Training course on demographic evaluation of age and sex data

Part 3(ii)

27 May – 3 June 2022
Contents of Part 3

• 3(i) Beers’ interpolation
• 3(ii) Evaluation of data on age of mothers giving birth
• 3(iii) Evaluation of data on age at death
Sources of data: ages of mothers

• **Civil registration**
  • Recommended that the age of the mother is captured in civil registration of births

• **Surveys**
  • DHS and MICS data routinely collect full birth histories allowing calculation of age of mother at birth of the child

• **Censuses**
  • Question on births in the last year classified by age of mother
    • This is a little more intricate, as there are technical issues associated with the reference period relative to the date to which the mother’s age refers
Diversion:
Age of mother from census data (1)

• The issue with census data is this: questions are asked about the number of births (or simply, was there a birth) in the year before the census
  • Date of the child’s birth is seldom asked, even if date of mother’s birth is known
  • In general, then, we have to assume that any reported birth(s) occurred, on average, 6 months before the census date
  • However, if the mother’s own date of birth is not provided, her age is that at the census date, NOT at the (putative) date of the child’s birth
    • Meaning that, on average, mothers are 6 months younger at the time of the birth of a child than they are reported to be at the census date
Diversion:
Age of mother from census data (2)

• This problem is material, especially at the extremes of the age range of childbearing, when one only has the age of the mother at the time of the census
  • Women ‘aged’ 17 last birthday (on average, 17 ½ at the time of the census) would be 6 months younger (on average, 17) when the child was born
  • While this error can be corrected for in the derivation of fertility rates, using a Relational Gompertz model, much harder to adjust the numerator alone

• If one has mothers’ date of birth, the age of the mother at the time of the child’s birth (assumed on average 6 months earlier) should be derived
Source data

- From civil registration / survey data
  - A tabulation covering births registered in a given calendar year(s), by the age of the mother at birth
    - Ideally those births should be adjusted for late registration as described in the recent Guidelines for Estimating Completeness of Civil Registration of Vital Events produced by UNESCAP
  - Group ages of mother at birth into 5-year age groups (15-19, 20-24 ... 45-49)
    - Ignore births to mothers aged less than 15, or older than 50 – the numbers are both small, subject to substantial variation. Also, no way of deriving a counterfactual comparator from the available UNWPP data outside of the age range 15-49
Source data (2)

- From census data
  - A tabulation of births in the year before the census by age of mother (preferably by age of mother at birth if available)
- SAMPLE data (South Africa vital registration data)
Counterfactual data

• You might use any population projection output (e.g. from Spectrum, or internally- or nationally-produced population projections) that produces a counterfactual estimate of the numbers of births by age group of mother by calendar year.

• The recommendation, however, is to use the most current (national-level) projections produced by the UN Population Division, the UN World Population Prospects.

• Limitations:
  • no projections at sub-national level
  • manipulation of the available output to produce a counterfactual estimate of numbers of births by age group of mother for a given calendar year is required.
Counterfactual data: UNWPP (1)

• The published data from the UNWPP do not directly lend themselves for use as a counterfactual source of data
  • A tabulation of births by age of mother is available, but published only for 5-calendar year aggregates (mid1950-mid1955; mid1955-mid1960 …)
  • One could apply Beers’ interpolation to this series to derive annual estimates and then interpolate each annual estimate to provide an estimate of births by age of mother in each calendar year, but the availability of other tabulations in the UNWPP makes a more refined approach possible. In particular we can use
    • The published numbers of women at mid-year of each calendar year by single years of age; in conjunction with
    • The published schedules of age-specific fertility rates for 5-year periods and 5-year ages
Counterfactual data: UNWPP (2)

• Summary of the recommended approach
  • Apply Beers’ interpolation to the UNWPP ASFRs (published in 5-calendar year periods) to derive annual ASFRs by age group
    • Fertility rates change only slowly, and are not affected by population momentum
    • The resulting fertility rates apply from the middle of one year to the middle of the next, so then linearly interpolate to get calendar-year specific ASFRs
  • Apply the ASFRs (applicable at mid-year) to the UNWPP annual mid-year estimates of the number of women (by age group) to get the births in the year by age group
  • Re-scale the total annual number of births derived above to the UNWPP estimate of the total number of births by calendar year
Counterfactual data: UNWPP (3)

• All the preceding steps are automated in a spreadsheet that accompanies this workshop …
  • For all countries covered by the UNWPP
  • For all calendar years from 2000 to 2028

• … demonstration of the spreadsheet (DTW_Beers_UNWPP.xlsx)
Comparing the source and counterfactual data

• Having prepared the source and counterfactual data, one can then set about drawing comparisons between the results.

• If your source data are from a survey (or are not nationally representative in scale) you will have to compare the proportional distributions of mothers’ age at birth in the survey with the proportional distributions of mothers’ age at birth estimated from the UNWPP.
Comparisons of data from source and counterfactual

- You are really only limited by the data you have (data from a census more sparse than survey or vital registration data) and your imagination
- But some useful starting points
  - For a given year, by age group, how do
    - the total numbers of births line up?
    - the proportional distribution of ages of mother at birth agree?
  - Estimates of completeness by age group in a single year
  - Trends in completeness by age group, over time
  - ...
Example: South Africa

Births by age of mother -- South Africa -- 2014

Age distribution of births -- South Africa -- 2014
Example: South Africa
Squaring it off …

• When confronted by a discrepancy between two estimates, EITHER OR BOTH may be the source of the disagreement!
  • Consequently, the untangling of these discrepancies requires further work and investigation as to what might explain them
Reminder!

• If you have any queries or questions on this material, please email Thomas.Moultrie@un.org, copied to escap-crvs@un.org

• I will do my best to answer questions, either by return of email, or in the first plenary session on 27 May 2022