Data Quality Review (DQR) Desk Review Tools and Methods Workshop

Session 6: Domain 4

Consistency of Population Data

World Health Organization

The Global Fund

JSI

USAID FROM THE AMERICAN PEOPLE

MEASURE Evaluation

Learning Objectives

Learning Objective is to familiarize the workshop participants with the analysis of metrics for Domain 4– External Comparisons of Population Data. Specifically, by the end of the workshop the participants will;

- Understand the challenges to maintaining good quality data on population
- Understand the data requirements for the different metrics pertaining to the evaluation of denominator data in Domain 4
- Understand mechanisms and challenges to accessing data for denominators, particularly for program-specific data
- Learn to configure analyses and metrics within Domain 4 using the DHIS2 app
- Learn to input and analyze data for the evaluation of denominators for the different metrics
- Learn to interpret findings and develop plans for improving denominator data

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Quality of population data

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Overview on denominators

Calculation of coverage rates

The reliability of routine coverage estimates depends upon the reliability of denominators

Coverage (%) =

(Numerator / Denominator) * 100

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Error sensitivity with increasing coverage rates

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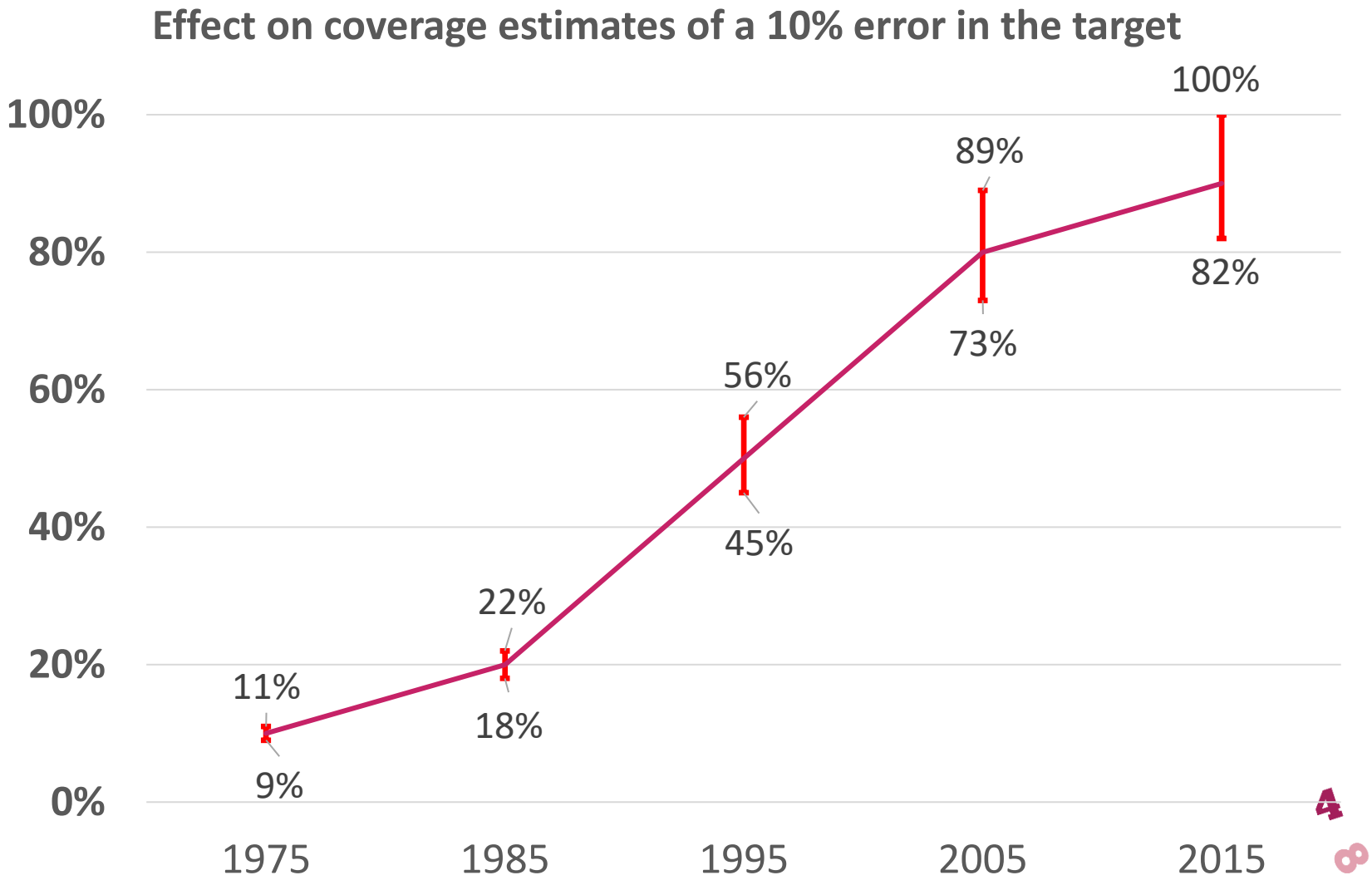
As coverage rises, estimates are increasingly sensitive to errors in denominators



Selecting denominators

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What is the denominator ?

Numerators/Service outputs	Denominators
Penta vaccine 3rd doses	
BCG doses	
Institutional deliveries	
Antenatal care 1st visits	

Quality of denominators

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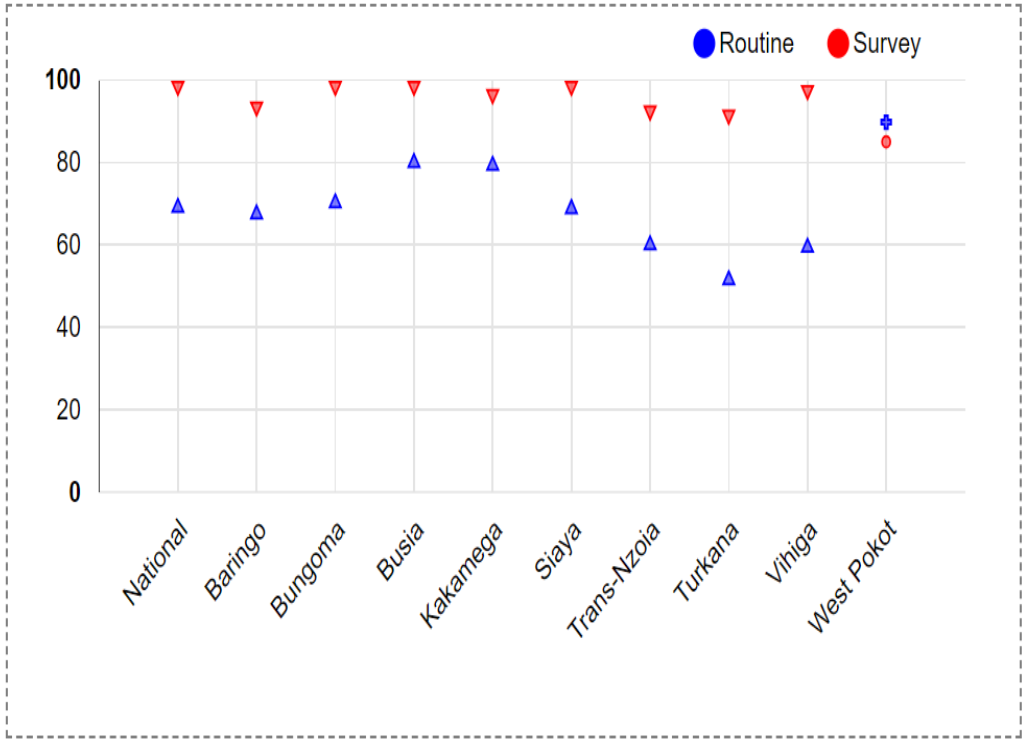
Can we tell if we have problems with our denominator? Comparing routine coverage estimates to survey coverage estimates

EXTERNAL COMPARISON

Comparison with external/survey data

Consistency of routine data with data from external source, e.g. population-based surveys.

ANC 1 coverage	
Survey value	98%
Routine value	69.6%
Quality threshold	± 15%
Overall score	71%
Number of SNU2 with divergent score	8
Percent of SNU2 with divergent score	88.9%
Baringo, Bungoma, Busia, Kakamega, Siaya, Trans-Nzoia, Turkana, Vihiga	



Domain 4: Consistency of population data

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Dimensions of Data Quality

1) Completeness & timeliness of data

2) Internal consistency of reported data

3) External comparisons/cross-checks (with other data sources, e.g. surveys)

4) Consistency of population data – review denominator data used to measure performance indicators

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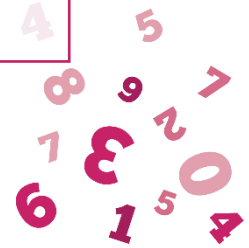
Domain 4: Consistency of Population Data

Focus

- Determine the adequacy of the population data used in the calculation of health indicators

Process

- Compare estimates from the National Statistics Office to estimates used by programs or estimates of UNPD
- Compare estimates of related denominators (e.g. pregnancies vs births vs infants)
- Review the consistency over time



Domain 4: Consistency of population data

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Domain 4: External Comparisons of Population Data

Data Quality Metric	Definition	
	National Level	**Subnational Level**
Consistency of population projections	Ratio of population projection of live births from the country Census Bureau/Bureau of Statistics to a UN live births projection for the country	NA
Consistency between related denominators	**For example:** -Ratio of expected pregnancies to live births and surviving infants; -Consistency of live births with accepted estimate of crude birth rates	# (%) of subnational units where there is an extreme difference (e.g. ±10%) between the 2 denominators
Consistency of population trend	Ratio of population values for selected indicator(s) from the current year to the predicted value from the trend in population values up to 3 preceding years	NA

Metric 1: Consistency of population projections

For example: Ratio on NBS projections to UN projections

$$\frac{Official\ population\ estimate\ (From\ NBS)\ for\ year}{Population\ projection\ from\ UN\ for\ same\ year} = \frac{255\,000}{200\,000} \approx 1.28$$

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Metric 2: Consistency of related denominators

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Example – External Consistency of Population Denominators

Comparison of national & subnational administrative unit ratios of official government live birth estimates. Administrative units with difference ≥ ±10% are highlighted in red.

District	National Bureau of Statistics estimate of surviving infants	EPI program estimate of surviving infants	Ratio of NBS to EPI estimates
District 1	12,216	16,248	0.75
District 2	10,824	12,612	0.86
District 3	7,393	8,988	0.82
District 4	5,884	6,204	0.95
District 5	4,567	4,812	0.95
……	……	……	……
…….	…..	….	…..
National	1,553,306	1,678,858	**0.93**

Consistency of related denominators

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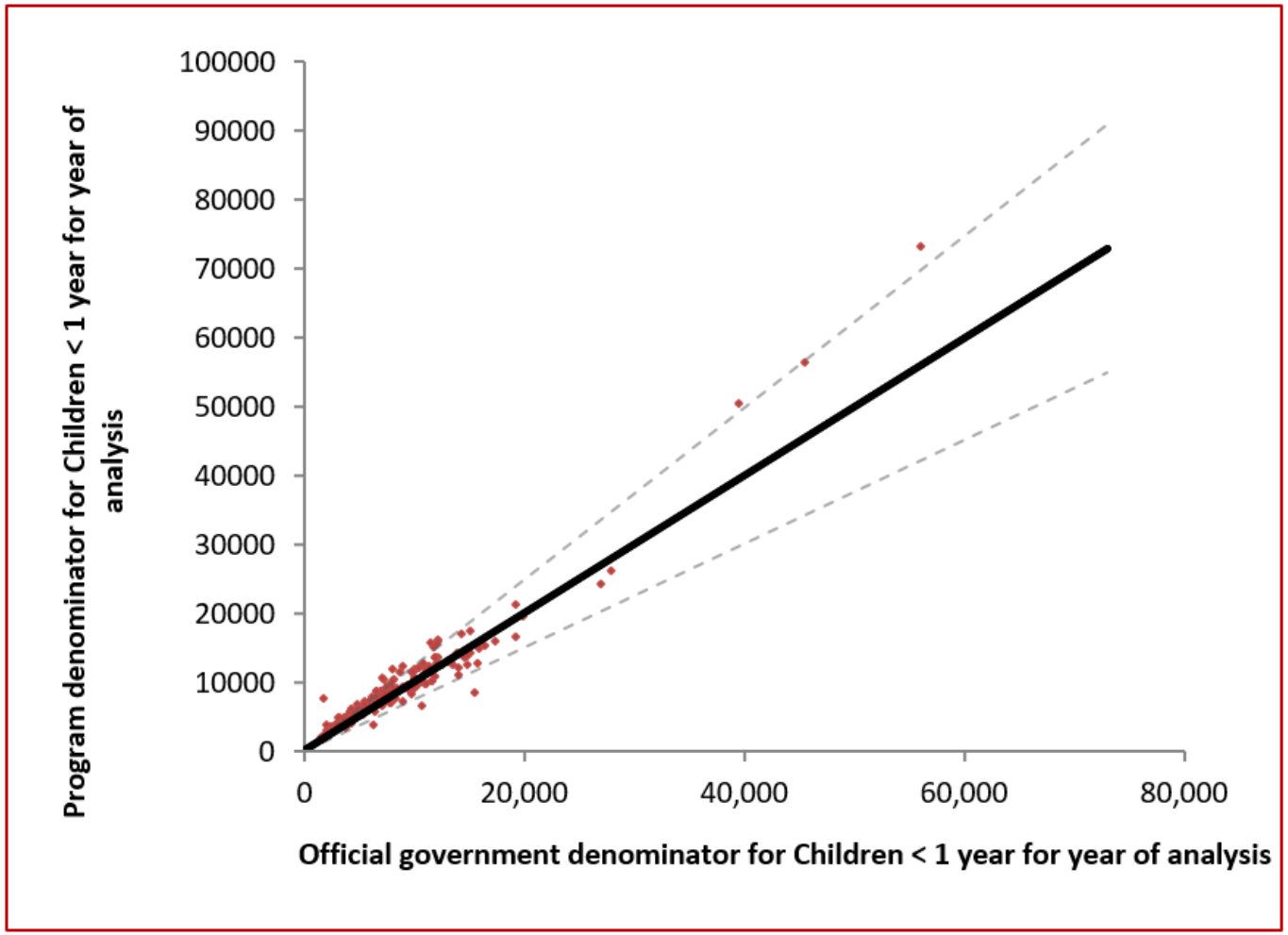
Domain 4: WHO's Excel-based DQR Tool identifies the districts with discrepant population estimates



Consistency of related denominators

Additional denominator consistency checks

1. Assess the implied crude birth rate (implied CBR)
2. Assess the implied infant mortality rate (implied IMR)

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Assessing implied crude birth rate – Step 1

Calculate implied crude birth rate?

$$\text{Implied crude birth rate} = \frac{\text{HMIS/DHIS2 estimate of live births}}{\text{HMIS/DHIS2 estimate of total population}} \times 1{,}000$$

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Estimate of live births

How are live births estimated?

What is your answer?

A. 5% of the total population

B. Total population x Crude Birth Rate/1,000

C. Ask the National Statistics Office

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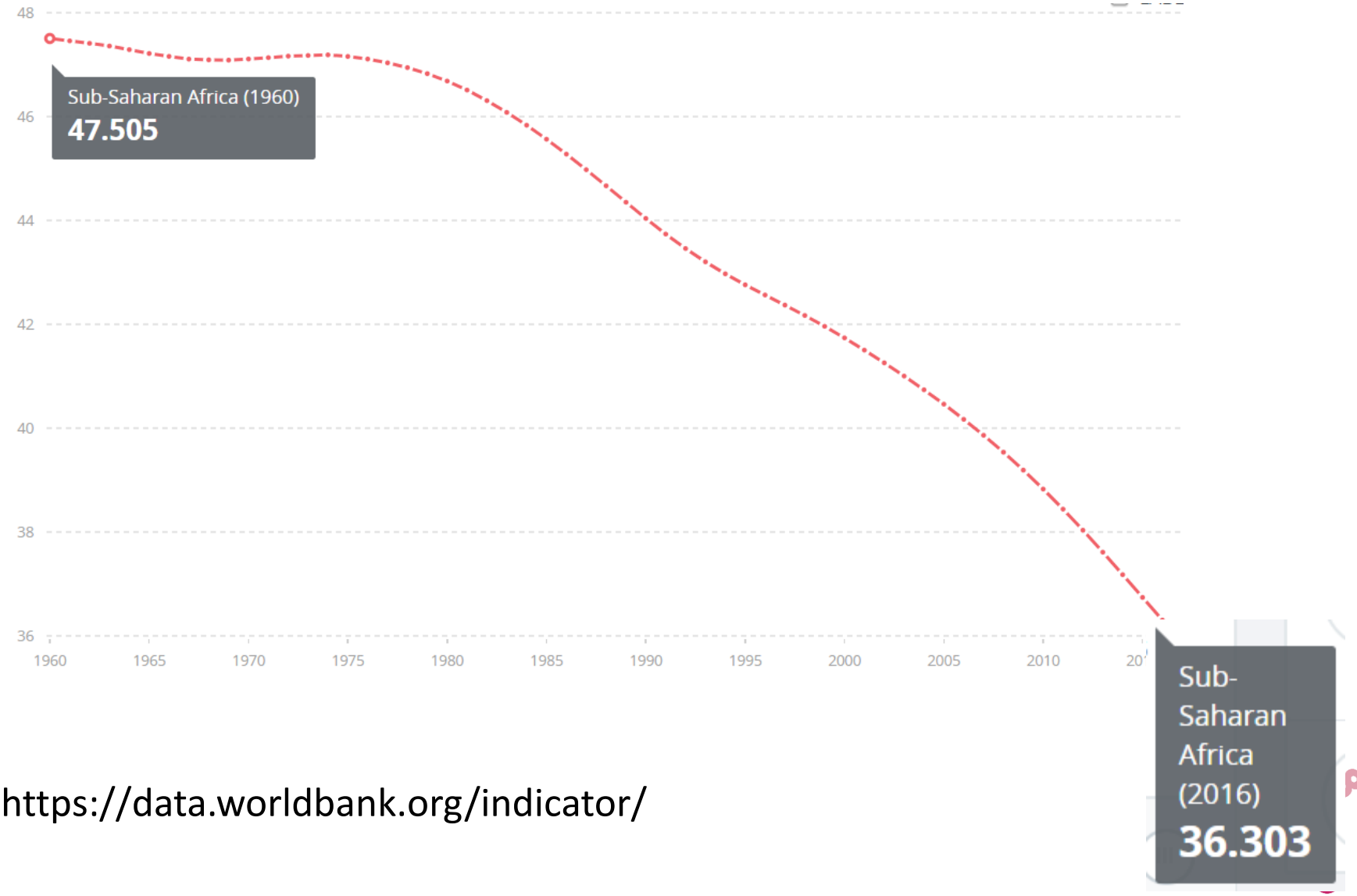
Trends in crude birth rates

The crude birth rate has fallen dramatically



https://data.worldbank.org/indicator/

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Assessing implied crude birth rate - Step 2

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Other sources of CBR estimates

- Census
- DHS or MICS

Tableau 5.1 Fécondité actuelle

Taux de fécondité par âge, Indice Synthétique de Fécondité (ISF), Taux Global de Fécondité Générale (TGFG), et Taux Brut de Natalité (TBN) pour la période des 3 années ayant précédé l'enquête par milieu de résidence, EDS-III Burundi 2016-2017

	Résidence		
Groupe d'âges	Urbain	Rural	Ensemble
10-14	[2]	[1]	[1]
15-19	45	60	58
20-24	122	234	218
25-29	194	270	261
30-34	225	261	257
35-39	153	195	190
40-44	70	103	99
45-49	[10]	[22]	[21]
ISF (15-49)	4,1	5,7	5,5
TGFG	131	188	180
TBN	33,0	38,5	37,9

Other sources of CBR

U.N. estimates of the 2016 crude birth rate

Country	CBR/ 1,000	Country	CBR/ 1,000
Burundi	42	Somalia	43
Kenya	31	South Sudan	36
Mali	43	Sudan	33
Nigeria	39	Tanzania	38
Rwanda	31	Uganda	42
Sierra Leone	35	Zambia	38

https://data.worldbank.org/indicator/

Assessing implied crude birth rate - Step 3

Calculate ratio of implied CBR to CBR from a bona fide source

$$\frac{Implied\ crude\ birth\ rate\ for\ year}{Crude\ birth\ rate\ from\ a\ bonafide\ source\ for\ same\ year}$$

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Assessing implied infant mortality rate – Step 1

What is the implied infant mortality rate (IMR)?

$$\text{Implied infant mortality rate} = \frac{\text{HMIS/DHIS2 estimate of live births} - \text{HMIS/DHIS2 estimate of population under 1}}{\text{HMIS/DHIS2 estimate of live births)}} \times 1{,}000$$

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Assessing implied infant mortality rate – Step 2

Get other sources of IMR such as U.N. estimates of the 2016 infant mortality rate

Country	IMR/ 1,000	Country	IMR/ 1,000
Burundi	48	Somalia	83
Kenya	36	South Sudan	59
Mali	68	Sudan	45
Nigeria	67	Tanzania	40
Rwanda	29	Uganda	38
Sierra Leone	83	Zambia	44

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Assessing implied IMR- Step 3

Calculate ratio of implied IMR to IMR from a bona fide source

$$\frac{Implied\ infant\ mortality\ rate\ for\ a\ specific\ period}{Infant\ mortality\ rate\ from\ a\ bonafide\ source\ for\ the\ same\ period}$$

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Metric 3: Consistency in population trends

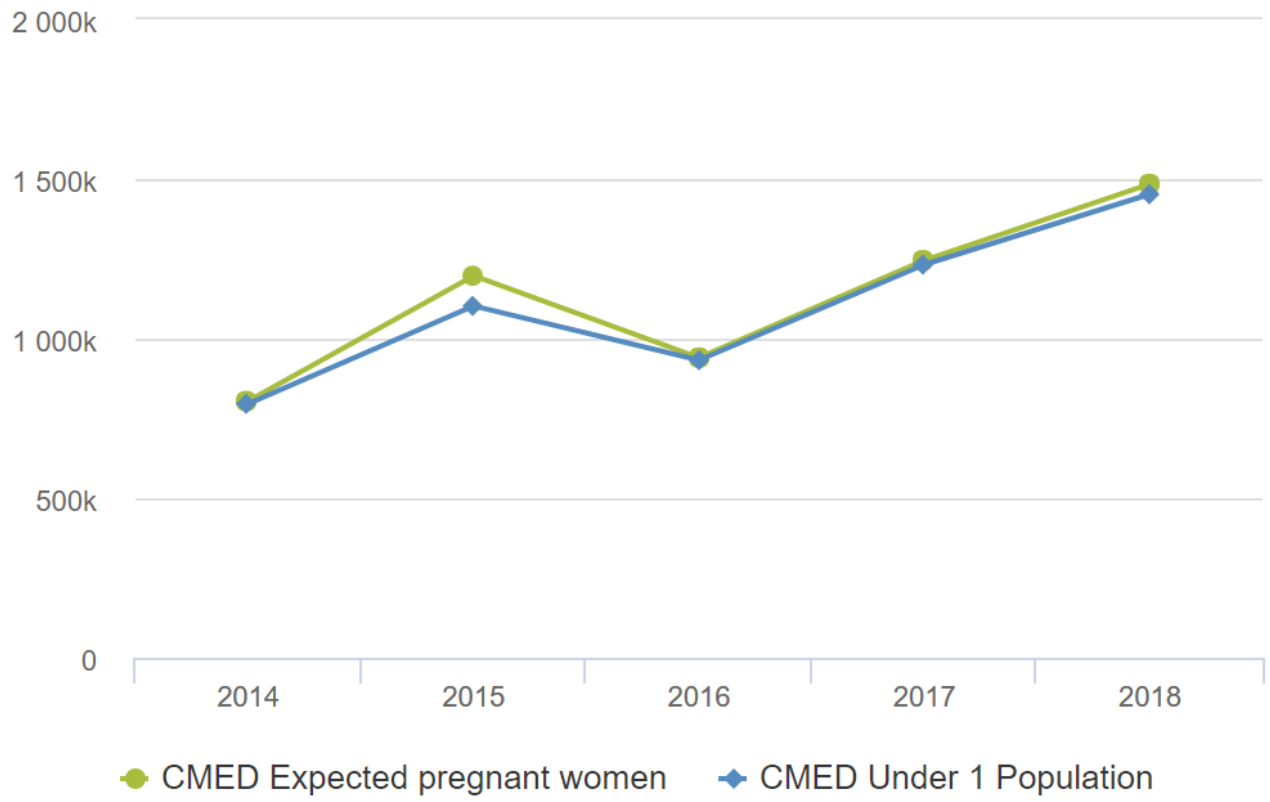
Assess the estimated annual growth in live births and surviving infants

Annual growth rate =

(DHIS2 estimate of live births in 2018 /

DHIS2 estimate of live births in 2017) x 100

- Is the growth rate realistic?
- Is the growth steady or is it erratic?



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Consistency in population trends

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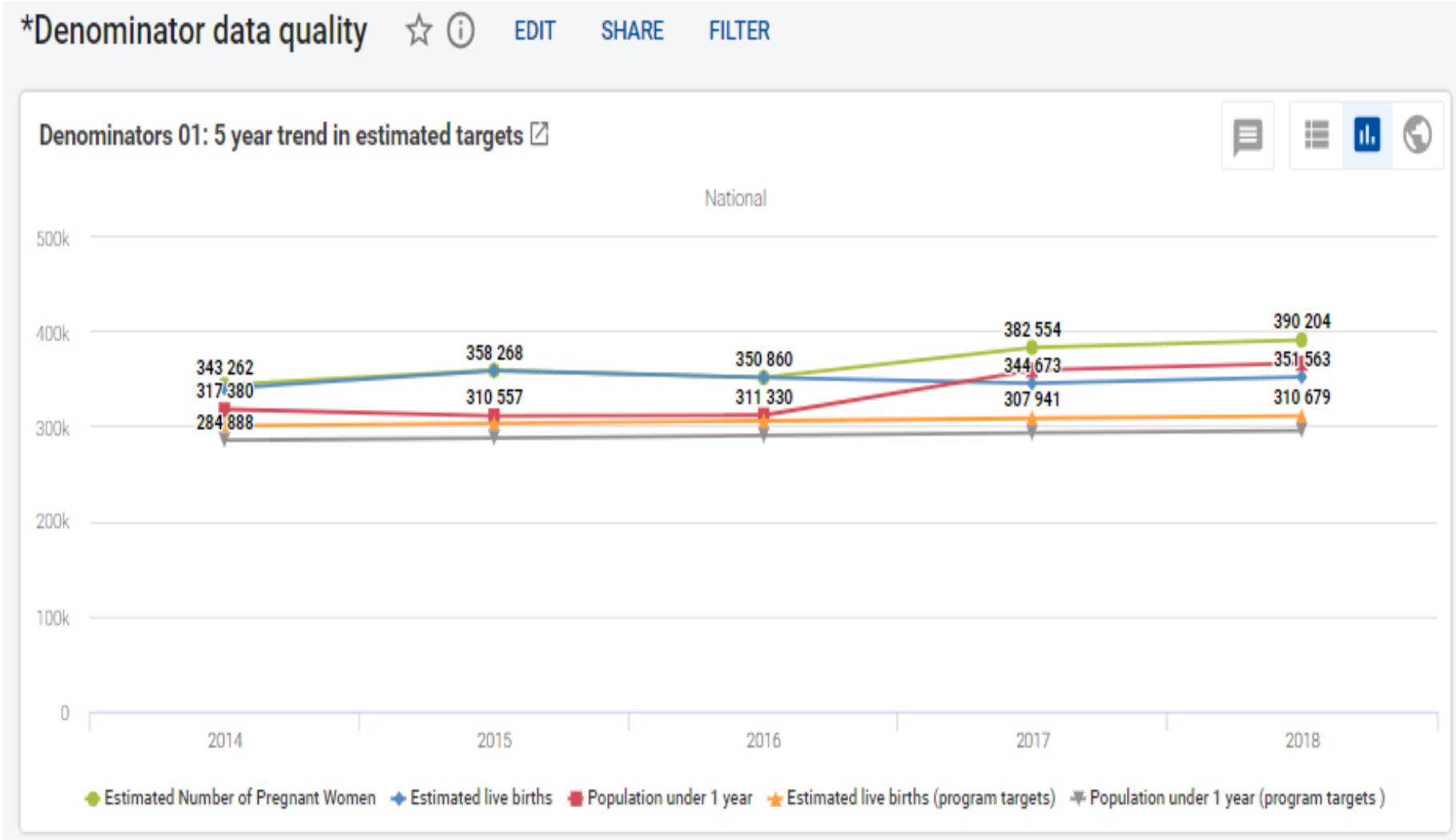
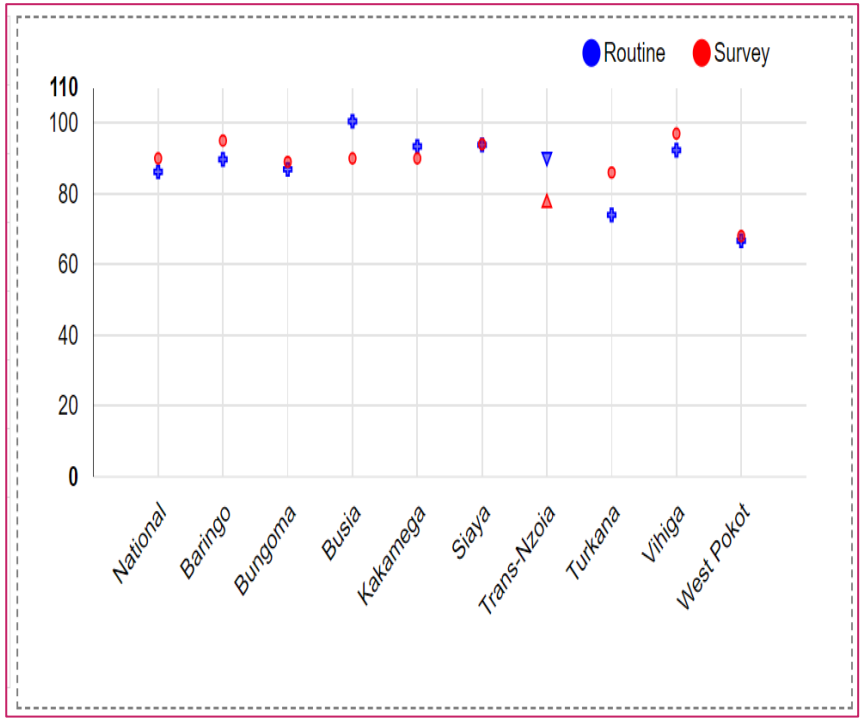
Examining consistency in population trends in with a DHIS2 dashboard

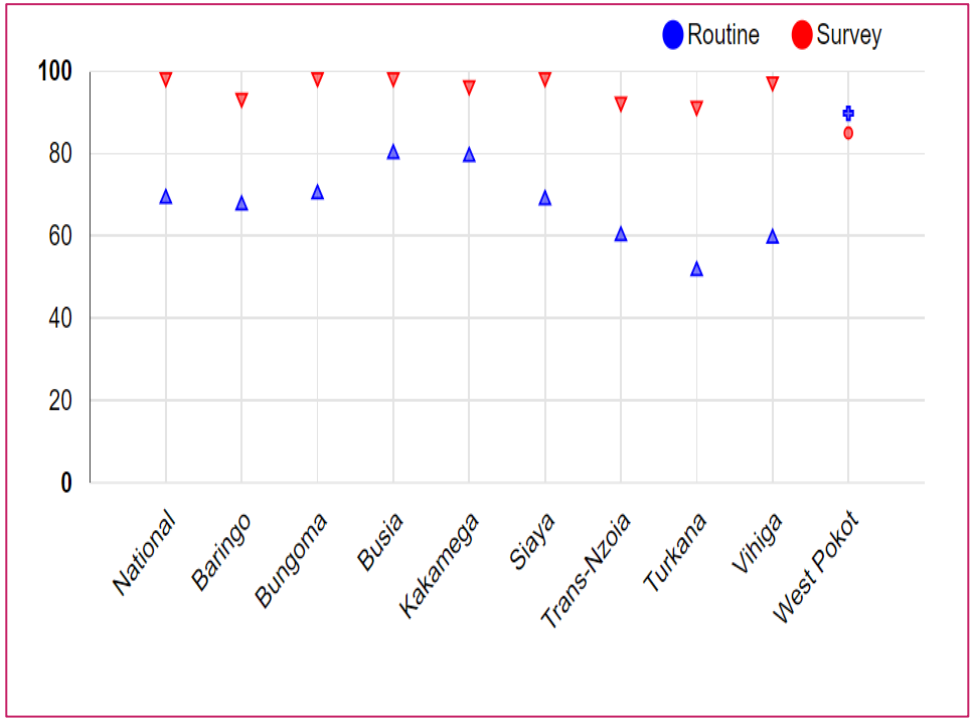


Results of different denominator choices

Routine value calculated using programme denominators



Routine value calculated using NSO denominators



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Discussion

Discussion Questions:

- How are population data used to monitor performance of interventions in the health sector?
- What are some of the threats to data quality of population data?
- What would be an indication that a given population estimate may be in error?
- What should be done if there are denominator errors?

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Exercise

Exercise – External Consistency of Population Data

- Navigate to the DQ Demo instance of DHIS2: https://demos.dhis2.org/dq/dhis-web-commons/security/login.action

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