Adult and old-age mortality data: evaluation and modelling for deficient or lacking VR countries in Latin American countries
LAMBdA

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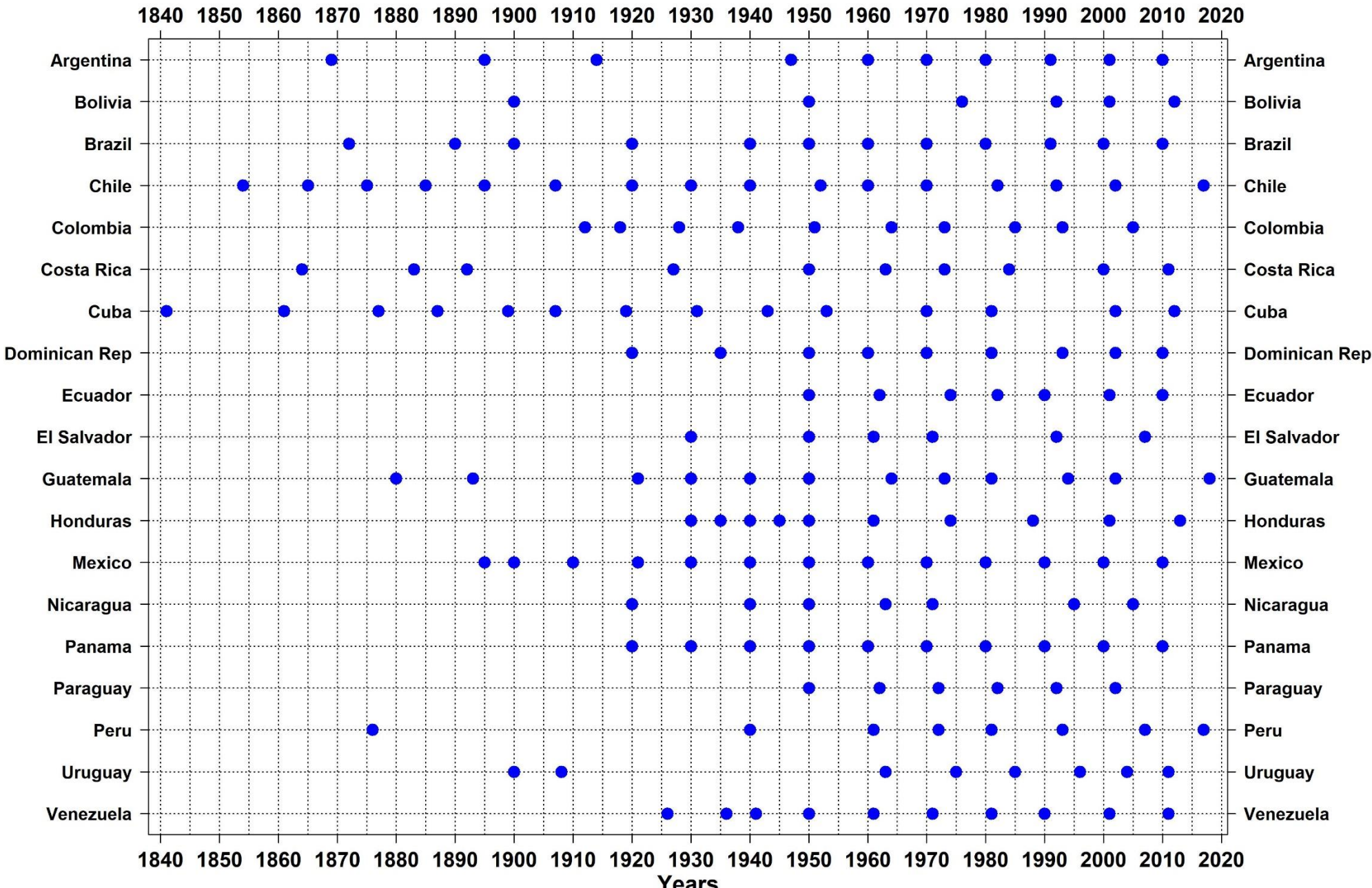
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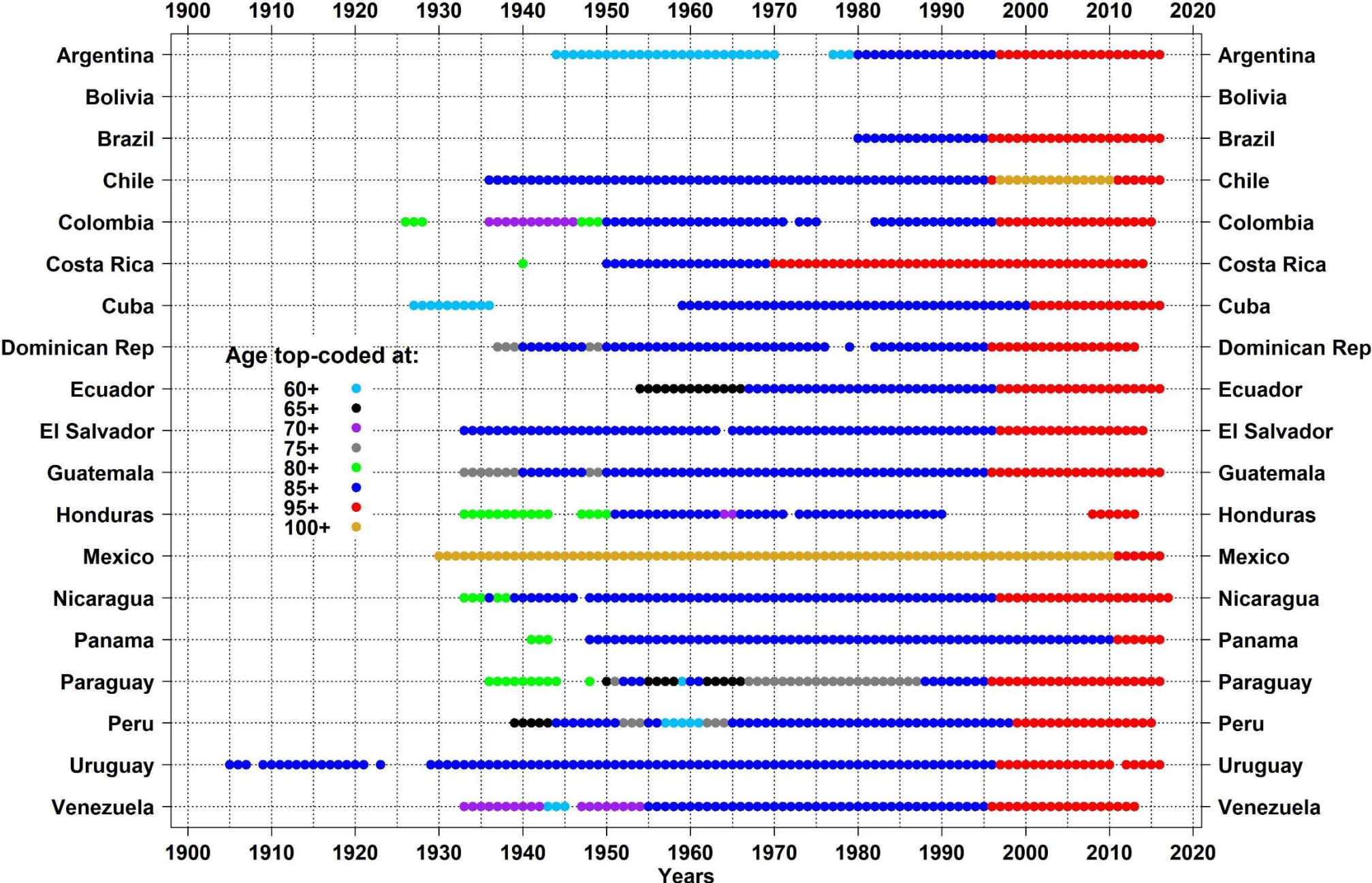**Community Health Sciences**

Data problems

- Completeness of death registration
- Completeness of censuses
- Age misreporting
  - Age heaping
  - Systematic age misreporting

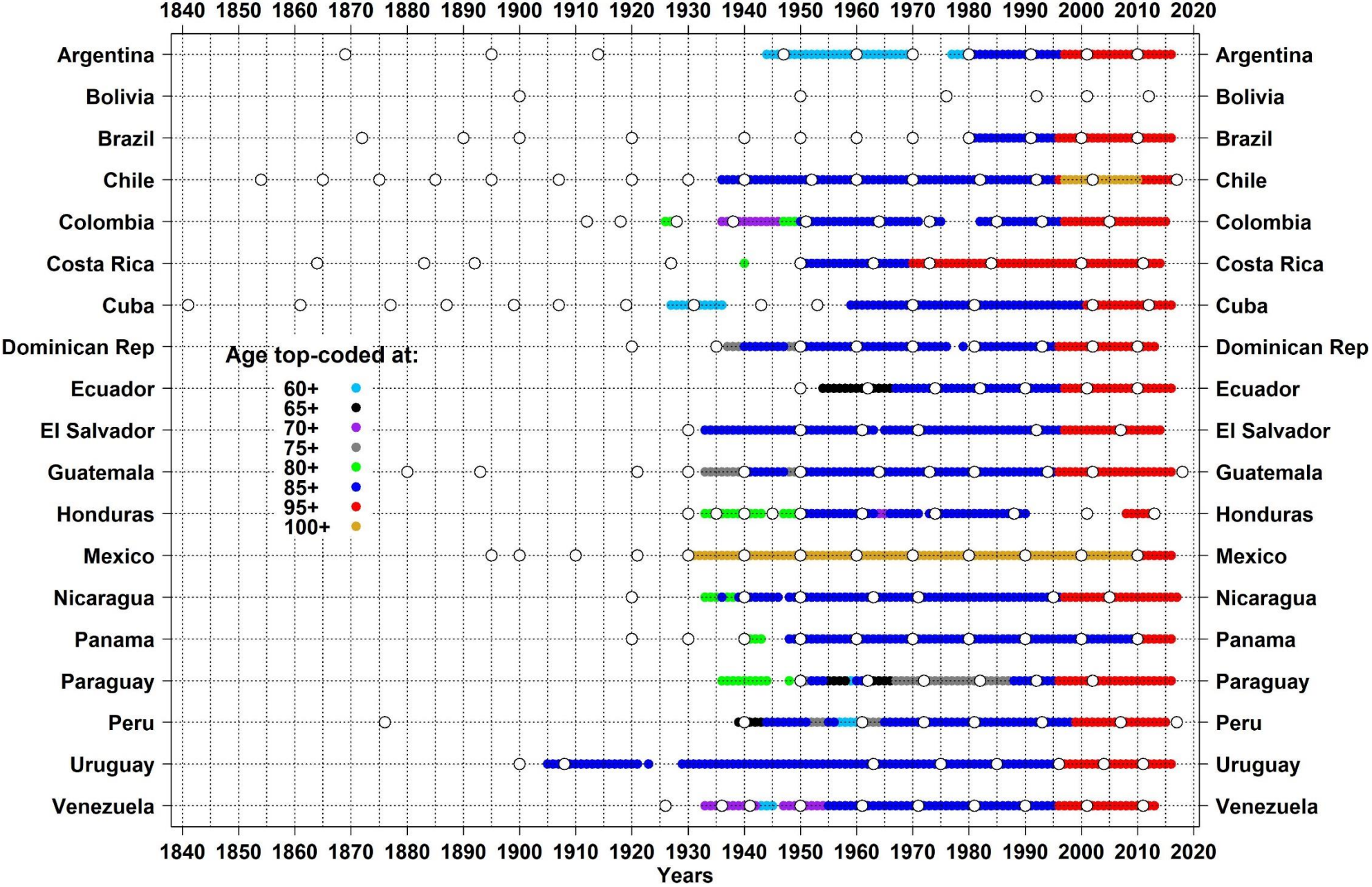# Data sources: Census

Data sources: Vital statistics

Data sources: Census & Vital Statistics

Adult pivotal life tables:

1. Two successive census and complete counts of intercensal deaths: two consecutive censuses and counts of intercensal deaths. We adjust adult mortality rates of the reference intercensal period for

- (a) relative completeness of death registration and

- (b) adult age misreporting

- The adjustment is based on census counts at both ends of the intercensal period and the entire series of intercensal deaths.

- The pivotal life table is computed using the adjusted average rates for the intercensal period centered in the middle of it.

Adult pivotal life tables:

2. Single population census and death counts in neighboring years: available is reduced to one census and a limited count of deaths within a period of three to five years centered around the census (pivotal) year.

- We adjust adult mortality rates centered on the census year for both relative completeness and age misreporting

Adult pivotal life tables:

3. Two successive censuses but no intercensal deaths counts: there is information for two consecutive censuses separated by at most 15 years but no or only incomplete information on death counts during the intercensal period
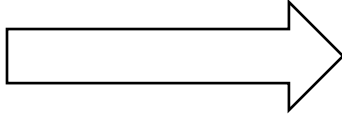
a) We first estimate an adult pivotal life table centered in the middle of the intercensal period using the generalized ogive procedure

b) We then use each census and information on intercensal rates of growth to estimate life tables for each of the two censal years

Simulation study

designed to assess the performance and establish a ranking of alternative methods to correct for errors due to

- under (over) counting of population and deaths by age groups (relative completeness) and

- age misreporting after 1950

Simulate populations representing different demographic profiles (stable, quasi-stable and non-stable) driven by combinations of
(a) constant fertility and mortality,
(b) constant fertility and declining mortality, and
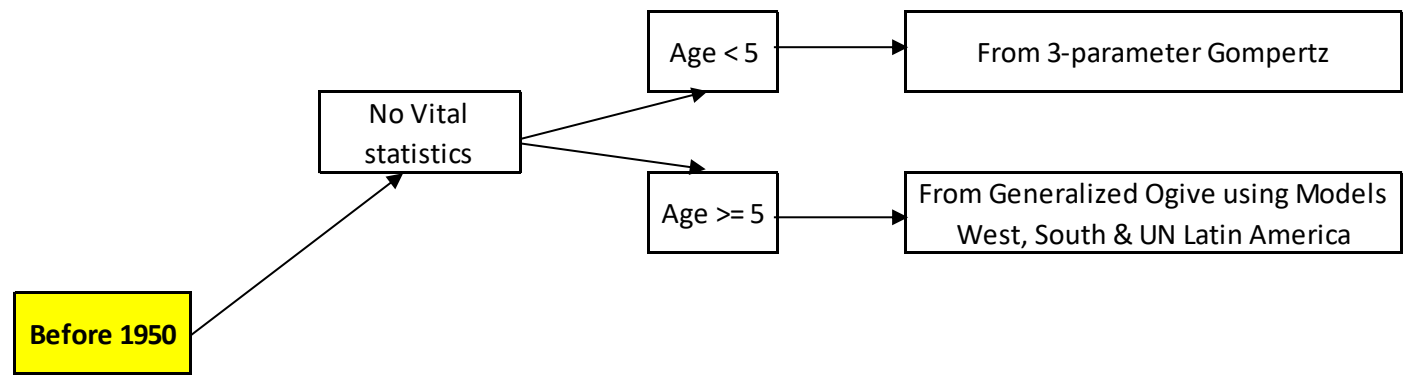(c) declining fertility and declining mortality

→ combine these population profiles with different patterns of distortions due to faulty coverage of population and death counts as well as of age misreporting

Completeness of death registration and census:
- Deaths: Bennett-Horiuchi (BH)
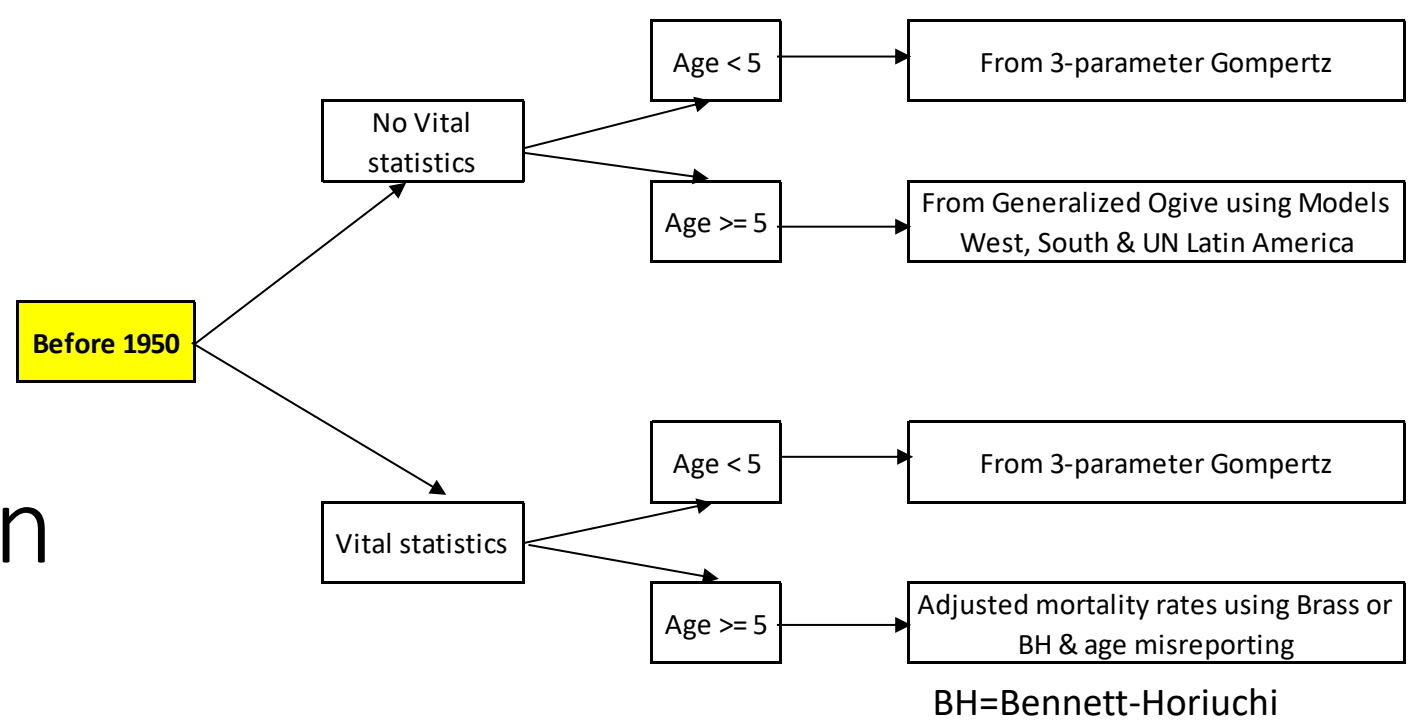- Census: Brass' method

Age misreporting:

- **Age heaping**: McNeil splines applied to observed cumulated population distribution and Sprague multipliers

- **Systematic age misreporting**: proposed a method using a matching study in Costa Rica to estimate standard pattern of population age misreporting:
  - Probability of over(under) stating age at age *x*
  - Conditional probability of over(under) stating age by 1-10 years given over(under) statement at age *x*
  - The above is referred to as "standard pattern of age misstatement"
  - Generate a "standard matrix" of population transfers across ages

Before 1950 → No Vital statistics

No Vital statistics → Age < 5 → From 3-parameter Gompertz

No Vital statistics → Age >= 5 → From Generalized Ogive using Models West, South & UN Latin America
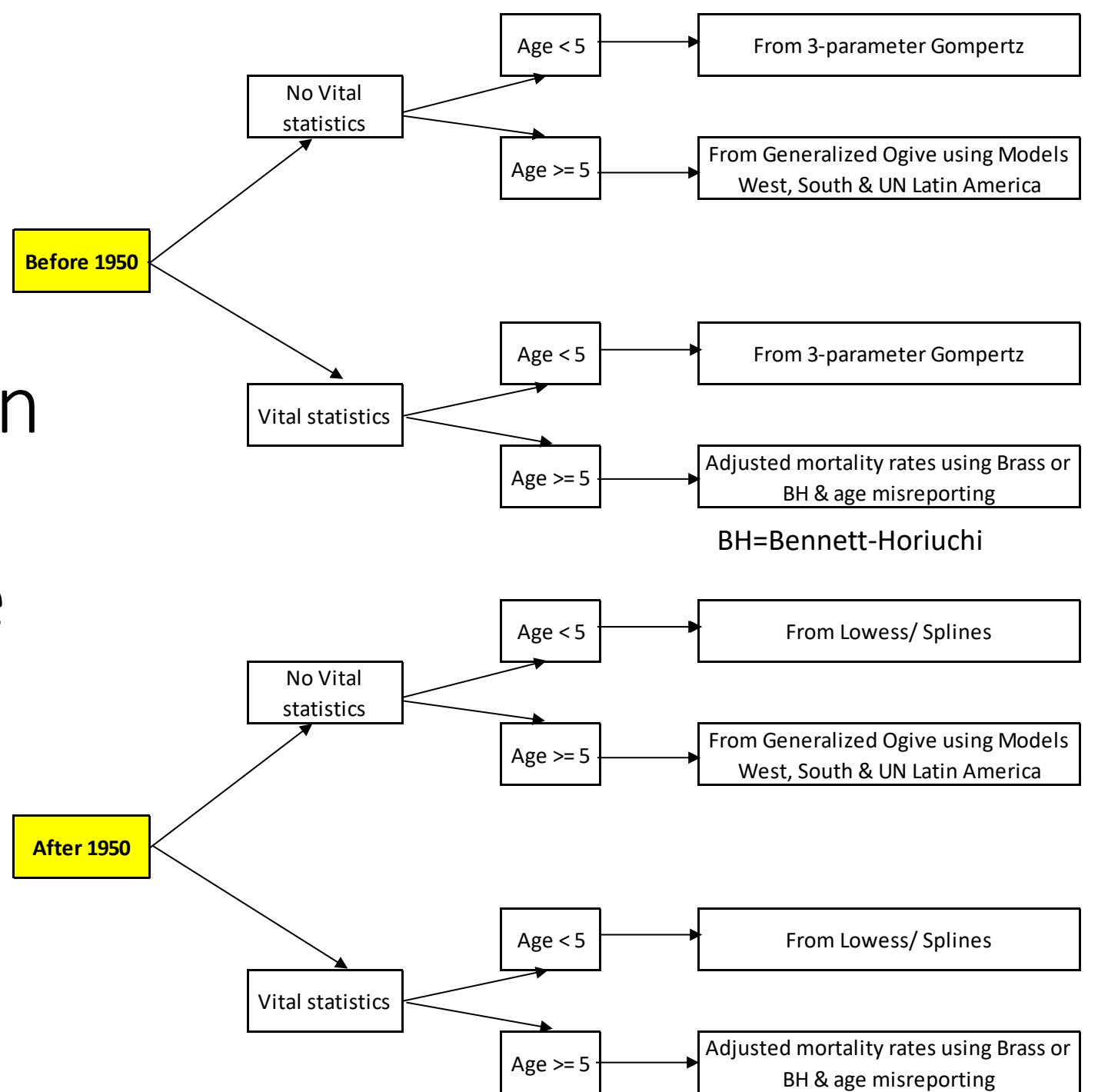
Graphic representation of decisions points to construct LAMBdA life tables

Graphic representation of decisions points to construct LAMBdA life tables

Before 1950

No Vital statistics

Age < 5 → From 3-parameter Gompertz

Age >= 5 → From Generalized Ogive using Models West, South & UN Latin America

Vital statistics

Age < 5 → From 3-parameter Gompertz

Age >= 5 → Adjusted mortality rates using Brass or BH & age misreporting

BH=Bennett-Horiuchi

Graphic representation of decisions points to construct LAMBdA life tables

Conclusions after applying correction methods to data in Latin American countries 1850-2015

- Based on a large simulation study we found that the following sequence of steps worked best for correcting the data:

1. Correct age-specific growth rates using Brass method

2. Apply one of the variants of Bennett-Horiuchi

3. Correct for age misstatement at older ages

4. The methods we selected are based on a simulation, these methods are best (less sensitive) when all the simulated errors are present. It is thus possible that other methods may be optimum under specific errors the user may know are present in the data (e.g., completeness is not constant by age)

Thank you

- LAMBdA website: https://www.ssc.wisc.edu/cdha/latinmortality2/
- Documentation: https://www.ssc.wisc.edu/cdha/latinmortality2/wp-content/uploads/LAMBdA_documentation_Jan2020.pdf

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