The Robert Cruickshank Lecture 2008
International Epidemiological Association

The Millennium Development Goals

A Challenge to Epidemiologists

Cesar Victora
Federal University of Pelotas
Brazil

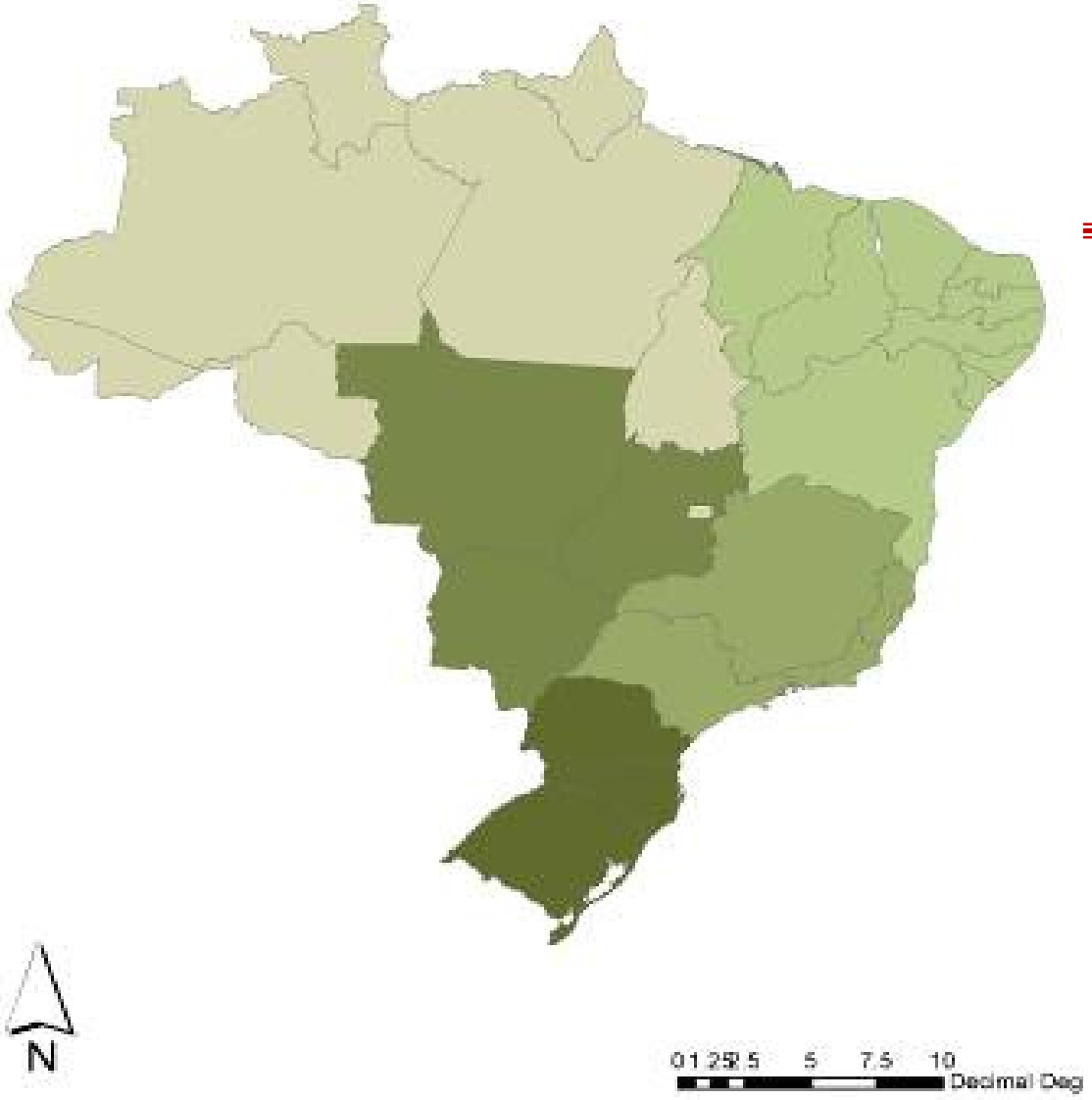
Epidemiology and Community Health in Warm Climate Countries

The Late ROBERT CRUICKSHANK, C.B.E., M.D., F.R.C.P., F.R.C.P.E., D.P.H., F.R.S.E., Hon. LL.D. (Aberd.)

Formerly, Professor of Bacteriology, University of Edinburgh; Professor of Social and Preventive Medicine, University of the West Indies, Kingston, Jamaica; Past President of the International Epidemiological Association (I.E.A.)

Outline of presentation

- **The MDGs**
- Child survival: the last 10 years
- Imbalances in health research
- The Countdown to 2015
- Data and research challenges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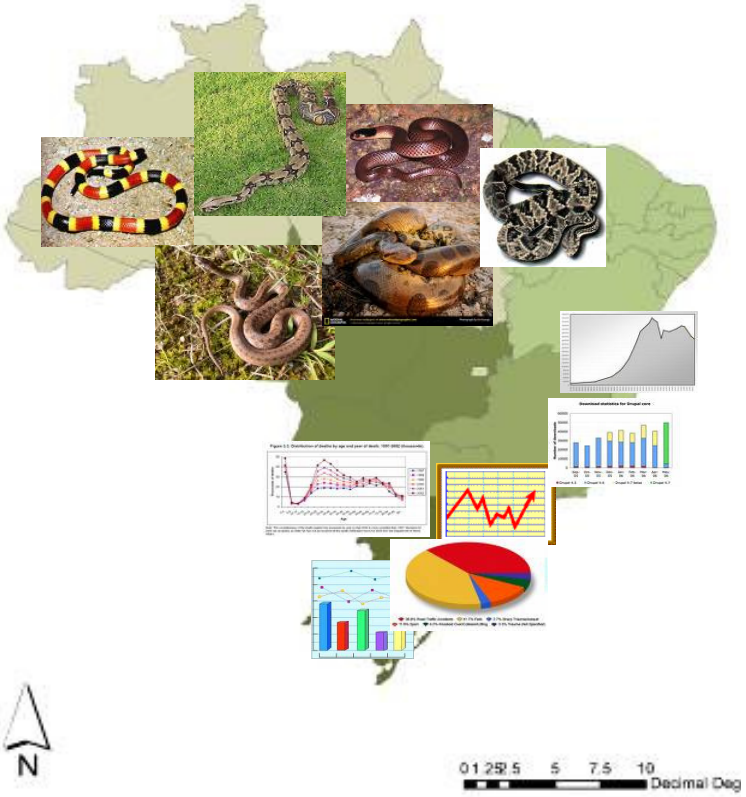
Brazilian statistics on snakebites?



"Nobody knows.

Where we have snakes, we don't have statistics;

and where we have statistics we don't have snakes".

Maurício Rocha e Silva
1910-83
Brazilian pharmacologist

The MDGs

- Set in 2000 and endorsed by leaders from 192 countries
  - Endline = 2015; Baseline 1990

The MDGs

- MDG1: reduce the prevalence of underweight in children by 1/2
- MDG4: reduce underfive mortality by 2/3
- MDG5: reduce maternal mortality by 3/4

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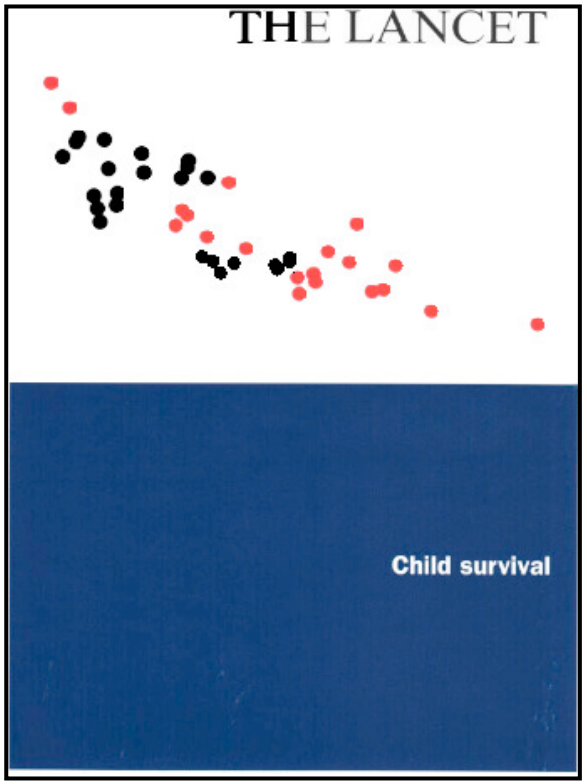
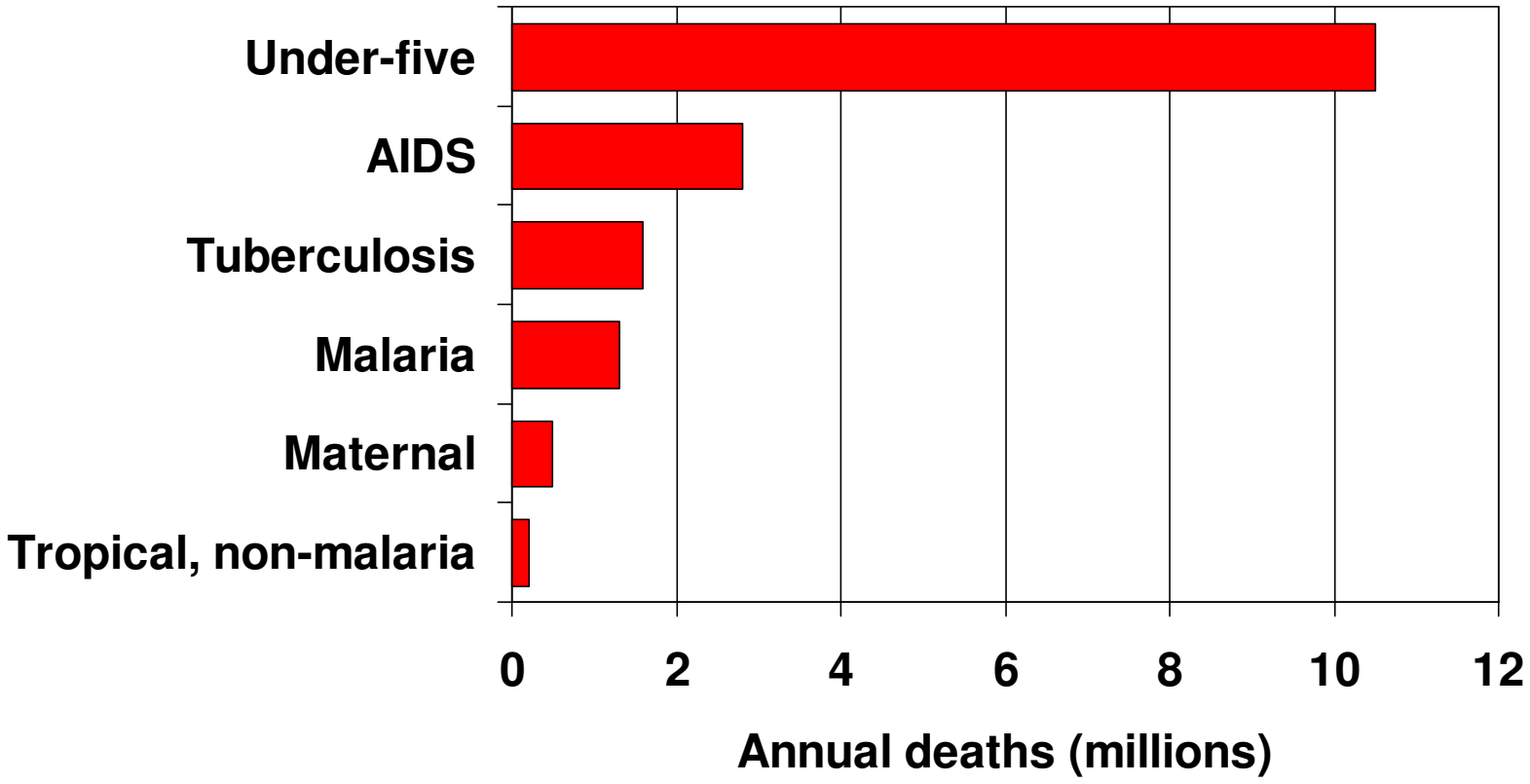
The Lancet Child Survival Series

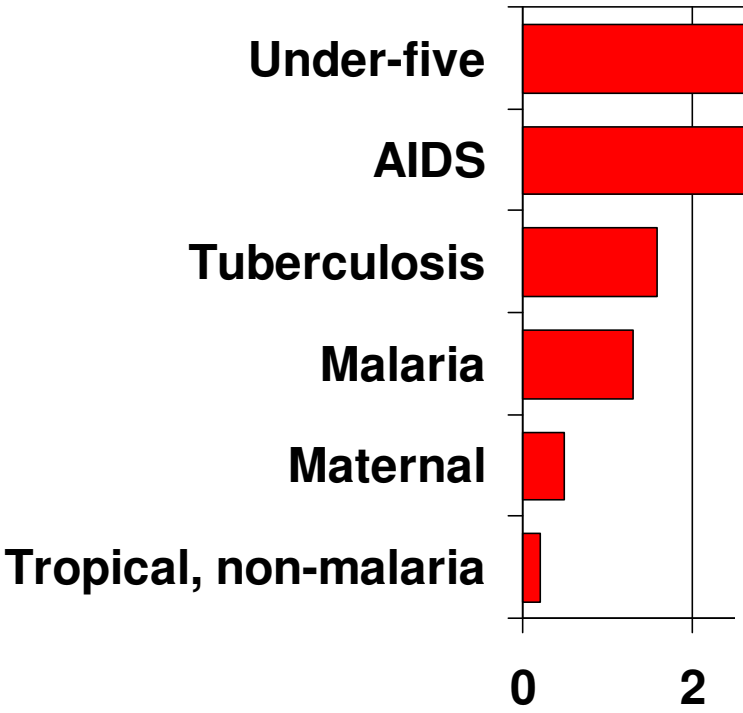


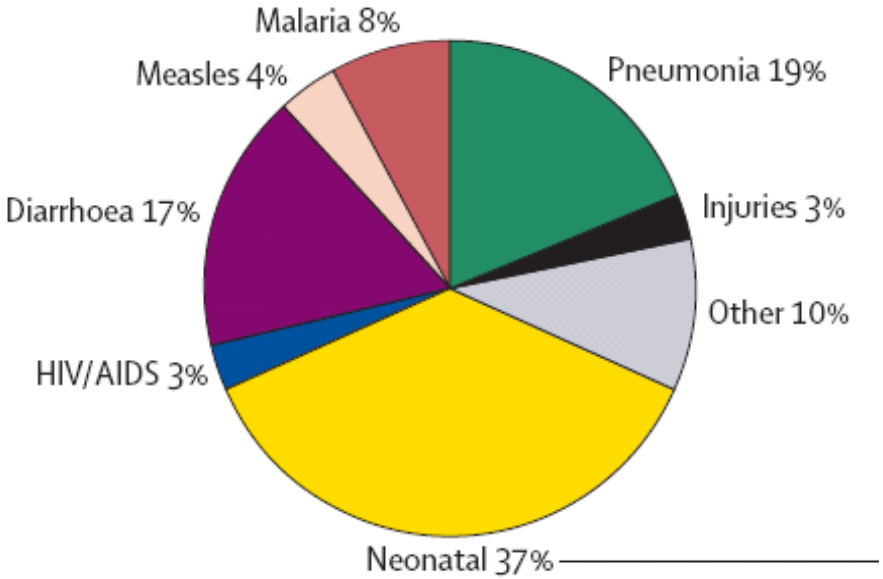
Deaths by cause: 2003 estimates



Source: 2003 World Health Report

Deaths by cause: 2003 estimates

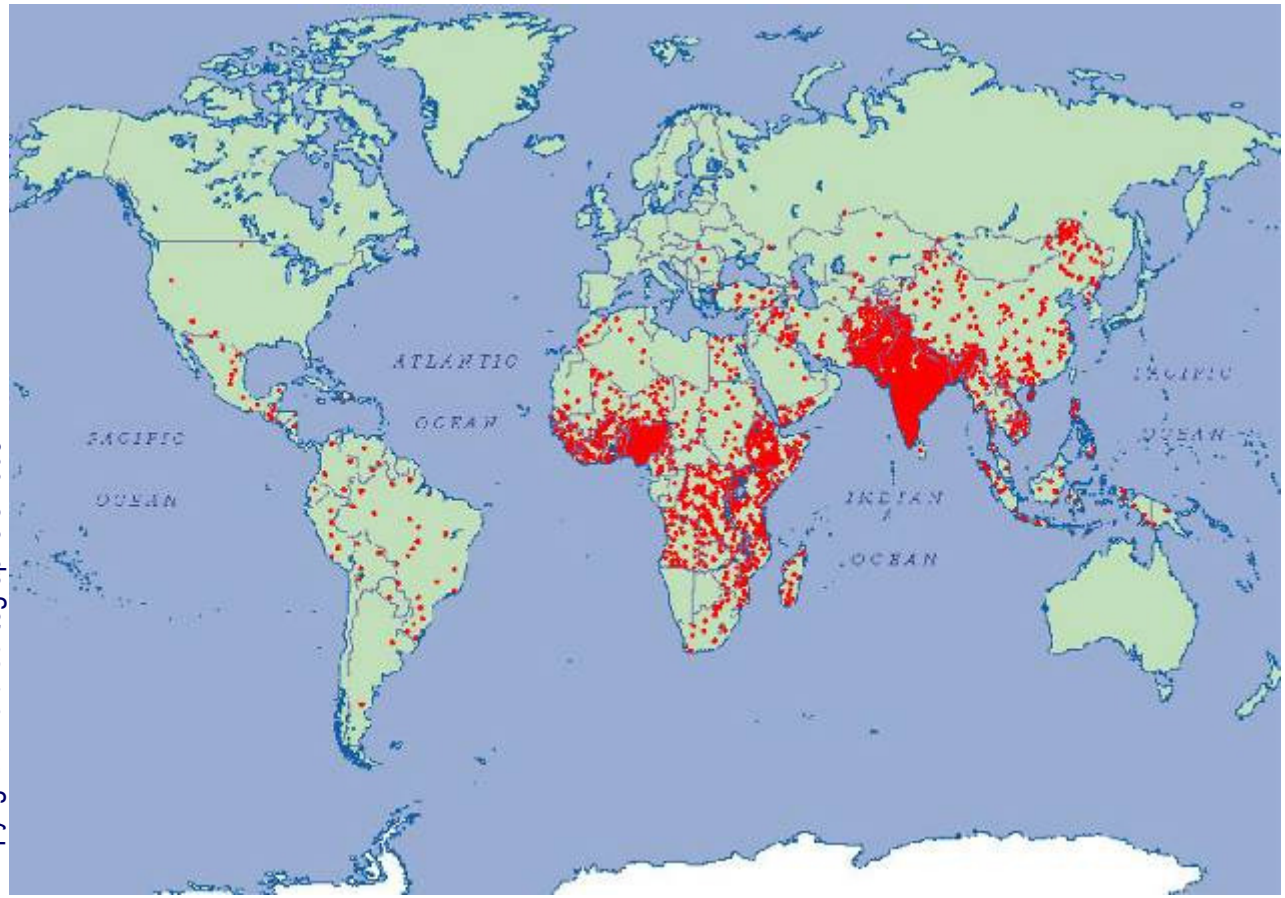




Source: 2003 World Health Report

Source: CHERG, Lancet 2005

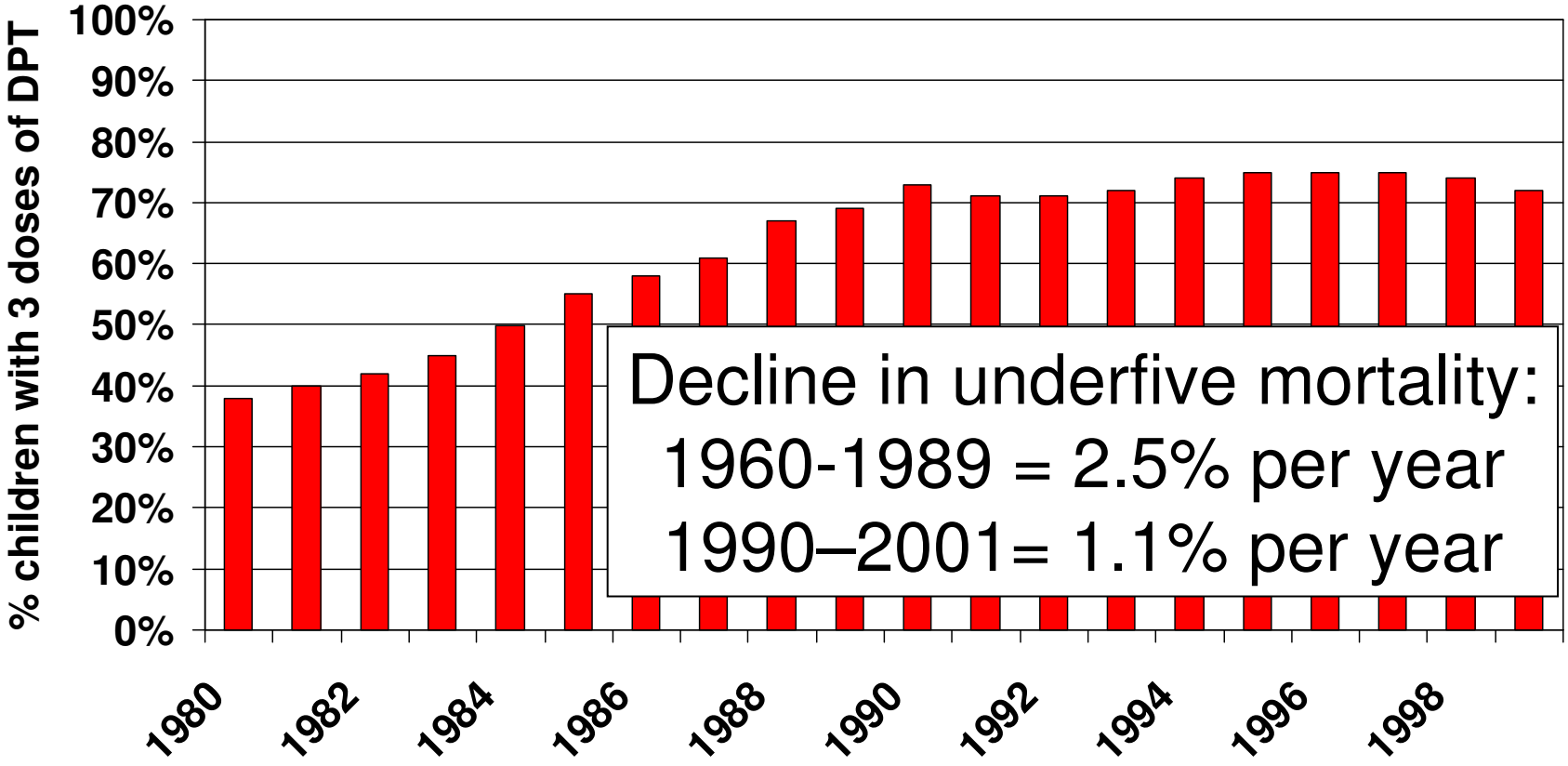
2003: Where did 10.8 million children die every year?



copyright Oxford Cartographers 2003

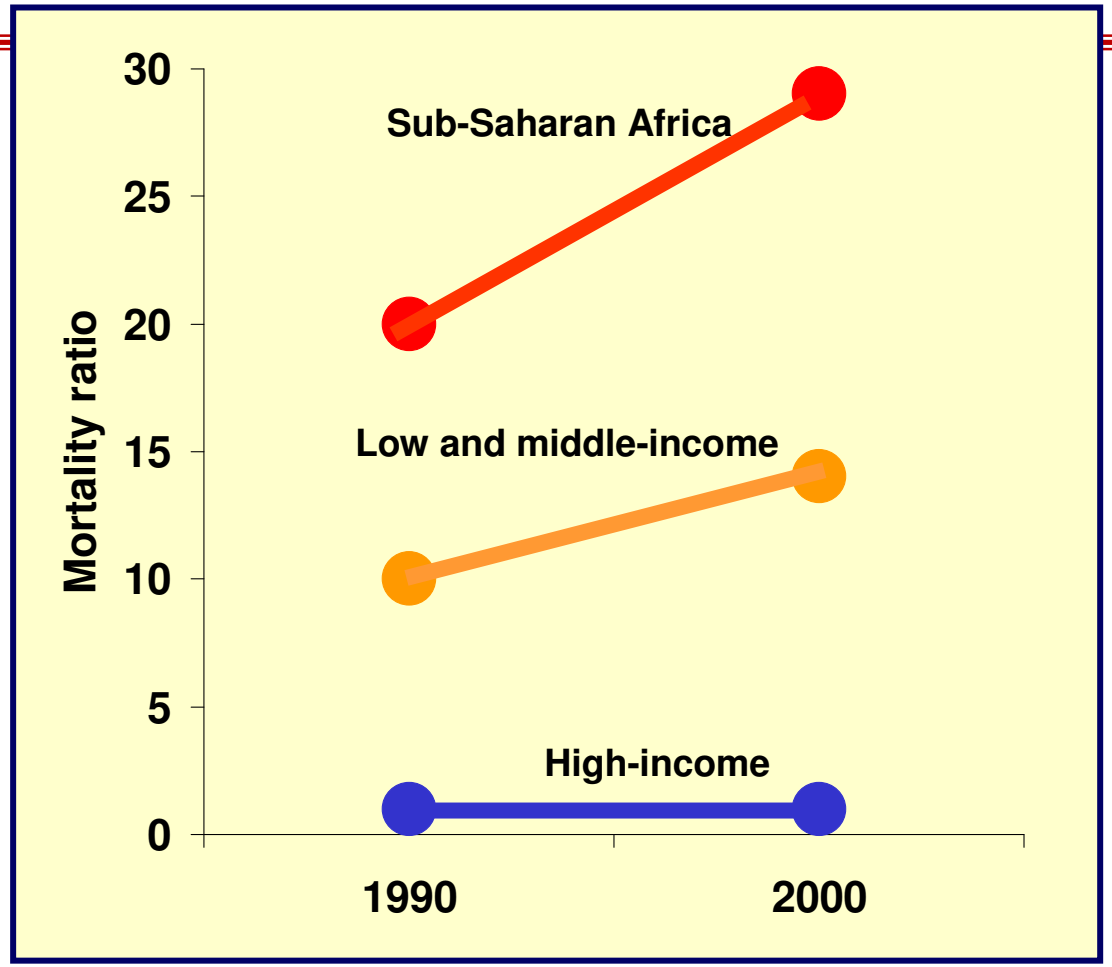
Source: Black, Morris, Bryce, Lancet 2003

Global coverage of DPT3 vaccine



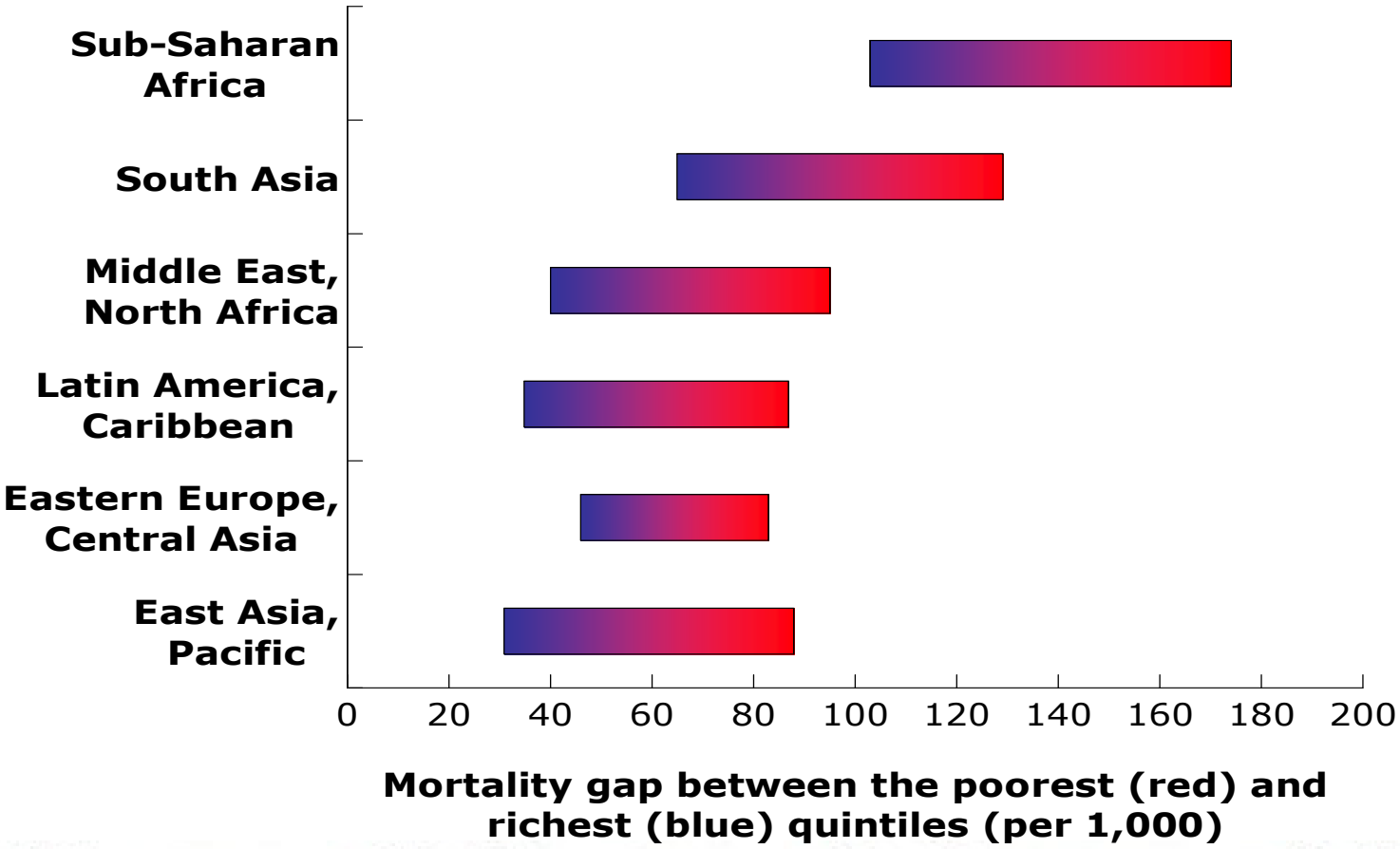
Source: Bryce et al., Lancet 2003

Gaps between rich and poor countries were increasing



Source: Victora et al., Lancet 2003

Within-country equity gaps for underfive mortality



Source: DHS, analyzed by Gwatkin et al. 2007

The challenge of reaching high and equitable coverage

Available, feasible interventions could prevent 6 million (63%) child deaths if they reached all mothers and children.

How to deliver these interventions to those who need them most?

Summing up this section

- About 10 million deaths of underfive children and half a million maternal deaths
- Little progress in the 1990s
- Relative gap between rich and poor is growing
- Cost-effective interventions could prevent 2/3 of child deaths if delivered at high and equitable coverage

Outline of presentation

- The MDGs
- Child survival: the last 10 years
- **Imbalances in health research**
- The Countdown to 2015
- Data and research challenges

The 10/90 Gap

- Only 10% of the global investment in health research is directed at 90% of the global burden of disease

(Global Forum for Health Research)

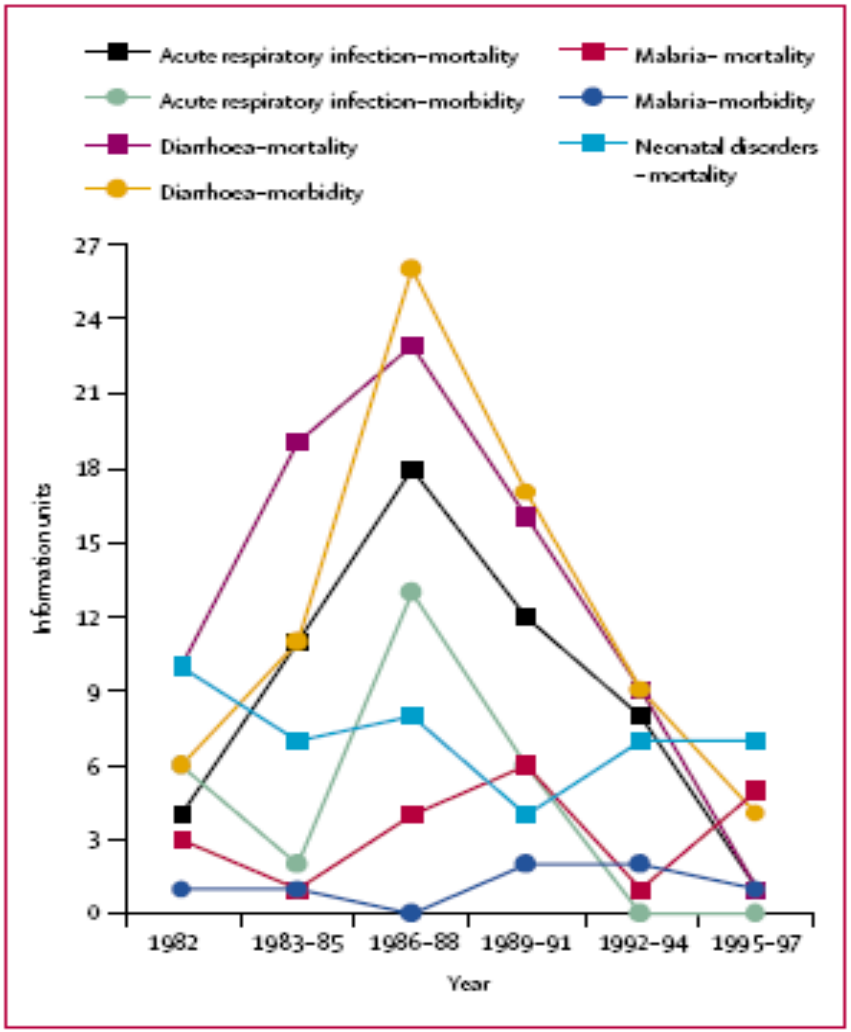
Global R&D investments per DALY

- Global average (all diseases): US$ 72.00
- HIV/AIDS, malaria and TB: US$ 8.40
- Acute respiratory infections: US$ 0.51
- Diarrhea: US$ 0.32

Source: GFHR 2004

Publications on child mortality

- The number of studies on causes of death of children in low and middle-income countries fell after the 1980's

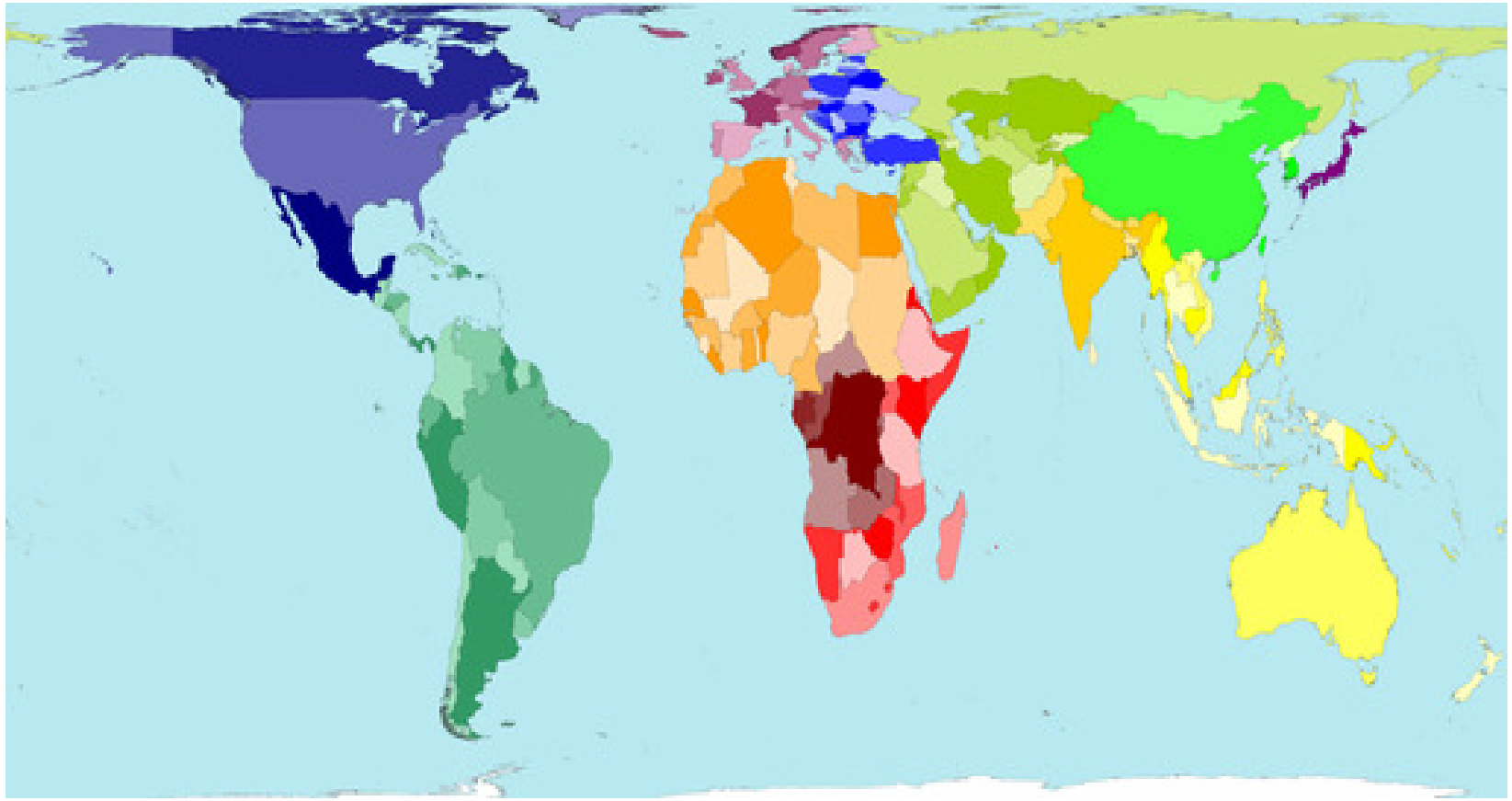


Source: Rudan et al, Lancet 2005

Reasons for decline in interest and funding for maternal and child health

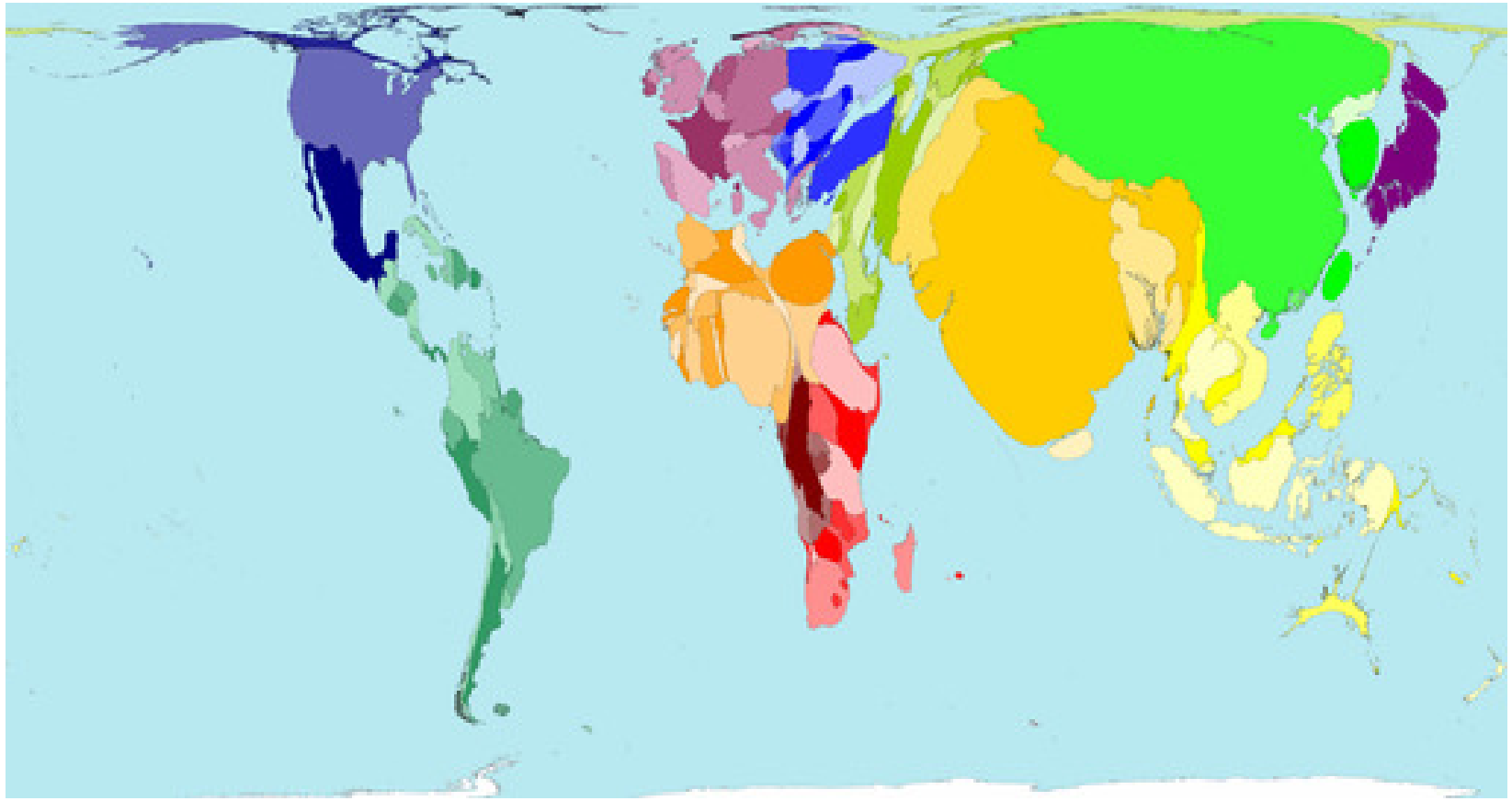
- Wrongful perception that maternal and child mortality were under control
- Growing interest in other diseases:
  - HIV/AIDS
  - Chronic diseases
- Particularly diseases that also affect rich countries?
- Limited funding for research on MCH

Land area



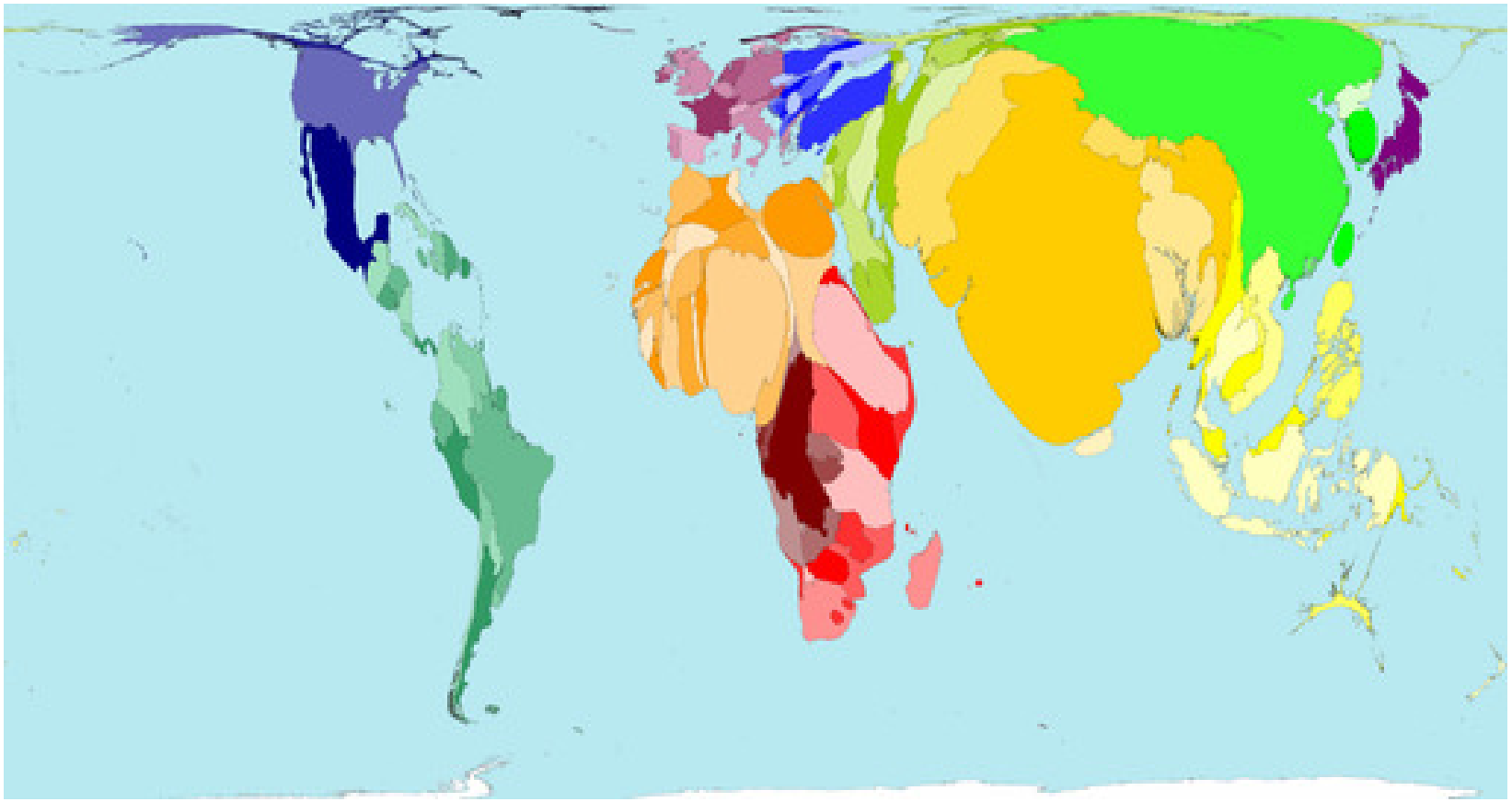
Source: www.worldmapper.org

Total population, 2000



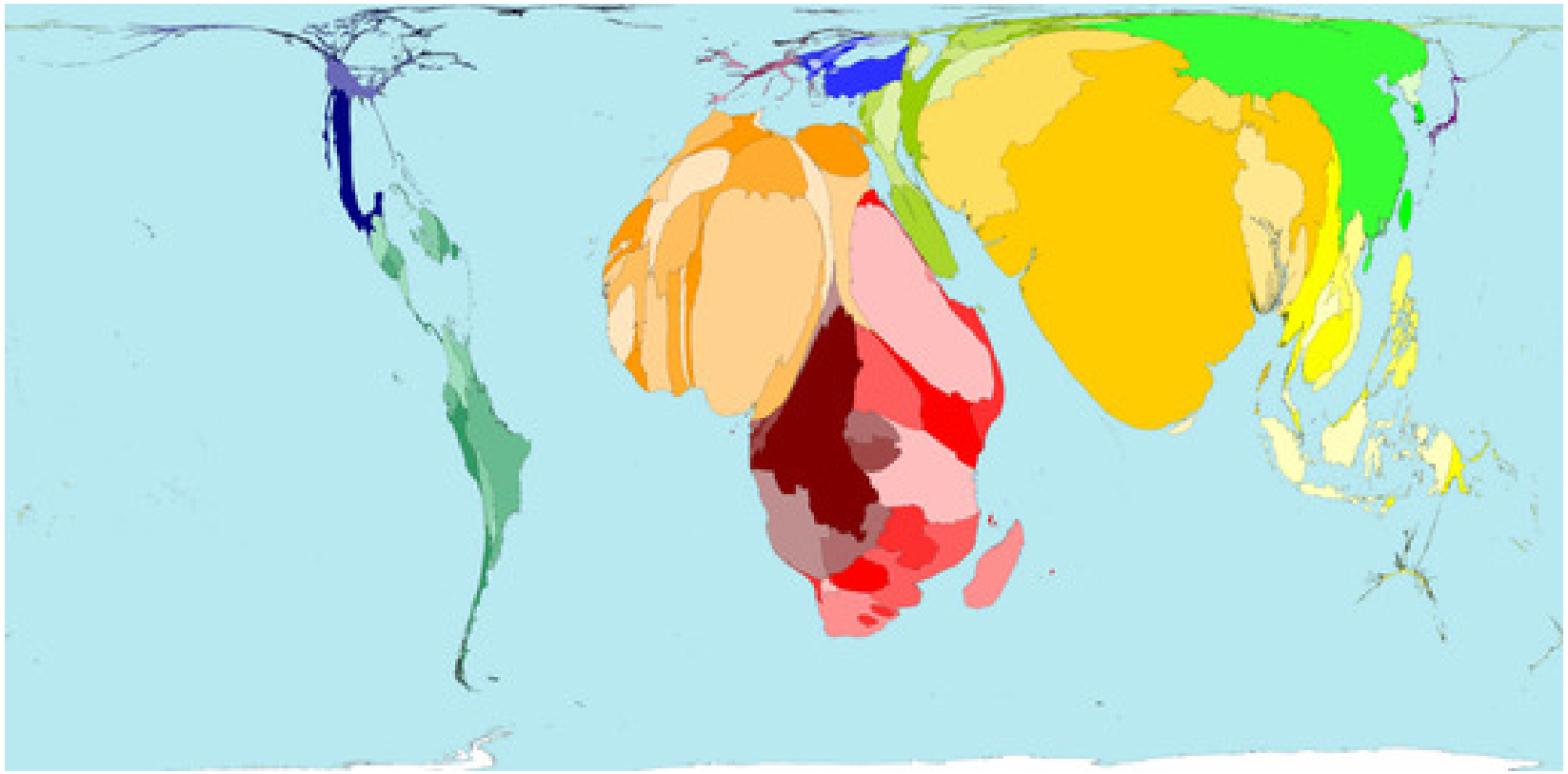
Source: www.worldmapper.org

Total births, 2000



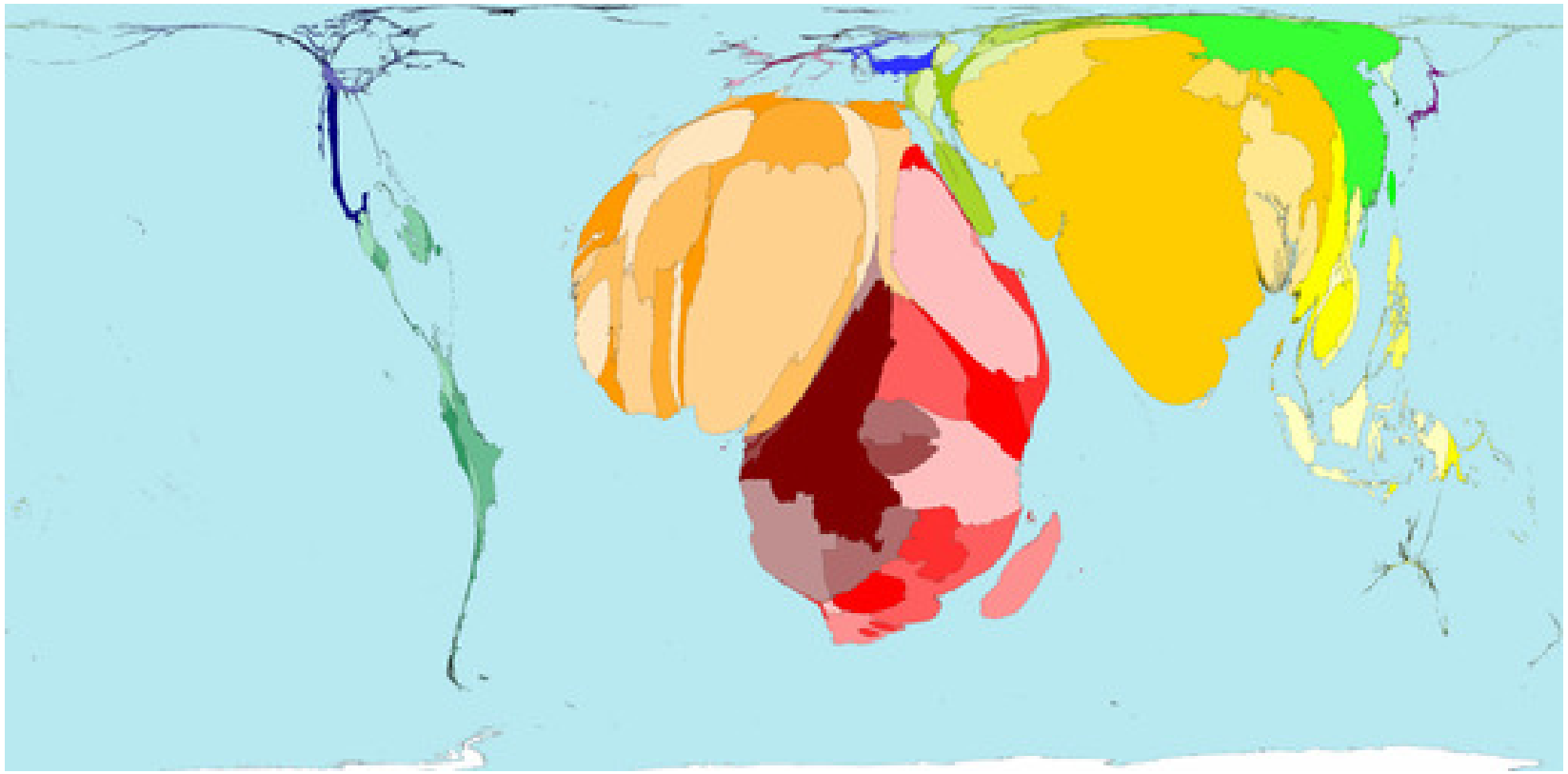
Source: www.worldmapper.org

Infant mortality rate, 2002



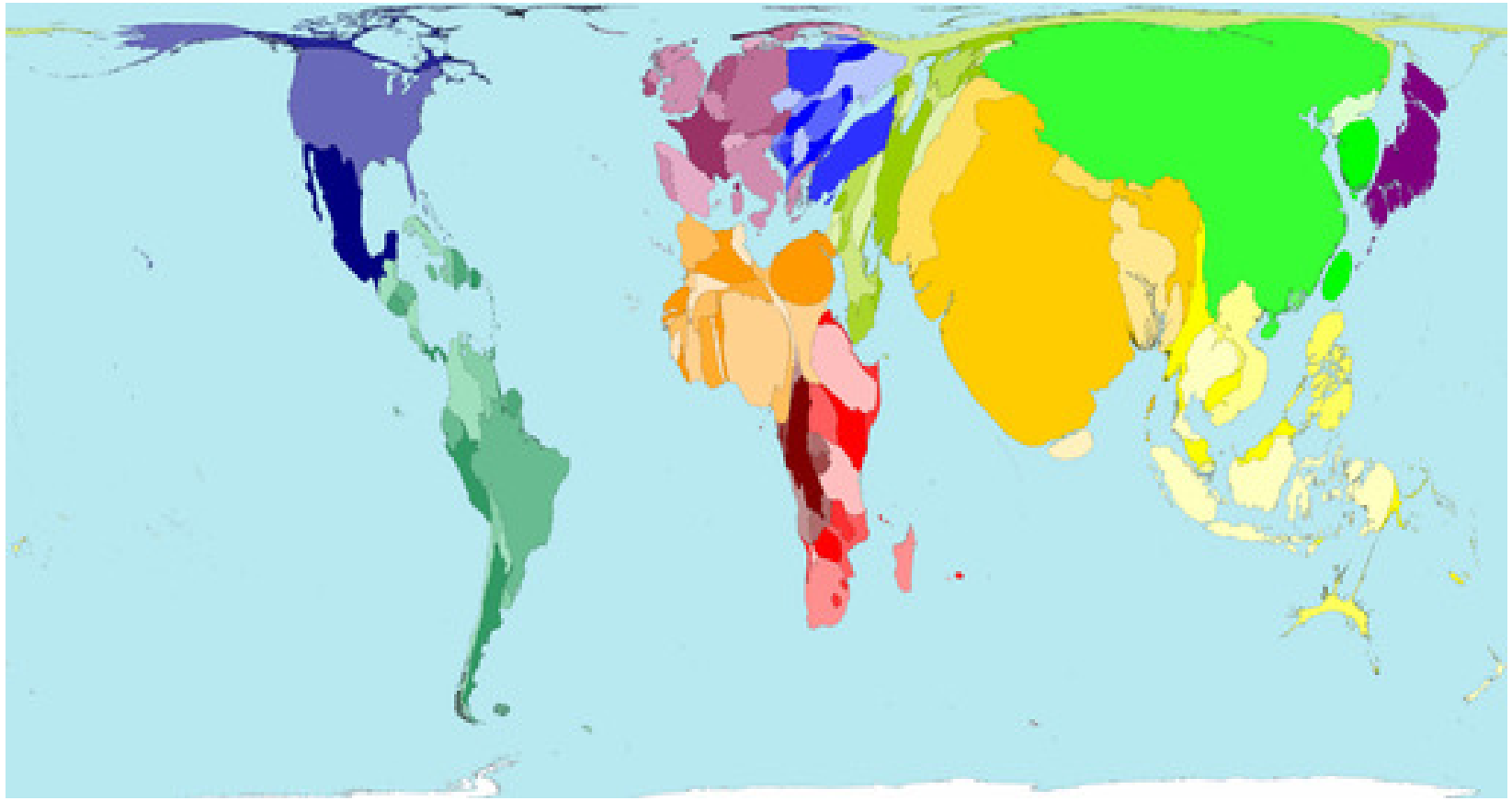
Source: www.worldmapper.org

1-4 yr old mortality rate, 2002



Source: www.worldmapper.org

Total population, 2000



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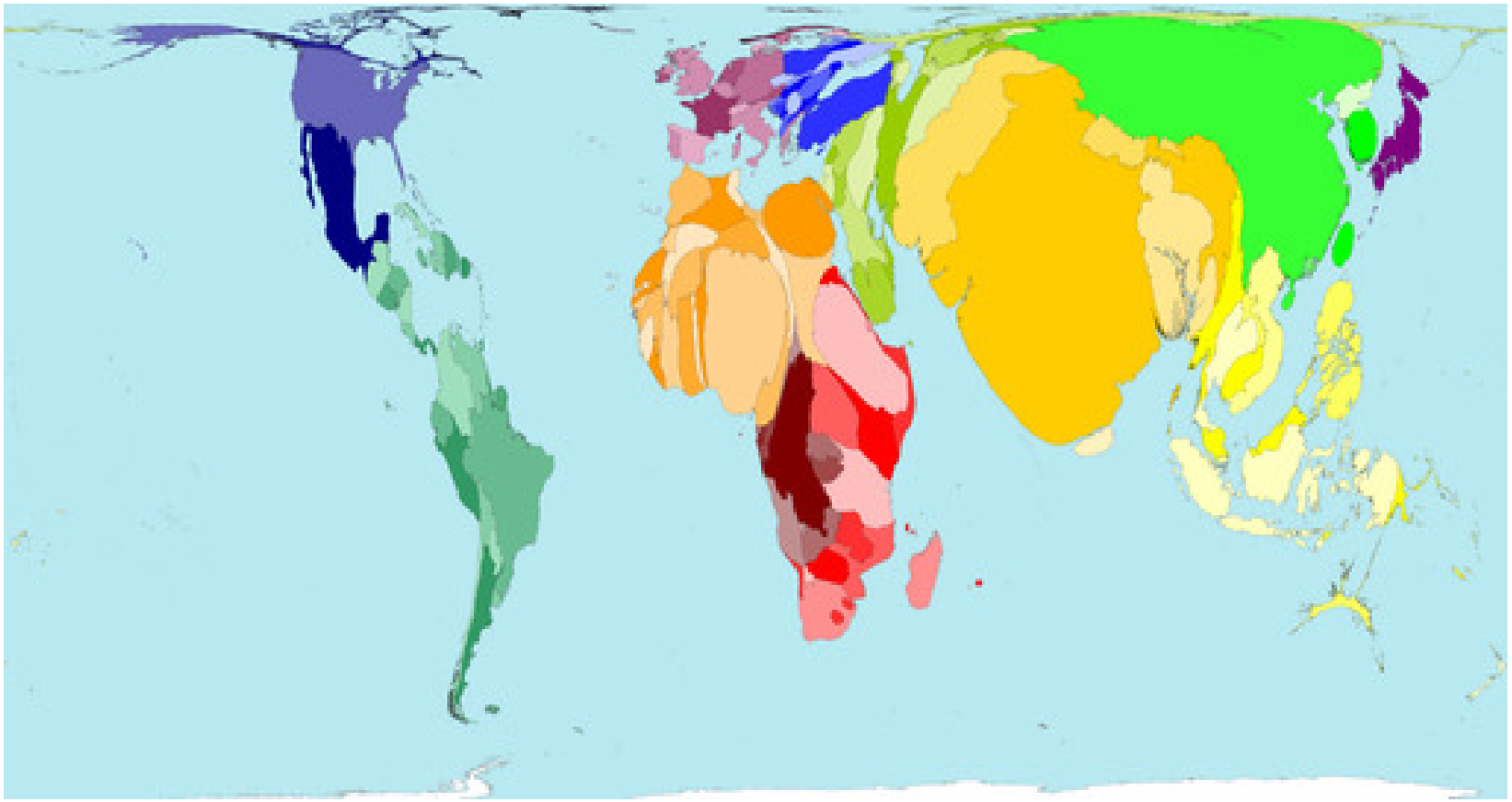

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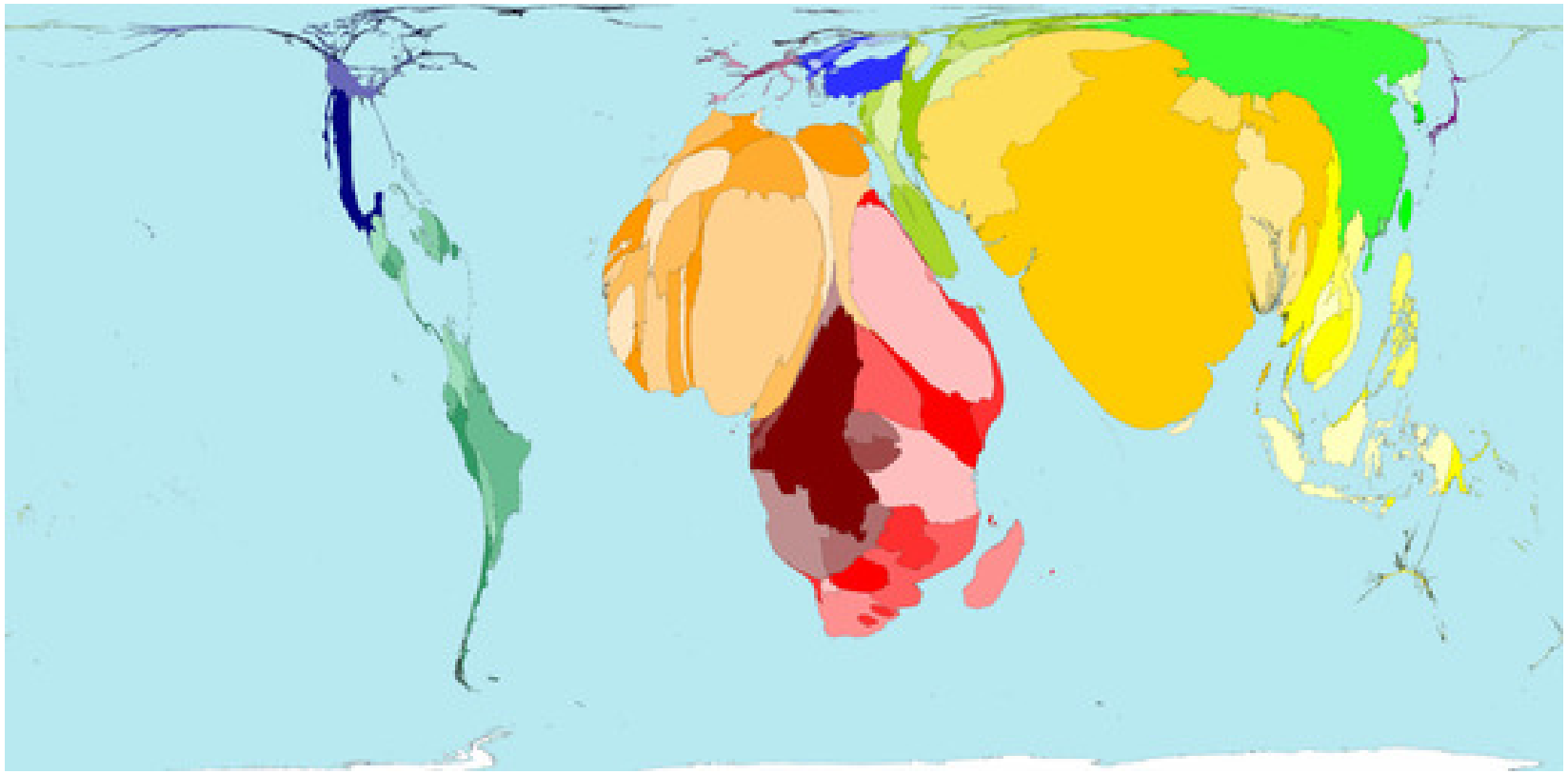

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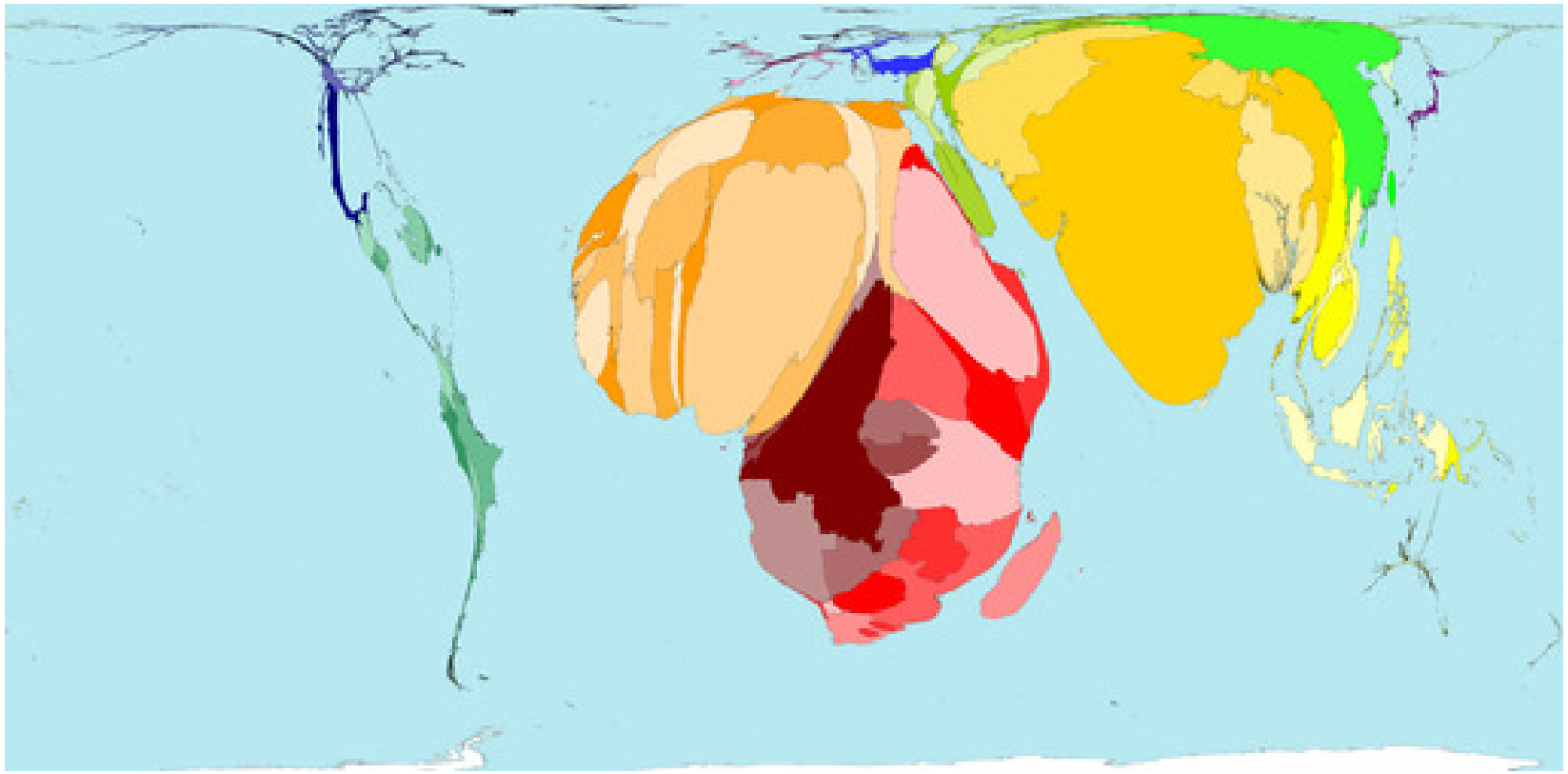
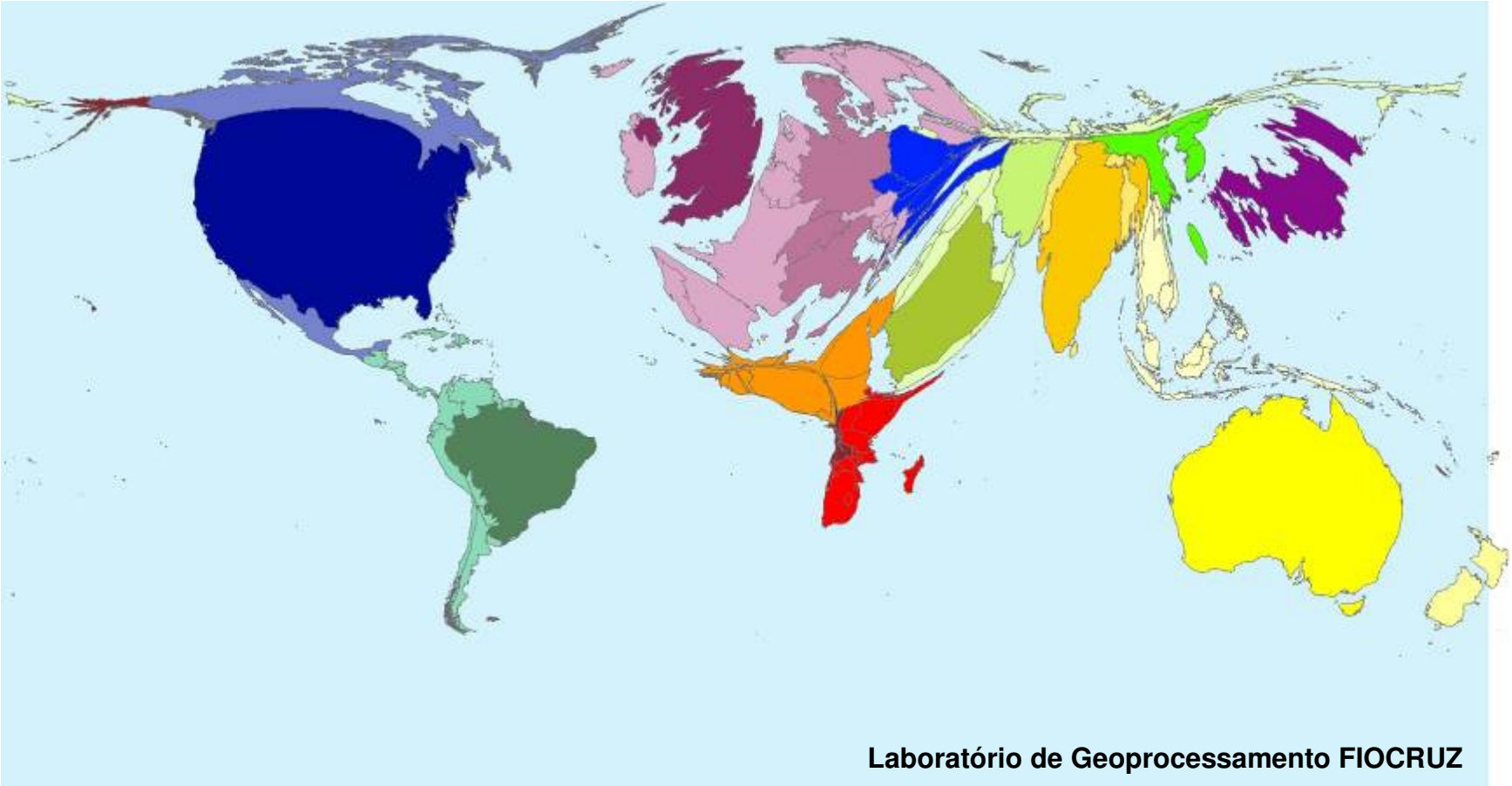


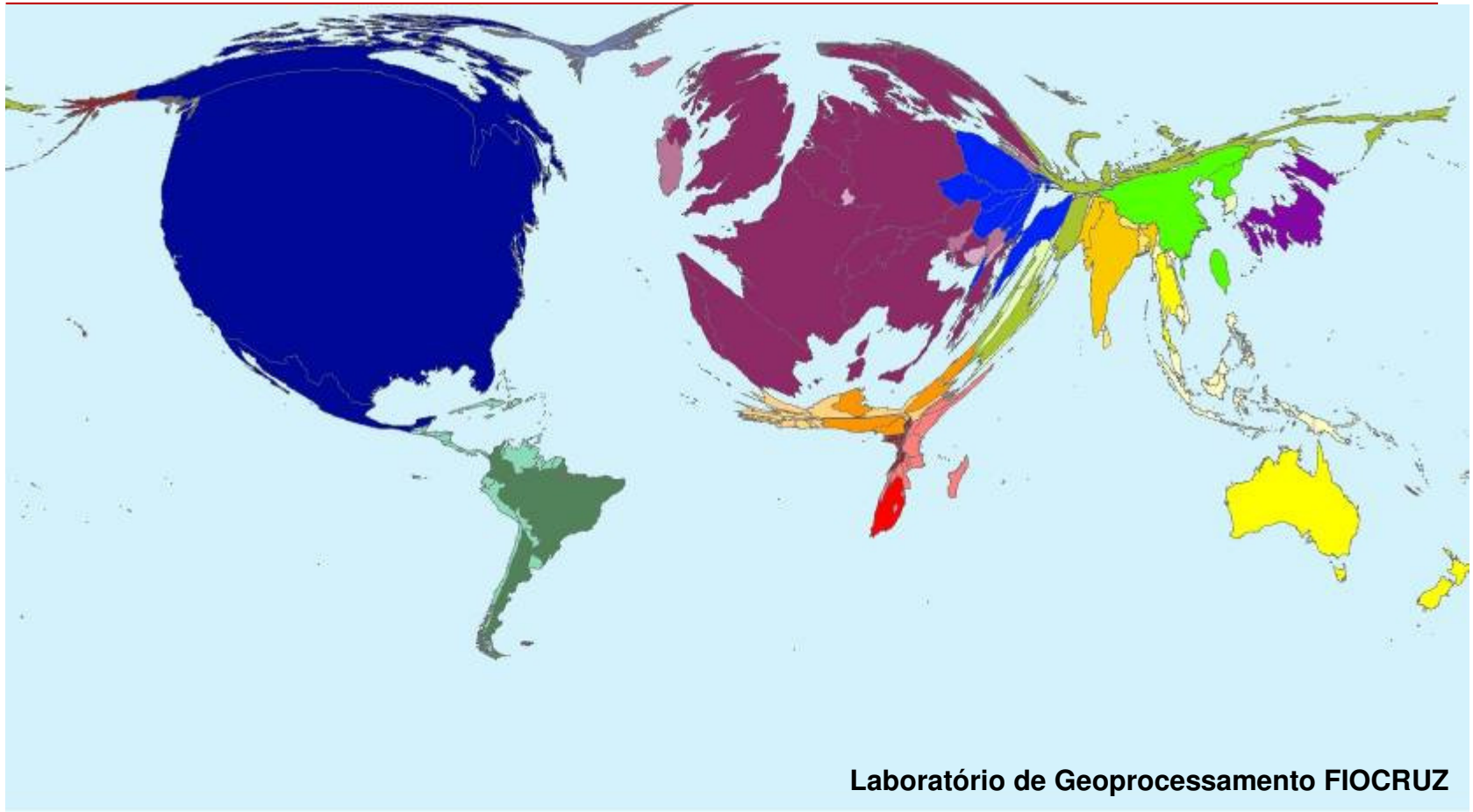
Source: www.worldmapper.org

Number of IEA members, 2008



Source: www.worldmapper.org

Epidemiology publications by country of first author, 2003-7

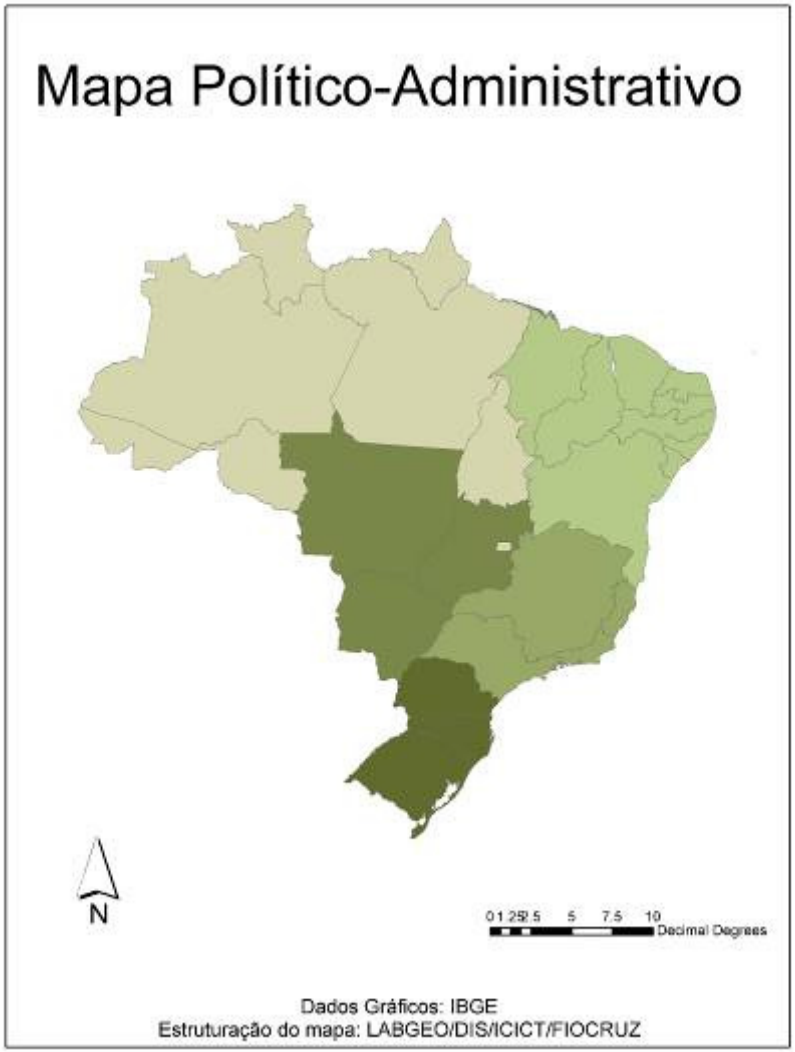


Source: www.worldmapper.org

African research capacity

- Review of PubMed in the period 2003-2007
- 17,000 articles with the term “epidemiology” as a keyword or in the abstract
- 177 (1.6%) with a first author from Sub-Saharan Africa

Political map of Brazil



Maps by Christovam Barcellos, Vanderlei Matos and Marília Sá Carvalho

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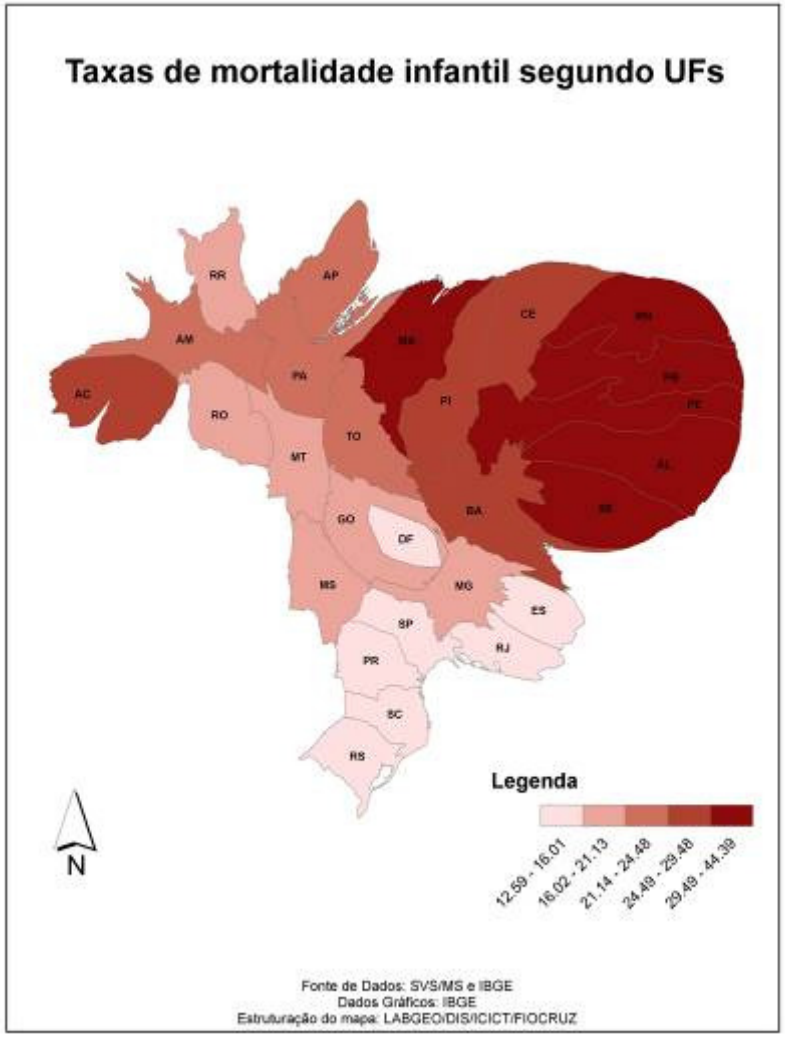
Infant mortality rate by State, Brazil 2005



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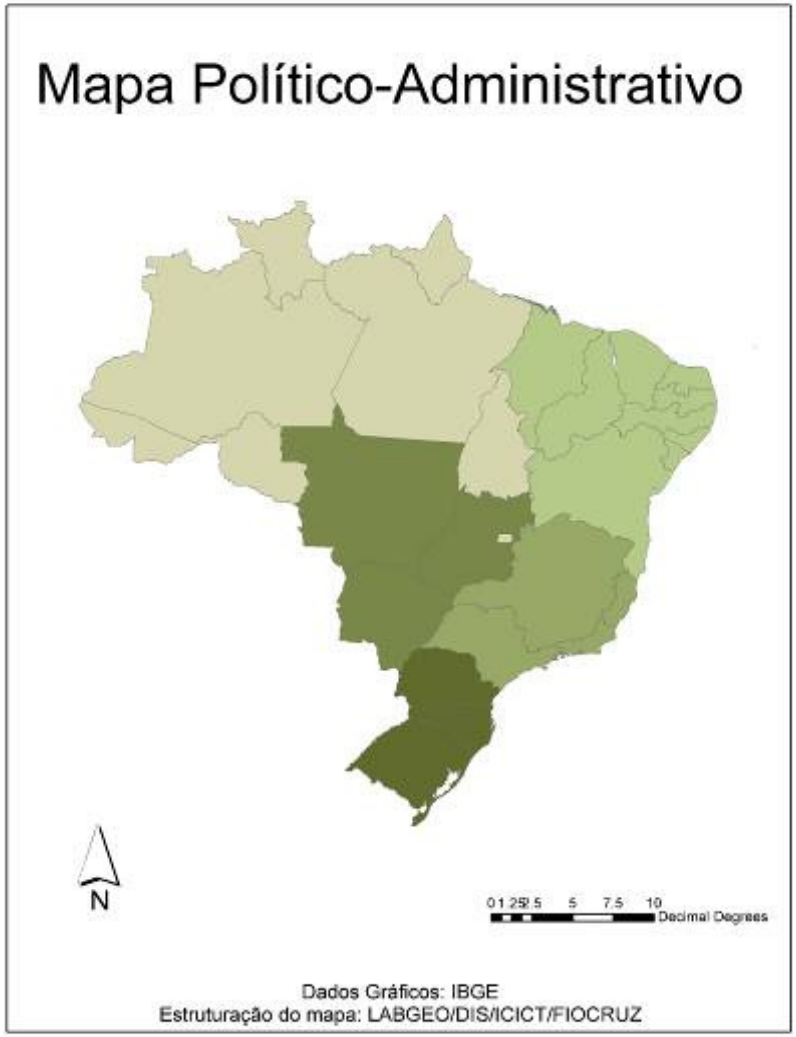

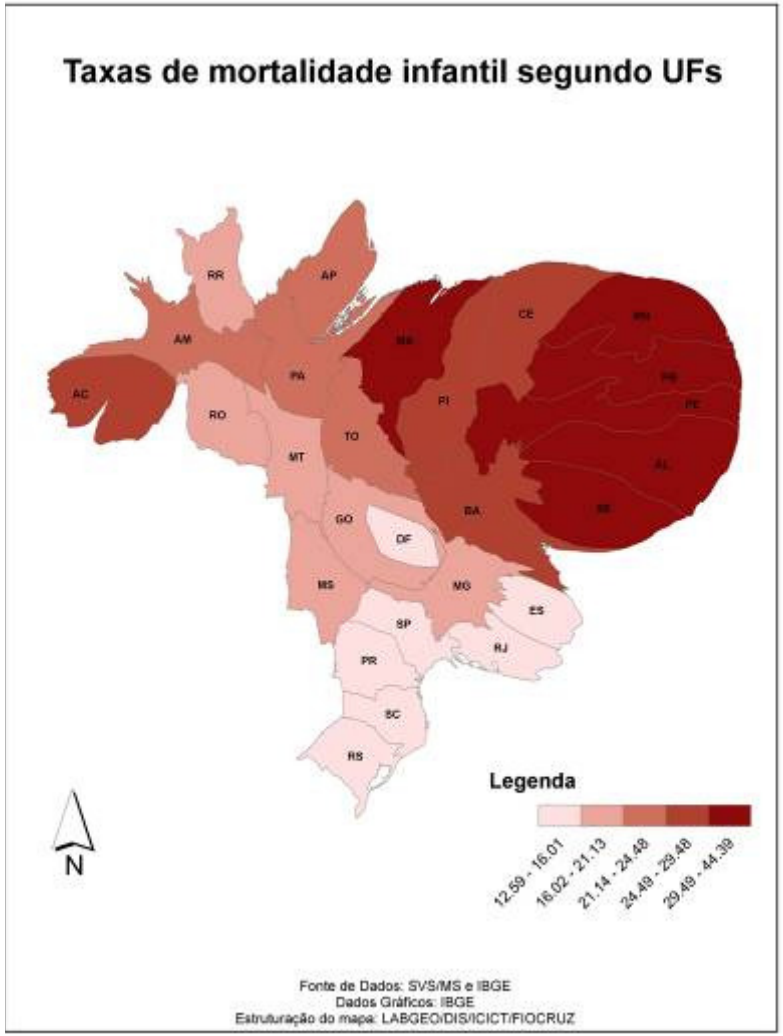

Maps by Christovam Barcellos, Vanderlei Matos and Marília Sá Carvalho

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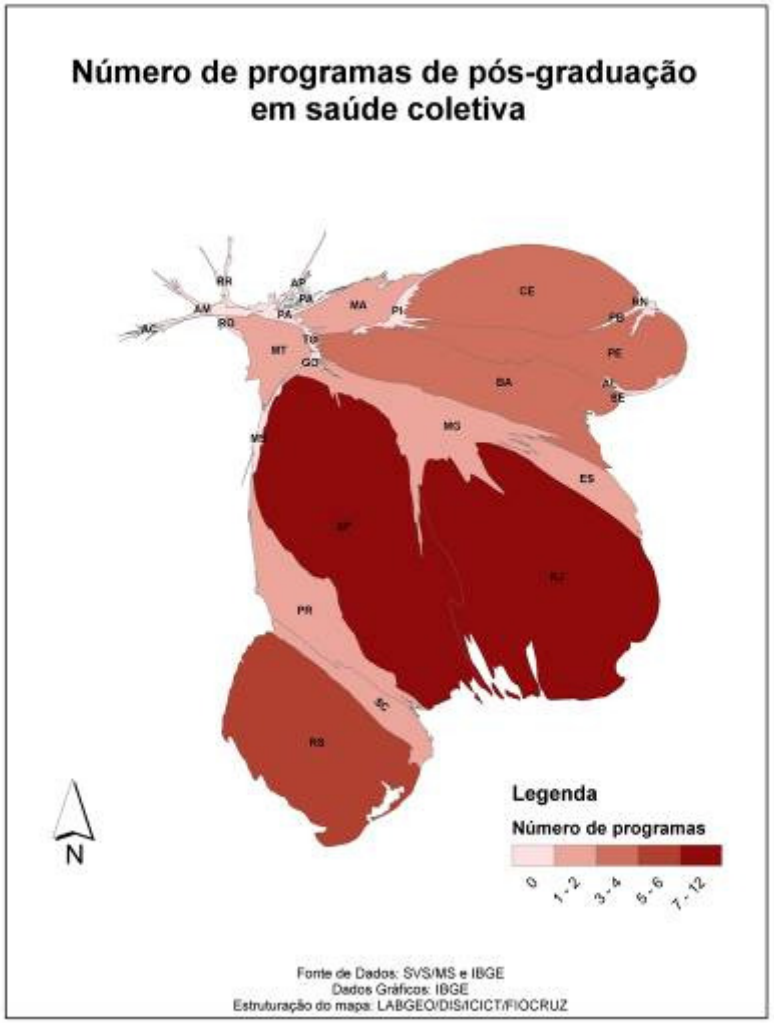
Number of post-graduate Public Health programs, Brazil 2008



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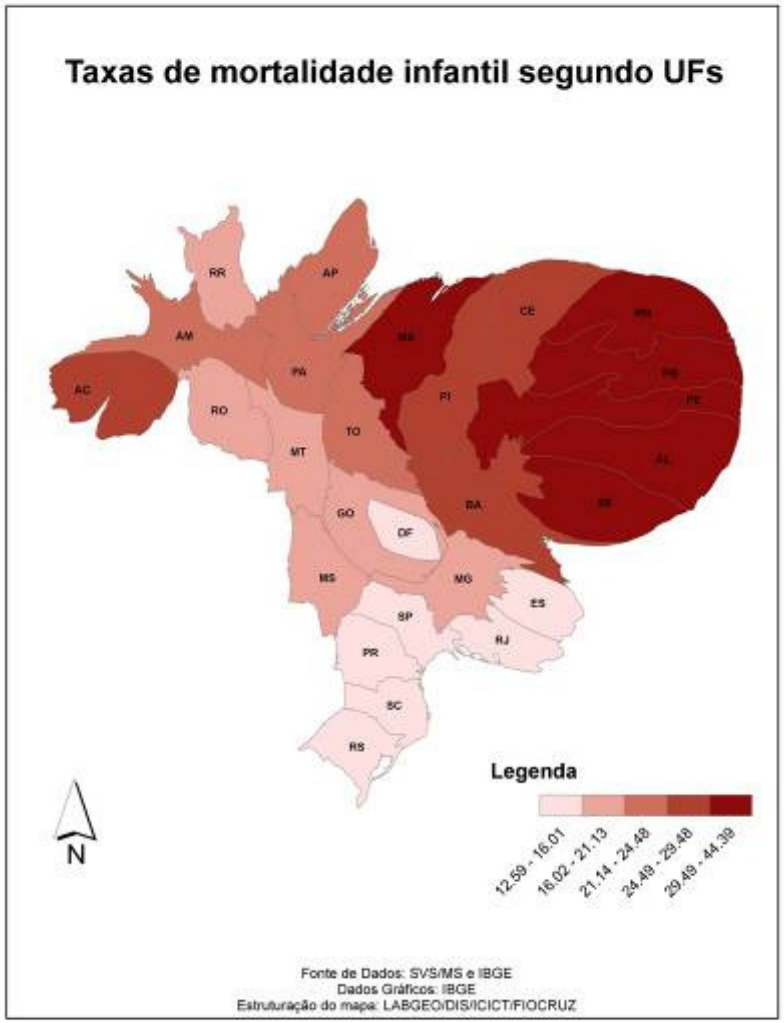
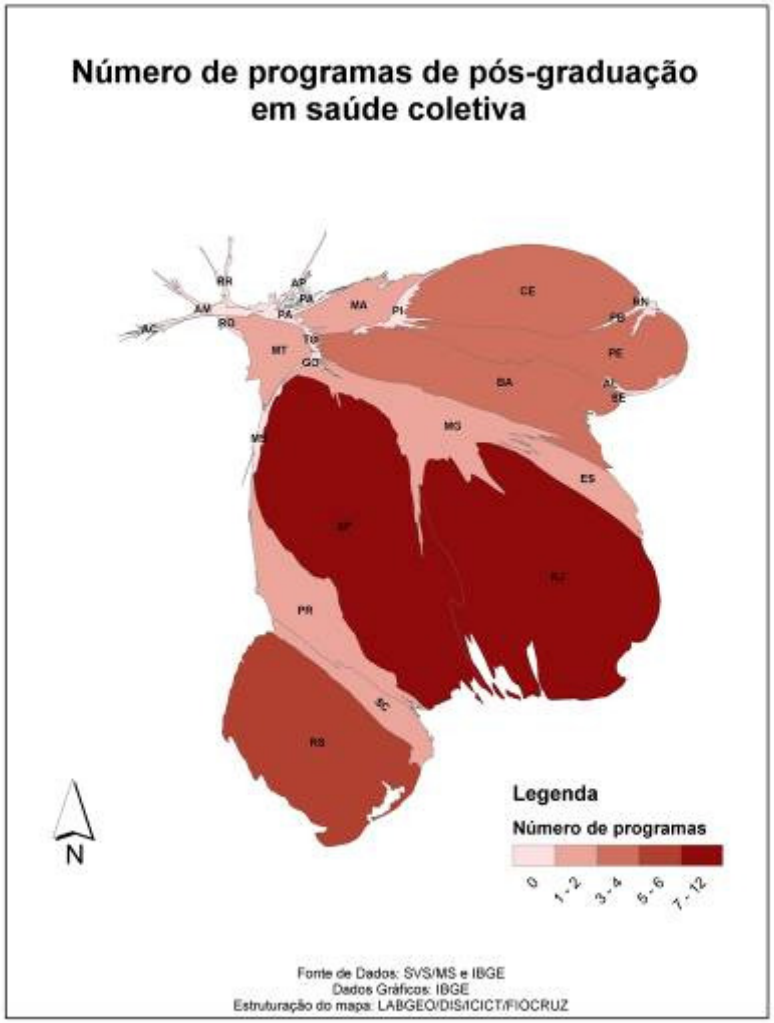




Maps by Christovam Barcellos, Vanderlei Matos and Marília Sá Carvalho
Laboratório de Geoprocessamento FIOCRUZ

Summing up this section

- Some diseases attract donors, funders and researchers; others don't
- There is a great geographical and thematic imbalance between the burden of disease and health research

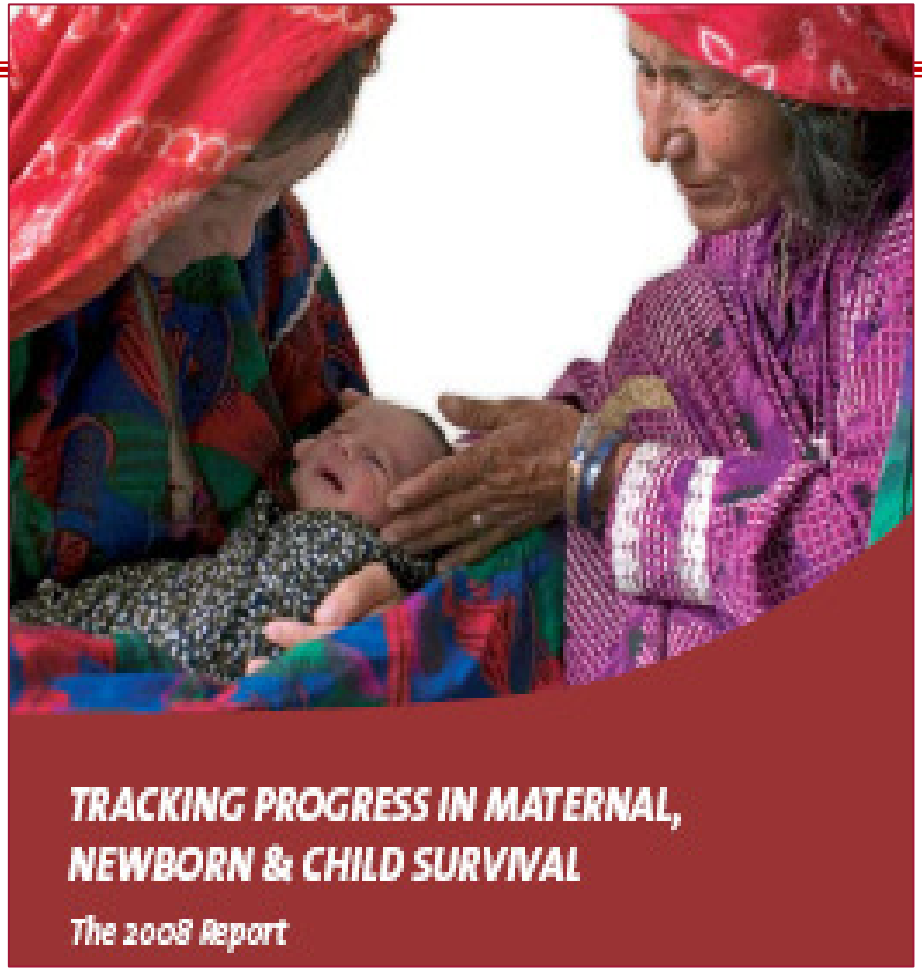
Outline of presentation

- The MDGs
- Child survival: the last 10 years
- Imbalances in health research
- **The Countdown to 2015**
- Data and research challenges

There are many levels of determination of child health and nutrition

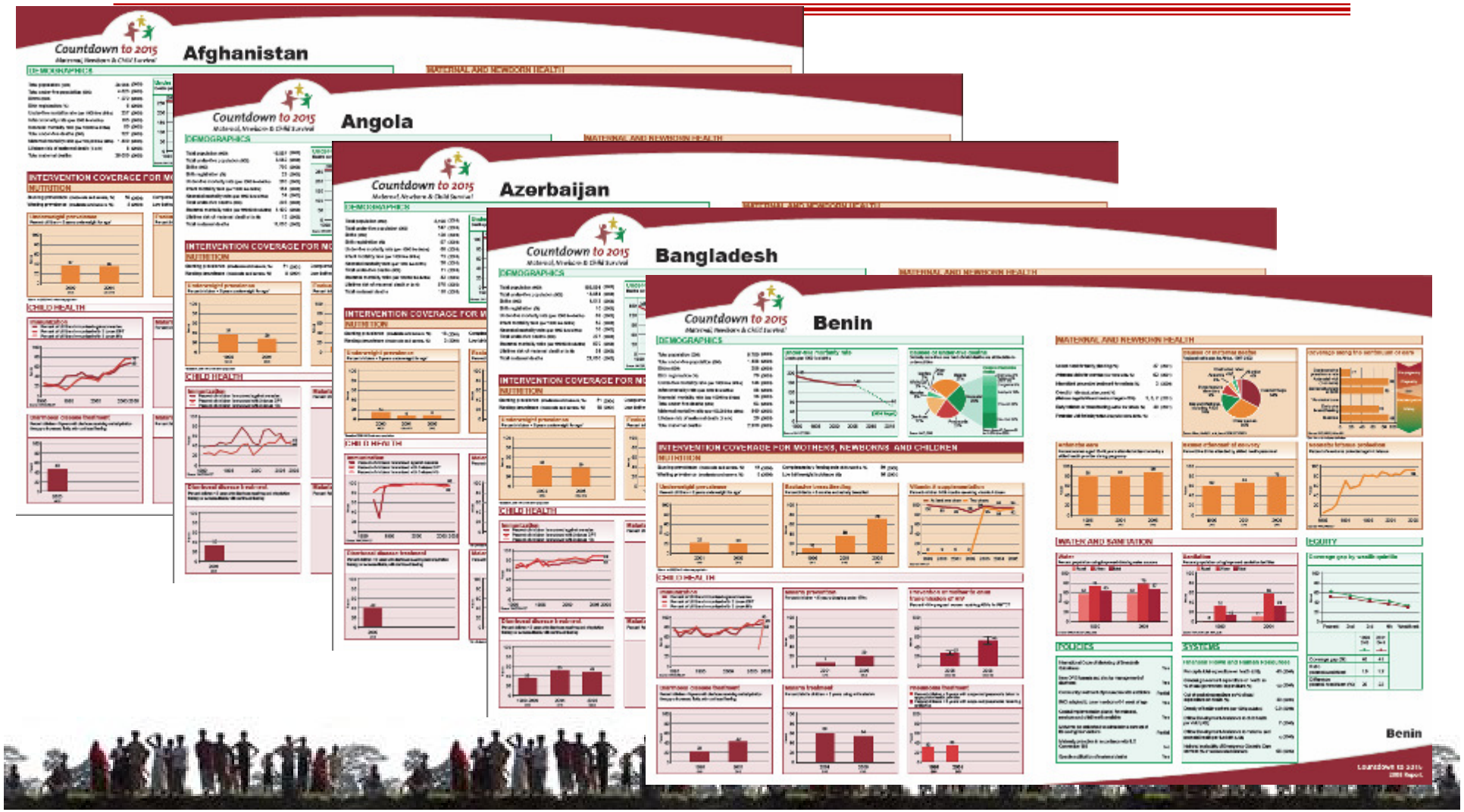
- Global level
  - Trade barriers and foreign debt
  - Colonialism and neocolonialism
  - Global policies
  - Global environmental changes
  - Food and fuel crises
- National level
  - Political and ideological superstructure
  - Environmental conditions
  - Class structure
- Community level
  - Environmental conditions
  - Health services availability
- Family/individual level
  - Income/education/wealth
  - Exposure to pathogens
  - Diet
  - Susceptibility
  - Use of services

The Countdown to 2015 Report



The Countdown Partnership

The country profiles: monitoring progress



Progress toward MDG4

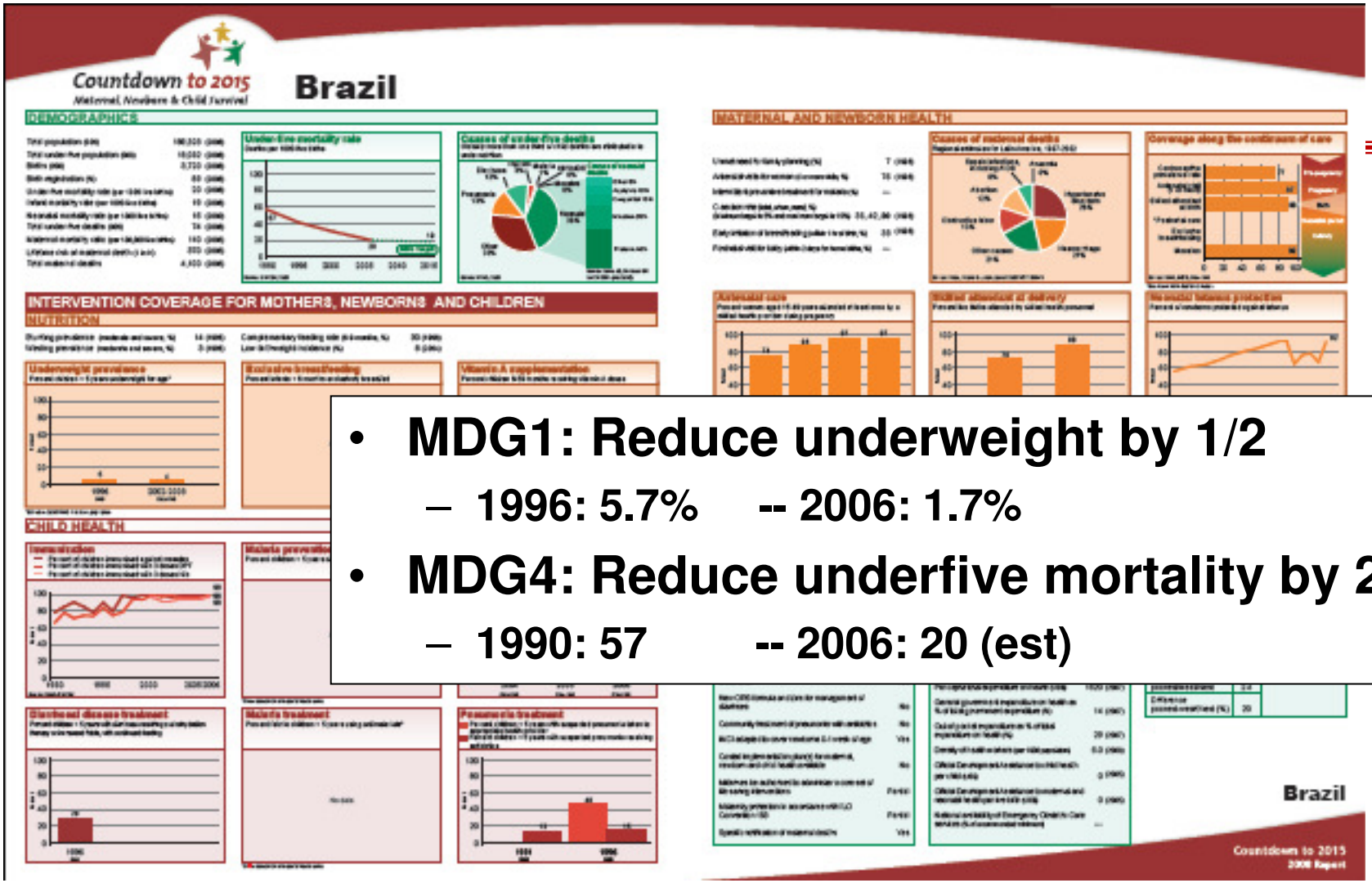
- Of 68 priority countries:
  - 16 on track
  - 26 insufficient progress
  - 14 no progress
  - 12 worsening

- The 10 countries with least progress are all in sub-Saharan Africa

	Rank	Mortality in children younger than 5 years (1990)	Mortality in children younger than 5 years (2006)	Change (1990–2006)
Ten with most progress				
Peru	1	78	25	68%
Brazil	2	57	20	65%
Indonesia	3	91	34	63%
Egypt	4	91	35	62%
Nepal	5	142	59	58%
Morocco	6	89	37	58%
Laos	7	163	75	54%
Bangladesh	8	149	69	54%
Bolivia	9	125	61	51%
Guatemala	10	82	41	50%
Ten with least progress				
Chad	59	201	209	−4%
Cameroon	60	139	149	−7%
South Africa	61	60	69	−15%
Equatorial Guinea	62	170	206	−21%
Congo	63	103	126	−22%
Kenya	64	97	121	−25%
Lesotho	65	101	132	−31%
Zimbabwe	66	76	105	−38%
Swaziland	67	110	164	−49%
Botswana	68	58	124	−114%

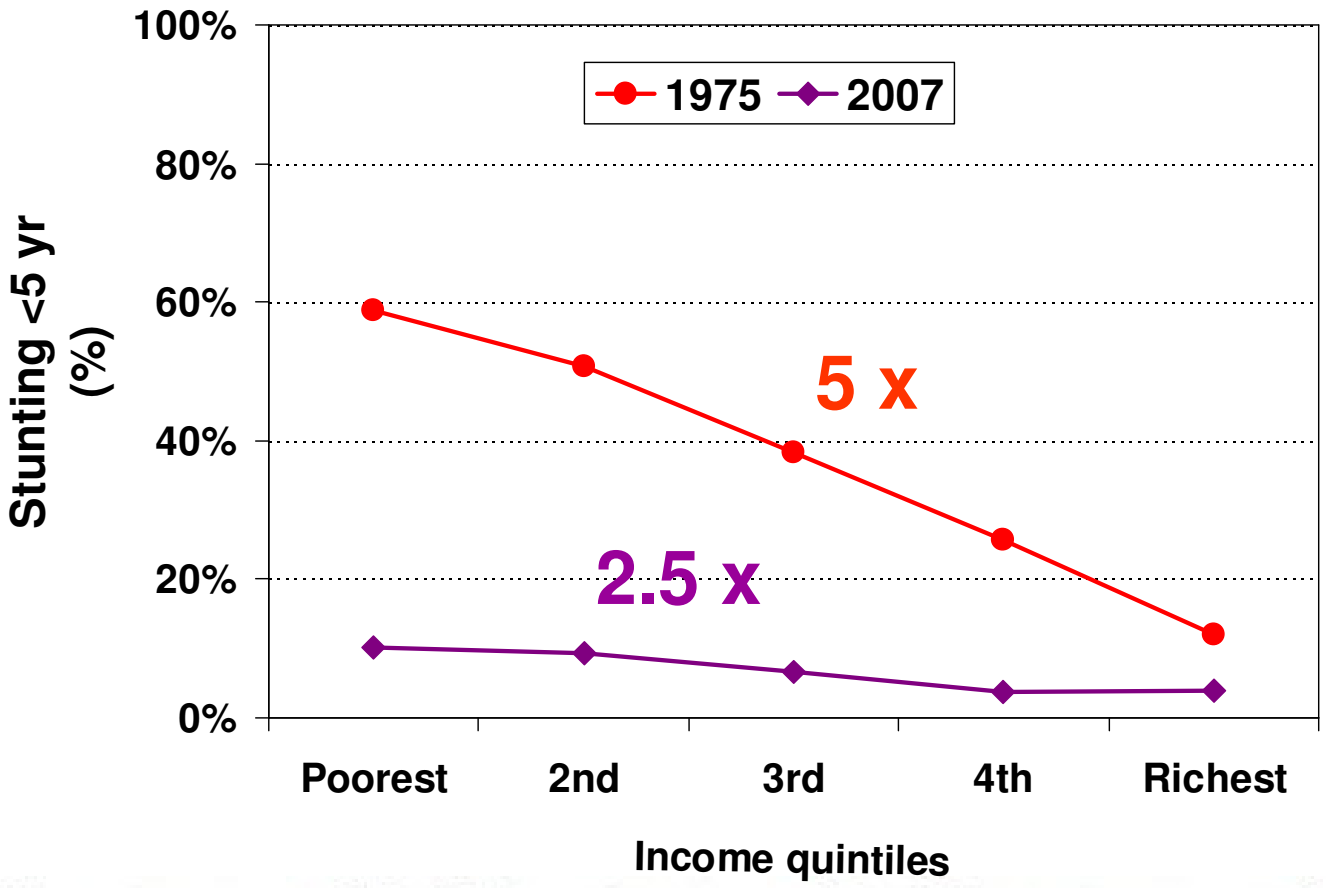
Data are rank or deaths per 100 000 livebirths, unless otherwise specified.
MDG=millennium development goal.

Table 3: Ten best and 1000 rst performing countries on progress towards MDG 4 since 1990



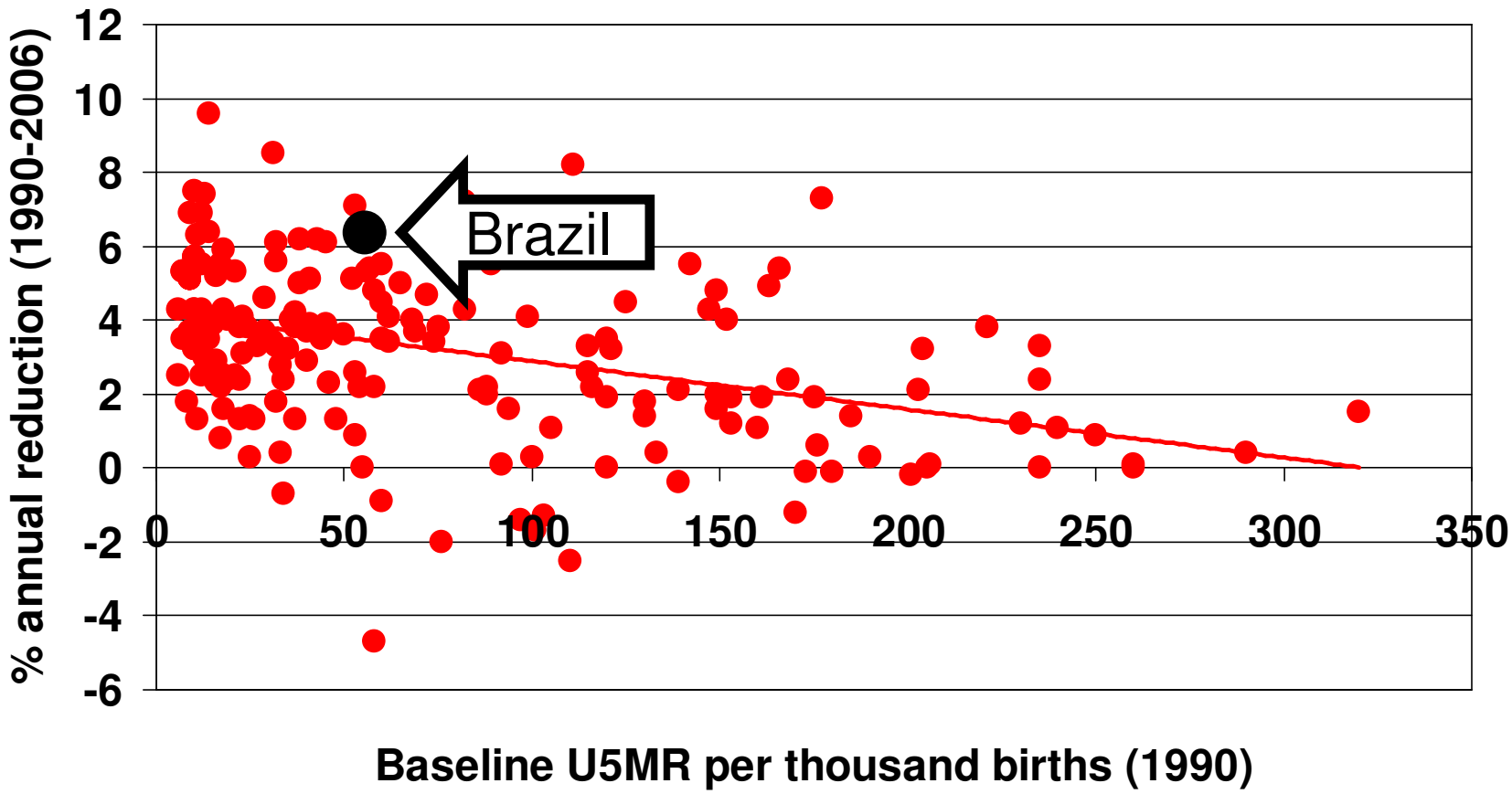
- **MDG1: Reduce underweight by 1/2**
  - **1996: 5.7% -- 2006: 1.7%**
- **MDG4: Reduce underfive mortality by 2/3**
  - **1990: 57 -- 2006: 20 (est)**

Brazil: inequalities are being reduced



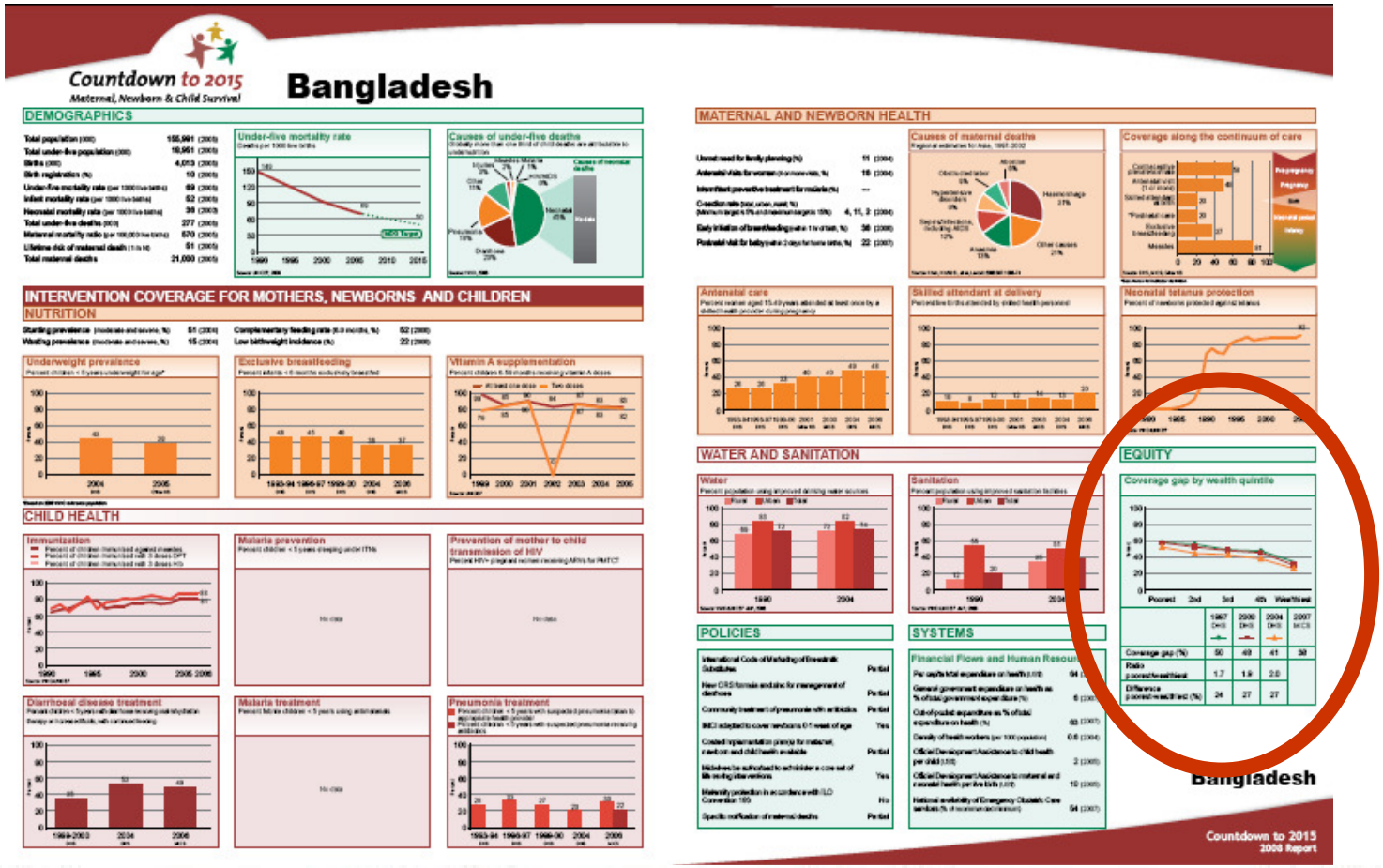
Monteiro & Victora, unpublished

Faster progress where it is least needed



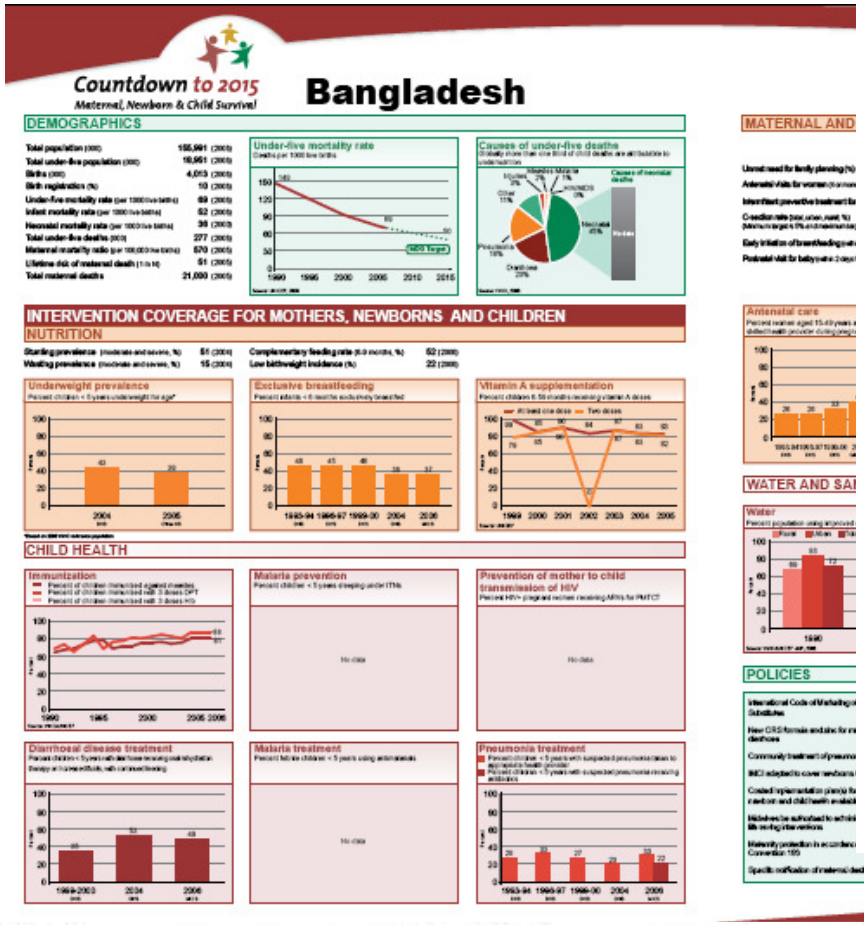
Source: Victora JECH 2008

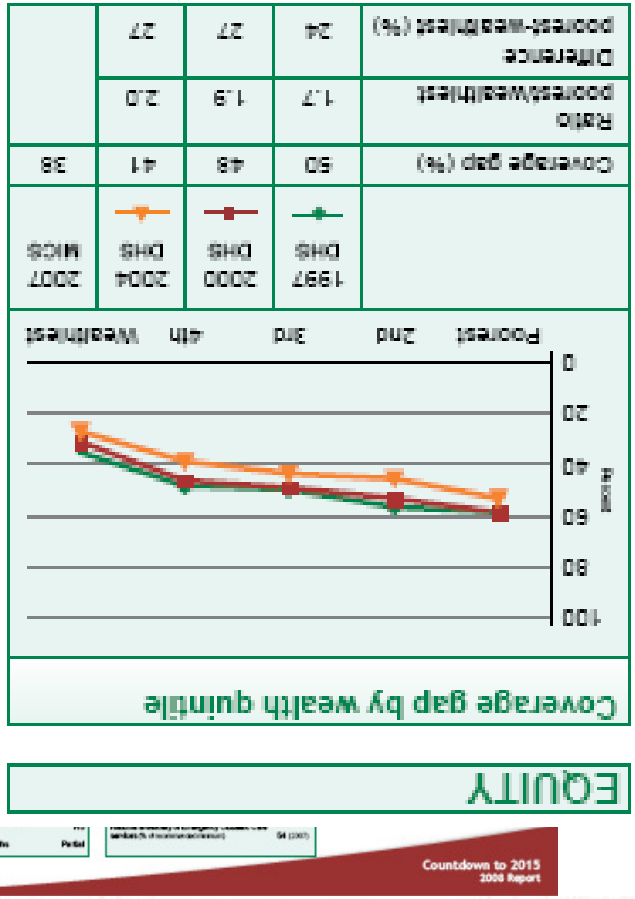
Countdown to 2015: Equity



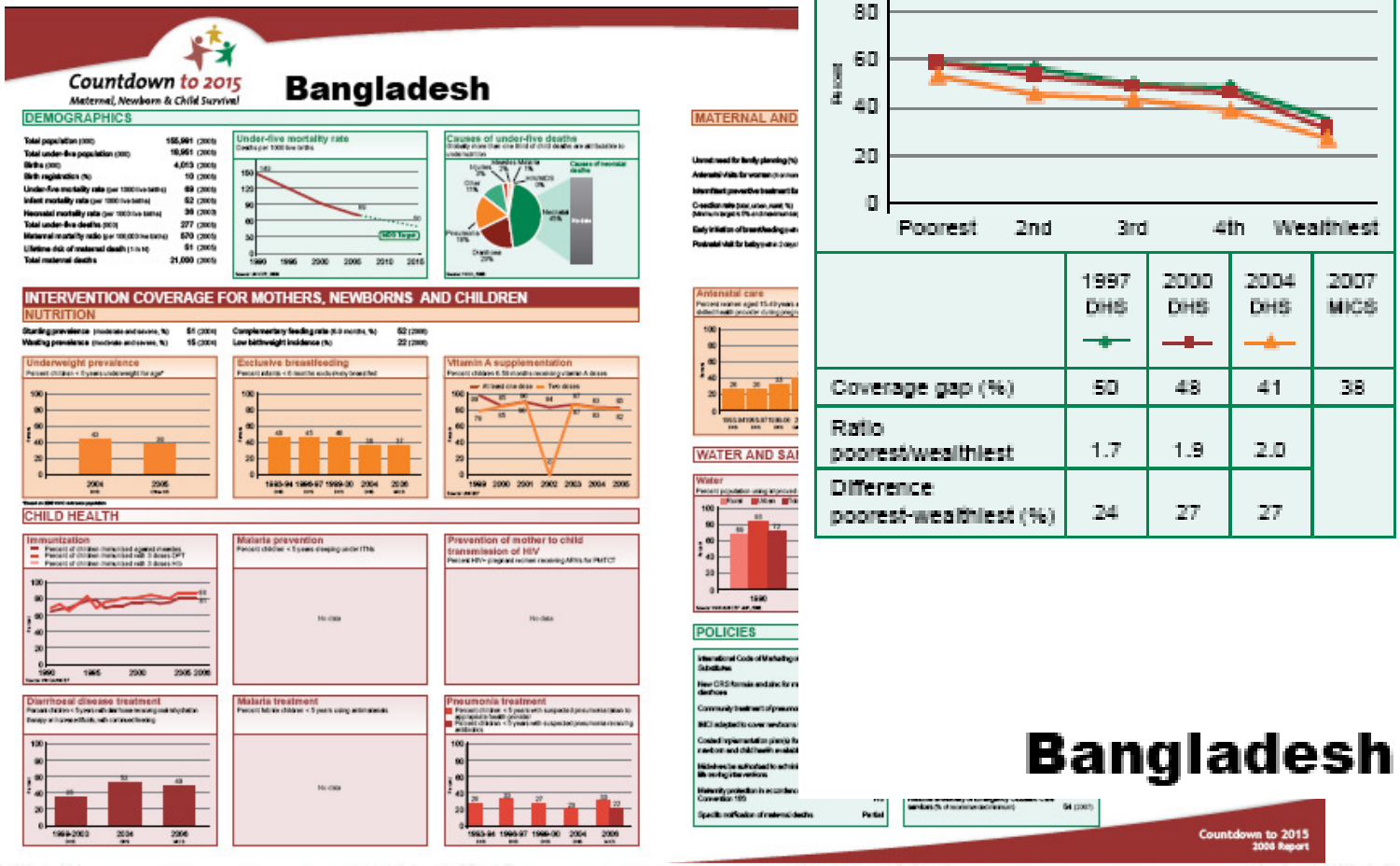
Equity

Bangladesh



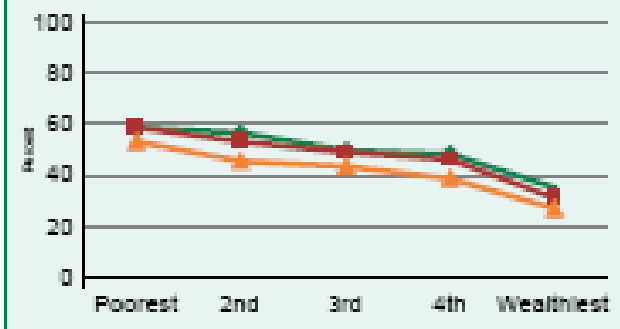


Equity



EQUITY

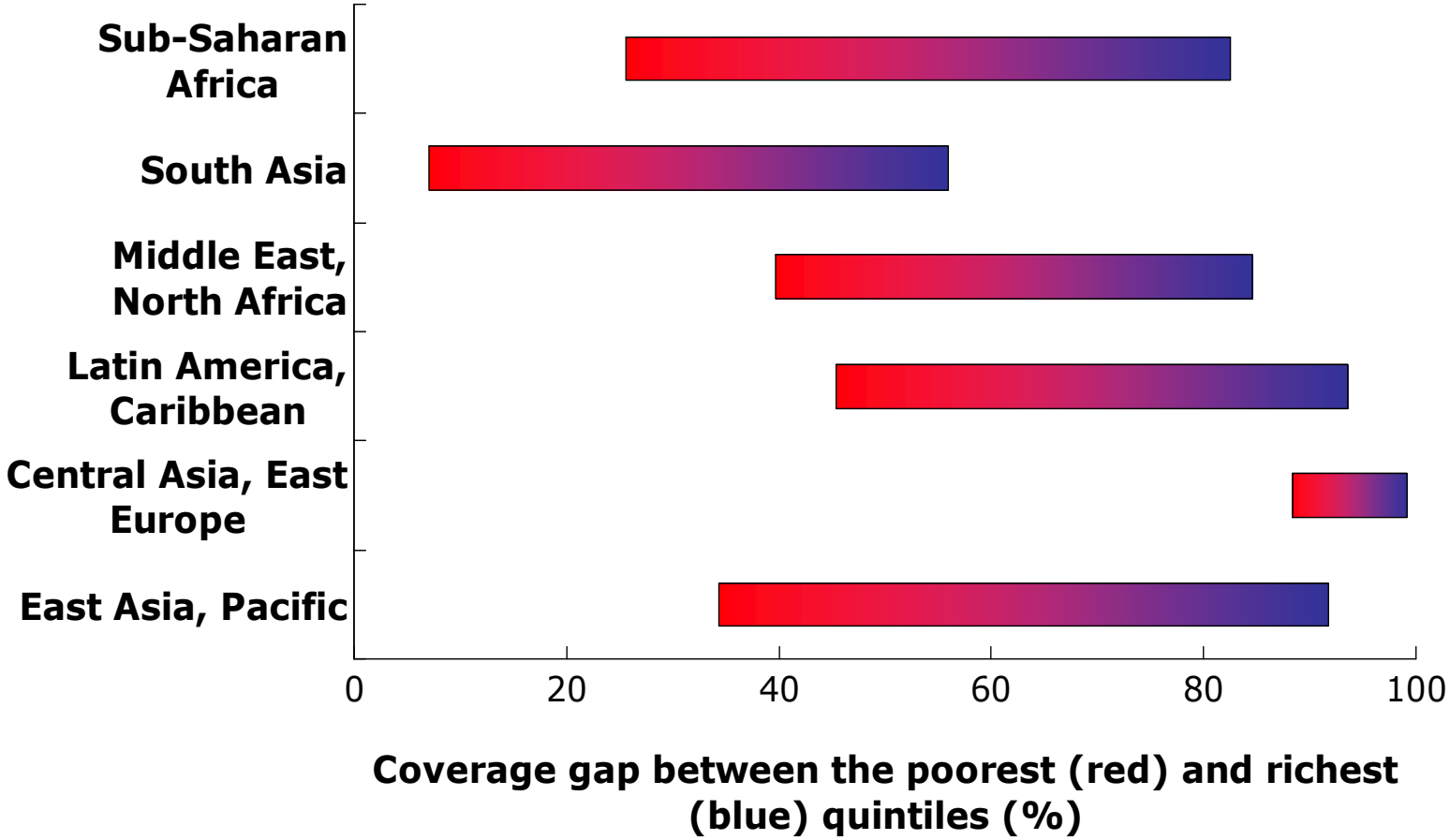
Coverage gap by wealth quintile



	1997 DHS	2000 DHS	2004 DHS	2007 MICS
Coverage gap (%)	50	48	41	38
Ratio poorest/wealthiest	1.7	1.9	2.0	
Difference poorest-wealthiest (%)	24	27	27	

Bangladesh

Within-country equity gaps for skilled attendant at delivery



Source: DHS, analyzed by Gwatkin et al. 2007

The size of the problem

- 9.7 million underfive deaths a year
  - 99% in low and middle-income countries
- 0.5 million maternal deaths a year
- Sub-Saharan Africa now accounts for more than half of all maternal and child deaths in the world.

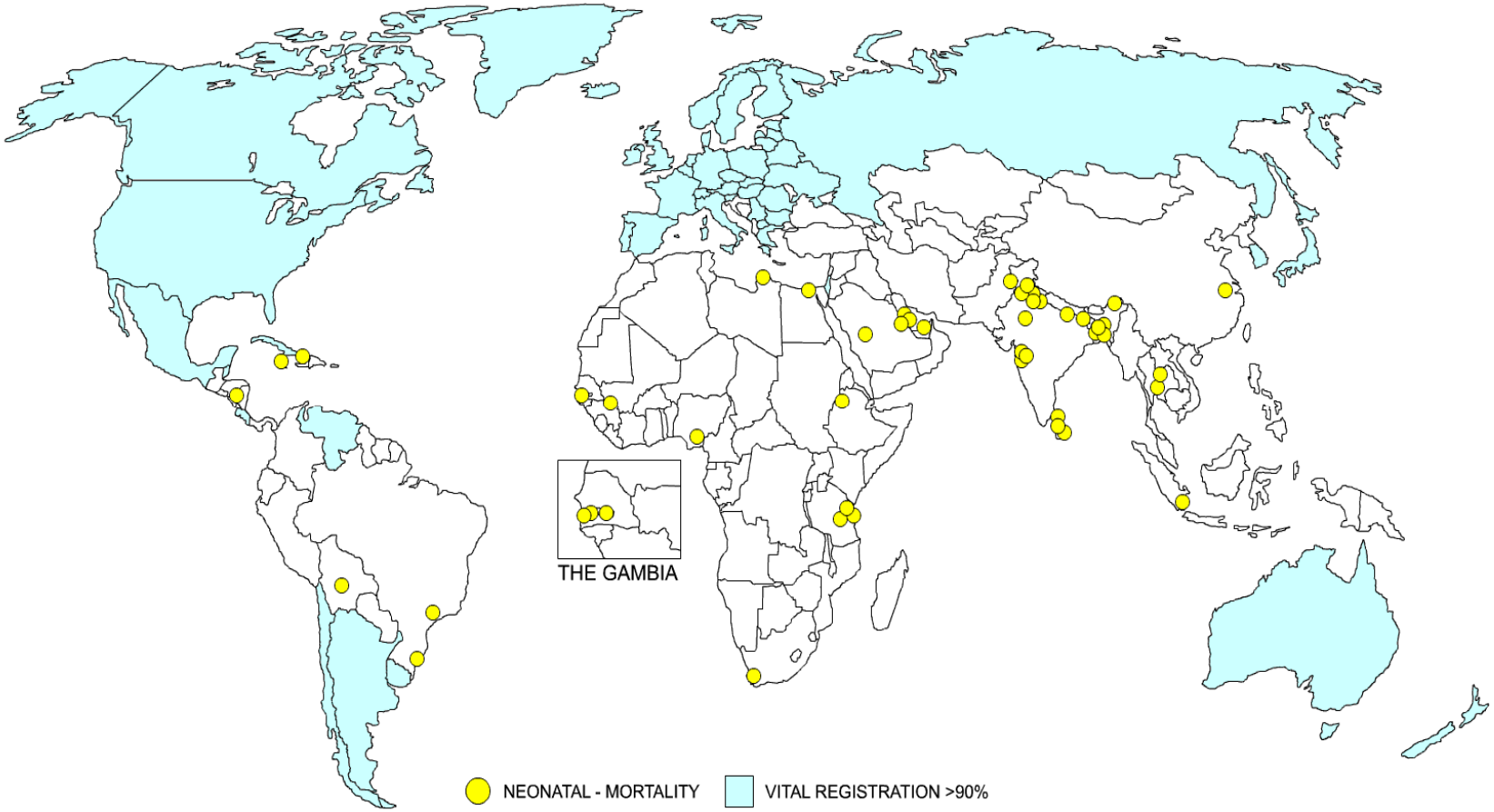
Summing up this section

- A major effort to monitor MDG4 and MDG5 is underway
- Overall progress is insufficient
- Countries and population groups with the greatest needs are being left behind
- The health sector often helps increase inequities

Outline of presentation

- The MDGs
- Child survival: the last 10 years
- Imbalances in health research
- The Countdown to 2015
- **Data and research challenges**

Data on neonatal causes of death, 2000



Source: Rudan I et al, Lancet 2005

Statistical arthritis*

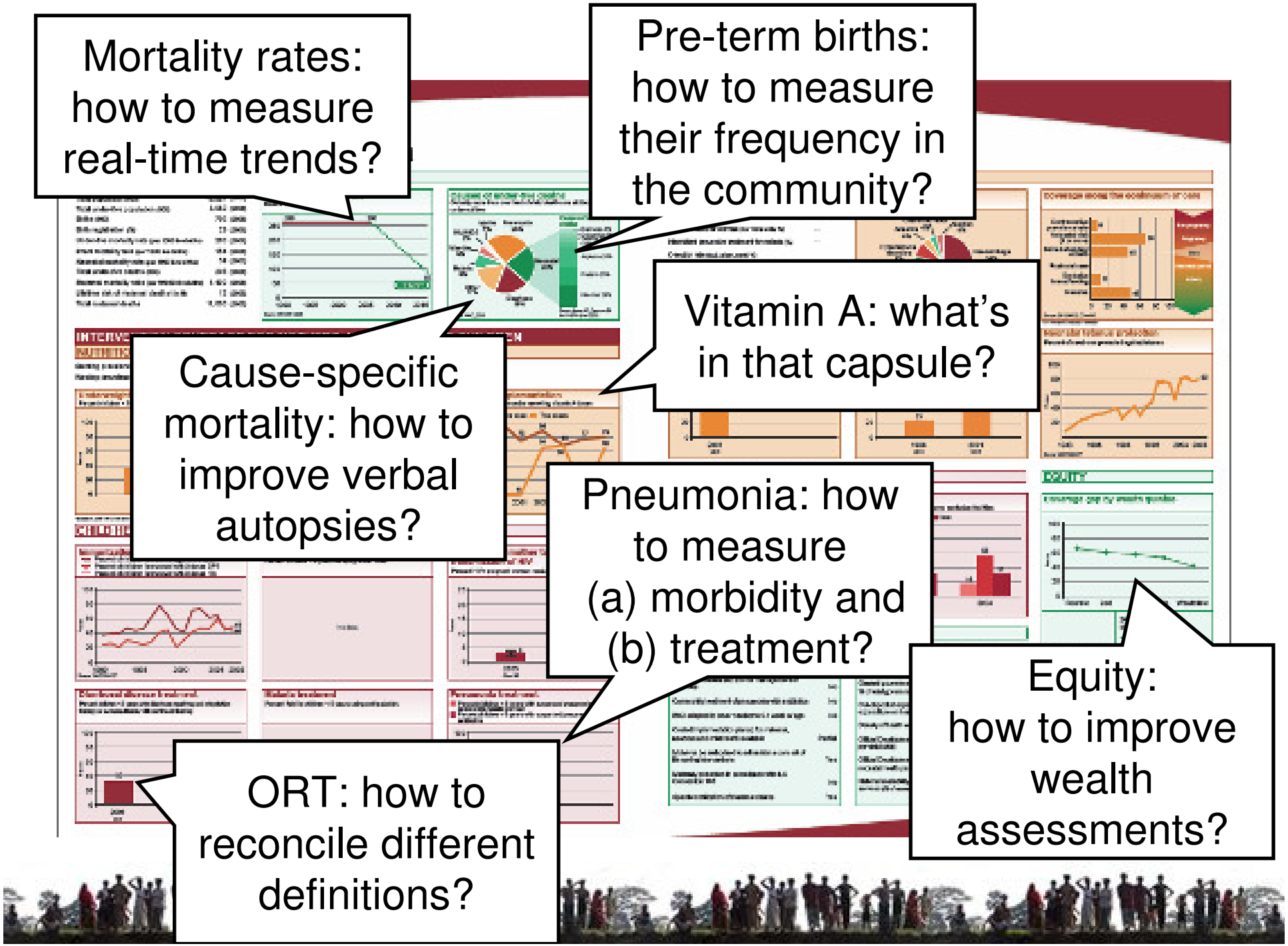
- Information on child mortality in surveys and censuses is collected retrospectively
  - Typical estimates refer to a period up to 5 years before survey (midpoint 2-3 years)

- Median of the most recent midpoint for child mortality data lies 6 years before the survey or census in 123 countries
  - Or even worse: 8 years for high-mortality countries

* Peter Adamson, UNICEF 1994

Desafios para os epidemiologistas

- Measuring real-time mortality trends
- Improving coverage indicators
- Mainstreaming equity in epi research
- Delivery channel research
- Improving large-scale evaluation designs
- Balancing advocacy with evidence


Mortality rates: how to measure real-time trends?
Pre-term births: how to measure their frequency in the community?
Vitamin A: what's in that capsule?
Cause-specific mortality: how to improve verbal autopsies?
Pneumonia: how to measure (a) morbidity and (b) treatment?
Equity: how to improve wealth assessments?
ORT: how to reconcile different definitions?

The challenge of large-scale evaluations

- The efficacy-effectiveness gap
- Need to evaluate effectiveness under real-life conditions
- RCTs often unethical, politically unacceptable or plain impossible to do
- Need for more and better evaluations with observational designs

Delivery channel research

- The 10/90 gap – but what about these 10%?
  - 514 NIH grants for child survival in 2000-2003
  - <3% addressed how to deliver interventions

(Leroy J et al, AJPH 2007)

- Urgent need for epidemiologists to help improve quality and quantity of
  - Operational research
  - Health systems and policy research
  - Delivery channel research

Balancing evidence with advocacy

- Nearly every figure I have shown you so far is probably inaccurate and/or outdated
- Are these data so inaccurate and/or outdated that we should avoid using them?

Interpreting health statistics for policymaking: the story behind the headlines

Neff Walker, Jennifer Bryce, Robert E Black

Lancet 2007; 369: 956–63

This is the third in a Series of four articles about health statistics

Politicians, policymakers, and public-health professionals make complex decisions on the basis of estimates of disease burden from different sources, many of which are "marketed" by skilled advocates. To help people who rely on such statistics make more informed decisions, we explain how health estimates are developed, and offer basic guidance on how to assess and interpret them. We describe the different levels of estimates used to quantify

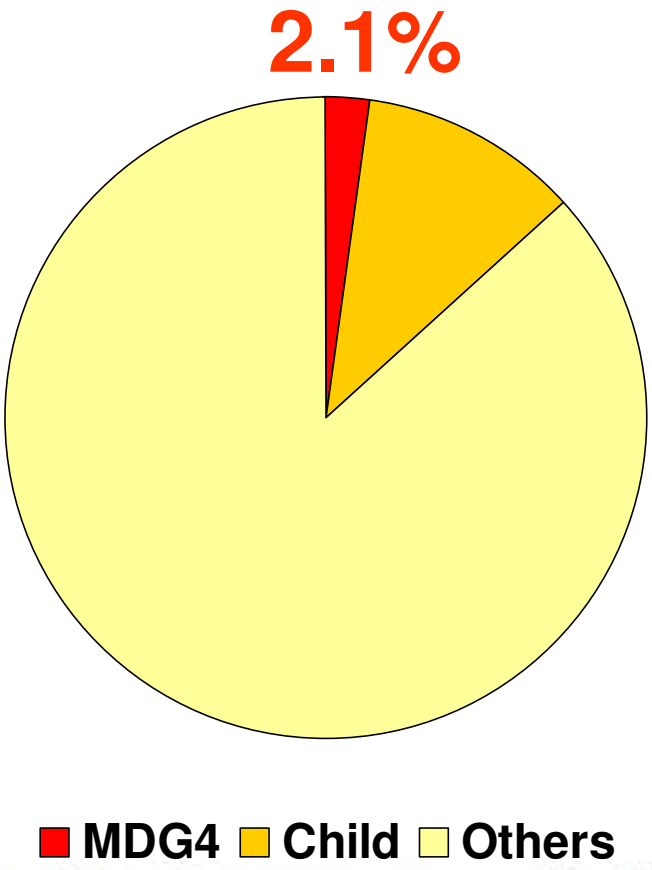
A larger role for epidemiologists

- Who is monitoring MDGs 4 and 5?
  - Economists
  - Demographers
  - Statisticians
  - Pediatricians / obstetricians
  - A few epidemiologists
    - Where are the rest of us?

Source: Victora, anecdotal evidence, 2008

What do we publish?

- All 2007 articles in
  - AJE
  - IJE
  - JECH
  - Epidemiol
  - Epidemiol Rev
- Total: 1,104 papers
- Child: 147 papers
- MDG4: 23 papers

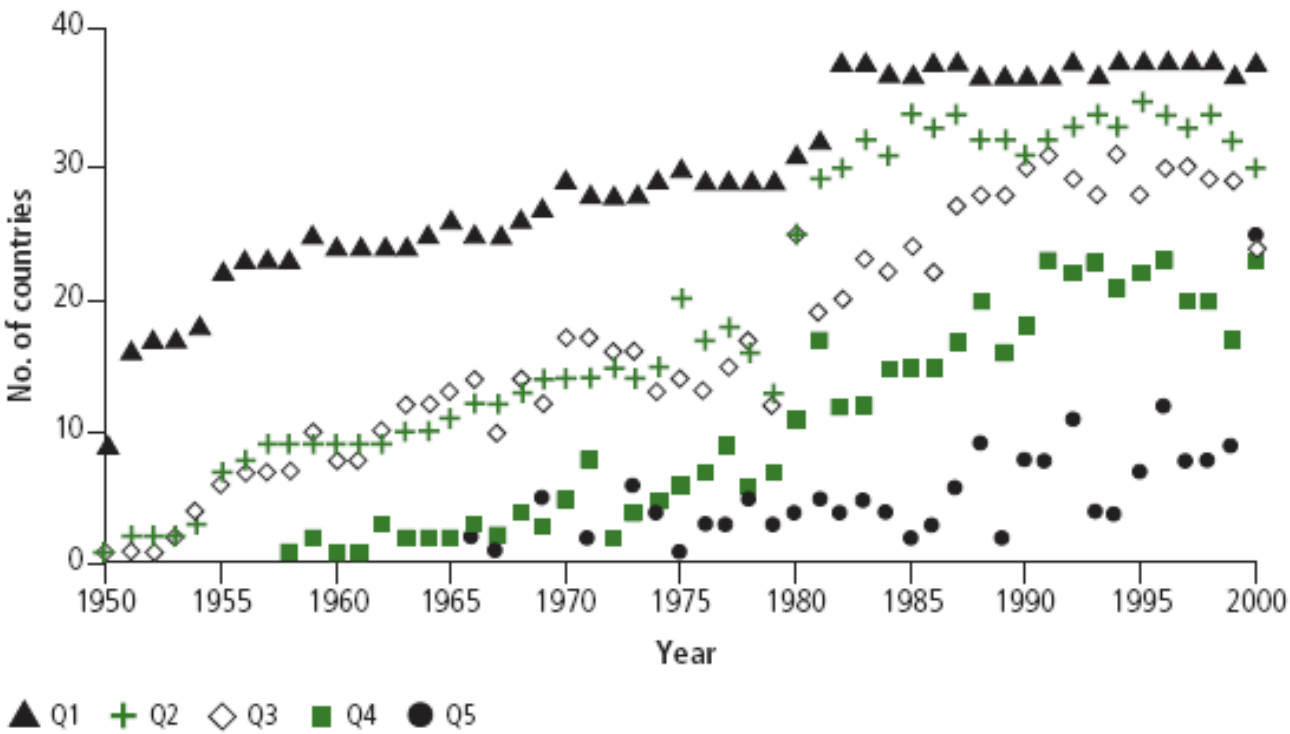


Let’s build upon what exists

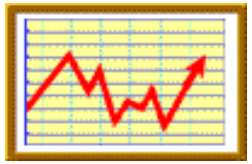
- CHERG – Child Health Epidemiology Research Group
- Health Metrics Network
- Countdown to 2015 Coverage Monitoring
- IEA International Courses on Epi Methods

Data availability on underfive mortality

Fig. 1. Number of countries with data sources available at WHO, by under-five mortality quintile (Q), 1950–2000 (at April 2005)



Low-mortality countries



High-mortality countries

Bull WHO 2006;84:225-232.

Take home messages

- 10 million deaths a year
- Statistical arthritis!
- Epidemiologists are not doing enough
- Our skills are badly needed for research on equity, coverage, delivery and evaluation
- Over half of maternal and child deaths in Sub Saharan Africa
- Let’s bring statistics to where the snakes are!

An epidemiologist needs dirty hands and a clean mind.

Geoffrey Rose