Lessons learned from recent experiences with the evaluation of the completeness of vital statistics from civil registration in different settings

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Background

- Assessment of the completeness of registration should be a routine activity of CRVS systems:
  - assist in monitoring CRVS system performance
  - adjust registration data to produce fertility and mortality statistics.

- This presentation describes recent experiences with the assessment of the completeness of death registration in the Data for Health Initiative and considers some of the lessons learned from these activities.

Data for Health Initiative (D4H)

- Jointly funded by Bloomberg Philanthropies and the Australian Department of Foreign Affairs and Trade
- Primary objective is to strengthen birth and death registration systems
- Partners:
  - University of Melbourne
  - Vital Strategies (Formerly Union North America)
  - CDC

Data for Health Initiative

- 18 countries/cities:

Africa

- Malawi
- Rabat (Morocco)
- Rwanda
- Tanzania
- Zambia
- Ghana

Latin America

- Brazil
- Ecuador
- Peru

Asia-Pacific

- Bangladesh
- Mumbai (India)
- Indonesia
- Myanmar
- Papua New Guinea
- Philippines
- Shanghai (China)
- Sri Lanka
- Solomon Islands

Data for Health Initiative – Completeness Assessment

1. Assessment of country's own estimate of completeness of birth and death registration
2. Independent baseline estimate of completeness of death and birth registration
   - Institute of Health Metrics and Evaluation, University of Washington and University of Melbourne - using publically available data
3. Train country specialists to understand and apply methods to measure registration completeness
   - Potentially access additional data sources to assist in estimating completeness

Indirect (death distribution) methods

- Use intercensal death registration data by age and sex, population data from two censuses by age and sex, and possibly migration data (where reliable)
- Assumptions may not be relevant to most populations:
  - Closed population (age trimming can mitigate this)
  - Constant completeness across ages 5+
  - Accuracy of age reporting
- Timeliness of estimate – i.e. assess intercensal deaths, which might be 5-15 years ago
- But compared with direct methods:
  - Not as time and resource intensive
  - Can be applied in settings with population data from two censuses and intercensal registered deaths
- Generalised Growth Balance, Bennett-Horiuchi, hybrid

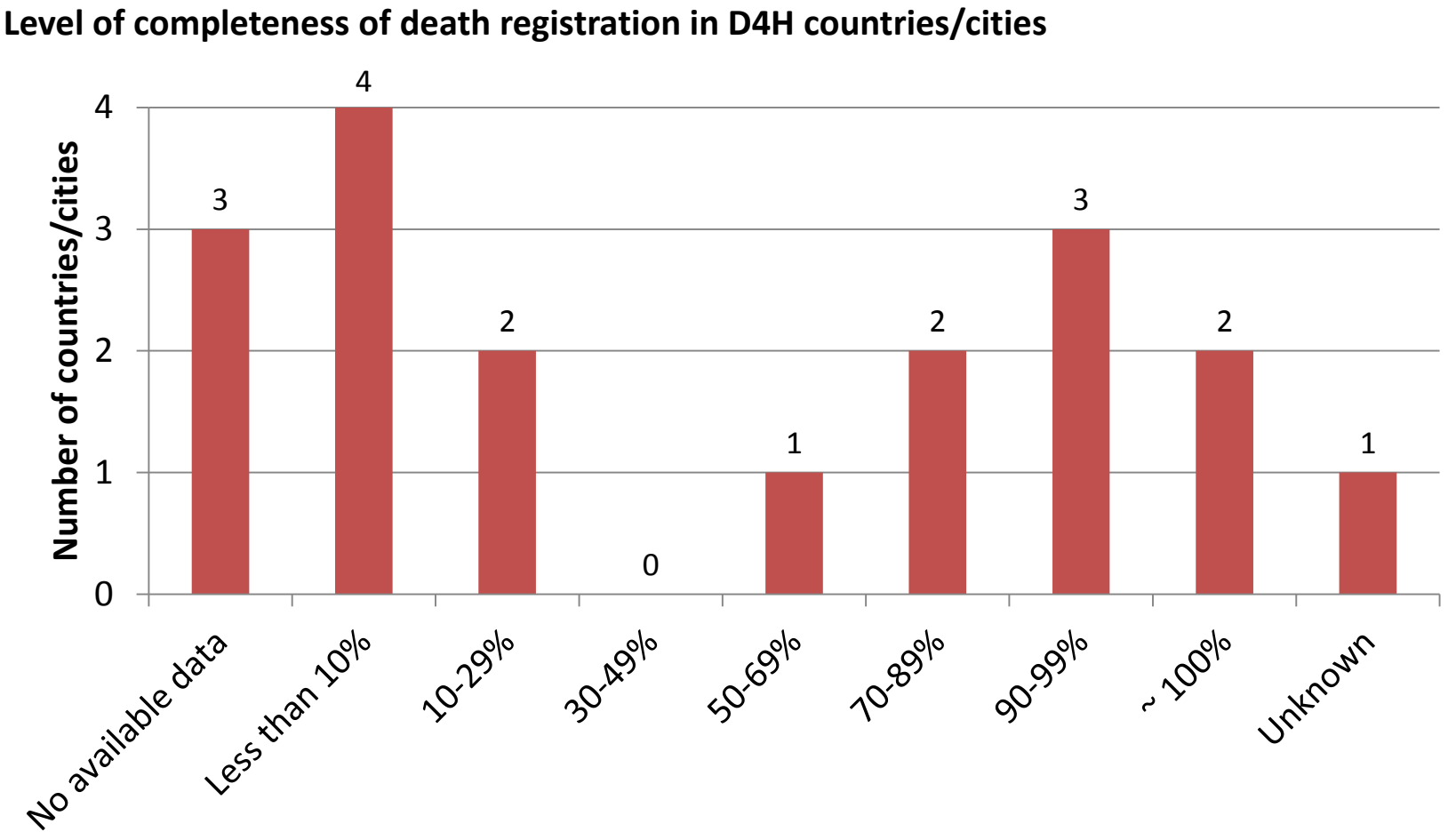
Direct (capture-recapture) methods

- Direct linkage with other data source (assuming sources are independent)
- Can make use of existing data sources (e.g. HDSS, census/survey reporting of household deaths)
- Need high quality data → especially age reporting
- Can make completeness estimates at sub-national level or by demographic group (e.g. age)
- Potentially more timely than indirect methods
- Readily interpretable by policy makers
- Can be time and resource intensive
- Can’t be applied in all settings

Estimating total deaths from multiple sources

- Use multiple data sources (surveys, census, SRS) to estimate total deaths (i.e. denominator in completeness calculation):
  - 5q0 (summary and complete birth histories)
  - 45q15 (household deaths, sibling survival, application of indirect completeness methods)
  - Limitations of methods to estimate 5q0 and 45q15 – e.g. age reporting in household deaths
- Model data points of 5q0 and 45q15
- Input 5q0 and 45q15 estimates into model life table
- In some settings indirect and direct completeness methods cannot be applied, so reliant on this approach
- Subnational estimates – availability of data, considerable uncertainty

Completeness in D4H countries/cities



No available data: no aggregated data available to analyse. Completeness likely close to 0%.
Unknown: Government have not made number of registered deaths available.

Estimating completeness in D4H countries

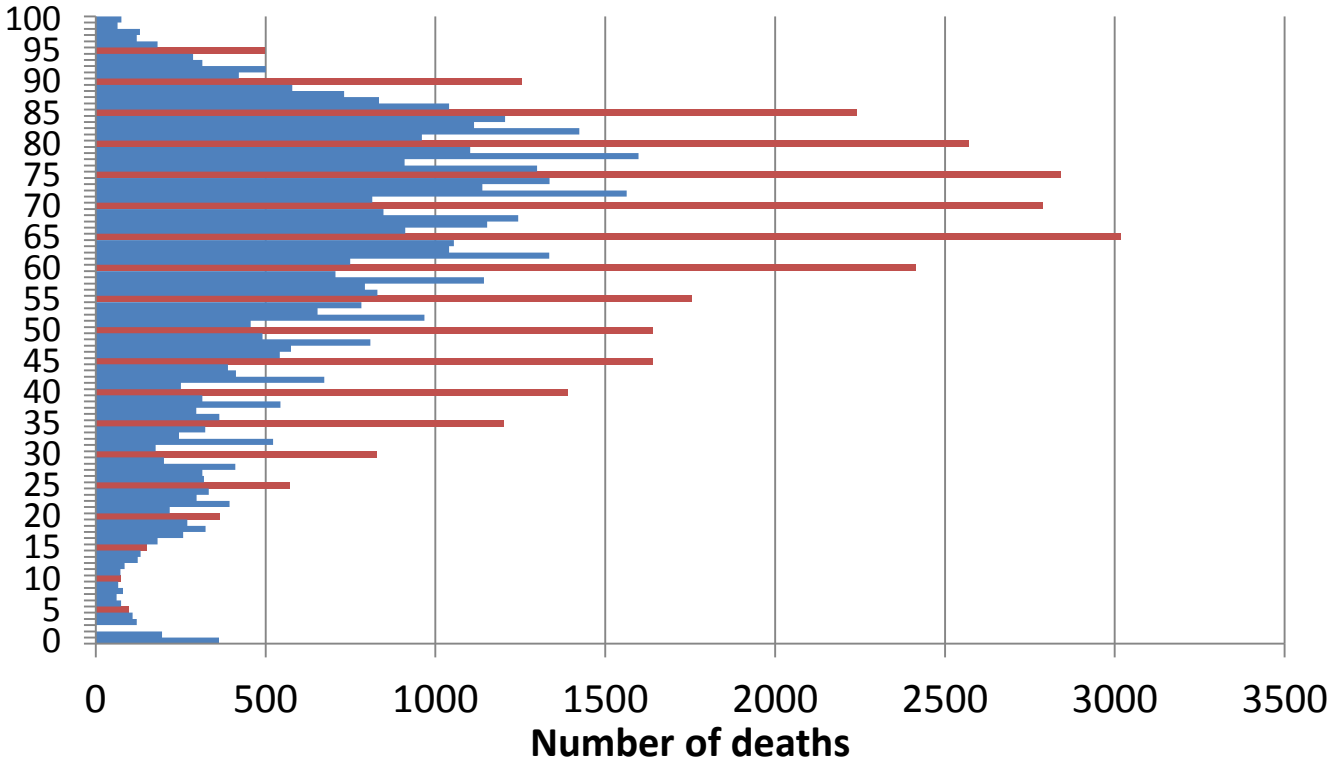
- Availability and quality of CRVS data.
- Non-CRVS data sources to estimate completeness.
- Methods to estimate completeness.
- In-country capacity and D4H capacity building activities.

Availability and quality of CRVS data

- Years of data available:
  - 3 countries/cities have no data
  - 7 countries/cities have less than 10 years of data available
  - 8 countries/cities have at least 10 years of data available
  - ➢ Implications for use of intercensal death methods
- Inconsistency of definition used to classify vital events by year:
  - Should be year of occurrence, with information included on delayed and late registration
  - Year of registration used
  - Three countries/cities use a definition of ‘deaths that occurred and were registered in the same calendar year’

Availability and quality of CRVS data

- Age misreporting / heaping:
  - In one site, Whipple's Index >200
  - Registration/reporting form not using date of birth



➢ Implications for application of indirect methods

Availability and quality of CRVS data

- Definition of residency (subnational): in two cities, completeness is >100% → partly due to over-reporting of deaths of non-residents

Non-CRVS data sources to estimate completeness

- All countries/cities have 5q0 data
- Some countries have no 45q15 data
  - e.g. Myanmar – only have household deaths collected in 2014 census, but data not released (census conducted by Ministry of Labour, Immigration and Population → different from Central Statistical Office).
- Census data: Myanmar also only has 1 census conducted in last 30 years (2014)

Methods to estimate completeness

- Because of availability of both CRVS and non-CRVS data sources, we can only apply intercensal death distribution methods in 7 out of 18 countries/cities → i.e. have population data from 2 censuses and registered deaths for entire intercensal period
- Other countries solely reliant on modelling 5q0 and 45q15 from censuses and surveys, and inputting into model life tables
- Lack of data = considerable uncertainty in completeness estimation
  - **Myanmar estimated deaths:**
    410,958 (275,812 to 560,627) (GBD 2016)
  - Subnational areas – also significant uncertainty

Methods to estimate completeness

- Existing country methods:
  - Preston-Coale method – completeness estimate significantly different from the independent assessment by the D4H project
  - Summing the highest number of deaths reported by each of three sources in each township (stats office, Ministry of Health, Ministry of Population)
  - Use of capture-recapture survey from 7 years ago
  - Assume 100% completeness
- In some settings, no assessment conducted

Existing capacity

- Varies by country
- Different institutions responsible → mainly national statistical office, but can be ministry of health → different demographic capacity
- In some countries demographic skills limited to life tables
- Potential to be taught death distribution methods – however these are only applicable in less than half of D4H countries
- Teaching more complex modelling as done in GBD / UN? → Significant gap between skills to apply the most appropriate methods and existing capacity .

Building capacity – D4H

- 3-4 day training course - structure and content of the curriculum will vary depending on the existing capacity and available data sources in each country.
- Target audience
  - Practitioners (e.g. demographers, statisticians, epidemiologists) who have routine responsibility for generating fertility and mortality estimates from the CRVS system
    - National Statistics Office
    - Ministry of Health
    - Institution responsible for CRVS (e.g. Ministry of Internal Affairs)
    - Universities – incorporate into teaching programs
  - Vital to ensure that countries are appropriately employing appropriate methods

Building capacity – D4H

Training course objectives

After completing the course, participants will:

- Understand how to **utilise a range of methods to estimate the completeness of birth and death registration**, including how to critically evaluate the strengths and limitations of each method.
- **Select the most appropriate method(s) to utilise** to estimate the completeness of birth and death registration for given their country's demographic characteristics and available data.
- **Use the completeness estimate to adjust death and birth registration data** and generate summary mortality and fertility measures, while appreciating the assumptions and limitations of the method(s) employed.

Building capacity – D4H

- Topics
  - Purposes of estimating completeness (to adjust vital stats & for monitoring to improve system performance)
  - Data sources
  - Summary measures of mortality and fertility
  - Direct or capture-recapture methods
  - Indirect methods
  - Estimating total deaths/births from multiple data sources
- Significant course time for participants to apply methods to own country's data
- Post-training follow-up and supervision will be provided to facilitate skills learnt to be incorporated into countries' routine CRVS functions

Lessons learned from completeness assessment

- Lack of available registration data for analysis → implications for the application of death distribution methods.
- Quality of age reporting is quite poor in some cases – related to no date of birth on registration forms
- Lack of other data sources to estimate 45q15. Potential for linking household reporting of deaths in a census with CRVS data?
- Lack of training in appropriate methods to estimate completeness
- Lack of capacity is exacerbated by the relative complexity of methods that need to be applied in countries where there is a lack of data (e.g. GBD methods where no 45q15 data exists Myanmar).
- Relatively low priority given to CRVS data as a potential source of mortality statistics by some statistical offices.

Guidance for countries

- Improve the availability of death registration data for analysis by providing readily analysable unit record files of deaths with a complete list of variables.
- Improve the quality of death registration data by taking steps such as adding date of birth of the deceased to the death registration form and having a clear definition of place of residence → quality control mechanisms at various stages within the system.
- Prioritise estimation of death registration completeness a routine activity of the CRVS system → adequately resource and train staff with the responsibility to estimate completeness.
- Report the level of completeness of death registration in national vital statistics publications.

Guidance for countries

- Report deaths by year of occurrence, with separate reporting of late registrations, in national vital statistics publications.
- Investigate linkage of vital registration data with household deaths in the 2010 census round.
- Investigate linkage of vital registration data with HDSS or other data sources.
- Retain inclusion of household deaths in 2020 census round – but greater focus on quality of data (especially date of birth of the deceased).

Guidance for experts

- Promote estimation of completeness as a core routine activity of a CRVS system.
- Develop training activities to strengthen the ability of country statistical offices to estimate completeness of death registration using a range of methods.
- Investigate ways to bridge the gap between appropriate methods and available capacity in settings where a lack of available data sources requires use of advanced modelling techniques.