

Role of empirical observations and  
model-based estimates with uncertainty  
for global and country-level monitoring

# **Experience of child mortality estimates**

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UNICEF

United Nations Expert Group Meeting on Strengthening the  
Demographic Evidence Base for the Post-2015 Development Agenda  
October, 2015

# Overview of Presentation

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- Summary of UN IGME work
- Empirical data and model-based child mortality estimates
- Challenges and opportunities

# I. The Work of UN IGME



Child Mortality Estimates  
CME Info

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**CME Info** is a database containing the latest child mortality estimates based on the research of the UN Inter-agency Group for Child Mortality Estimation.

[Click here to explore country data.](#)



COMMITTING TO CHILD SURVIVAL  
A PROMISE RENEWED

## NEW UPDATES: LATEST RELEASE

**9 September 2015**

The UN Inter-agency Group for Child Mortality Estimation released the latest estimates on child mortality.

[Click here to download](#) the report, and [click here to read the Lancet Paper](#).

A detailed explanation of the B3 model used in developing the UN IGME child mortality estimates is available [here](#).

For more information on the child mortality estimation methods, refer to the PLOS Medicine Collection on Child Mortality Estimation Methods.

Also available for download:

**Estimates for under-five, infant and neonatal mortality:** Estimates

**Sex-specific under-five and infant mortality rate:** Estimates

**Annual rate of reduction of under-five mortality:** Estimates and 90% uncertainty intervals

**Country-specific methodological notes:** Summary

**Underlying data:** Under-five mortality rate and infant mortality rate

**Global and regional estimates:** MDG region and UNICEF region

## UN IGME

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- Year of birth: 2004
- Objectives of the UN IGME
  - **Harmonize estimates** within the UN system
  - **Produce consistent estimates** of child mortality worldwide **for reporting on progress** on child survival at global level
  - **Improve methods** for child mortality estimation, including data quality assessment methods, curve fitting methods, etc.
  - **Build and enhance capacity** of countries to produce timely estimates of child mortality
- Member agencies:



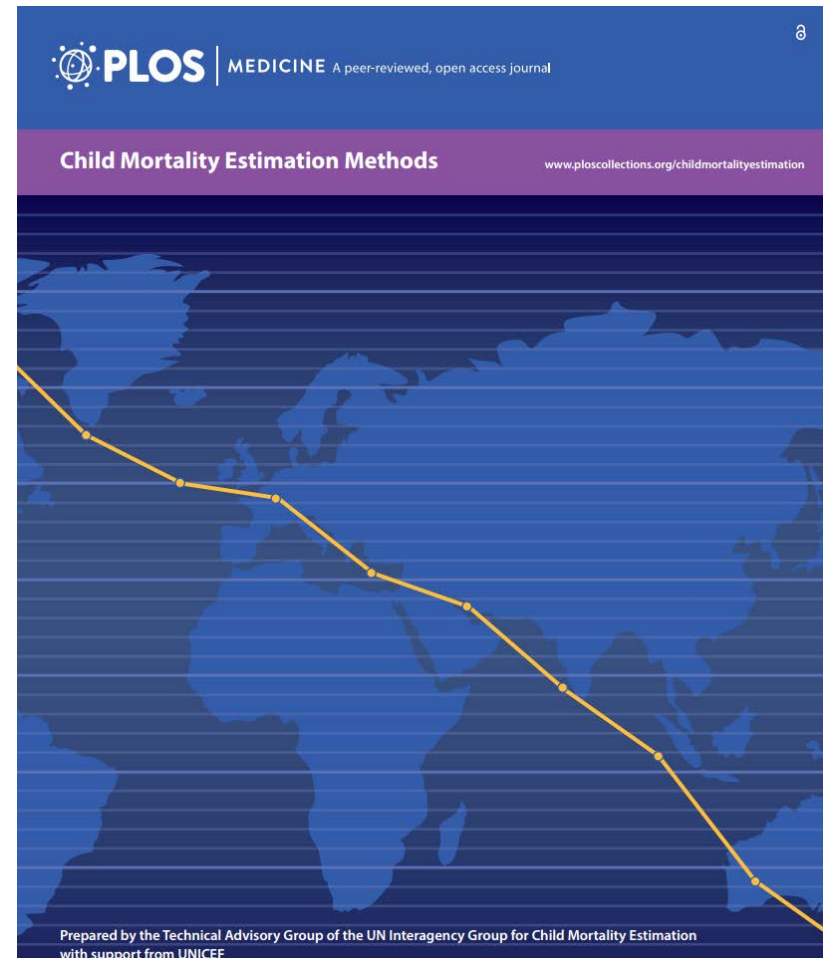
## TAG of the UN IGME

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- Technical Advisory Group (TAG)
  - Independent
  - Composed of leading experts in demography, statistics, biostatistics and public health
  - Provide technical guidance on estimation methods, technical issues and strategies for data analysis and data quality assessment
  - 2 meetings every year

## Scope of the UN IGME work

- Estimation of child mortality
  - Currently produces estimates of U5MR, IMR, NMR and sex-specific U5MR, IMR
  - Planned work includes child mortality beyond age 5, disparities in child mortality, etc.
- Methodological development
  - Curve fitting modelling work
  - Estimates using smaller intervals
  - Data quality assessment
  - Age pattern of child mortality
  - Direct estimates vs. indirect estimates
  - etc.



## Scope of the UN IGME work (cont'd)

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- Country capacity building through regional workshops, country missions, remote technical support
  - Purpose
    - **Explain IGME estimation methods** to reach mutual understanding: why discrepancies exist between IGME and country official estimates, etc.
    - **Engage countries in the IGME estimation process**
    - **Provide technical training** to countries in data quality assessment and child mortality estimation
    - **Evaluate CRVS system**: completeness of birth and death registration; provide recommendations to improve CRVS
  - **Participants**: Officials from MOH and NSO; professionals from universities, research institute; UNICEF ROs and COs
  - **7 regional workshops**, 250 participants and about 120 countries
  - **About 15 country missions** in recent years: Rwanda, South Africa, Mongolia, Mexico, Belarus, Azerbaijan, Georgia, Kazakhstan, Uzbekistan, Tajikistan, etc.

## Country consultation

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- Purpose
  - Inform countries about the forthcoming UN IGME estimates
  - Provide opportunities to countries to share feedback on empirical data and the UN IGME estimates
  - **Not a country approval process**
- Process
  - WHO to send country consultation email to MOH directly after identifying focal point from countries
  - UNICEF to send to NSO through UNICEF country offices
  - Countries are given one month to provide feedback or new data
- 2015 country consultation results
  - 88 among 195 countries responded; 45 of those provided comments or additional data;
  - UN IGME draft estimates were revised for 33 countries using new data



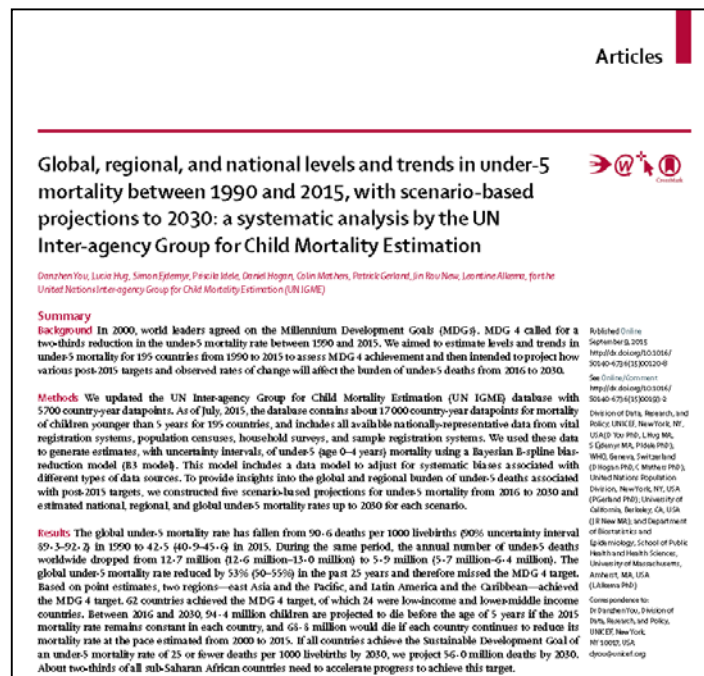
## Data use

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- In-depth analysis on child survival: A Promise Renewed report, Progress for Children report, The State of the World's Children report, MDG report, Call to Action Report, etc.
- IGME estimates and findings from UNICEF in-depth analyses are widely used by UN, UN agencies, NGOs, donors, public health community, etc.
- Also used in some countries for policy advocacy, planning and decision making

## Data dissemination

- Reports: IGME report, APR report, SOWC report, etc.
- Peer-reviewed journal articles, comments: Lancet, PLoS Medicine, etc.
- CMEInfo, data.unicef.org
- Press release, social media, etc.
- UNICEF ROs and COs, others



# CME Info

The IGME's Child Mortality Database: [www.childmortality.org](http://www.childmortality.org)

**Child Mortality Estimates**  
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Substantial global progress has been made in reducing child deaths since 1990. The under-five mortality rate has dropped 53 percent since 1990, and the number of under-five deaths dropped from 12.7 million in 1990 to 5.9 million in 2015.

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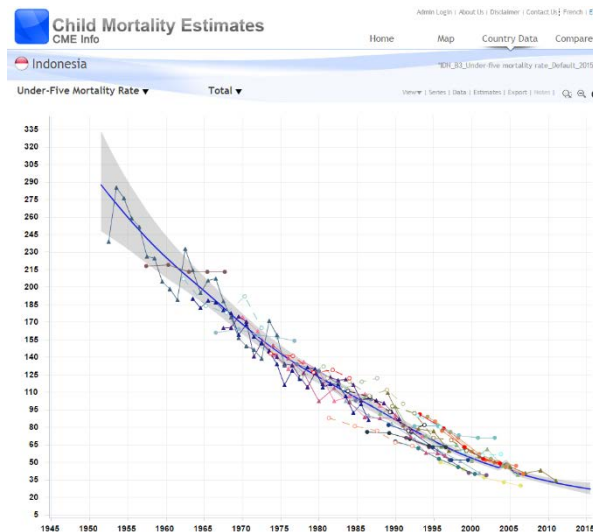
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Last update - 9 September 2015

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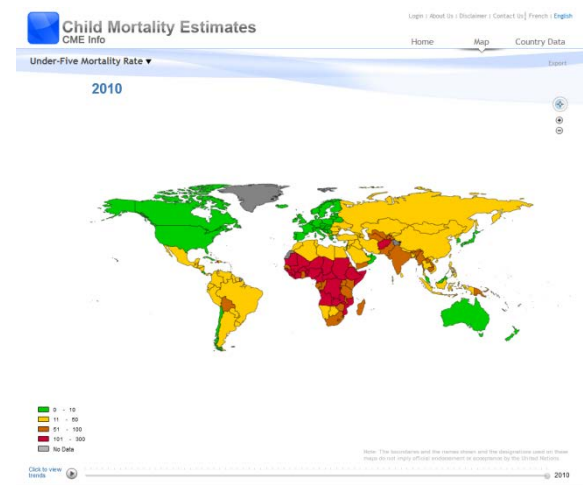
India

"IND\_Loess\_Under-five mortality rate\_DEFAULT\_NEW\_2011.5"

Under-Five Mortality Rate

Graph | Series | Data | Estimates | Export | Notes

Period/Age Group	Year	Value	VR Indicators	Notes
IND_National Family Health Survey 2005-06_Indirect (5 year)_2005				
25-29	2002.1	91		
30-34	1999.7	102		
35-39	1997.1	111		
40-44	1994.2	121		
45-49	1991.3	125		
IND_National Family Health Survey 2005-06_Direct (5 year)_2005				
0-4	2003.8	74		
5-9	1998.8	95		
10-14	1993.8	106		
15-19	1988.8	124		
20-24	1983.8	146		

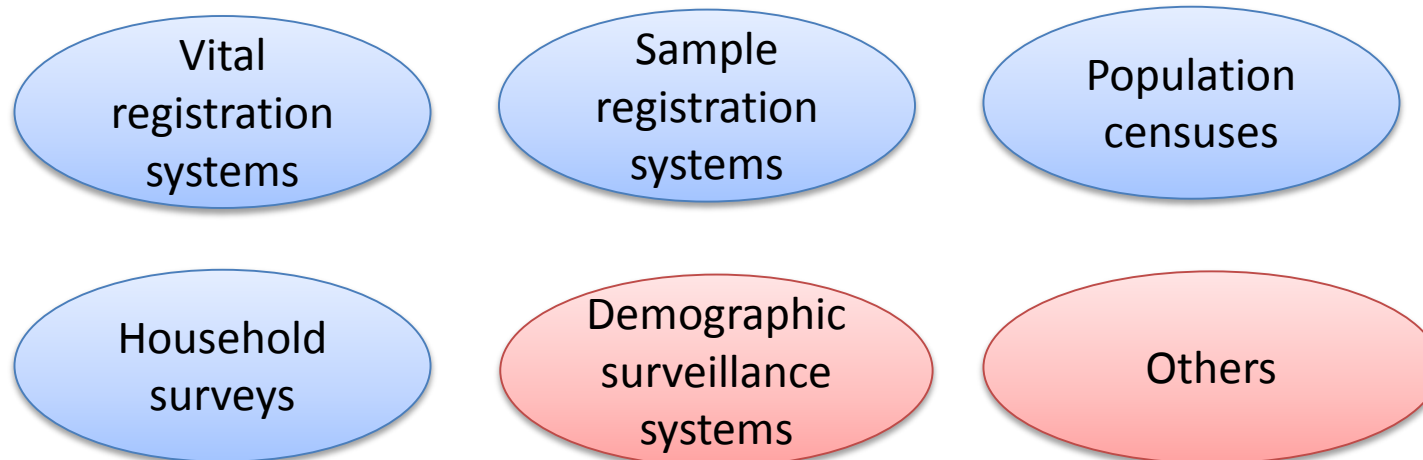


## **II. Child Mortality: empirical data and model-based estimates**

# Data

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- Data sources



- Main data errors

- omission of deaths
- misreporting of age at death or date of birth
- sampling errors (surveys)
- violation of assumptions (indirect only)



# Data rich country with small variations

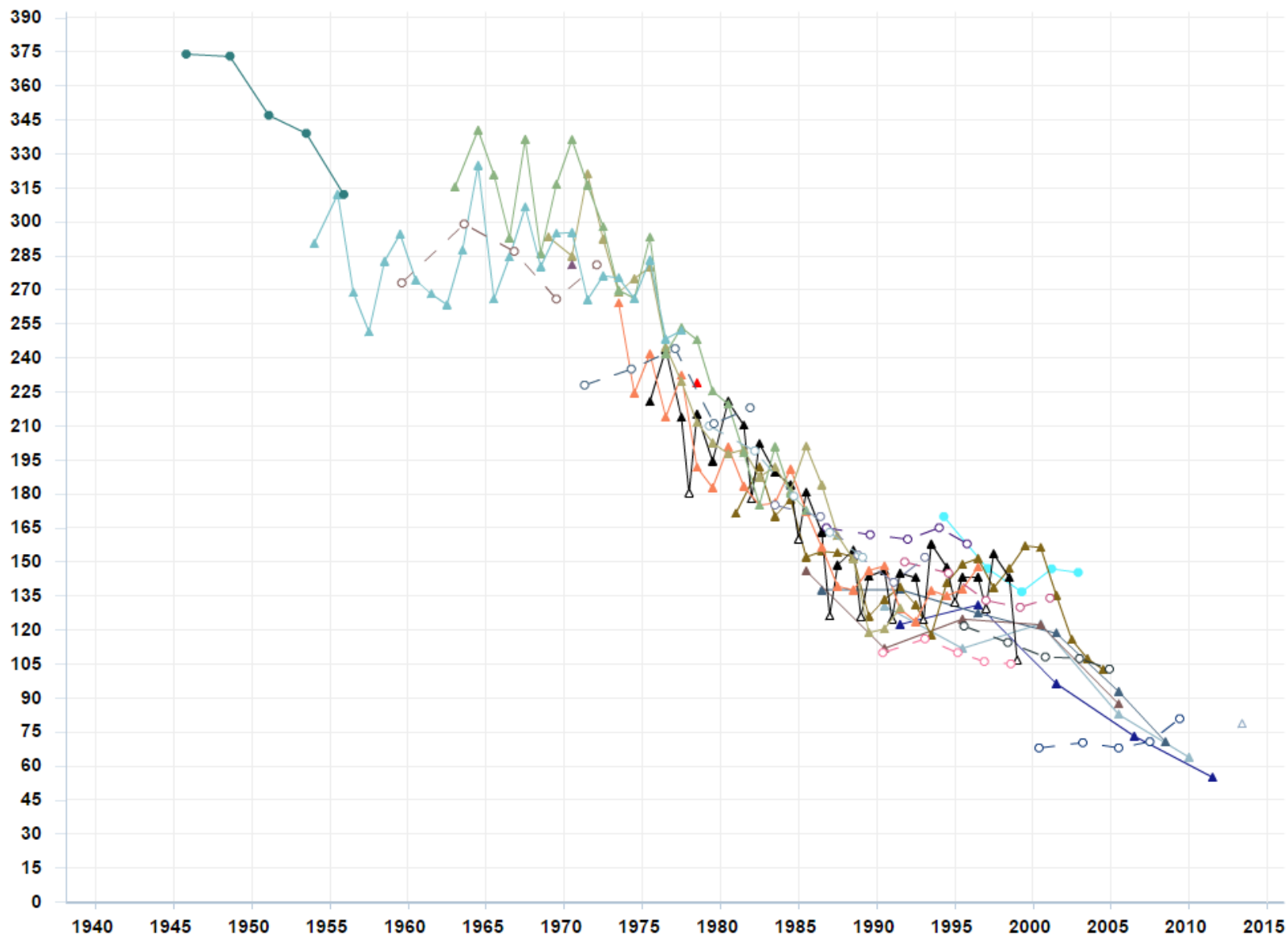
 Senegal

\*SEN\_B3\_Under-five mortality rate\_Default\_2015.5


Under-Five Mortality Rate ▼

Total ▼

View | Series | Data | Estimates | Export | Notes |  





# Data rich country with wide variations

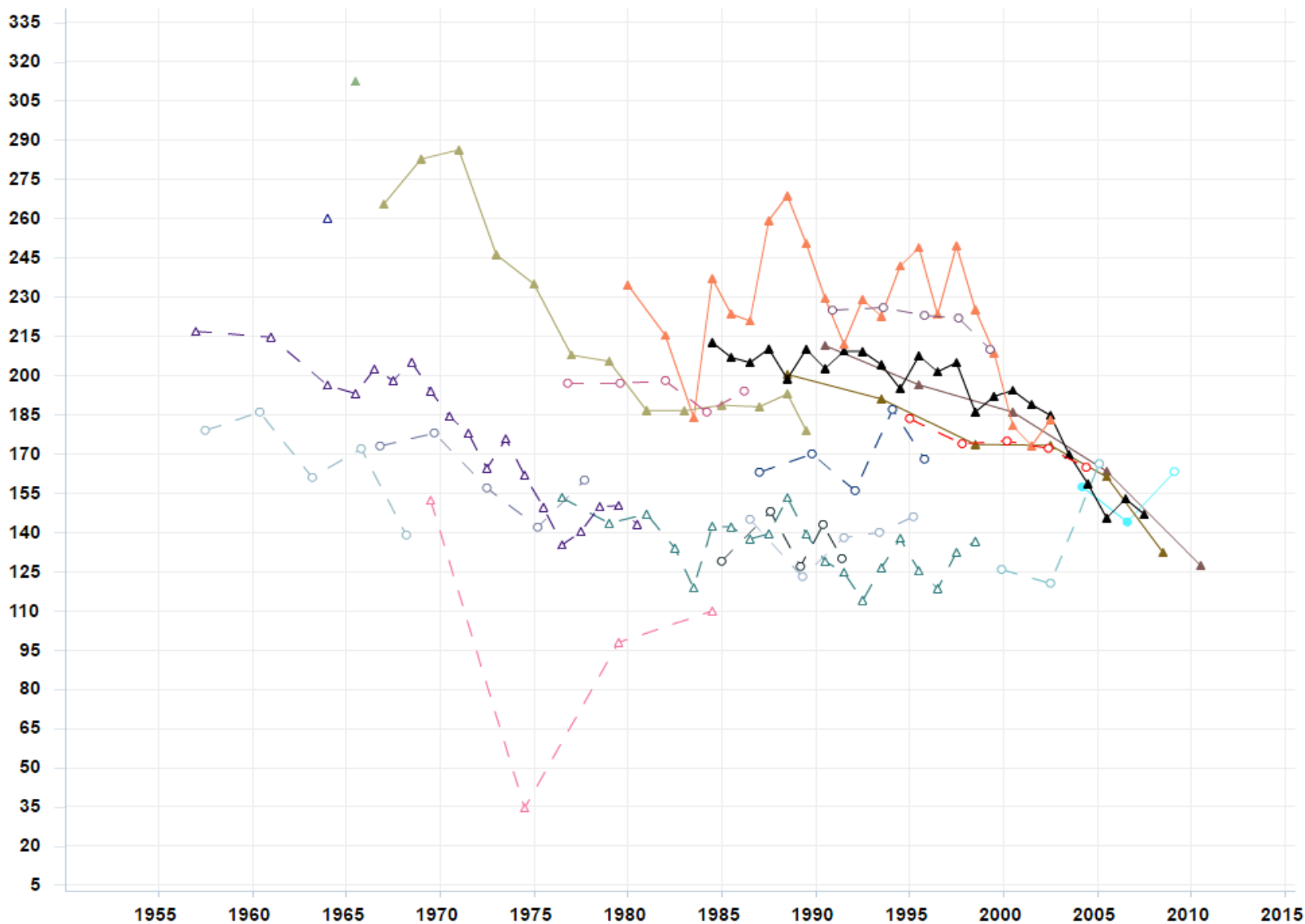
 Nigeria

\*NGA\_B3\_Under-five mortality rate\_Default\_2015.5

Under-Five Mortality Rate ▼

Total ▼

View | Series | Data | Estimates | Export | Notes |  



# Data poor country without recent data

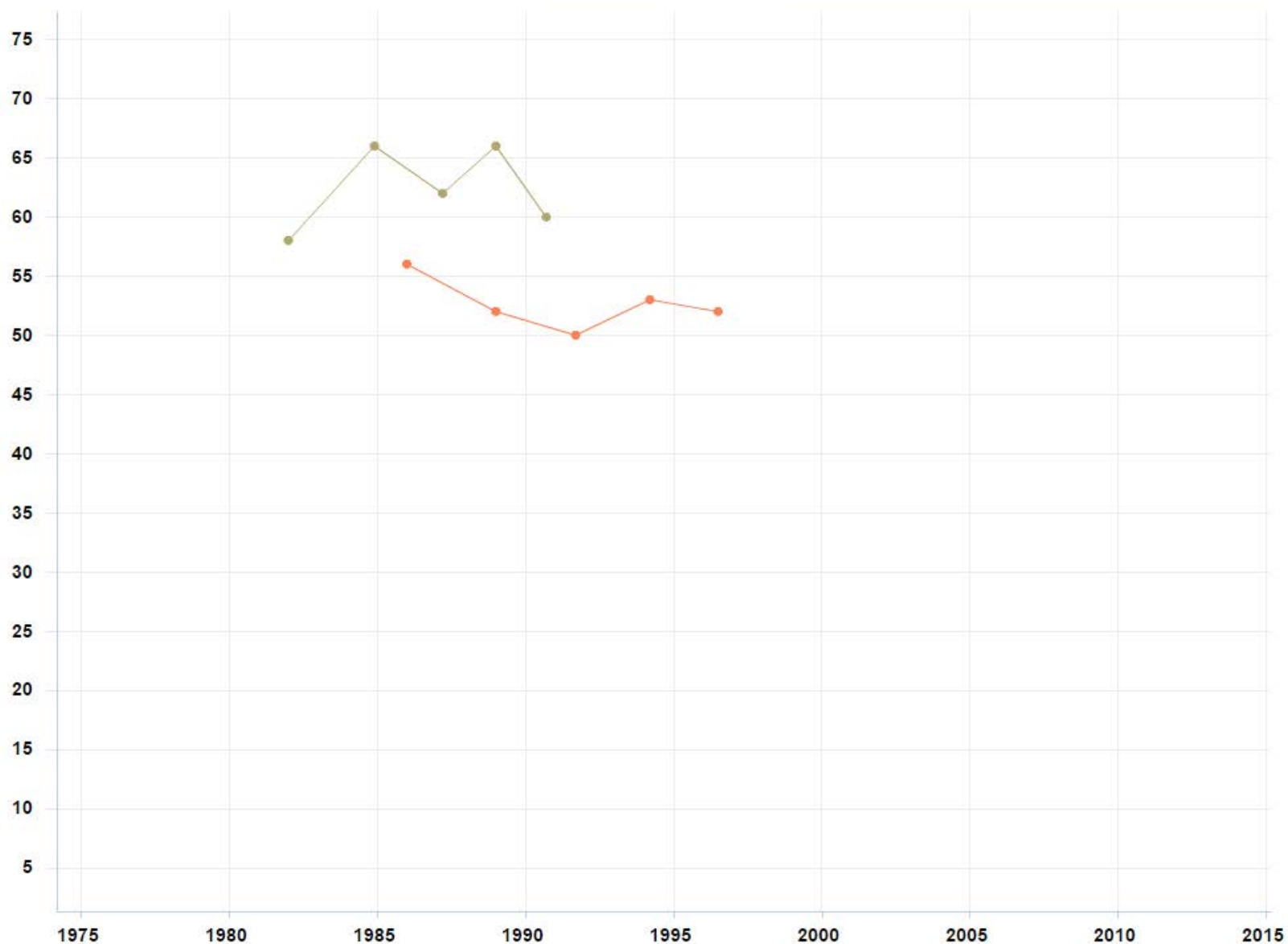
Micronesia (Federated States of)

\*FSM\_B3\_Under-five mortality rate\_Default\_2015.5

Under-Five Mortality Rate ▼


Total ▼

View | Series | Data | Estimates | Export | Notes | 🔍 🔄





# Incomplete VR data country

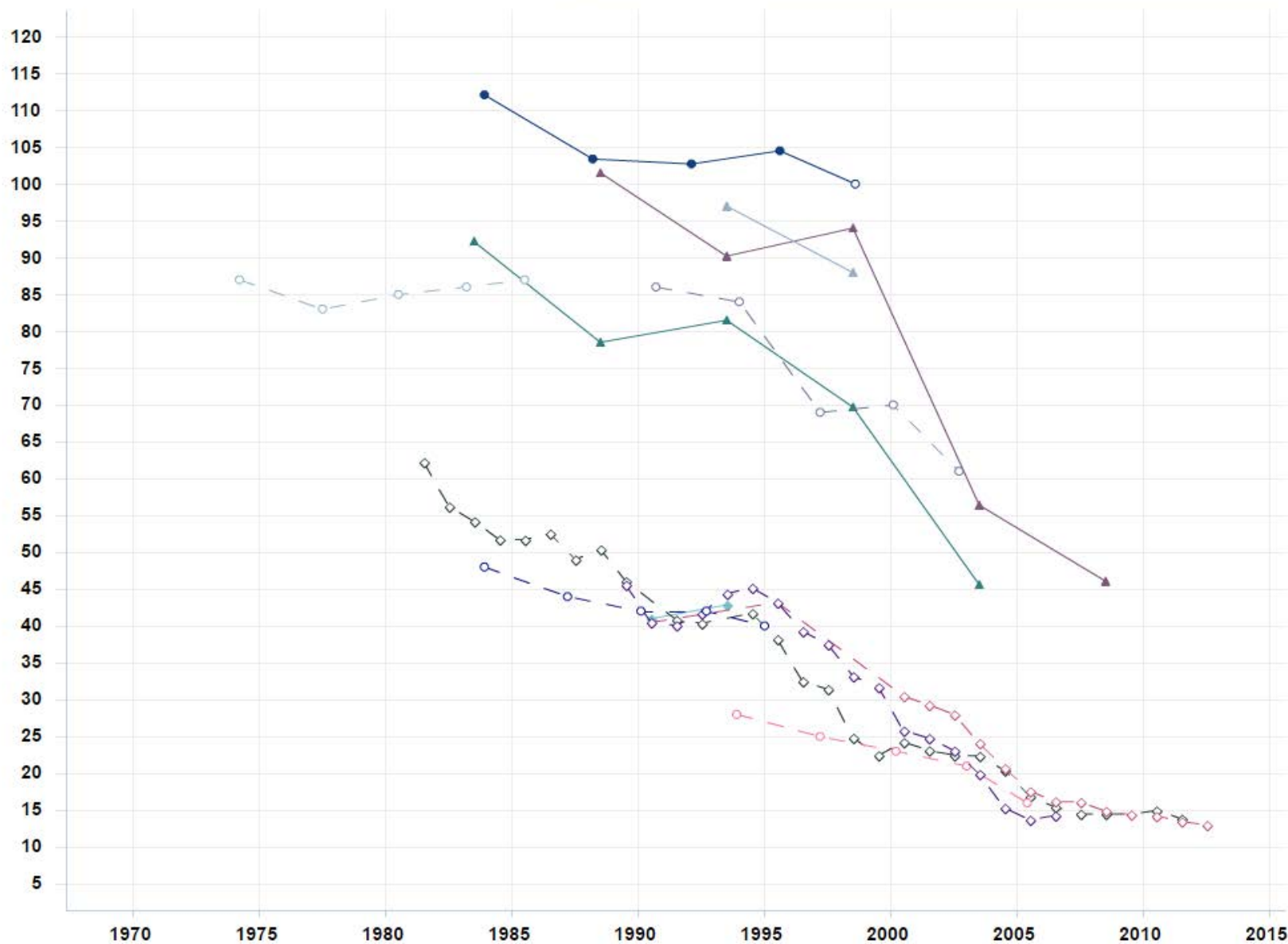
 Azerbaijan

\*AZE\_B3\_Under-five mortality rate\_Default\_2015.5

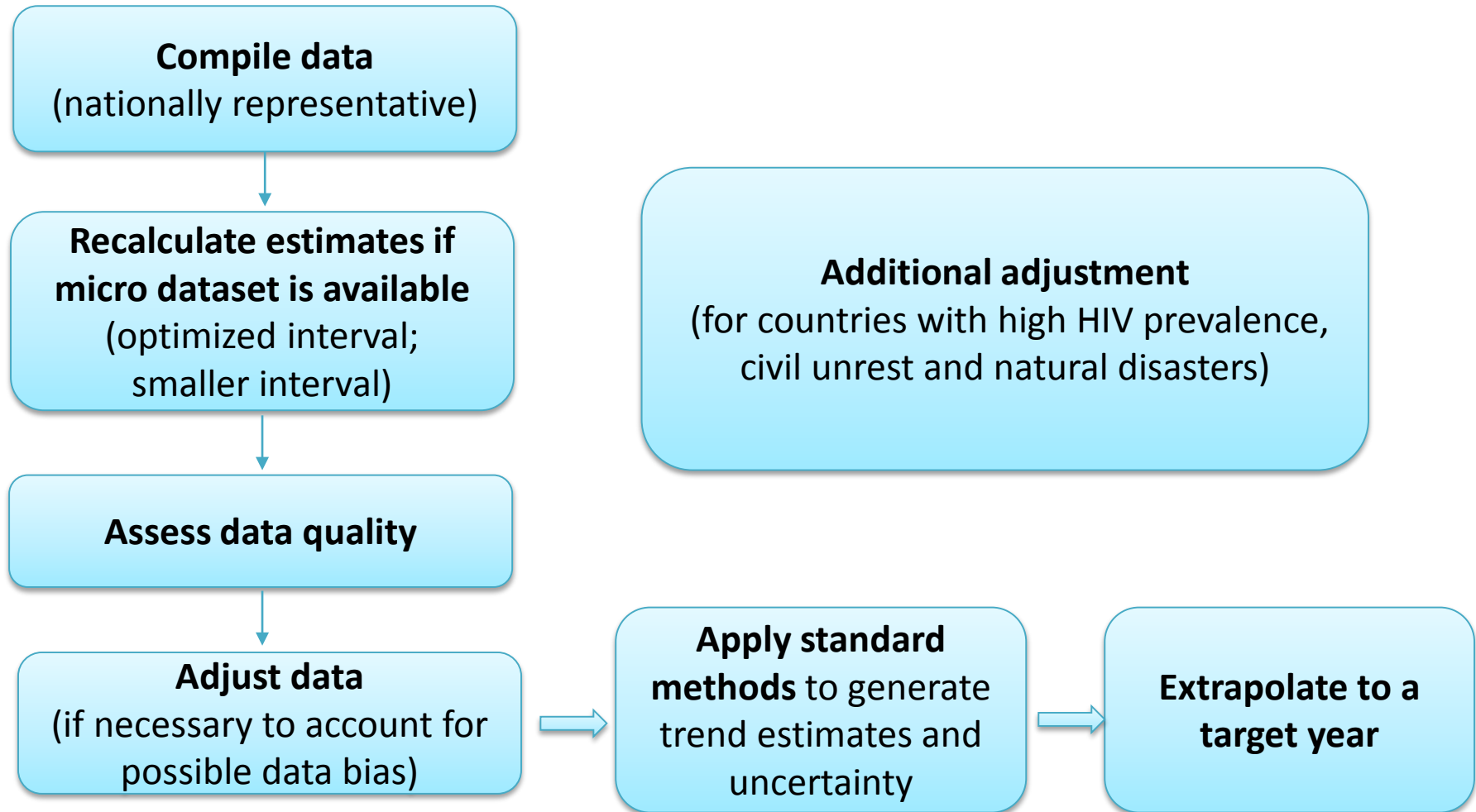
Under-Five Mortality Rate ▼

Total ▼

View | Series | Data | Estimates | Export | Notes |  

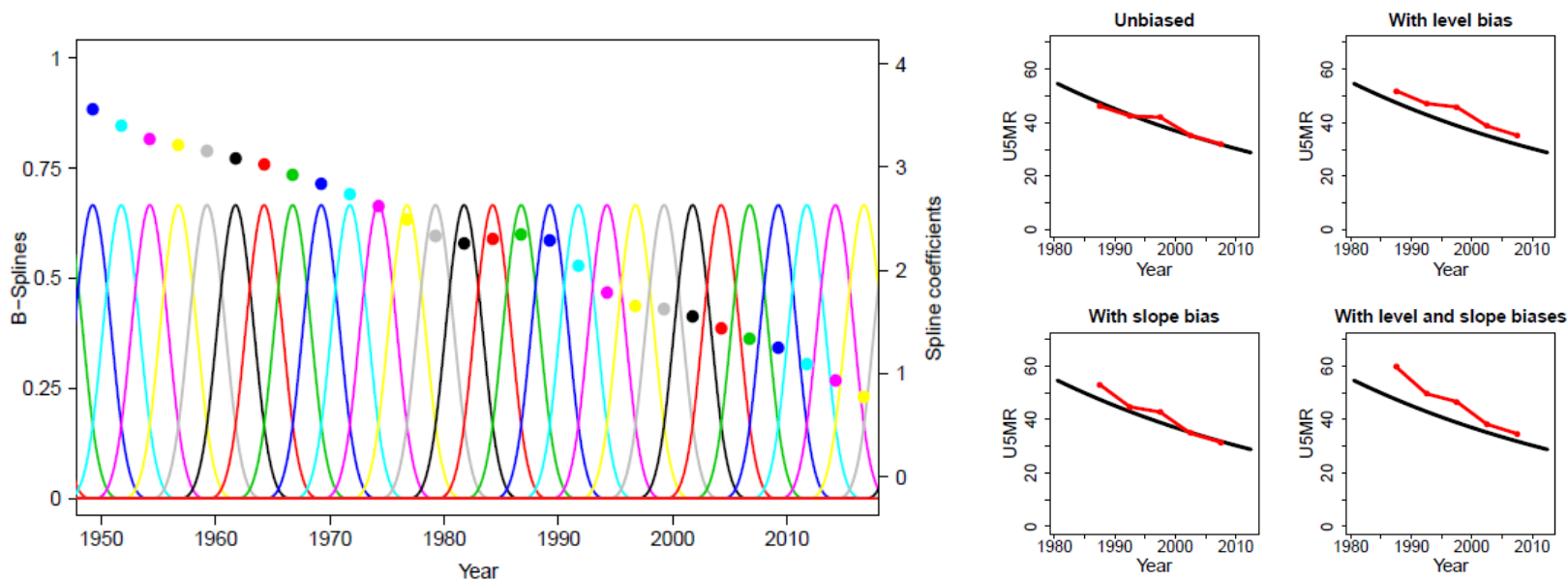


# UN IGME approach to measuring child mortality

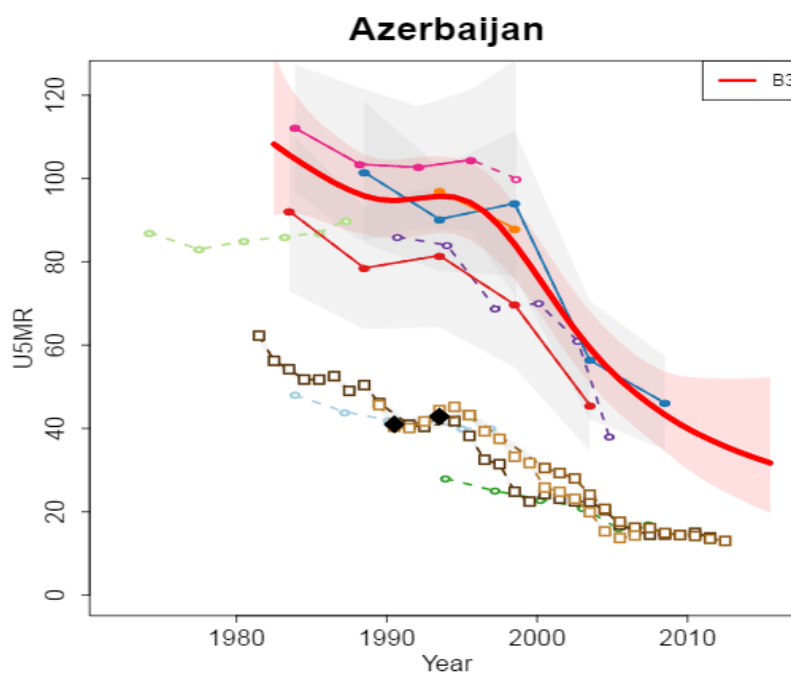
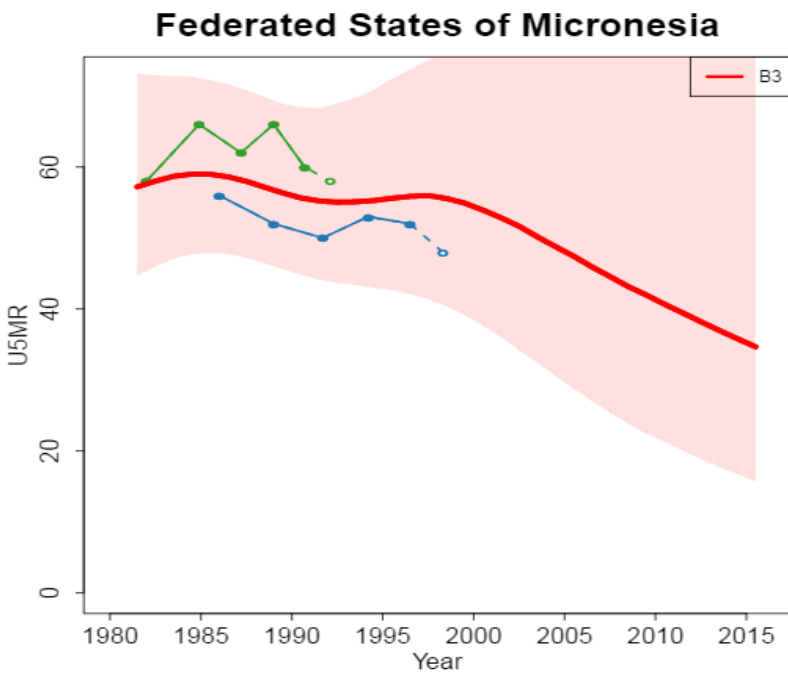
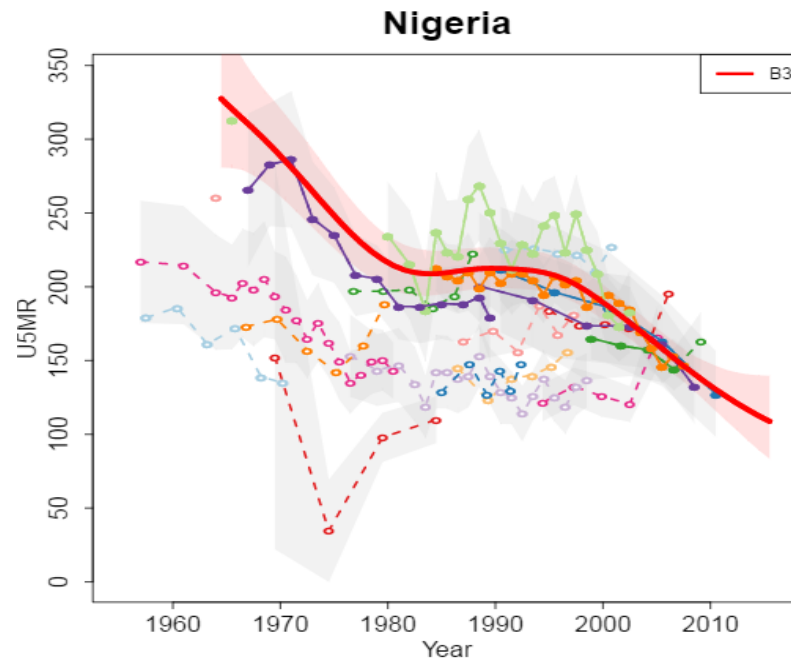
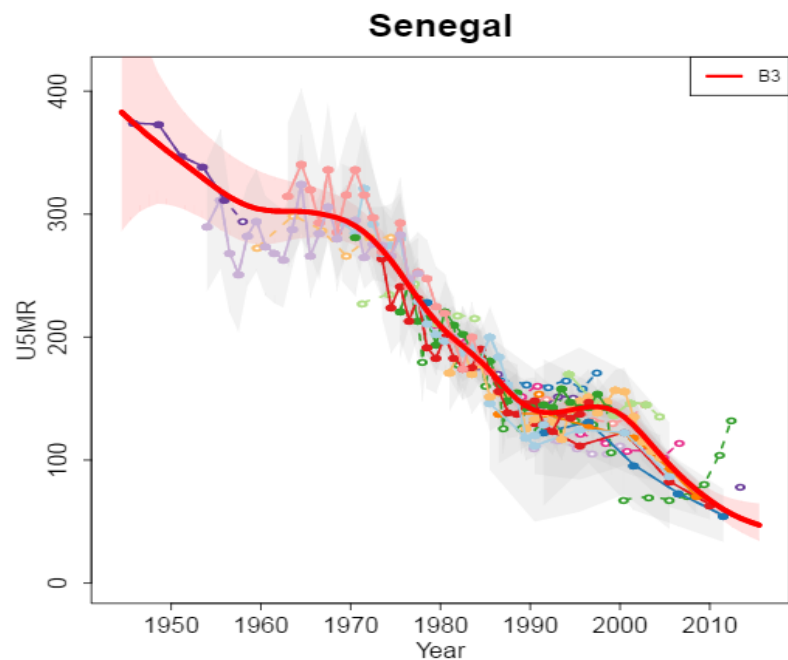


# Curve fitting methods

- Bayesian, B-Spline, Bias-reduction model
  - Account for potential data bias
  - Better capture short-term fluctuations and annual rate of reduction, thus is better able to account for evidence of acceleration in the decline of mortality from new surveys
  - Allows the inclusion of additional information, e.g., incomplete VR data
  - Performs well in out-of-sample model validation exercises



# UN IGME U5MR estimates with uncertainty



## Why use a model to derive child mortality estimates?

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- Lack of a single source of high quality data covering the last several decades
  - Lack of civil registration systems that accurately record all births and deaths
- Data quality issues in some data sources and discrepancies may exist between estimates from different sources
- Empirical data are usually not timely
  - Direct estimates: often refer to an average for a five-year period prior to the survey. IGME uses optimized smaller intervals if sample size allows
  - Indirect estimates: from women aged 25-29, refer to about 2-3 years before the survey
- Consistent trend line is needed for monitoring progress over time

## Pros and cons of global estimates

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- Pros
  - Consistent, comparable, more reliable (quality assessment)
  - Transparent
  - Provide a broad picture of levels and trends in child mortality and monitor progress at global level
  - Contribute to methodological development
  - Contribute to capacity building at country level by engaging in countries through the process
- Cons
  - Quality of estimates relies on quality of empirical data
  - Sometimes confusing because of discrepancies to country official estimates
  - Insufficient involvement from countries in estimation and data utilization
  - Estimates of uncertainty produced but not used in monitoring MDG progress
  - Changing estimates for the full series in each round sometimes causes confusion and problems

# III. Challenges and Opportunities



## SDG target on child mortality



Ensure healthy lives and promote well-being for all at all ages

**3.2** By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births

Relevant goals:



Achieve gender equality and empower all women and girls



Reduce inequality within and among countries



## Challenges

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- Poor availability of high-quality data
- Typically not timely
  - As of July 2015, about 40 countries do not have child mortality data for 2011 onwards
- Lack of subnational and disaggregated data
  - The SDG challenges for further disaggregation by age group, sex, social-economic characteristics and for small areas etc. For evidence-based decision making, planning and programming, subnational and disaggregated data are needed but these data are not available in many LMICs
  - **Household surveys** can't be used to generate child mortality estimates below provincial level due to the design of sampling frame and sample size
  - Mortality estimates from **censuses** are often underreported; census data are not fully used due to limited availability of micro datasets
  - Other data sources (disease surveillance systems, etc.) are often not fully used

## Challenges (cont'd)

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- Misuse and misinterpretation of data
  - Connect the latest data points from different surveys to obtain trend lines
  - Reference dates
- Lack of capacity in many countries
  - Calculation of indirect estimates from SBH, direct estimates from FBH
  - Data quality assessment
  - Modelling work

## Opportunities

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- Continued efforts in data collection from household survey programmes (MICS, DHS, etc.)
- Growing momentum for improving CRVS systems
- Improvements in data availability
- Advances in analytical methods
- Expanded knowledge of child mortality rates and trends in the world
- Data revolution: awareness of importance of data; possibility of innovation in data collection, reporting and utilization
- SDG 3.2: end preventable deaths of newborn and children under the age of five
- Stronger commitment and improved accountability

## Recommendations

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- Surveys and censuses: ensure high-quality data
- Need fully functioning and complete CRVS systems and HIS systems
- Innovative methods to collect, analyze and use data (e.g., geospatial mapping; combine or triangulate data from various sources to produce a more complete picture across both time and space)
- Fully use existing data and resources (disease surveillance data, health facility data, etc.)
- Capacity building at country level for data collection, analysis and utilization

***Ideally*** - no modelling work is needed if all countries have fully functioning CRVS and HIS systems to produce transparent, accurate frequent, timely and disaggregated mortality data, including COD data.

# Thank You



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