



Making sense of data on maternal and child mortality –

What research is being done by the MRC?

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Burden of Disease Research Unit



Maternal and child mortality:

What do we want to measure?

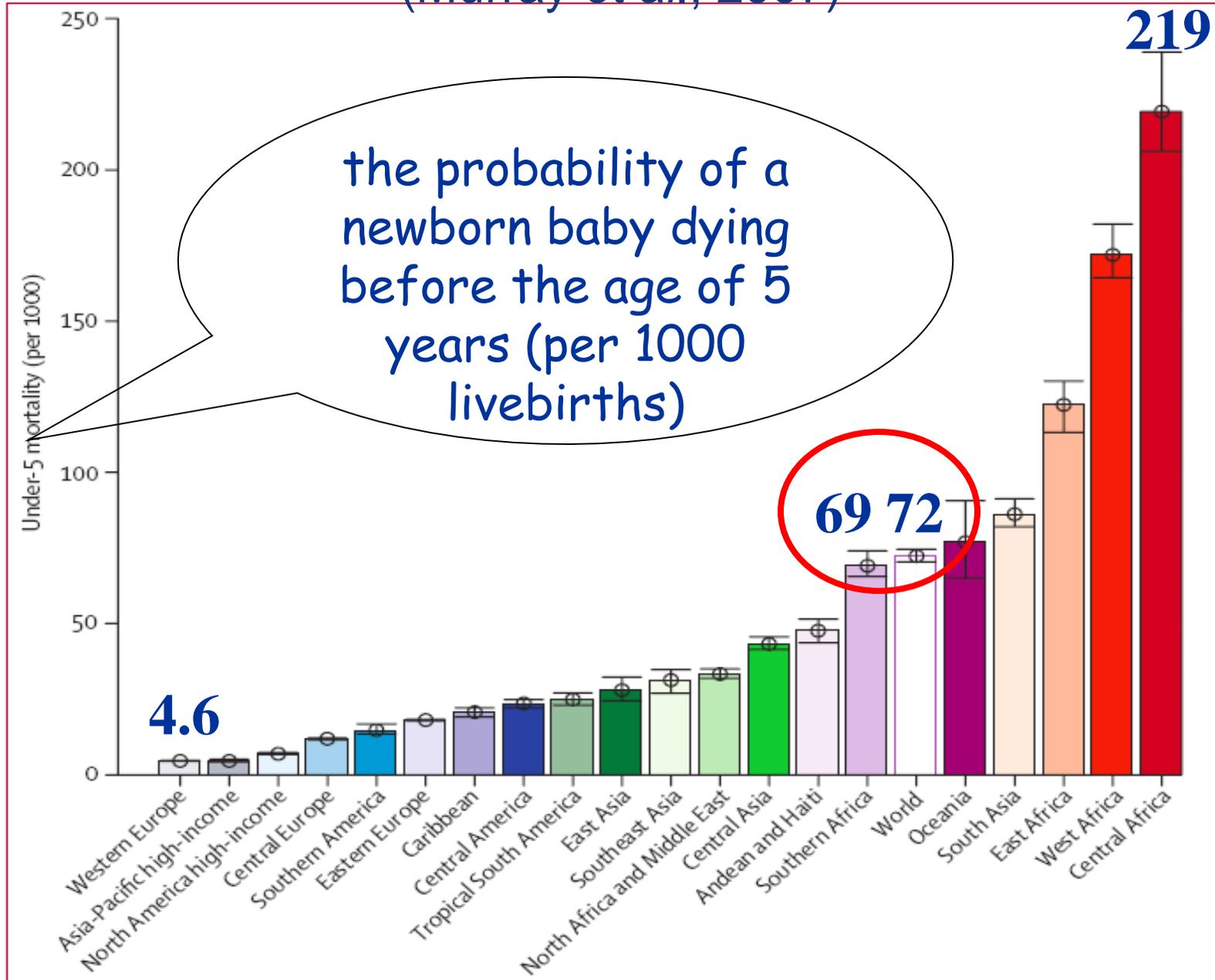
What data do we have?

What do the data say?

What research is being done by the MRC?

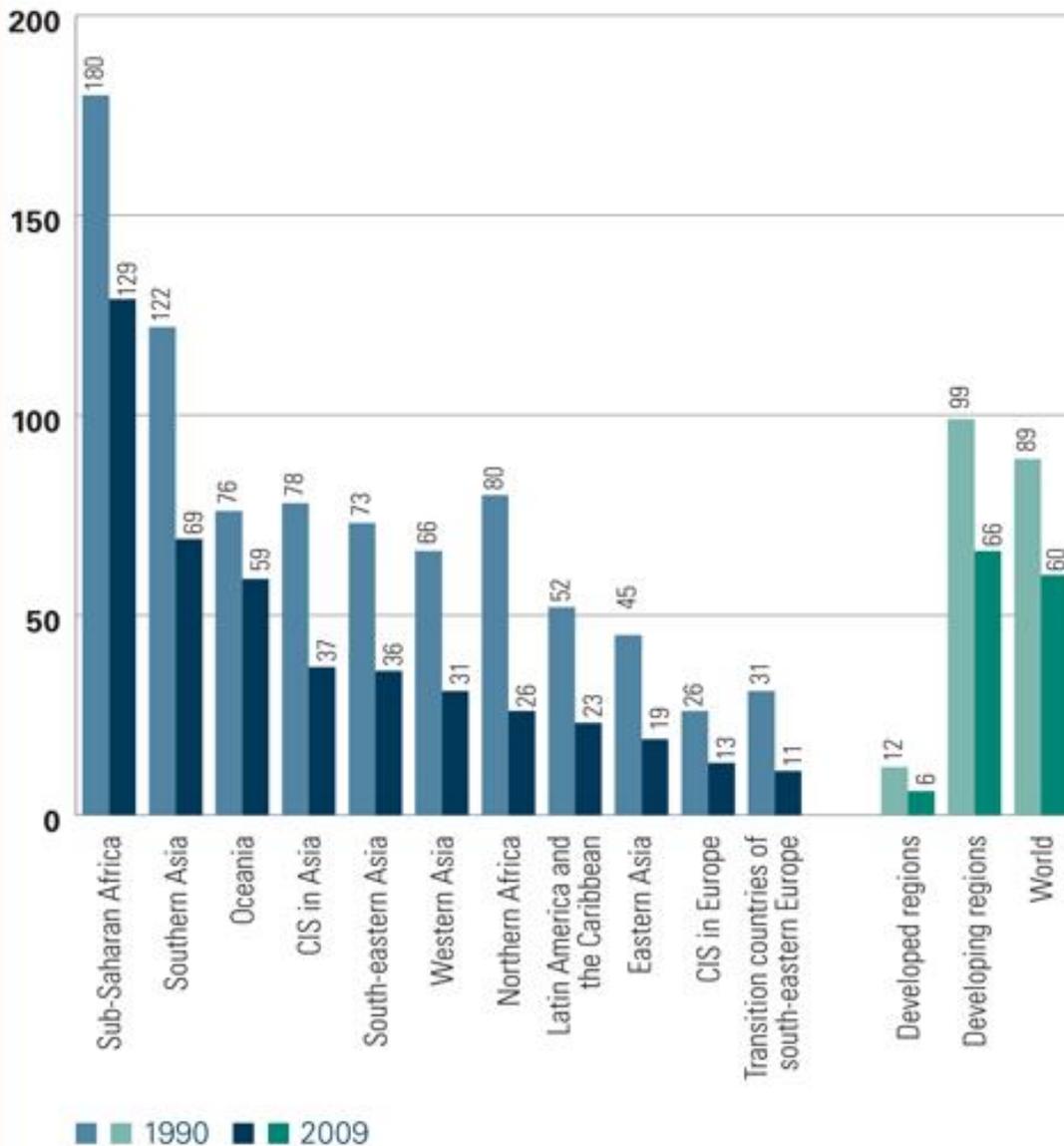
Under-5 mortality in 2005 estimates

(Murray *et al.*, 2007)



Under-five mortality declined in all regions between 1990 and 2009

Under-five mortality rate, by region, 1990 and 2009 (deaths per 1,000 live births)



The global under-five mortality rate has fallen by a third since 1990—from 89 deaths per 1,000 live births in 1990 to 60 in 2009

The U5MR has fallen from 180 to 129 per 1,000 live births in Sub-Saharan Africa



Ideal data for monitoring child mortality:

- Complete vital registration of births and deaths together with regular censuses and mid-year population estimates
=> routine estimates of ***Infant mortality rate*** (q_0) and ***Under-5 mortality rate*** (q_5)
- In addition, this should be timely, available at lower geographic area and have information about the cause of death

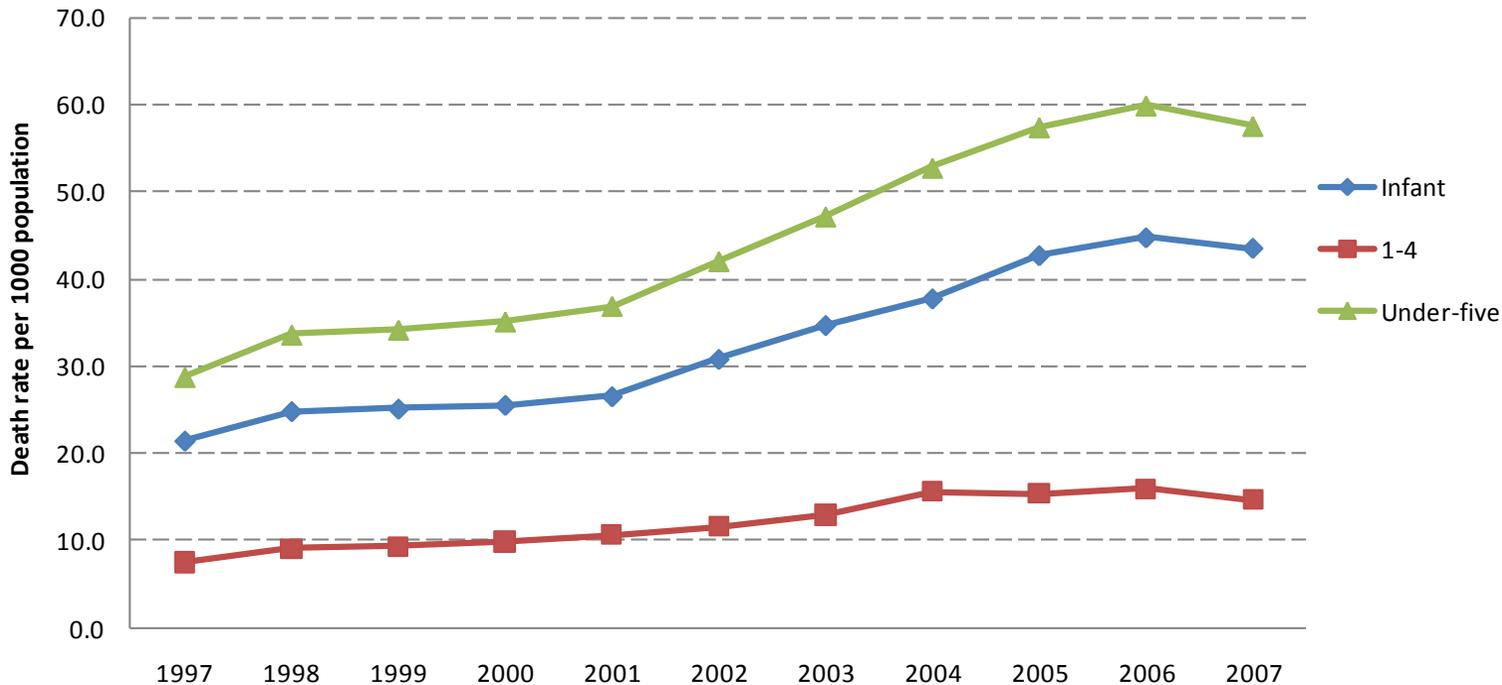
In the absence of complete vital registration data:

- Full birth history from a representative sample of women. Questions about each birth: *What was the date of birth? Is the child still alive? If not, how old was the child when s/he died?*
- Summary birth history from representative sample of women. Two questions: *How many live births has each mother had and how many of them have survived?*



Child mortality based on registered deaths, Stats SA

Death rates by age group

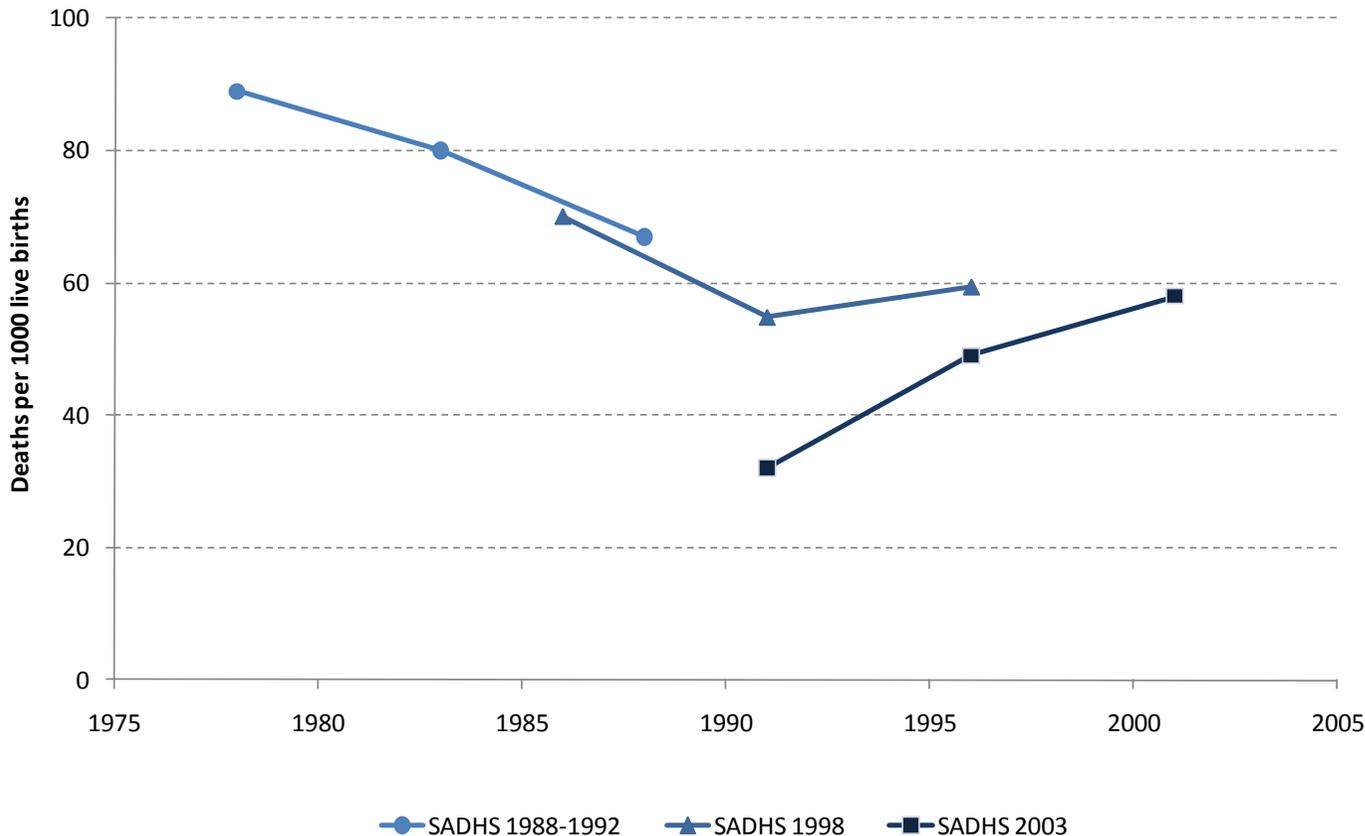


Death registration is incomplete – but has improved in recent years making it difficult to distinguish increases in death rates from improvements in registration of deaths



Full birth history data

Demographic and Health Surveys (DOH)



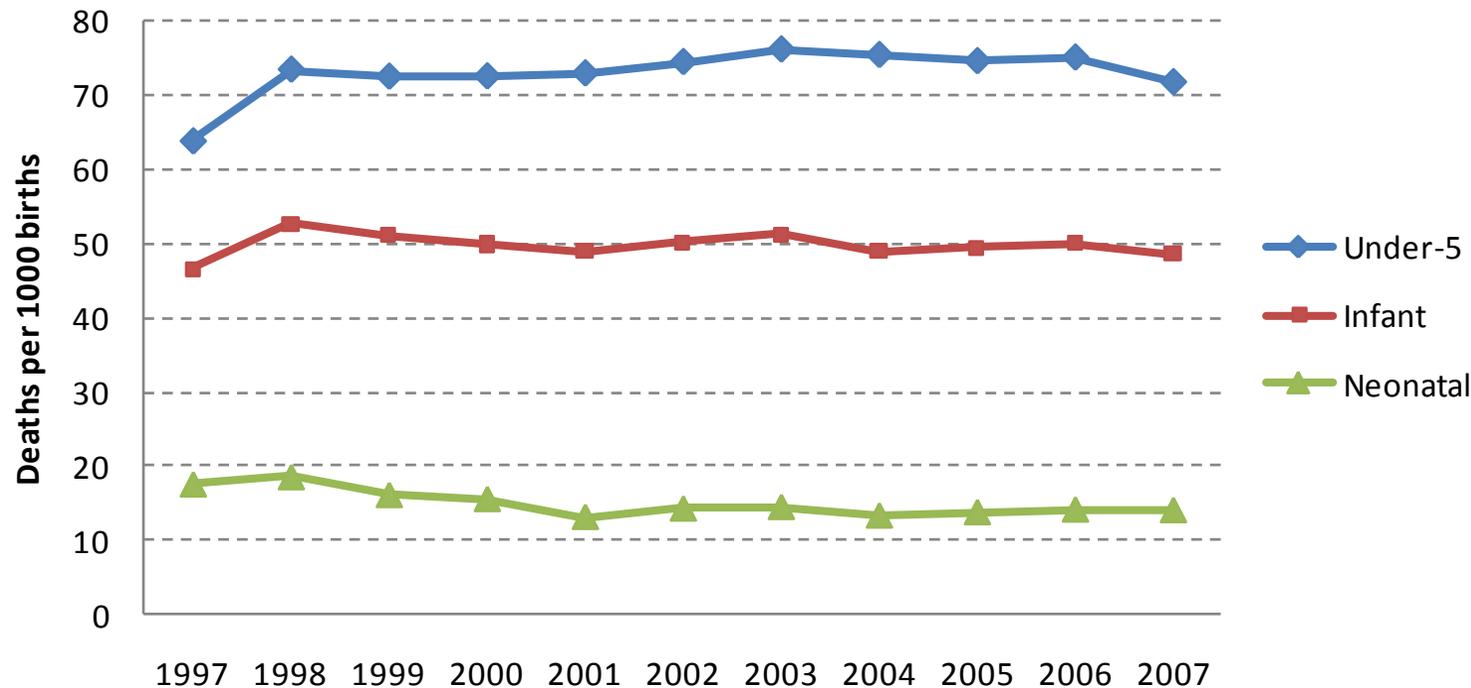
Demographic and Health Surveys indicate that mortality declined until the early 1990's and then increased - but the current levels remain uncertain



Summary birth history data

2007 Community Survey (Stats SA)

Adjusted neonatal, infant and under-5 mortality rate



Adjusted estimates from the summary birth history data of the 2007 Community Survey indicate that Under-5 mortality rate has been stable since about 2000

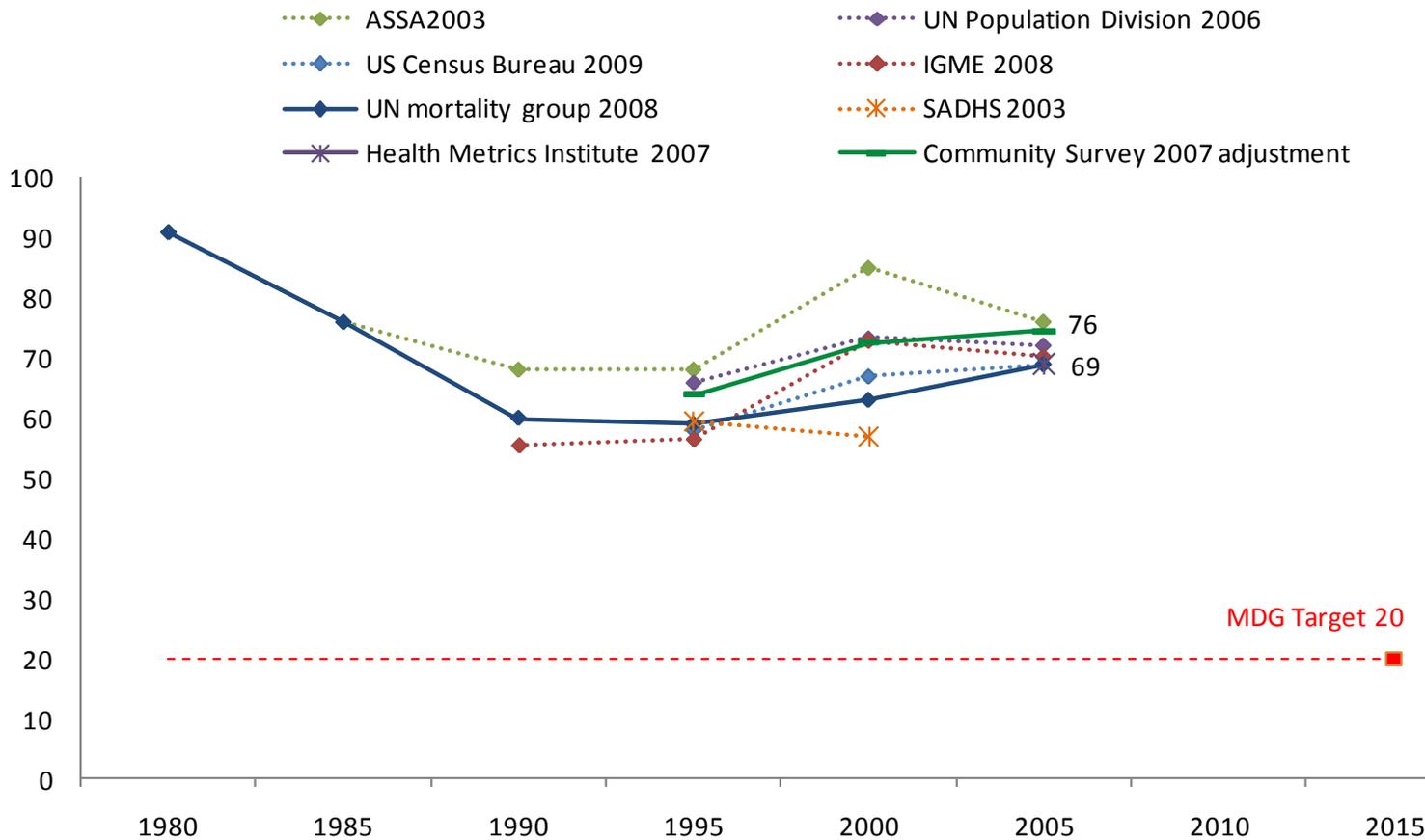


Assessing trends in child mortality

- **Identify all nationally representative data**
- **Asses data quality**
 - **sampling errors (surveys only)**
 - **omission of deaths**
 - **misreporting of child's age at death or date of birth (direct only)**
 - **selection bias**
 - **violation of assumptions (indirect only)**
 - **bias from the impact of HIV/AIDS**
- **Fit a regression line to all data points that meet data quality standards and adjust for impact of HIV**



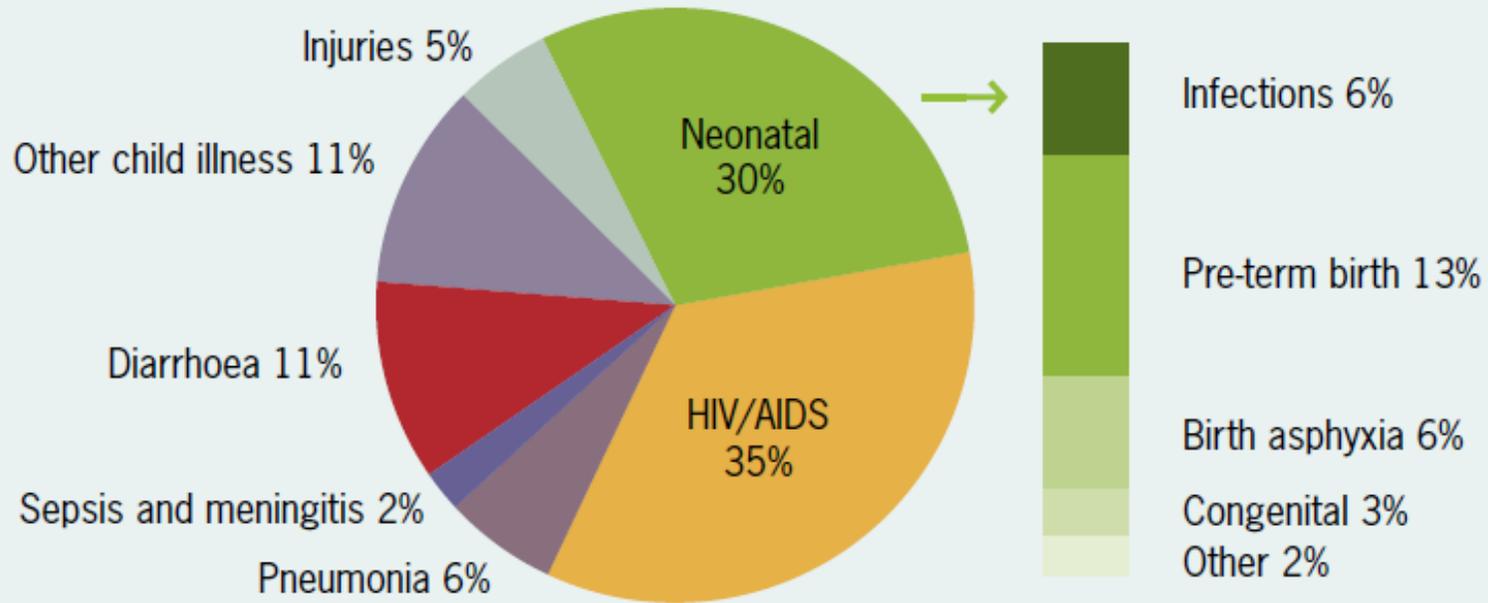
Model based estimates



1. There is considerable uncertainty about the level of child mortality
2. Nonetheless, It is clear that by 2005 rates were either stagnant or increasing
3. The MDG report for South Africa has implausible level – 104 per 1000 births for 2007



Figure 3: Causes of death in newborns and children under five years, 2000 – 2005

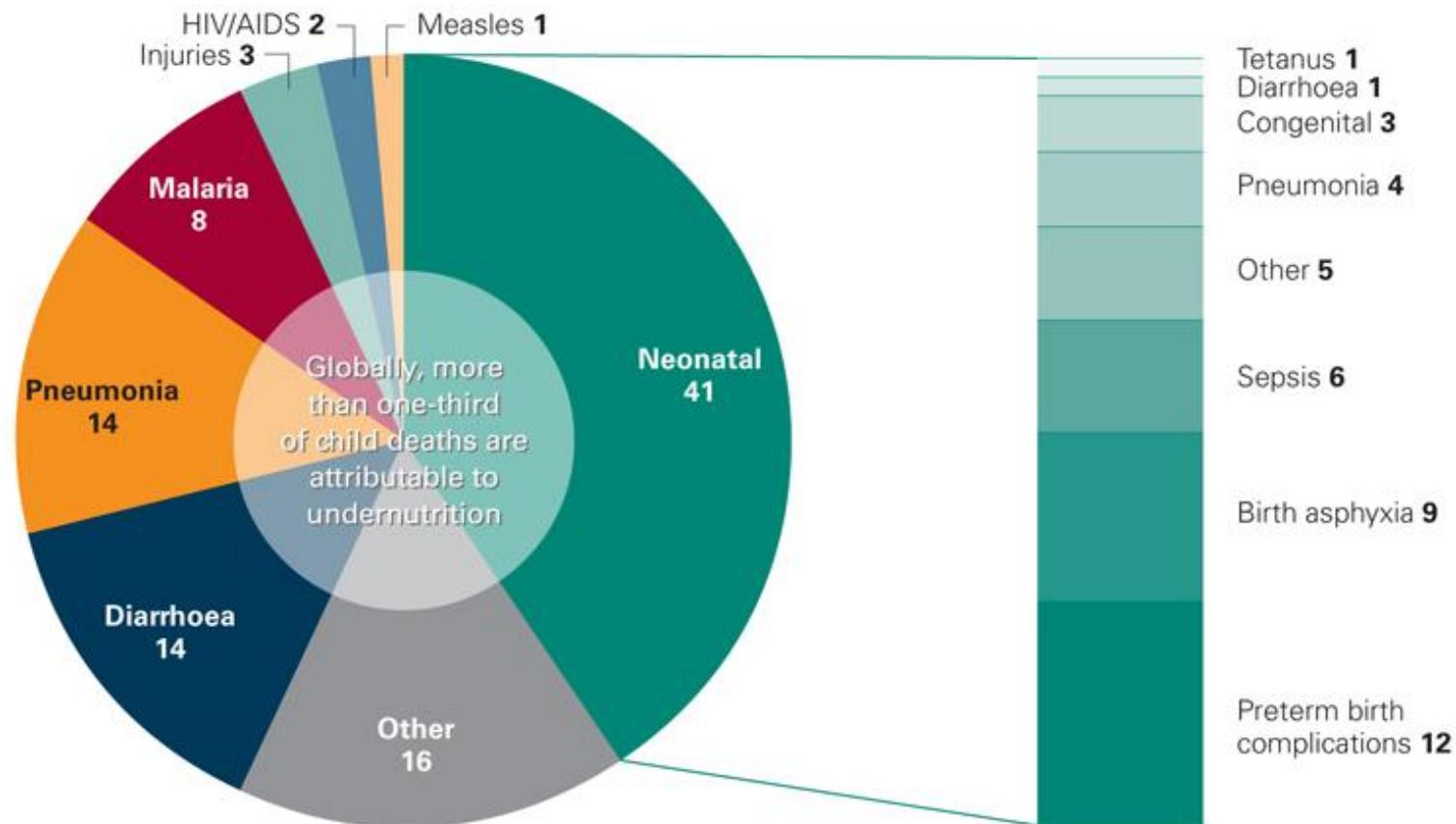


Source: South Africa Every Death Counts Writing Group (2008) Every death counts: Use of mortality audit data for decision making to save the lives of mothers, babies, and children in South Africa. *The Lancet*, 371: 1294-1304.

Data source: Norman R, Bradshaw D, Schneider M, Pieterse D & Groenewald P (2006) *Revised burden of disease estimates for the comparative risk factor assessment, South Africa 2000*. Cape Town: Medical Research Council.

Revitalizing efforts against pneumonia and diarrhoea, while bolstering nutrition, could save millions of children

Causes of deaths among children under age five, 2008 (percent)



Source: Black R, Cousens S, Johnson H, Lawn J, Rudan I, Bassani D, Jha P, Campbell H, Walker C, Cibulskis R, Eisele T, Liu L, and Mathers C, for the Child Health Epidemiology Reference Group of WHO and UNICEF, 2010, "Global, Regional, and National Causes of Child Mortality in 2008: A Systematic Analysis," *Lancet* 375(9730): 1969–87.

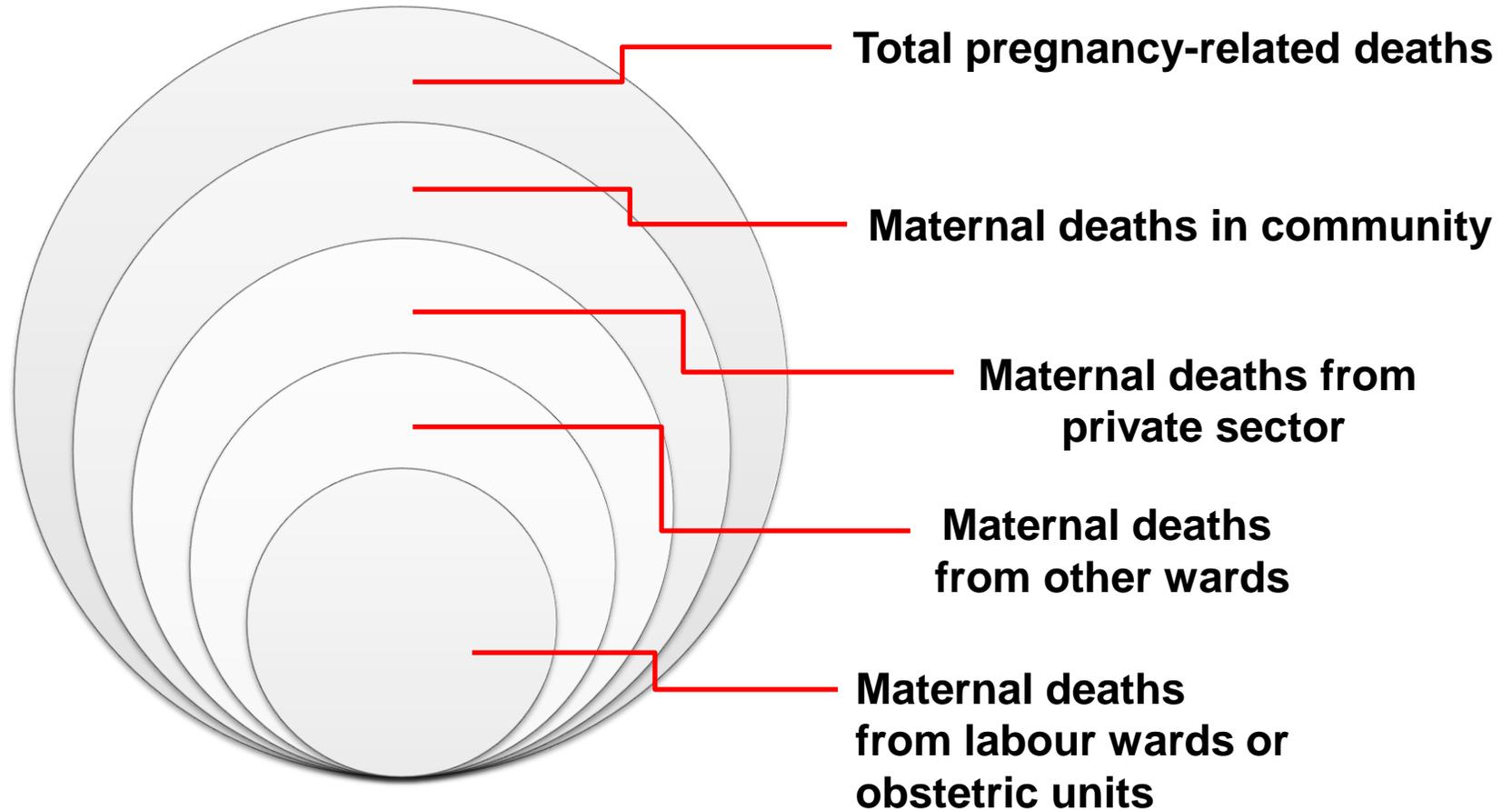


Maternal mortality

Maternal mortality ratio (MMR)
(Maternal deaths
per 100 000 live births)

$$\frac{\text{number of maternal deaths} * 100\ 000}{\text{number of live births}}$$

Maternal deaths often missed in routine statistics





Ideal data systems for maternal mortality:

1. Vital registration including a question on pregnancy status of deceased females
 - Completeness of registration needs to be improved
 - Quality of cause of death information needs to be improved
2. Health facility audit (**confidential enquiry**) that reviews each death to assess whether it was preventable and contributes to statistics
 - Needs to extend beyond the labour wards and also review deaths in general or other specialised wards
 - Needs to systematically include information from private sector
3. Data linkage
 - confidential enquiry with death registration
 - birth and death registration



In the absence of the ideal systems:

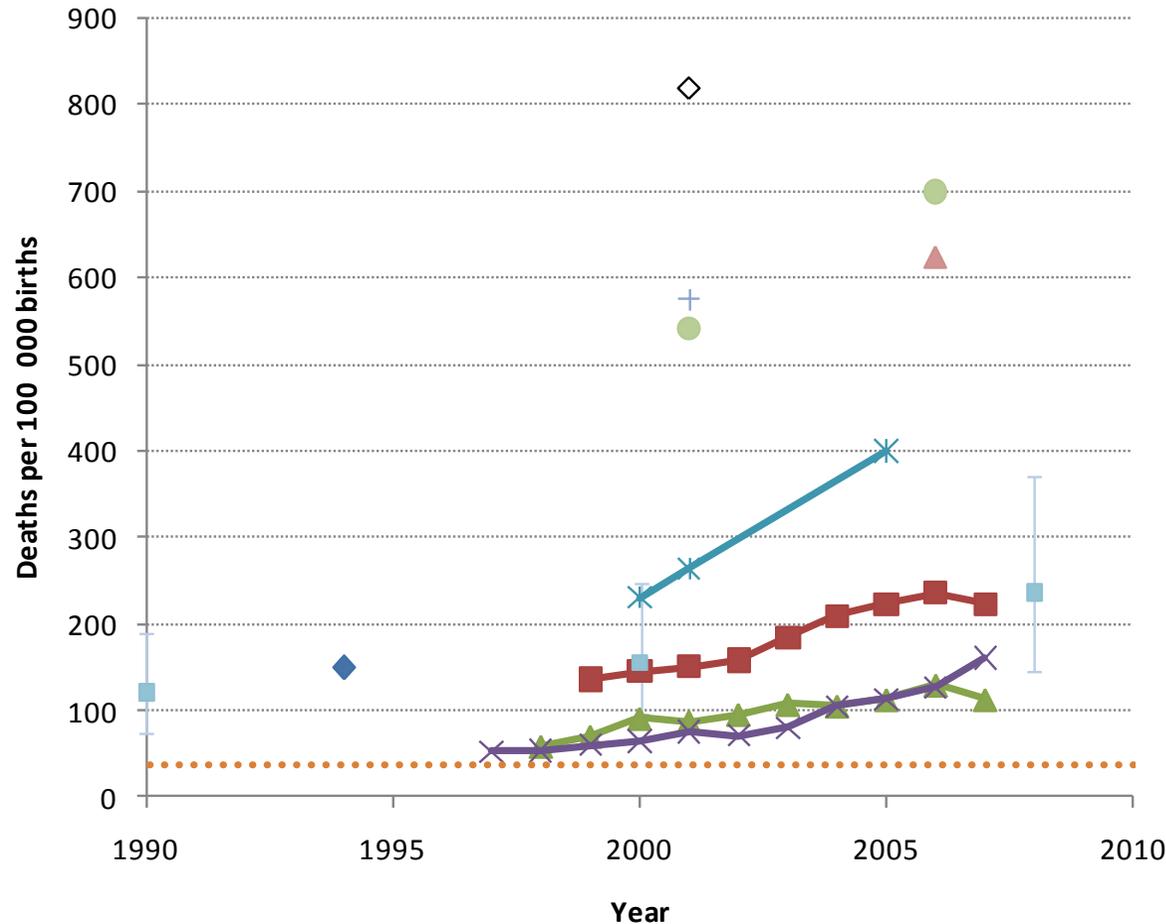
1. Maternal deaths in the past 12 months reported by households in the census or large household survey
 - Need to allow for bias in reporting of deaths
 - Need to allow for error in pregnancy related reporting

2. Deaths of siblings reported by a representative sample of women
 - Provides historical estimates on the maternal mortality ratio
 - Need to allow for bias the longer the recall period



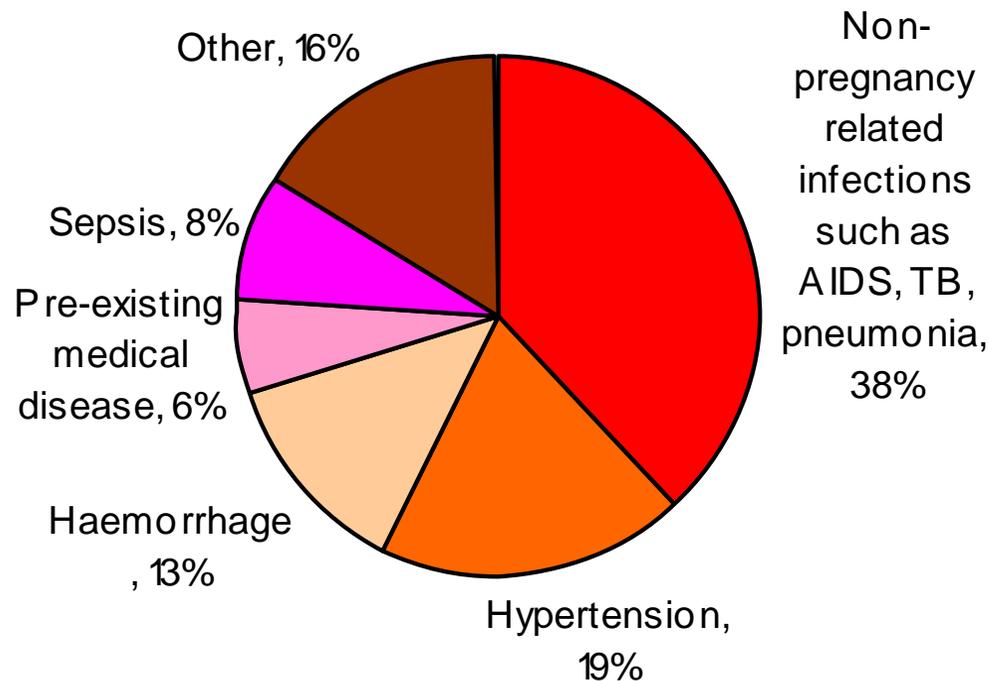
Estimates of the Maternal Mortality Ratio

- There is considerable uncertainty about the level of maternal mortality
- The census and survey approaches provide values that appear to be too high and vital registration and the confidential enquiry are too low
- Our estimate for 2006 was \pm 300 per 100 000 births
- It is clear that maternal mortality has been increasing but too soon to know whether it has peaked





Why do mothers die?



- According to the Confidential Enquiry report, the main increase has been in Indirect maternal deaths ie deaths from diseases that were aggravated by the pregnancy rather than from an obstetric problem
- The most common infection associated with maternal death is HIV/AIDS



Urgent need to strengthen the health information system to adequately monitor maternal and child mortality

- **Improve vital statistics**
 - Continue efforts to improve birth and death registration
 - Improve quality of cause of death certification
- **Urgently undertake a national household survey**
 - Include child mortality and ensure good quality data
- **Extend health facility audit**
 - Willingness to participate
- **Improve information to monitor effective programmes**
 - Both routine health information and health survey data are needed



South African Medical Research Council

2009/10 Annual Report Presentation to the Parliamentary Portfolio Committee on Health

Muhammad Ali Dhansay

27 October 2010





Alignment with NDOH Strategic Plan

The 2010/11 – 2012/13 Strategic Plan of the National Department of Health highlights the 10 Point Plan which includes Strengthening Research and Development. It further details twenty deliverables for four key areas, viz.

- ***Increasing life expectancy;***
- ***Decreasing maternal and child mortality;***
- ***Combating HIV and AIDS and decreasing the burden of TB;***
- ***Improving health system effectiveness.***

With its current and improved portfolio of research, the MRC will support the department in its endeavours.



Building a healthy nation through research

HIV and AIDS

South African AIDS Vaccine Initiative (SAAVI)

HIV Prevention Research Unit

Tuberculosis

Clinical and Biomedical Tuberculosis Research Unit
Tuberculosis Epidemiology and Intervention Research Unit
Centre for Molecular and Cellular Biology
Molecular Mycobacteriology Research Unit

Infectious Disease

Diarrhoeal Pathogens Research Unit

Immunology of Infectious Disease Research Unit
Inflammation and Immunity Research Unit
Malaria Research Lead Programme

Respiratory and Meningeal Pathogens Research Unit

Cardiovascular Disease and Diabetes

Chronic Diseases of Lifestyle Research Unit
Diabetes Research Group
Diabetes Discovery Platform
Interuniversity Cape Heart Research Group
Exercise Science and Sports Medicine Research Unit

Crime, Violence and Injury

Crime, Violence and Injury Lead Programme

Cancer

Cancer Epidemiology Research Group
PROMEC Unit
Oesophageal Cancer Research Group
Oncology Research Unit

Health Promotion

Alcohol and Drug Abuse Research Unit
Health Promotion Research and Development Research Unit



Public Health

Biostatistics Unit
Burden of Disease Research Unit
Cochrane Centre
Health Policy Research Unit
Health Systems Research Unit
Rural Public Health and Health Transition Research Unit

Genomics and Proteomics

Bioinformatics Capacity Development Research Unit
Bone Research Unit
Human Genetics Research Unit
Human Genomic Diversity and Disease Research Unit
Receptor Biology Research Group

Women, Maternal and Child Health

Gender and Health Research Unit
Maternal and Infant Health Care Strategies Research Unit
Mineral Metabolism Research Unit

Nutrition

Nutritional Intervention Research Unit

Environment and Health

Environment and Health Research Unit

Brain and Behaviour

Medical Imaging Research Unit
Anxiety and Stress Disorders Research Unit

African Traditional Medicines

Drug Discovery and Development Research Unit
Indigenous Knowledge Systems

HIV and AIDS

Building a healthy nation through research



- Epidemiological data has shown an alarmingly high prevalence of HIV among women in the communities (ranging from 38-47%), with HIV incidence ranging from 5-9%. This pioneering data is the first of its kind among non-pregnant women in the community in KwaZulu-Natal.
- The HIV Prevention Research Unit was an important collaborator in a clinical trial of a vaginal microbicide (PRO2000) that reduced HIV by 30% compared to the placebo – though the result fell just short of statistical significance.
- A follow up study whose results were released in December 2009 showed that the PRO2000 gel was safe but did not prevent HIV infection in women.



World Health Organization (WHO) Antiretroviral Therapy Guidelines

The 2009 update of WHO's Guidelines on *Antiretroviral therapy for HIV infection in adults and adolescents*, was based on an appraisal and synthesis of new and emerging evidence. This process included consideration of systematic reviews, GRADE profiles, risk-benefit analyses, technical reports, as well as the findings from impact, feasibility and cost assessments, each contributing to the development of sound global recommendations.

Reviews on *Optimal initiation of ART and Interventions for reducing the risk of mother-to-child transmission of HIV* which were incorporated into the *WHO Rapid Advice* and the final approved guidelines will be published later in the year. The review on *Optimal time for initiation of antiretroviral therapy in asymptomatic, HIV-infected, treatment-naive adults* was published in the March 2010 issue of *The Cochrane Library*.





- The outcome of a five-year vaccine trial conducted in Soweto with 39 876 children showed that the 9-valent pneumococcal conjugate vaccine reduced the burden of invasive disease due to vaccine serotypes by 85% and was also shown to be effective in HIV-infected children
- Profs Klugman and Madhi contributed to the WHO guidelines for the treatment of pneumonia in HIV-infected children. These episodes were prevented by administration of pneumococcal conjugate vaccine
- The National Department of Health introduced pneumococcal conjugate vaccine and rotavirus vaccine into the Expanded Programme on Immunisation for children in 2009



Building a healthy nation through research

THE LANCET

Health in South Africa

Executive summary for a Series of Lancet papers

Health in South Africa 2

**Saving the lives of South Africa's mothers, babies,
and children: can the health system deliver?**

Mickey Chopra, Emmanuelle Daviaud, Robert Pattinson, Sharon Fonn, JoyE Lawn

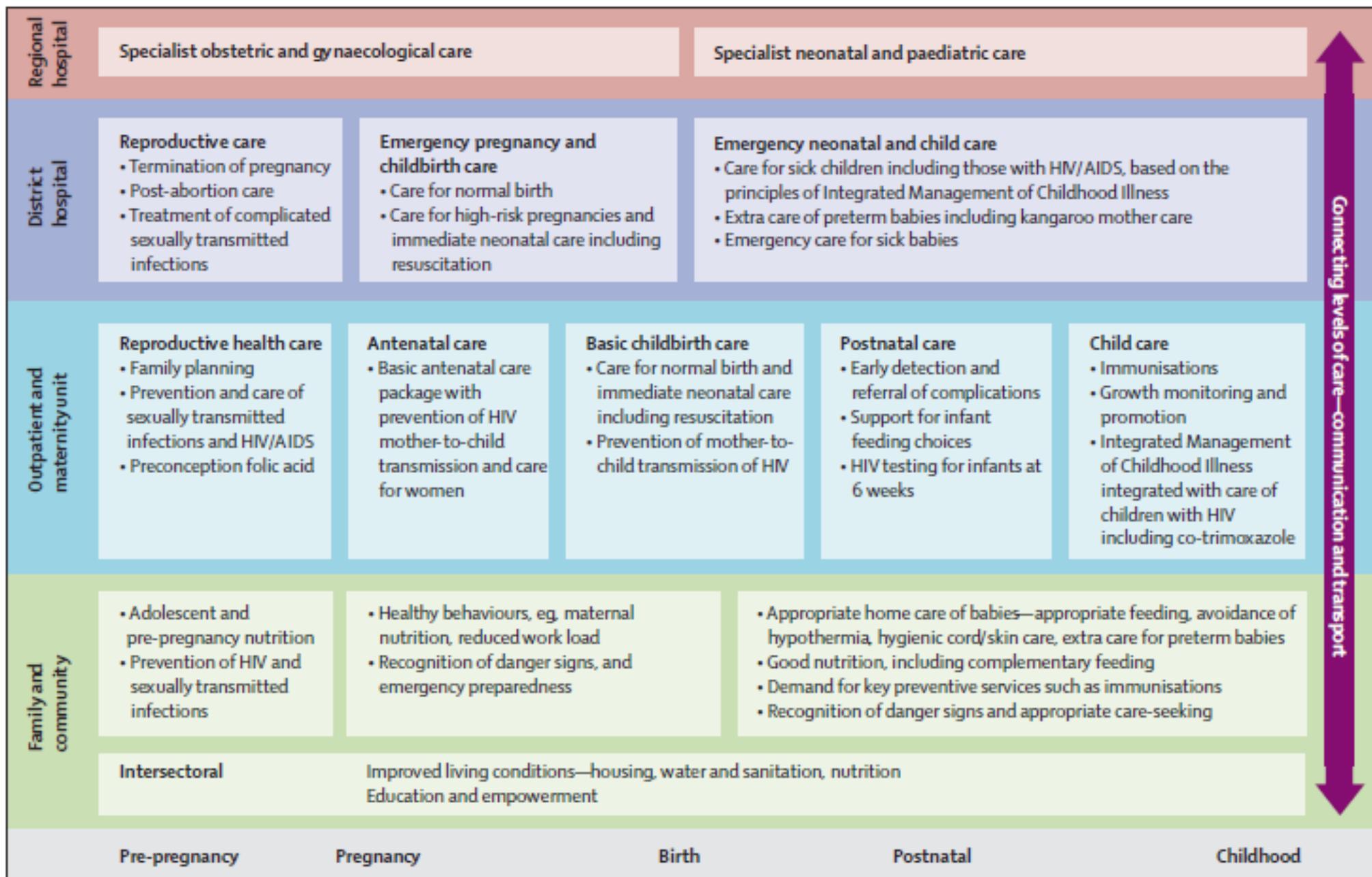


Figure 1: Integrated health-care packages for maternal, neonatal, and child health according to level of the health system in South Africa



Key messages

- HIV/AIDS and poor implementation of existing packages of care are the main reasons for the lack of progress towards the MDGs.
- Full coverage of key packages of interventions such as treatment and prevention of HIV infection and provision of comprehensive maternal and neonatal care would put South Africa on track to achieve MDG 4 and make substantial progress towards MDG 5.
- To achieve high coverage of priority care for mothers, neonates, and children is financially feasible, requiring a 2-4% increase in expenditure, but this money must be spent strategically.
- Strengthening of leadership, accountability mechanisms, and high quality of care interventions are also required.

*Source:
Chopra et al., 2009*

Neonatal

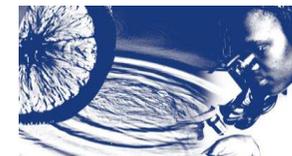
Antenatal care plus periconceptional folic acid supplementation or fortification*	700
Childbirth care including full obstetric package (eg, pre-eclampsia treatment, intrapartum care) plus antenatal steroids for preterm labour and neonatal resuscitation	4300
Postnatal care and support for appropriate feeding, early care-seeking for illness	2600
Care for sick babies and kangaroo mother care for preterm babies†	3900
Total	11 500

Children

PMTCT of HIV by dual therapy at 95% coverage, exclusive breastfeeding at 50%, exclusive replacement feeding at 40%, and mixed feeding at 10%	37 200
Total	48 700

Neonatal=day 0 to 28. Child here means from day 28 to 5 years. Estimates generated by LiST modelling; packages reducing neonatal mortality in many cases also reduce maternal deaths and stillbirths but the output for these lives saved is not yet available in this model. *Not including effect on HIV prevention, although same service delivery mechanism. †Not including continuous positive airways pressure, only basic neonatal care with oxygen, antibiotics, and so on.

Table 2: Estimated neonatal and children's lives saved in 2015 if all existing packages and interventions achieved linear increases in coverage from 2008 to 2015 and reached 95% coverage



research

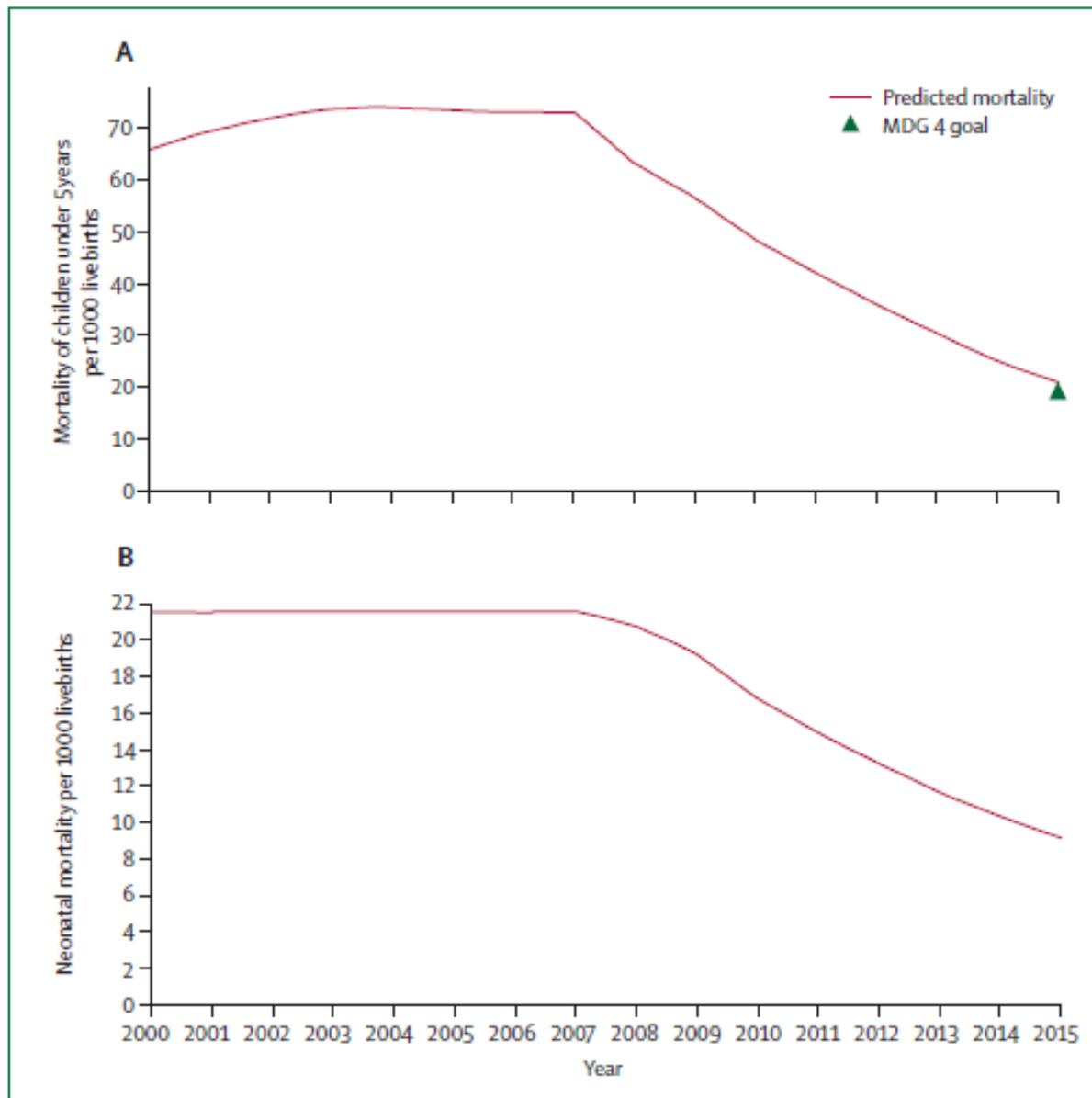
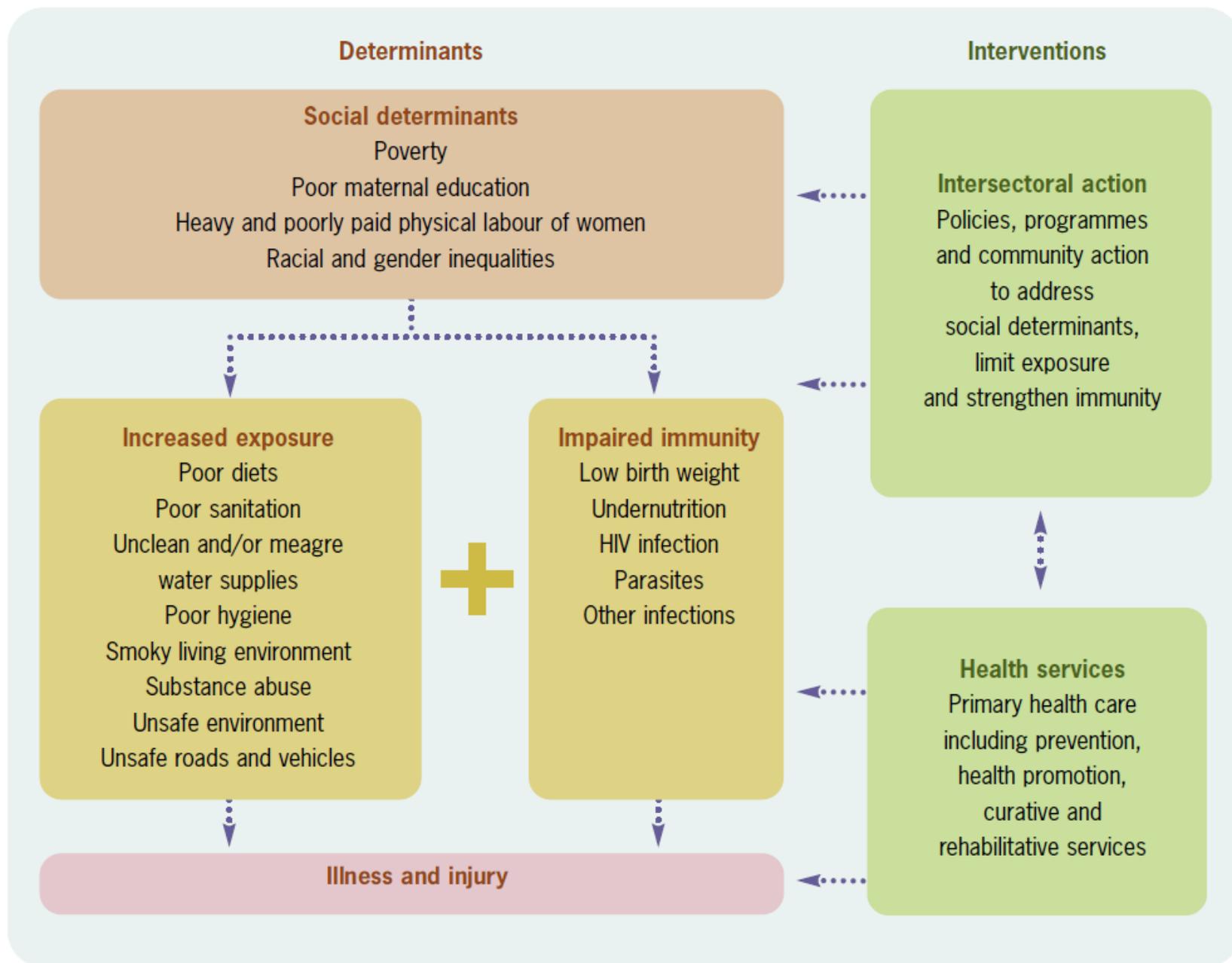


Figure 3: Predicted progress towards reduction of (A) child mortality and (B) neonatal mortality if coverage of prevention of mother-to-child transmission of HIV, newborn care, and preventive child care reached 90% by 2015. Data are based on modelling with the Lives Saved Tool (LiST). For details of methods and inputs see Chopra and colleagues.³ MDG 4=Millennium Development Goal 4 (reduce child mortality).

Source:
Chopra et al., 2009

Figure 5: Key interventions to address the determinants of child illness and injury



Source: Sanders et al., 2010



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Kealeboga

Building a healthy nation through research

Ngiyabonga

Inkomo

Enkosi

Retoleboga

Thankyou!

Dankie





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<http://www.mrc.ac.za>

