



# Measurement of Perinatal Mortality

C. Stanton

- From the outset, the perinate was included in the Impact mandate, *although* the focus was on the woman
- With extensive fieldwork, the perinate could (easily) be incorporated
- Decisions for the most feasible/most cost-effective approaches to measuring maternal mortality drove Impact field activities
- Ex: Indonesia's informants; the census in Burkina Faso, but these are not necessarily the most feasible approach for collecting data on perinatal deaths
- 3 decisions were made:
  - 1)where there are opportunities to add questions into to existing methods for maternal health/survival, add in perinatal outcome questions
  - 2)learn as much as possible from secondary analyses of existing datasets
  - 3)*greater focus on stillbirths than early neonatal deaths because so much less is known*

- Brief reviews of:
  - how stillbirths have been measured;
  - what we know about the data quality from these approaches;
- Present results of experimental efforts by Impact to measure perinatal mortality in resource poor settings;
- Concluding remarks

## Perinatal mortality:

- Stillbirths: pregnancy loss at 28 weeks gestation (7 completed months)
- Early neonatal death: deaths 0-6 days among live born children

Sources of population-based data on stillbirths:

1. Vital Registration: select countries (ex: Singapore, Israel, Mauritius, Chile, Mexico)
2. *Selected* demographic surveillance sites
3. Few special studies (93 located, mean reference year = 1990, very few national)

Sources of population-based data on stillbirths- *continued*:

4. National stillbirth (+early neonatal) rates: Demographic and Health Surveys (DHS) largest source -30+ developing countries;
  - preceding DHS; ~1970-80's the WFS)
5. Statistical exercises; Impact/Saving Newborn Lives 2006 AND WHO 2006
4. GOLD STANDARD METHOD: Perhaps prospective measurement?

- Very detailed interviews with women of reproductive age:
  - Are asked to provide a complete live birth history (birthdates, vital status, and dates of death)
  - In many countries: a contraceptive calendar
    - Month by month documentation of contraceptive use and/or pregnancy status for 60 months prior to interview – which allows identification of pregnancy loss
- **NOTE:** The calendar was designed for measurement of contraceptive continuation. SBrates are a by-product of the calendar.

# Data quality assessment of DHS stillbirth data:

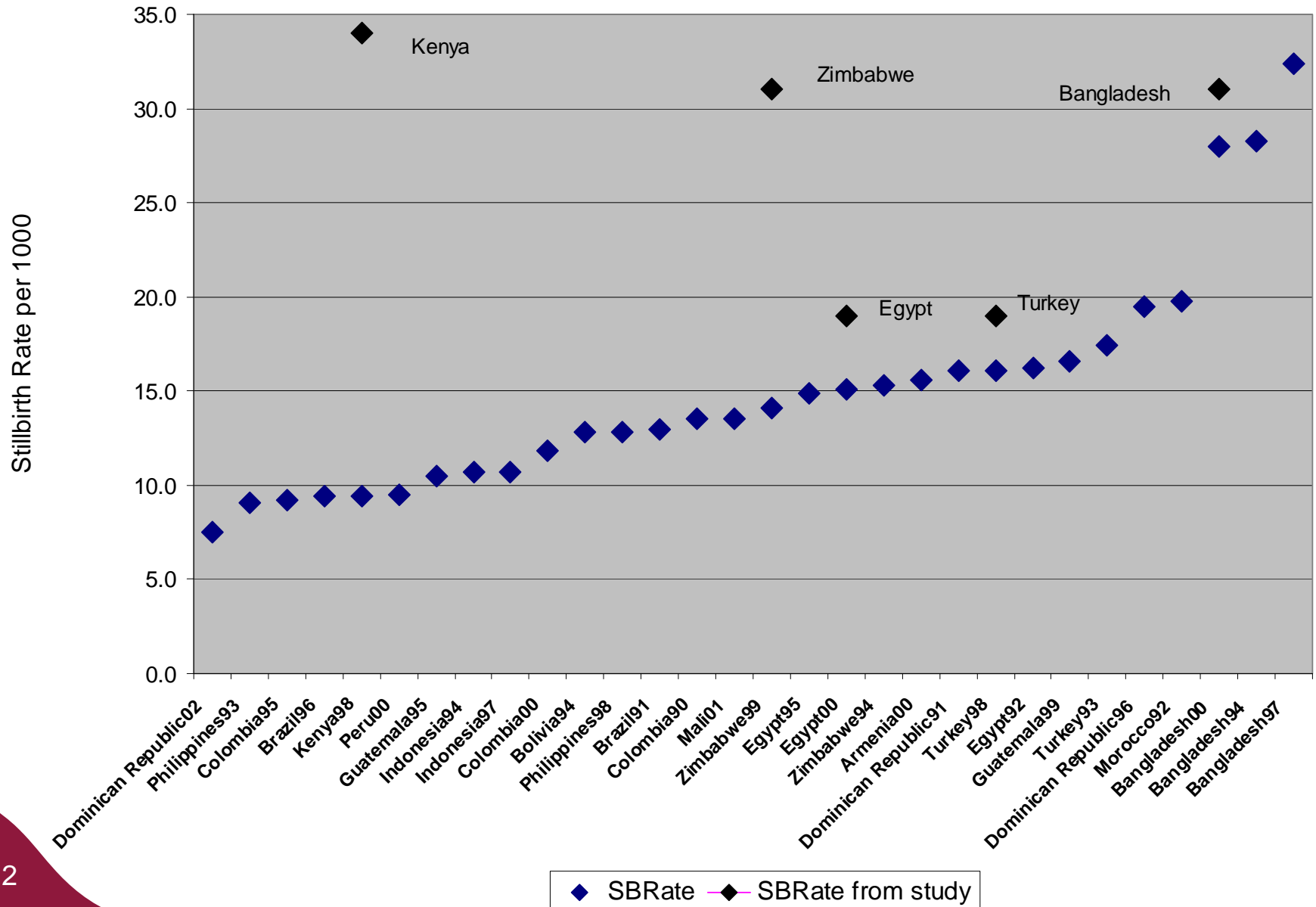
Data	All unrestricted DHS datasets with calendar data which were available up through 2005: 30 surveys; 16 countries
Reference years:	5 yrs prior to survey; Survey years vary from 1991-2002
Sample of deliveries (SB+LB)	Ranges from 1,674 – 16,223 Total births across all countries: 211,501 Average: 7,372
Regional representation	S and SE Asia, W Asia, LAC, N Africa and SS Africa

- to assess internal consistency of DHS calendar data re: stillbirths
- to assess external validity (?) or at least reliability of overall *rates* and *patterns* of stillbirths by gestational age against external sources— i.e., comparisons to estimates/patterns in the literature
- To inform users of the data re: their strengths and weaknesses and ...
- to perhaps/hopefully make recommendations re: data collection and reporting.

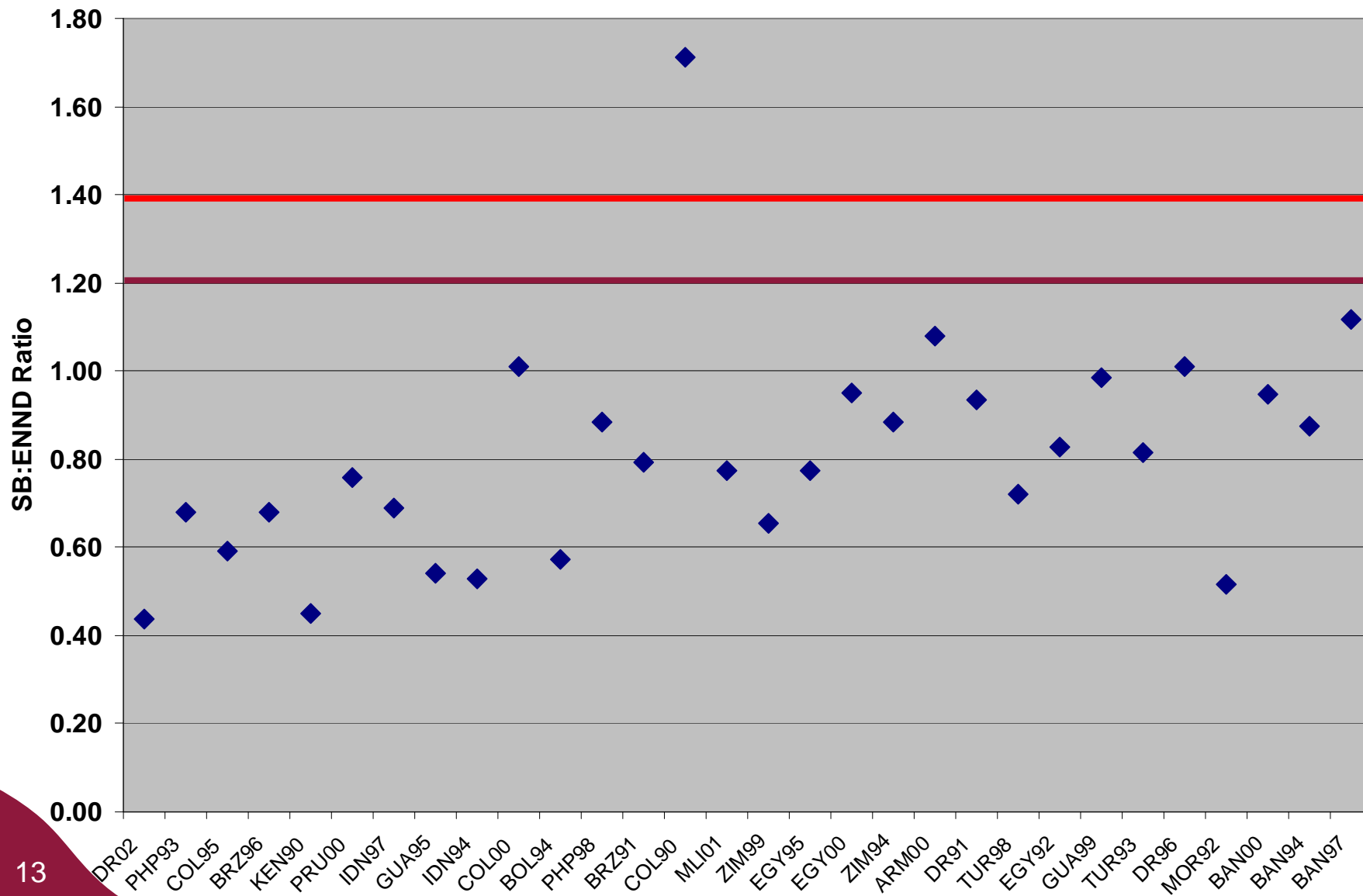
- Internal consistency checks:
  - Live births at  $< 7$  months gestation
  - Implausible gestational ages:  $>11$  months
  - Missing data
- External comparisons:
  - Against the literature; comparing DHS estimates against the “best” estimates identified in the literature
- Ratio Stillbirth Rate: Early Neonatal Mortality Rate
  - Recent WHO analysis shows that historical data suggest a ratio of 1.4 (where ENND $\geq$ 20; 1.2 for lower mortality settings)

- Live births at 6 months: virtually none (56 births across all datasets)
- Implausible gestational ages: virtually none (14-53 months for 5 cases across all countries)
- ... That is all that could be checked due to extensive data cleaning, reflective of interest

# DHS Stillbirth Rates per 1000 deliveries; 30 surveys, 16 countries



# Ratio of DHS Stillbirth Rates to Early Neonatal Death Rates; 30 surveys, 16 countries

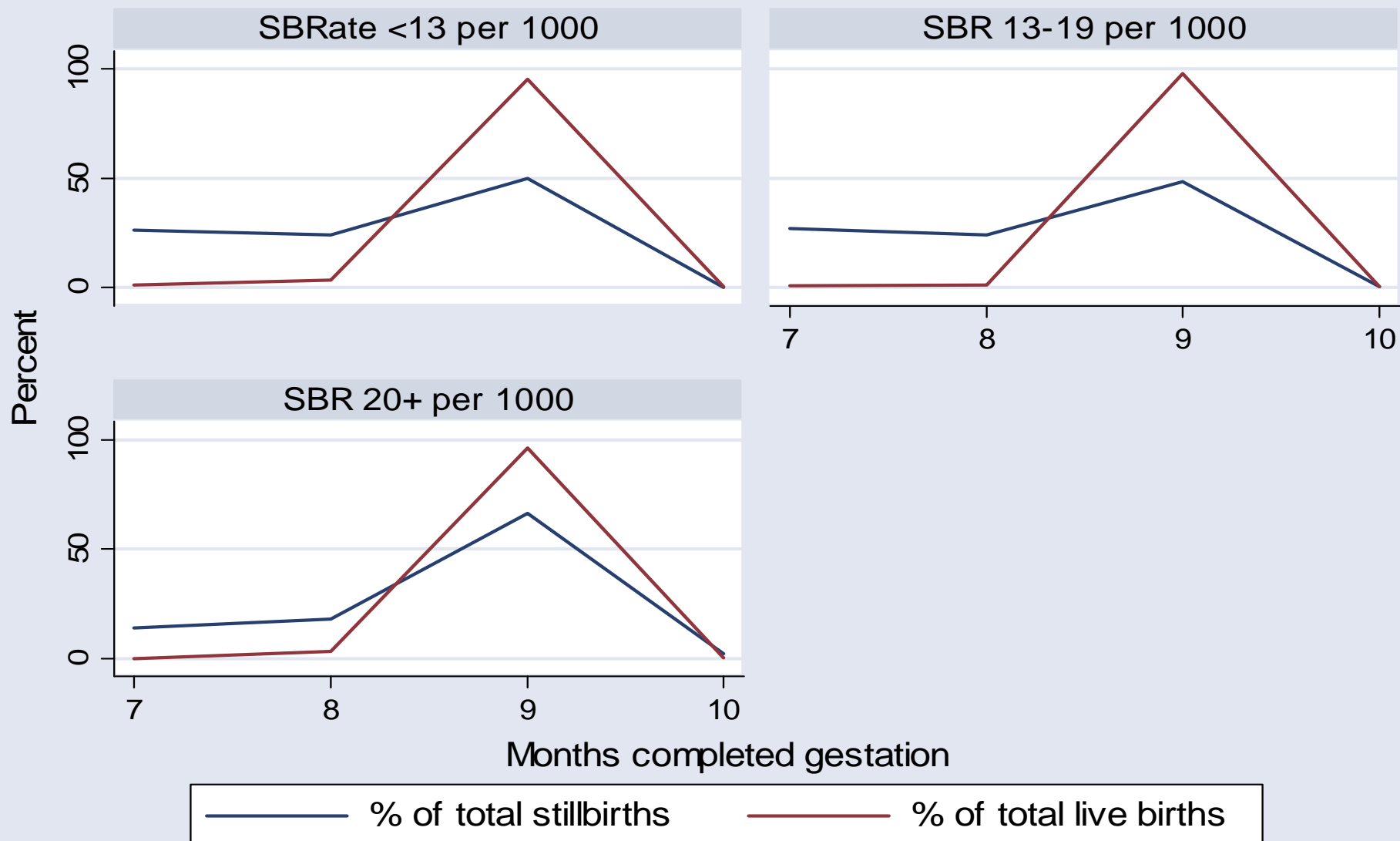


- Model for the Saving Newborn Lives/Impact exercise to estimate stillbirth rates showed:

Holding constant all other variables in the model

- Infant mortality, General Fertility Rate, GDP, geographic regions
- The DHS stillbirth rates were **27%** lower than other population-based stillbirth rates

# Percent distribution of stillbirths by gestational age



Graphs by group

- % of SBs at 9 months from the literature:
  - 37% stillbirths at “term” (assume fair to compare to 9 months) from a Latin American Center for Perinatology study (800K+deliveries)
  - DHS average is: 46.9%;
  - Average from WFS ~20 countries: 45.7%
  - From Matlab/Bangladesh 2003: 58% at 9+ months –
    - which is the same for all three DHS Bangladesh surveys

- One of the few countries with rates as high as one might expect – the only country among high mortality countries
  - Relied on a standard DHS live birth history and calendar
- Stillbirth rate in 1975-76 WFS for Bangladesh: 29.1 per 1000
- Some other WFS countries had rates in the 20's – low 30's; and all used variations on a pregnancy history
- Does it have to do with interest in recording menstrual regulation?
- Why do Bangladeshi women get it right – when most of the rest of the world doesn't seem to get it right??

- Sampling at Service Sites (SSS) – method designed as a cost-effective approach to obtaining a large sample size for the measurement of maternal mortality
- An interview of short duration is a key element to the approach;
  - the antithesis of long/detailed questionnaires
  - Worth adding perinatal questions as an experiment *if not detrimental to data collection on maternal mortality*

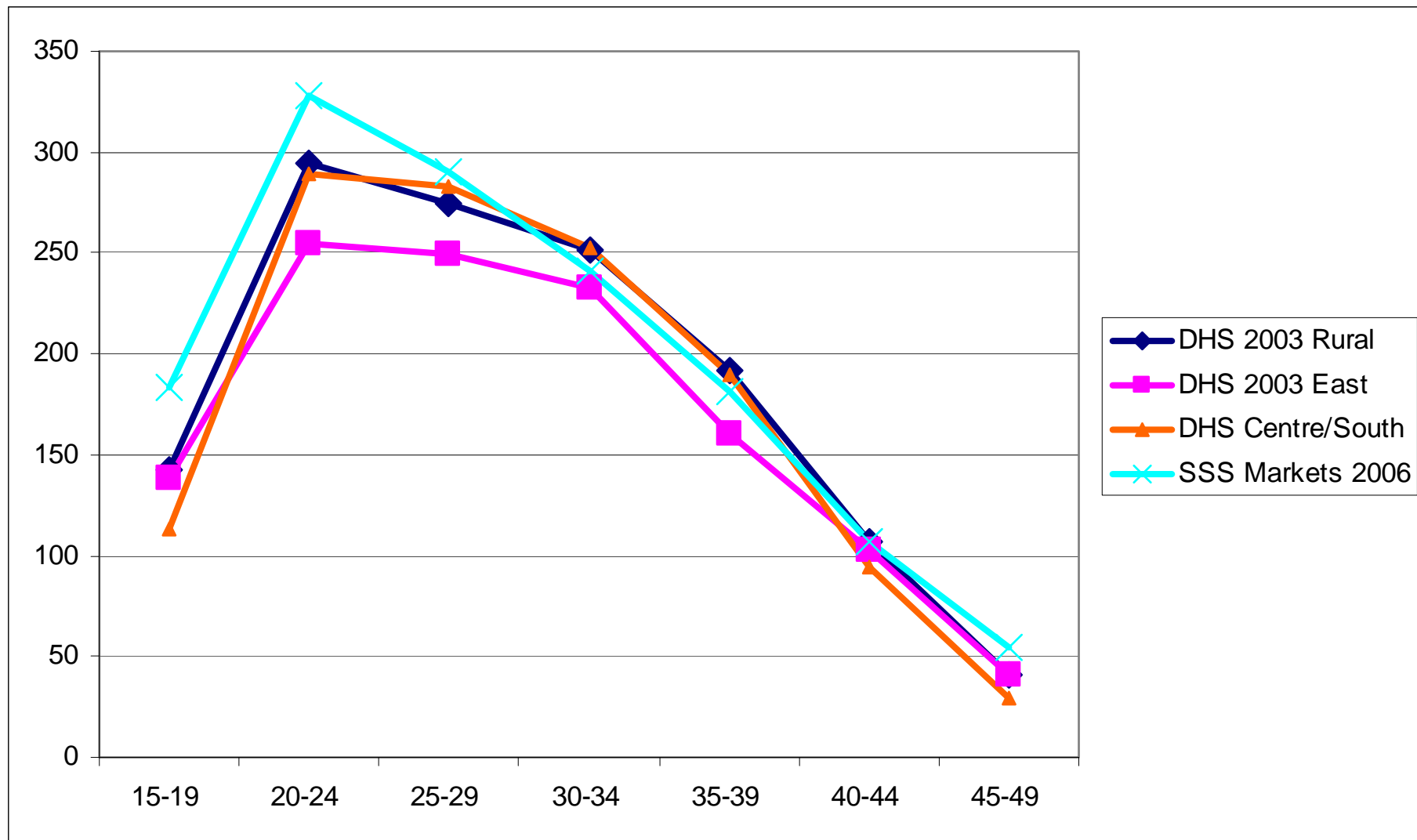
## The Exercises in Burkina Faso:

- Respondents (health care users) were asked the outcome of their pregnancies in the two years prior to interview
- Respondents were asked the outcome of recent pregnancies for a random selection of their adult living sisters

	<i>Exercise 1</i>		<i>Exercise 2</i>
<b>Reference period: 2 years prior to interview</b>	<b>Respondents</b>	<b>Respondents' sisters</b>	<b>Respondents</b>
<b>Stillbirth rate per 1000</b>	<b>24.5</b> (n=612 deliveries)	<b>26.4</b> (n=379 deliveries)	<b>35.7</b> (n = 1120 deliveries)
<b>Early neonatal mortality rate per 1000</b>	<b>21.8</b> (n = 597 live births)	<b>16.3</b> (n=369 live births)	<b>12.0</b> (n=1080 live births)
<b>Ratio SBR:ENMR</b>	<b>1.12</b>	<b>1.62</b>	<b>2.98</b>

## Other points of comparison

<p><b>SSS results:</b>  <b>Stillbirth rates:</b></p> <p><b>R = 24.5</b>  <b>R's sisters= 26.4</b>  <b>R = 35.7</b></p>	<p><b>2003 DHS</b>  <b>Burkina Faso</b>  <b>RURAL</b>  <b>stillbirth rate</b></p> <p><b>13.6</b></p>	<p><b>2000 WHO</b>  <b>Stillbirth rate</b>  <b>30</b></p> <p><b>Stanton, Lawn</b>  <b>et al (2006), for</b>  <b>2000</b>  <b>26.0 (national)</b></p>	<p><b>Stillbirth rates</b>  <b>from the</b>  <b>literature:</b>  <b>Chalmeau et</b>  <b>al (2000)</b>  <b>For 1984: 22</b></p>
<p><b>SSS results:</b>  <b>Early Neonatal</b>  <b>Mortality rates:</b></p> <p><b>R = 21.8</b>  <b>R's sisters =</b>  <b>16.3</b>  <b>R = 12.0</b></p>	<p><b>2003 DHS</b>  <b>Burkina Faso</b>  <b>RURAL early</b>  <b>neonatal</b>  <b>mortality rate</b></p> <p><b>19.9</b></p>	<p><b>2000 WHO Early</b>  <b>Neonatal</b>  <b>Mortality rate</b></p> <p><b>25</b></p>	



- Traditional methods (live birth history and the contraceptive calendar) do not seem to have worked well in most (but not all) countries
- General assumption: if traditional methods suggest clear under-reporting, then:
  - You need to be more careful during the interview
    - Probe more so as not to miss events
    - Define your terminology and reference period
    - Probably = longer interview
- The quicker approach used in the census in Burkina produced what we consider implausibly low rates

- HOWEVER, the SSS looks promising
  - It deserves more experimentation. Was it a fluke?
  - If there are conditions when the SSS is appropriate, it could allow for data collection on maternal *and* perinatal mortality in the same instrument/same sample

- How should the questions be formulated?
  - Have you had any miscarriages/stillbirths or live births.....?
  - OR do you determine the outcome for pregnancy loss by asking gestational age?
  - OR verbally describe stillbirth?
- What loss in quality is there by restricting questions to a truncated reference period (last 2 or 5 years)?
  - Definitely suggest clearly identifying the reference period (ie, January 2006 to present)
- How serious is the misclassification between stillbirths and early neonatal death?
- Validation studies are required to answer these questions.

- Until 6 months ago, no organization had released numbers/rates of stillbirth even by region, let alone country.
- Stillbirths are **not**
  - reported in WHO routine mortality data;
  - Measured/reported in many population-based surveys;
  - included in the Millennium Development Goals (MDG's);
  - included in the Global Burden of Disease

- Stillbirths are not evident in:
  - International policy
  - National programmes in low income countries
  - Research priorities
- J. Lawn: “This is where neonatal deaths were even a couple of years ago. So, it is possible to change the situation”.