Regional Capacity Building Workshop on Undertaking Inequality Assessments in Vital Registration

2-5 August 2022 (Virtual)

Renee Sorchik
Consultant, Civil Registration and Vital Statistics Expert
Interpreting your findings from an inequality assessment
Lecture 10: Performing disaggregated death registration completeness calculations and how to interpret the results for policy use

Renee Sorchik
Consultant, Civil Registration and Vital Statistics Expert
Remember, more detail is needed for inequality assessments...

Deaths registered in CAPITALVILLE to children age 1 year or less by Registrar General between Jan 1, 2018 to Dec. 31, 2018

Deaths in MoH system in CAPITALVILLE for children age 1 year or less between Jan 1, 2018 to Dec. 31, 2018

Are these defined the same?
Death registration completeness for 2018

Deaths occurring between Jan 1, 2018 to Dec. 31, 2018 that are registered by Registrar General

Deaths in MoH system occurring between Jan 1, 2018 to Dec. 31, 2018

But registered when??????
OPTION 3: Registered within 1 year* of the time of occurrence

Deaths occurring Jan. 1, 2018

Deaths occurring in 2018

Deaths occurring Dec. 31, 2018

Jan. 1, 2019

Dec. 31, 2019

Registered between Jan 1, 2018 to Jan 1, 2019

Registered between Dec 31, 2018 to Dec 31, 2019

*Or could use specified legal registration time frame. A specified delay is needed for comparison purposes.
Let’s start with sex

**Female deaths occurring between Jan 1, 2018 to Dec. 31, 2018 that are registered within 1 year**

**Female deaths in MoH system occurring between Jan 1, 2018 to Dec. 31, 2018**

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**Male deaths occurring between Jan 1, 2018 to Dec. 31, 2018 that are registered within 1 year**

**Male deaths in MoH system occurring between Jan 1, 2018 to Dec. 31, 2018**

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
<th>Both sexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>74%</td>
<td>82%</td>
<td>78%</td>
</tr>
</tbody>
</table>

Already we see policy implications!
Then age groups

Deaths to children under age 1 occurring between Jan 1, 2018 to Dec. 31, 2018 registered within 1 year

Deaths to children under age 1 in MoH system occurring between Jan 1, 2018 to Dec. 31, 2018

For each age group:
<1
1-4
5-9
10-14......up to age 90+
Who is being left behind???

Death registration completeness by age group, Poplandia, 2018
Then put it all together

Deaths to male children under age 1 occurring between Jan 1, 2018 to Dec. 31, 2018 registered within a year
Deaths to male children under age 1 in MoH system occurring between Jan 1, 2018 to Dec. 31, 2018

For both males and females calculate for each age group:
<1
1-4
5-9
10-14........up to age 90+
Poplandia death registration completeness by sex and age group, 2018

- Female
- Male
Adult males are more likely than adult females to have their deaths registered

(Use caution here in interpretation by sex as these are likely to be low numbers of deaths and a few deaths in either direction could skew results. Look for trends over time.)

More policy implications!
Now let’s look at ethnicity

*Indigenous Poplandian* deaths occurring between Jan 1, 2018 to Dec. 31, 2018 registered within 1 year
*Indigenous Poplandian* deaths in MoH system occurring between Jan 1, 2018 to Dec. 31, 2018

*Marzian* deaths occurring between Jan 1, 2018 to Dec. 31, 2018 registered within 1 year
*Marzian* deaths in MoHMS system occurring between Jan 1, 2018 to Dec. 31, 2018

<table>
<thead>
<tr>
<th>Indigenous</th>
<th>Marzian</th>
</tr>
</thead>
<tbody>
<tr>
<td>67%</td>
<td>94%</td>
</tr>
</tbody>
</table>

More policy implications!
More policy implications – who is being left behind???

Death registration completeness by ethnicity and age group, Poplandia, 2018

- Indigenous
- Marzian
What is going on here?? – Check for duplicates and definitions of ethnicity. Is ethnicity a mandatory field? Could be a data quality and/or a duplicate issue.

Death registration completeness by ethnicity and age group, Poplandia, 2018

Those being most left behind are starting to become apparent
Then put it all together

Deaths to male Indigenous Poplandian children under age 1 occurring between Jan 1, 2018 to Dec. 31, 2018 registered in 1 yr
Deaths to male Indigenous Poplandian children under age 1 in MoH system occurring between Jan 1, 2018 to Dec. 31, 2018

For each ethnicity for both males and females calculate for each age group:
<1
1-4
5-9
10-14........up to age 90+
Death registration completeness by sex, age group, and ethnicity, Poplandia, 2018

- Indigenous Female
- Indigenous Male
- Marzian Female
- Marzian Male
Death registration completeness by sex, age group, and ethnicity, Poplandia, 2018

Those being most left behind are starting to become apparent
Summary of our findings:

1. Children under age 1 are the least likely to have their deaths registered, especially indigenous children

2. Indigenous women are the most under-registered adult group

3. Both indigenous males and females are less likely to have their deaths registered compared to Marzians

4. There are sex differentials in registration within both the Marzian and the Indigenous population

5. Further investigation is needed to understand the data quality issues for Marzian death registration (duplicates, definition, completeness etc.)
Policy implications

1. Could hospitals facilitate death registration for infants? Many children in this age group die in the first few days of life, many may still be in the health facility when this occurs.


3. Investigate why there are sex differentials in registration. Target women’s groups through campaigns and awareness-raising activities.

4. Share your findings with data providers and discuss possible data quality issues and areas for improvement. Are there duplicate records in the CRO? Are ages miscoded? Are ethnicities missing in one source and not the other? Do definitions align?
Note that....

• Many of these interpretations can be used for birth registration completeness for things like age of mother, sex of the child, or ethnicity.
Exercise 5: Interpreting results from disaggregated death registration completeness calculations
Lecture 11: Performing disaggregated birth registration completeness calculations and how to interpret the results for policy use

Renee Sorchik
Consultant, Civil Registration and Vital Statistics Expert
# Analyzing survey data

**Figure 2.6 Birth registration by division**

Percentage of de jure children under age 5 whose births are registered with the civil authorities.

<table>
<thead>
<tr>
<th>Background characteristic</th>
<th>Had a birth certificate</th>
<th>Did not have a birth certificate</th>
<th>Total percentage of children whose births are registered</th>
<th>Number of children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2</td>
<td>12.3</td>
<td>3.9</td>
<td>16.2</td>
<td>3,346</td>
</tr>
<tr>
<td>2-4</td>
<td>24.7</td>
<td>6.6</td>
<td>31.2</td>
<td>5,001</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19.8</td>
<td>5.6</td>
<td>25.4</td>
<td>4,322</td>
</tr>
<tr>
<td>Female</td>
<td>19.6</td>
<td>5.4</td>
<td>25.0</td>
<td>4,025</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>21.0</td>
<td>5.0</td>
<td>26.1</td>
<td>2,235</td>
</tr>
<tr>
<td>Rural</td>
<td>19.2</td>
<td>5.7</td>
<td>24.9</td>
<td>6,112</td>
</tr>
<tr>
<td><strong>Division</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barisal</td>
<td>16.9</td>
<td>8.2</td>
<td>25.1</td>
<td>465</td>
</tr>
<tr>
<td>Chattogram</td>
<td>23.2</td>
<td>6.8</td>
<td>30.0</td>
<td>1,702</td>
</tr>
<tr>
<td>Dhaka</td>
<td>22.0</td>
<td>5.9</td>
<td>27.9</td>
<td>2,087</td>
</tr>
<tr>
<td>Khulna</td>
<td>17.6</td>
<td>3.4</td>
<td>21.0</td>
<td>788</td>
</tr>
<tr>
<td>Mymensingh</td>
<td>17.3</td>
<td>2.8</td>
<td>20.1</td>
<td>718</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>11.9</td>
<td>4.9</td>
<td>16.7</td>
<td>1,002</td>
</tr>
<tr>
<td>Rangpur</td>
<td>16.4</td>
<td>4.7</td>
<td>21.1</td>
<td>920</td>
</tr>
<tr>
<td>Sylhet</td>
<td>27.1</td>
<td>6.5</td>
<td>33.5</td>
<td>666</td>
</tr>
<tr>
<td><strong>Wealth quintile</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest</td>
<td>15.9</td>
<td>5.3</td>
<td>21.2</td>
<td>1,808</td>
</tr>
<tr>
<td>Second</td>
<td>18.8</td>
<td>4.7</td>
<td>23.5</td>
<td>1,670</td>
</tr>
<tr>
<td>Middle</td>
<td>20.7</td>
<td>5.5</td>
<td>26.2</td>
<td>1,581</td>
</tr>
<tr>
<td>Fourth</td>
<td>19.2</td>
<td>5.8</td>
<td>25.1</td>
<td>1,654</td>
</tr>
<tr>
<td>Highest</td>
<td>24.3</td>
<td>6.2</td>
<td>30.5</td>
<td>1,634</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>19.7</td>
<td>5.5</td>
<td>25.2</td>
<td>8,347</td>
</tr>
</tbody>
</table>

Source: Bangladesh DHS 2017-18
Policy implications from survey data

• Which sub-populations have the lowest rates registration?

• Do you know the root causes of this? Access? Cultural practices? Fear of the government? Lack of awareness? Other barriers such as cost or lack of necessary documents?
  • It’s OK if you do not yet know. Part of the implications could be that more research is needed to understand the root cause. Focus groups or other outreach discussions with the community could be a good first step.

• What interventions would need to be put in place to improve registration among these populations?

• In the former example, urban/rural does not seem to have a large impact, so there are likely to be other factors beyond remote access issues.
Poplandia example: Birth registration completeness for 2014

**Births occurring between Jan 1, 2014 to Dec. 31, 2014 that are registered within 1 year**

(School enrollment data in MOE system for children born in 2014 + children estimated to have died in the 7 year interim period)

- Let’s assume Poplandia has close to 0 migration for children.
- The most recent year for school enrollment data is likely to be 2021.
- If we assume grade 1 is most complete, some children in grade 1 would be born in 2015 and some in late 2014.
- We will query the database for children in any grade with birthdays in 2014.
- Using infant and child mortality estimates for the years 2014 to 2021 we will estimate those who have died and add them to our denominator.
Reverse survived births

• We will need to redistribute these “reverse survived” children by sex, age of the mother, ethnicity, and residence as best we can.

• Reverse survival and the complexities of redistribution are outside the time and scope of this workshop, but as an example, let’s say we use the percent distribution of these characteristics from a recent census and apply them to our “reverse survived” births.

• If we don’t know infant and child mortality rates by ethnicity, we will need to distribute total estimated deaths by other sources.

• E.G. If the census had 50% of births as being Indigenous, we would make 50% of our “reverse survived births” indigenous and then add these to the indigenous children enrolled in the MOE database born in 2014.
Let’s start with sex of the baby

Male Births occurring between Jan 1, 2014 to Dec. 31, 2014 that are registered within 1 year
(School enrollment data for male children born in 2014 + male children estimated to have died in the 7 year interim period)

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
<th>Both sexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>92%</td>
<td>91%</td>
</tr>
</tbody>
</table>

There may be a differential, but how many records are unknown for sex? Could our simplified redistribution cause the slight difference? Let’s dig deeper.
Then by age of the mother

Births to mothers age 15 – 19 occurring between Jan 1, 2014 to Dec. 31, 2014 that are registered within 1 year

(School enrollment data for children born in 2014 to mothers age 15 – 19 + children born to mothers age 15 – 19 estimated to have died in the 7 year interim period)

For each mother’s age group:

15-19
20-24
25-29

.........up to 45-49+

We can look at mothers under age 15 and 50+ IF our numbers are high enough, but births to mothers in these age groups are often in the hundreds or less and prone to error.
We start to see differentials in younger and older mothers

Birth registration completeness by mother's age, Poplandia 2014

<table>
<thead>
<tr>
<th>Mother's age group</th>
<th>Birth registration completeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 19</td>
<td>70%</td>
</tr>
<tr>
<td>20 - 24</td>
<td>80%</td>
</tr>
<tr>
<td>25 - 29</td>
<td>98%</td>
</tr>
<tr>
<td>30 - 34</td>
<td>97%</td>
</tr>
<tr>
<td>35 - 39</td>
<td>98%</td>
</tr>
<tr>
<td>40 - 44</td>
<td>90%</td>
</tr>
<tr>
<td>45 - 49</td>
<td>70%</td>
</tr>
<tr>
<td>Total</td>
<td>91%</td>
</tr>
</tbody>
</table>
Let’s look at mother’s age by sex of child

Male Births to mothers age 15 – 19 occurring between Jan 1, 2014 to Dec. 31, 2014 that are registered within 1 year
(School enrollment data for male children born in 2014 to mother’s age 15 – 19 + male children born to mothers age 15 – 19 estimated to have died in the 7 year interim period)

For both males and females calculate for each mother’s age group:
15-19
20-24
25-29
........up to 45-49+
There is a sex differential for young and older mothers

Birth registration completeness by mother's age and baby's sex, Poplandia 2014

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 19</td>
<td>75%</td>
<td>65%</td>
</tr>
<tr>
<td>20 - 24</td>
<td>83%</td>
<td>77%</td>
</tr>
<tr>
<td>25 - 29</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>30 - 34</td>
<td>97%</td>
<td>97%</td>
</tr>
<tr>
<td>35 - 39</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>40 - 44</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>45 - 49</td>
<td>74%</td>
<td>66%</td>
</tr>
<tr>
<td>Total</td>
<td>92%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Male | Female
Now let’s look at ethnicity

Indigenous Births occurring between Jan 1, 2014 to Dec. 31, 2014 that are registered within 1 year
(School enrollment data for indigenous children born in 2014 + indigenous children estimated to have died in the 7 year interim period)

<table>
<thead>
<tr>
<th>Indigenous</th>
<th>Marzian</th>
</tr>
</thead>
<tbody>
<tr>
<td>89%</td>
<td>99%</td>
</tr>
</tbody>
</table>

More policy implications!
More policy implications – who is being left behind???

Birth registration completeness mother's age and child's ethnicity, Poplandia 2014

<table>
<thead>
<tr>
<th>Mother's age group</th>
<th>Indigenous</th>
<th>Marzian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>89%</td>
<td>99%</td>
</tr>
<tr>
<td>15 - 19</td>
<td>93%</td>
<td>60%</td>
</tr>
<tr>
<td>20 - 24</td>
<td>99%</td>
<td>70%</td>
</tr>
<tr>
<td>25 - 29</td>
<td>92%</td>
<td>100%</td>
</tr>
<tr>
<td>30 - 34</td>
<td>93%</td>
<td>99%</td>
</tr>
<tr>
<td>35 - 39</td>
<td>92%</td>
<td>98%</td>
</tr>
<tr>
<td>40 - 44</td>
<td>80%</td>
<td>99%</td>
</tr>
<tr>
<td>45 - 49</td>
<td>81%</td>
<td>99%</td>
</tr>
</tbody>
</table>
Mother’s age by ethnicity by sex

- We will look at this as part of our exercises
We know that young mothers are less likely to register births, is there something else going on?

Young indigenous mothers who are married are much more likely to register births.

Unmarried teenage Marzians are also less likely to register births compared to their married counterparts.

Is there a legal deterrent? Societal stigma? What is the policy implication?
We know that young mothers are less likely to register births, is there something else going on?

Birth registration for young mothers by age groups and ethnicity, Poplandia, 2014

How does marital status impact registration in other age groups compared to young mothers?

Other factors such as wealth, education, etc. would be important to look at, particularly for the impact on young mothers.
Geography and access

• Let’s say both MOE and CRO collect Provincial level data

• However, MOE data is for school location and CRO is usual residence

• As people are likely to go to school close to home we will use the school location as a proxy for usual residence
  
  • At the provincial level, this would be less prone to error. At lower levels, we may run into problems.
Eastern Births occurring between Jan 1, 2014 to Dec. 31, 2014 that are registered within 1 year

(Eastern School enrollment data for children born in 2014 + Eastern children estimated to have died in the 7 year interim period)

Now let’s look at geography

Birth registration completeness by Province, Poplandia, 2014

<table>
<thead>
<tr>
<th>Province</th>
<th>Completeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitalville</td>
<td>99%</td>
</tr>
<tr>
<td>Western</td>
<td>98%</td>
</tr>
<tr>
<td>Mid-Western</td>
<td>95%</td>
</tr>
<tr>
<td>West Isle</td>
<td>85%</td>
</tr>
<tr>
<td>Central</td>
<td>80%</td>
</tr>
<tr>
<td>Mid Isles</td>
<td>80%</td>
</tr>
<tr>
<td>Eastern</td>
<td>65%</td>
</tr>
<tr>
<td>Eastern Isle</td>
<td>50%</td>
</tr>
<tr>
<td>National</td>
<td>91%</td>
</tr>
</tbody>
</table>
If we know the majority of the population in the East is indigenous, what has a greater impact on registration, access or cultural practices?

Are there disparities among the missing? Who is missing?

Is everyone in the East left behind equally? Or are there further disparities? We will examine this in Exercise 6.
Summary of our findings:

1. Young unmarried Indigenous mothers are the least likely to register births.

2. Young unmarried Marzians are less likely to register births than their married counterparts.

3. Those living in the Eastern part of the country, especially Eastern Isle, have no registry offices and are less likely to register births compared to other provinces.

4. Across all ages, Indigenous mothers have lower rates of birth registration compared to Marzian mothers.

5. Younger mothers and older mothers are slightly more likely to register a male child compared to a female child.

6. Further investigation is needed to understand the impact of poverty, education and the intersection with age, ethnicity, and geography.
Policy implications

1. Ensure the law does not prohibit registration by single or under-age mothers. Educate registry staff so that young single mothers do not experience stigma when registering births. Seek out young single mothers, especially indigenous mothers, in targeted campaigns and mobile outreach.

2. Work towards building registries in the Eastern part of the country. Aim so that X% of the population lives within Y kilometers of a registry office. Increase the number of mobile campaigns in the interim to service remote populations.

3. Investigate why there are sex differentials in registration among older or younger mothers. Target these groups for educational campaigns around the importance of birth registration for both boys and girls.

4. Share your findings with data providers and discuss possible data quality issues and areas for improvement. Is it possible for MOE to start collecting usual residence data?
Exercise 6: Interpreting results from disaggregated birth registration completeness calculations
Lecture 12: How to determine reliability? Comparing to other data sources, graphing over time

Renee Sorchik
Consultant, Civil Registration and Vital Statistics Expert
Comparing to other sources

The best way to understand if your data and results are robust is to compare them to other sources, or the same data that is collected over time.

Inequality assessments are relatively novel undertakings. Unfortunately, we do not have many sources with disaggregated to compare to.

Evaluate data at the national level when comparing completeness to other sources.
Death registration completeness for 2018

Our results:
• 80% for deaths registered at any time
• 75% for those registered within 1 year of death

World Bank:
• Crude death rate of 2018 was 8.2 deaths per 1,000 population
• Population in 2018 was 85M
• \( 8.2 \times 85,000,000 / 1000 = 697,000 \) deaths in 2018
• 550,000 registered (any time) deaths/697,000 estimated deaths = 79% complete
• (Similarly, the Lancet Global Burden of Disease for 2017 estimates ~700k deaths)
Are our data consistent with time?

Registered deaths by age group, Poplandia
Are our data consistent with time?

Registered deaths in Poplandia by sex (including delayed registration)

Registered deaths in Poplandia by ethnicity (including delayed registration)
How do our data compare to other sources?

- Two sources share similar patterns, a sign of good data quality
How do our data compare to other sources?

Deaths in Poplandia, 2018

- MOH deaths
- Registered deaths
Comparing our data to other sources

Aside from the census values, these are all within range of each other and are mutually reaffirming.

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Indigenous</th>
<th>Marzian</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICS</td>
<td>2013</td>
<td>91%</td>
<td>98%</td>
</tr>
<tr>
<td>MOE</td>
<td>2014</td>
<td>89%</td>
<td>99%</td>
</tr>
<tr>
<td>Census</td>
<td>2015</td>
<td>80%</td>
<td>95%</td>
</tr>
<tr>
<td>DHS</td>
<td>2017</td>
<td>92%</td>
<td>99%</td>
</tr>
</tbody>
</table>
Comparing our data to other sources

Results like these may make us question our data. They are aberrant from the trend from other sources.

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Indigenous</th>
<th>Marzian</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICS</td>
<td>2013</td>
<td>70%</td>
<td>85%</td>
</tr>
<tr>
<td>MOE</td>
<td>2014</td>
<td>89%</td>
<td>99%</td>
</tr>
<tr>
<td>Census</td>
<td>2015</td>
<td>73%</td>
<td>90%</td>
</tr>
<tr>
<td>DHS</td>
<td>2017</td>
<td>79%</td>
<td>92%</td>
</tr>
</tbody>
</table>
What to do with implausible values?

• Do your research - was there a policy, event, or other cause that could have affected your data?

• If so, highlight in the text the reason why your number may be different from other estimates, but why you believe it’s still accurate.

Registered deaths in Poplandia by month of occurrence

Birth registration completeness by ethnicity, Poplandia 2013-2017
What to do with implausible values?

• If the explanation is more likely due to incomplete data, poorer data quality, or age misreporting, you can still publish your results, but be sure to caution the reader in the text about their low value and mention possible causes for this.
  
  • It’s helpful if you publish aberrant results alongside other estimates for comparison so the reader can interpret them correctly.

• However, you may need to adjust your results before using them as inputs for other mortality measures, such as calculating a life table

• Don’t forget it’s OK to say the data was not robust enough for analysis more research is needed! Highlight the unknowns and what may need further investigation and ways data collection and quality could be strengthened
Exercise 7: Assessing your results for reliability