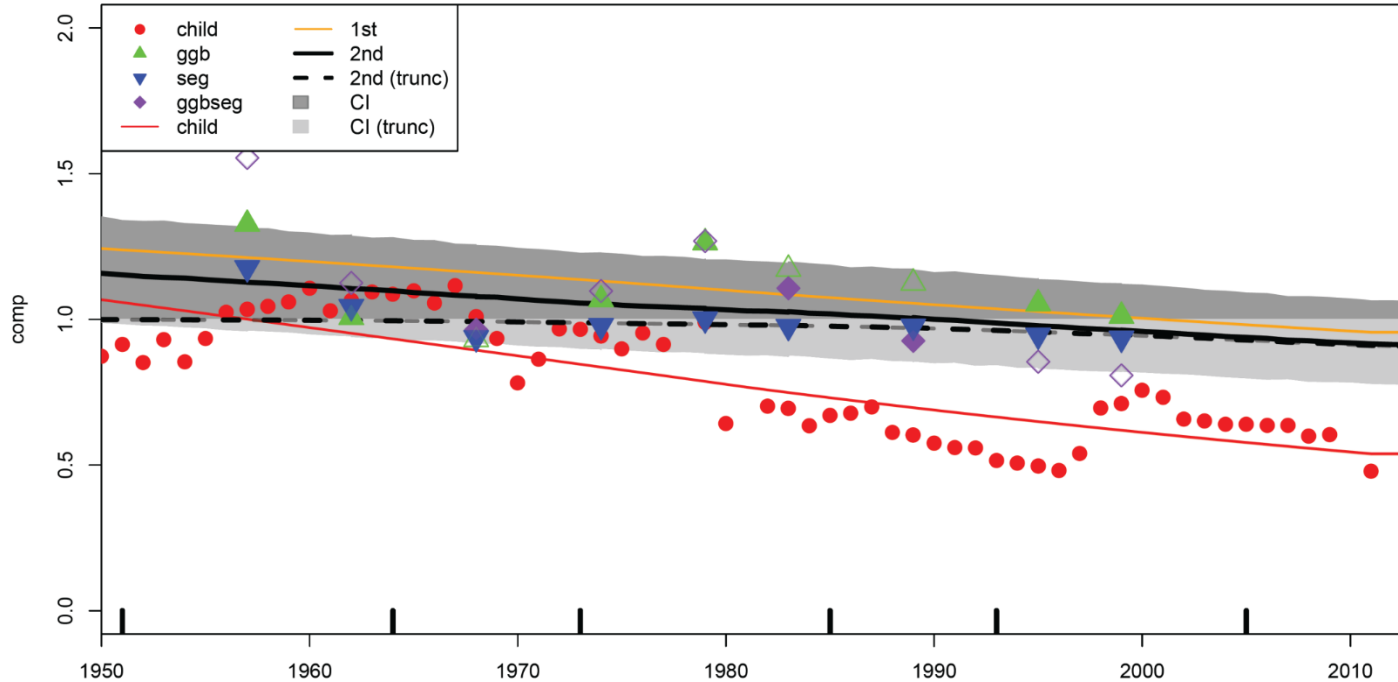
# Assessing completeness: data synthesis

AUS - Australasia - Australia  
both - VR

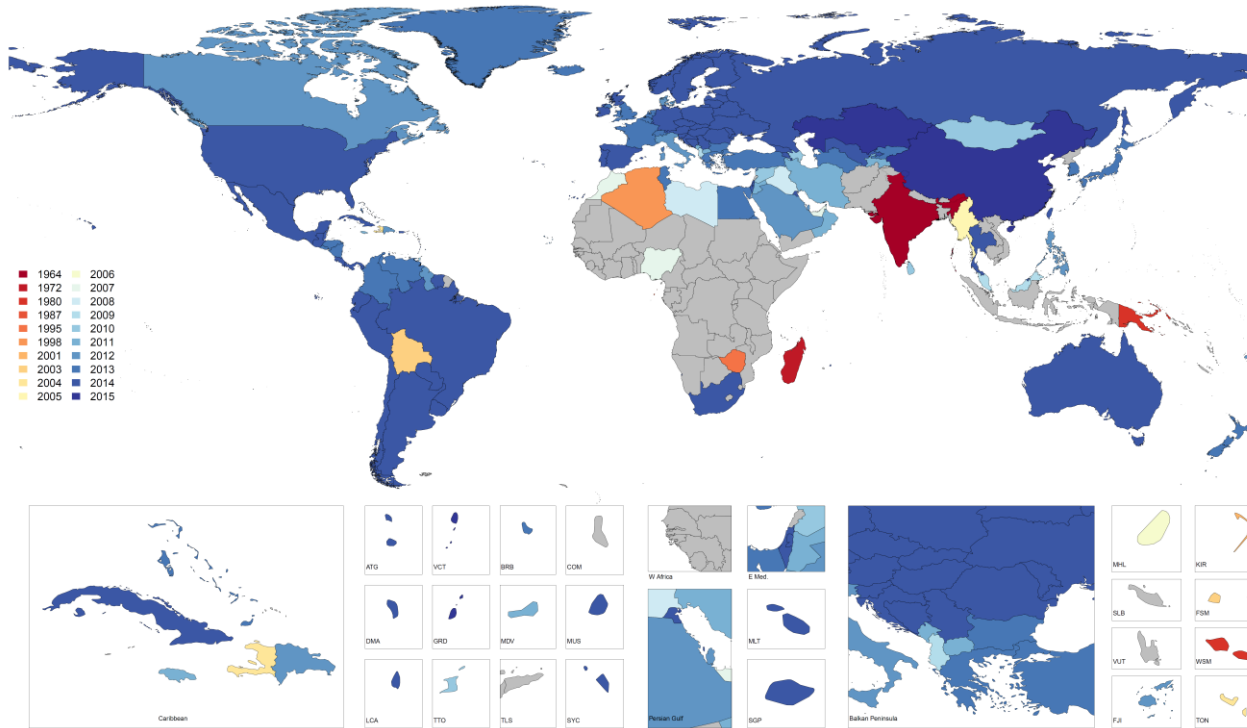


# Assessing completeness: data synthesis

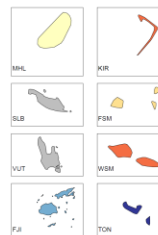
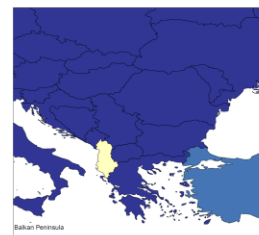
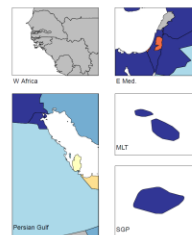
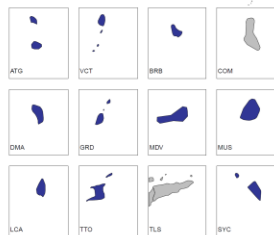
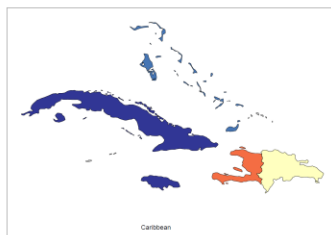
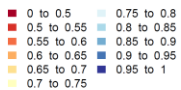
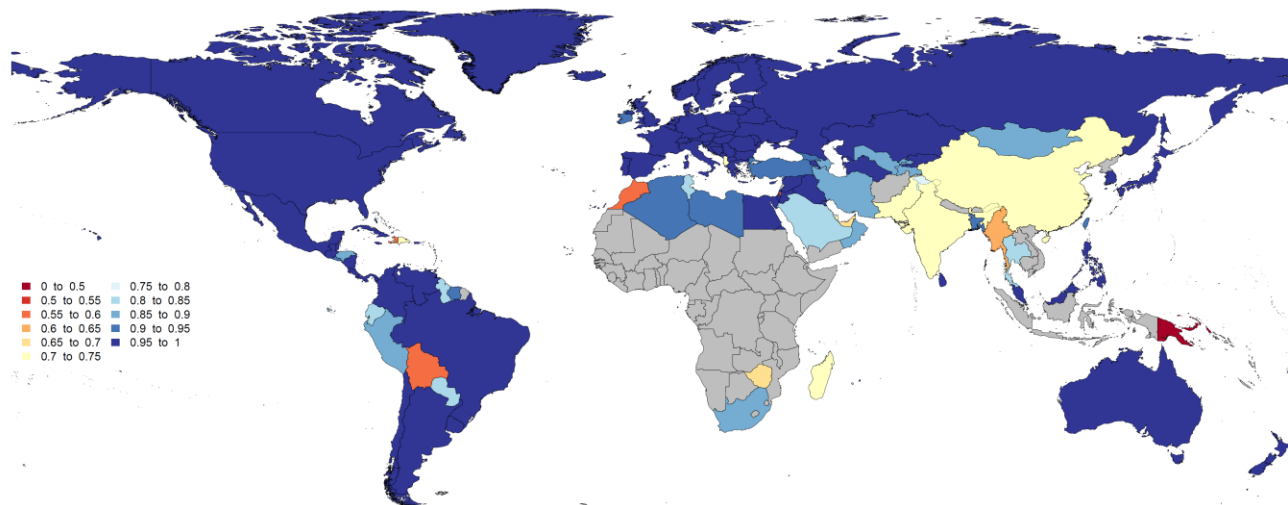
COL - Central Latin America - Colombia  
both - VR



# Latest year of death registration in GBD

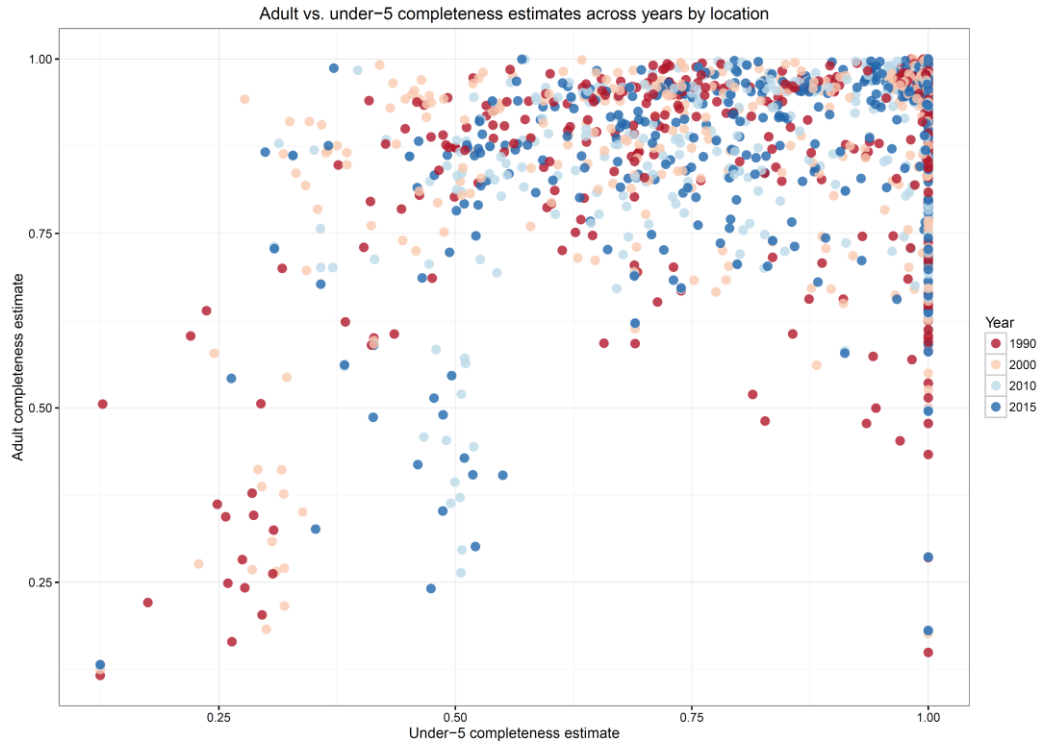


# Completeness for the latest year of death registration: VR, SRS, and DSP





# U5 v.s. adult completeness



# Estimated completeness compared to implied completeness



# Discussion

- More efforts need to be done to properly select specific DDM method instead of non-replicable methods
- Method that is more proper in evaluating completeness at the subnational level
- Dealing with migration, especially internal migration where empirical data are rare.
- Integrating uncertainty of DDM/completeness in entire all-cause mortality estimation process: computation time, disk space limitation