

# Pneumonia in Asia – marker of inequity in child survival

Kim Mulholland

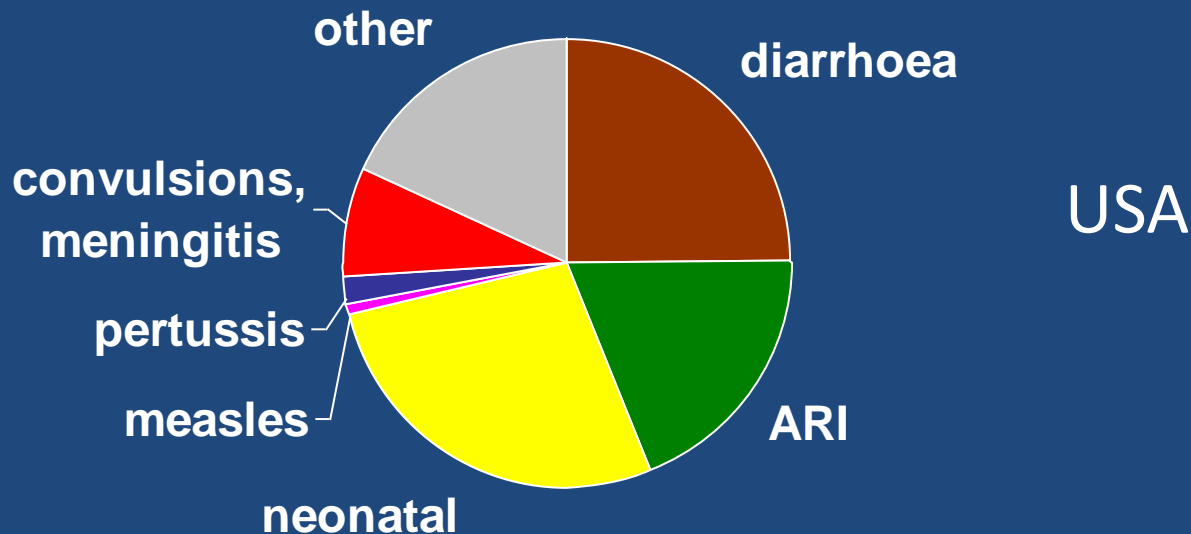
Murdoch Childrens Research Institute, Melbourne

Menzies School of Health Research, Darwin

London School of Hygiene and Tropical Medicine

# 1912 – still within living memory

- In USA, Europe, Australia
  - Child mortality 150-200/1000
  - Pneumonia a major component

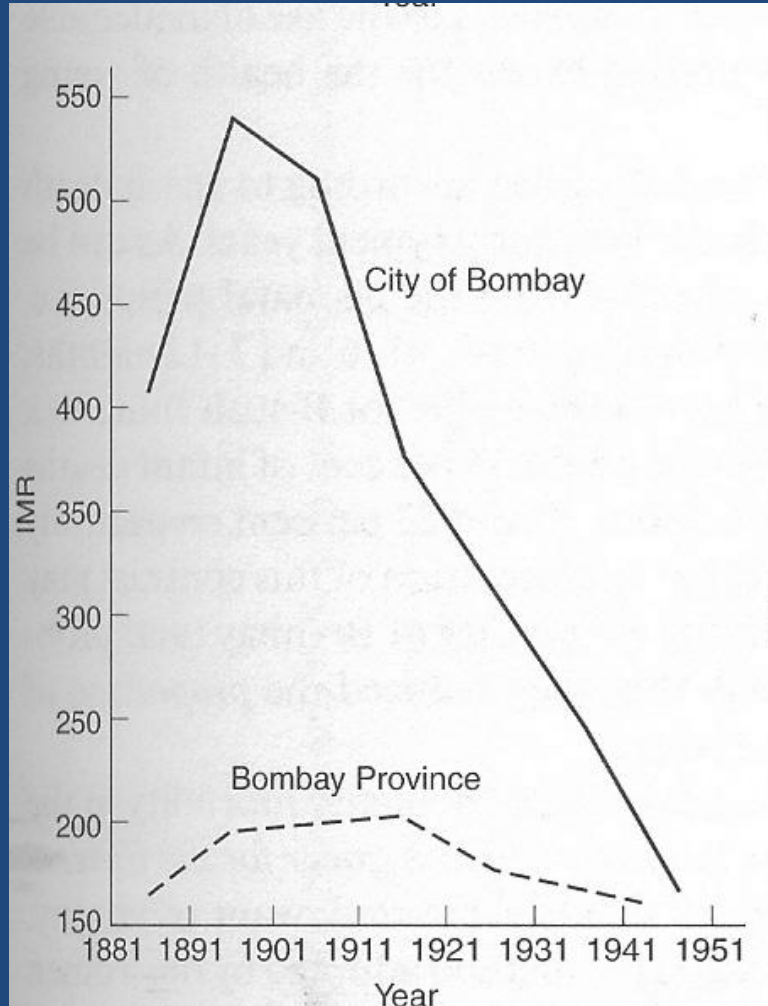


Source: Fatal Years, Preston & Haines, Princeton, 1991

# Asia 1912 – where are we coming from?

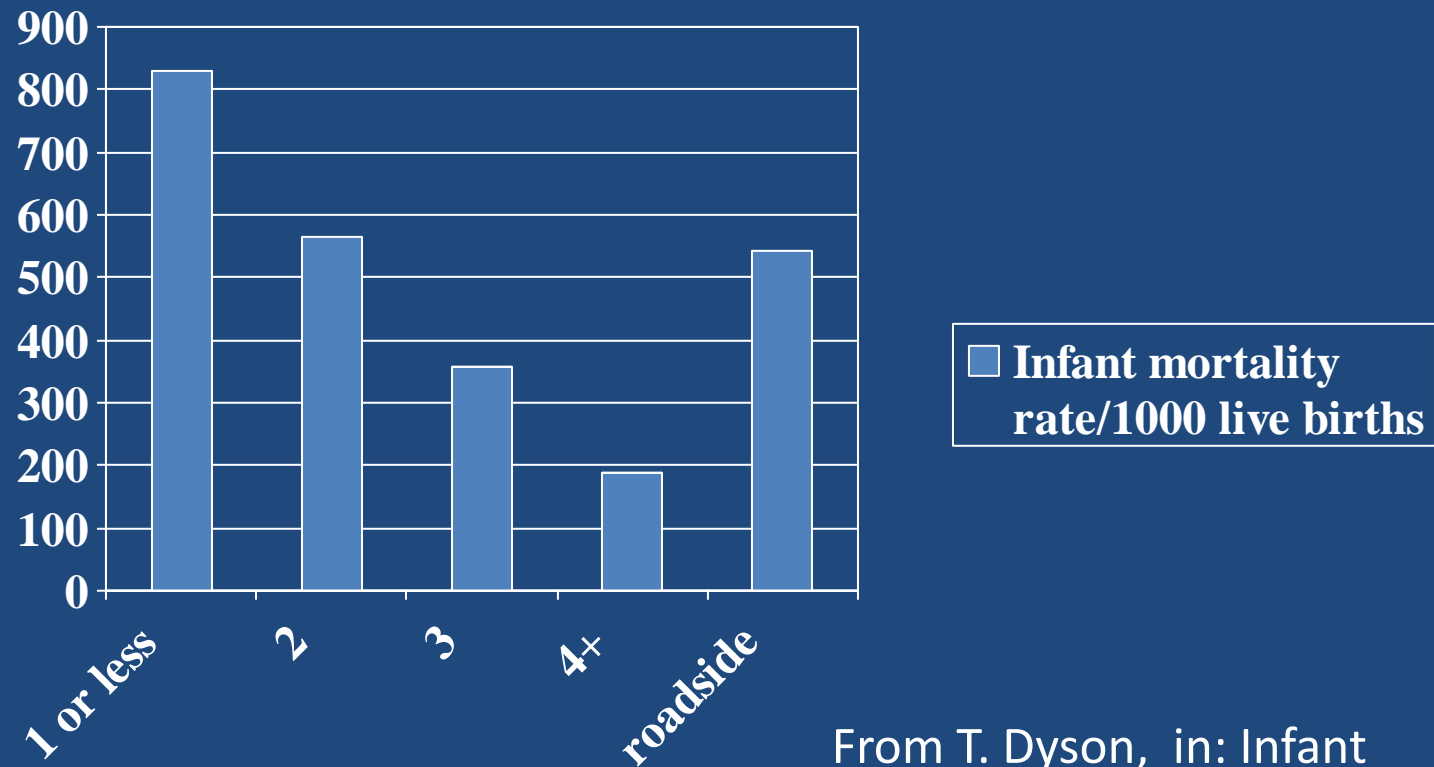
- Child mortality  $>200/1000$  in most settings
- Major epidemic diseases such as small pox, scarlet fever, etc
- Otherwise usual suspects:
  - Pneumonia
  - Diarrhoea
  - Malnutrition
  - Neonatal causes

# Infant mortality rate, Bombay 1881-1951



From T. Dyson, in: *Infant Mortality in the Past*, Bideau, Desjardins & Brignoli eds. Oxford 1997.

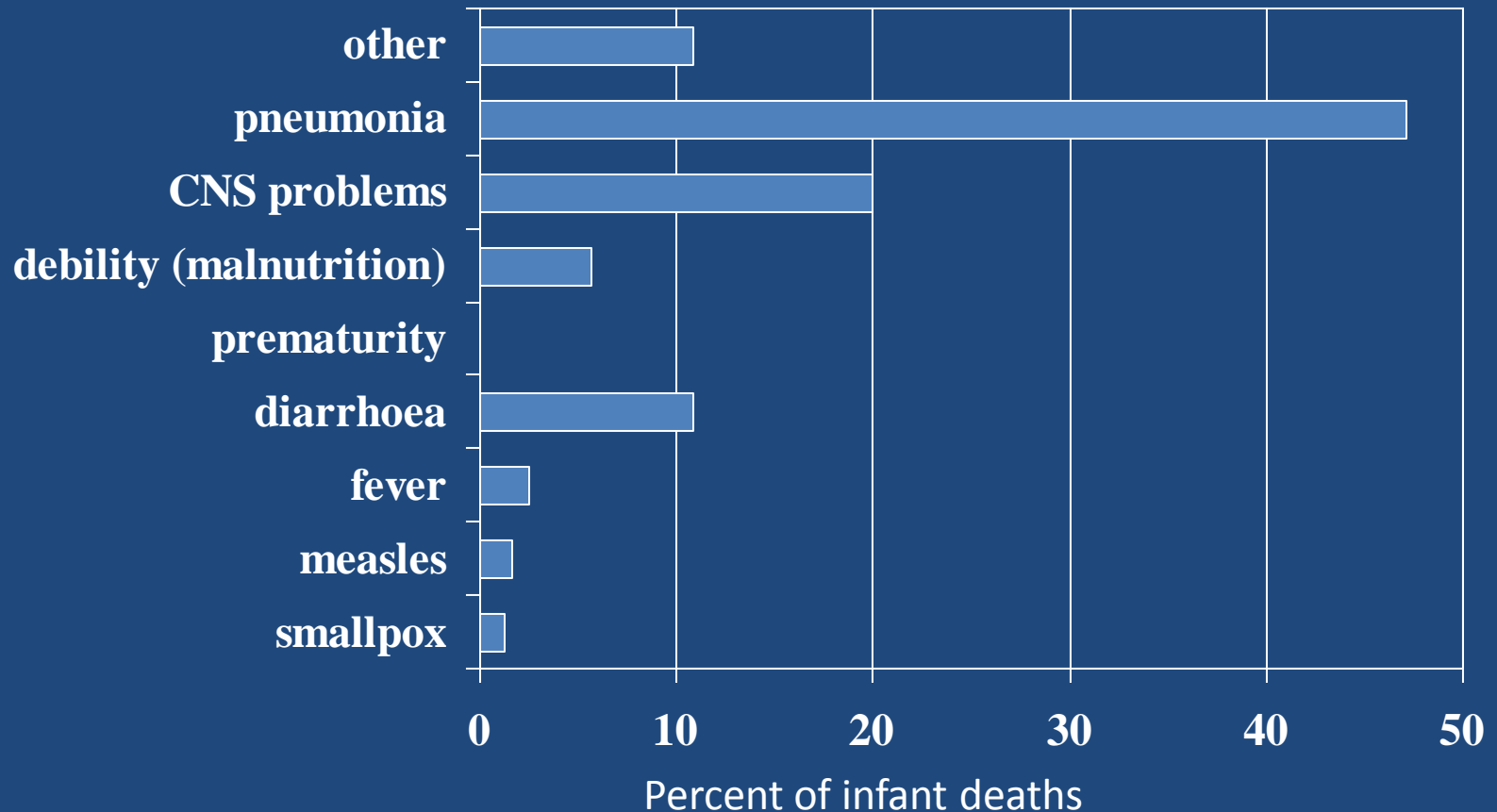
# Mortality by number of rooms occupied, Bombay 1919



Number of rooms occupied by family

From T. Dyson, in: *Infant Mortality in the Past*, Bideau, Desjardins & Brignoli eds. Oxford 1997.

# Post-neonatal infant mortality by cause, Bombay 1914



# Conclusions from Bombay study

- In crowded communities with extremely high mortality rates pneumonia is a (the) major cause of death
- Although such societies still exist today, we have no data from them and no idea what is behind the very high mortality rates when they occur.

# What are the main risk factors for pneumonia mortality?

- Malnutrition
- Poverty, crowding, poor housing
- Indoor air pollution
- Lack of suitable treatment



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- Poverty, crowding, poor housing
- Indoor air pollution
- (Lack of suitable treatment)



Irrelevant in 1912

# “Equity”

- Same as justice, but with a greater emphasis on fairness.
- Closer to distributive justice, rather than general justice which is more defined by legal processes.
- Similar to equality, but carries implications of fairness.

# Inequity within countries

- Emphasis on national data disguises inequity
- There is gross and poorly appreciated inequity in access to health services:
  - Geography
    - Quality of health services
  - Economic poverty – wealth quintiles
  - Ethnicity, language, etc.
  - Gender preference (in certain societies)
- Evidence for this is inequity in child survival

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# Asset indices - Families and their possessions

*Mali*

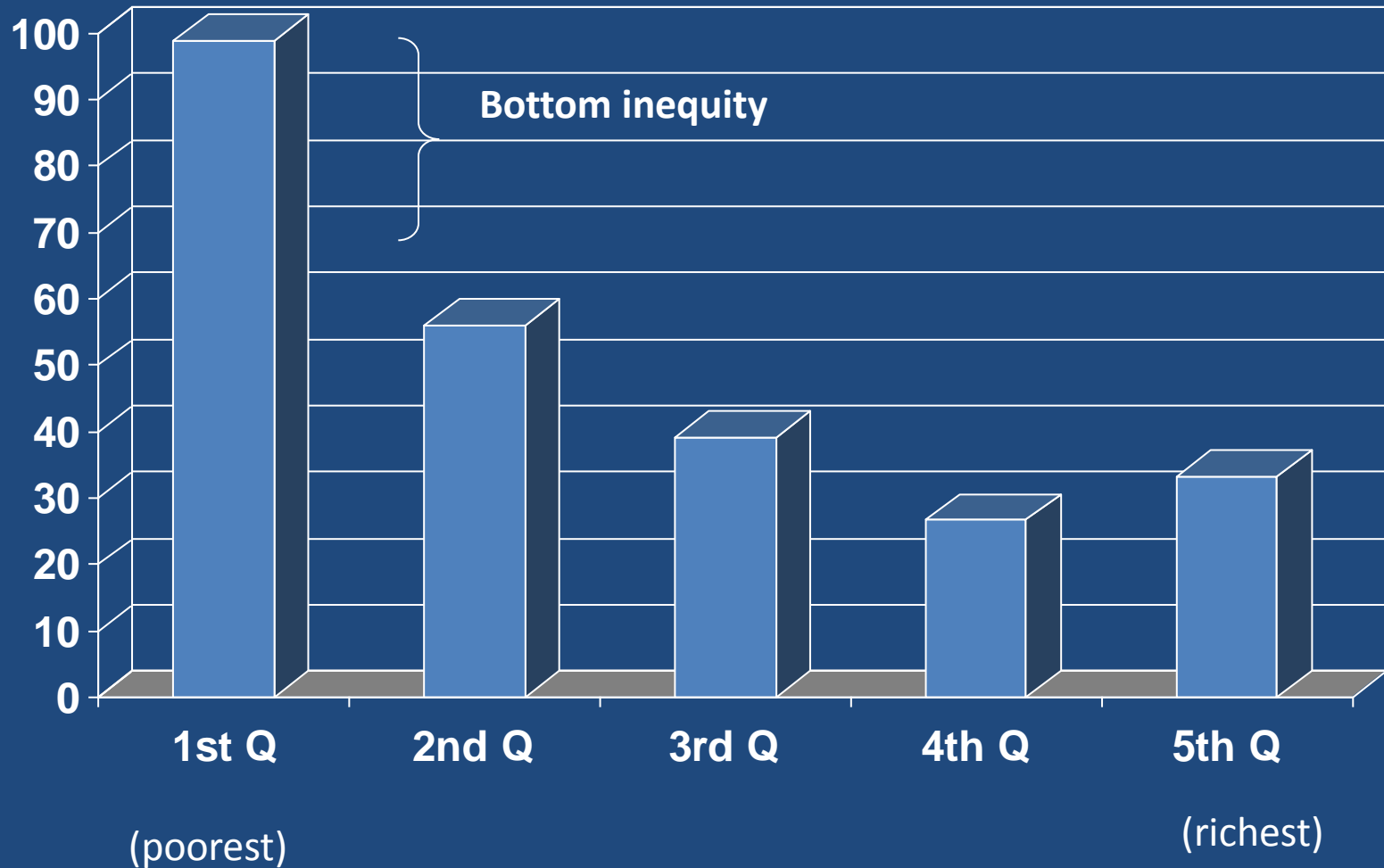


*Ethiopia*

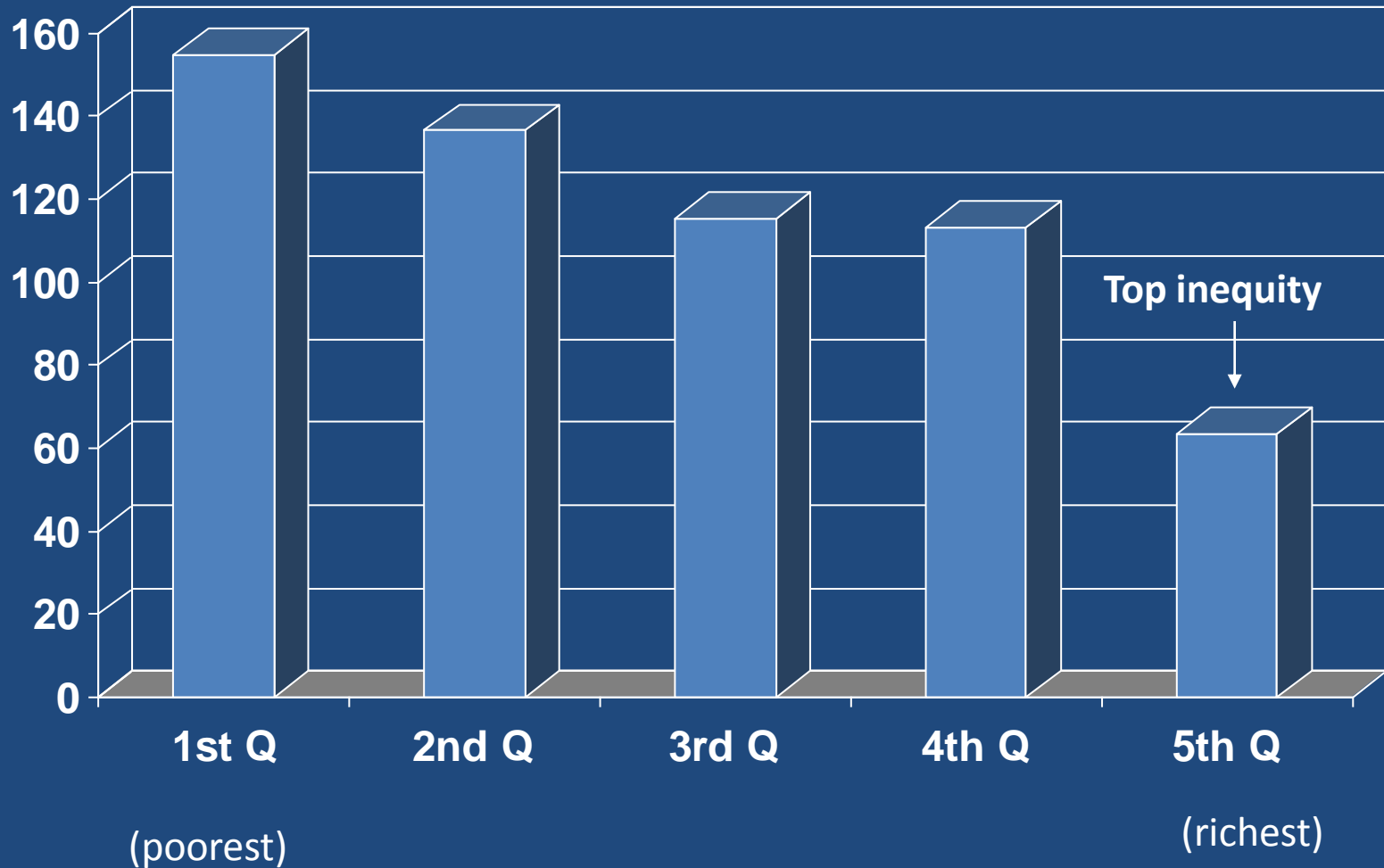


*South Africa*

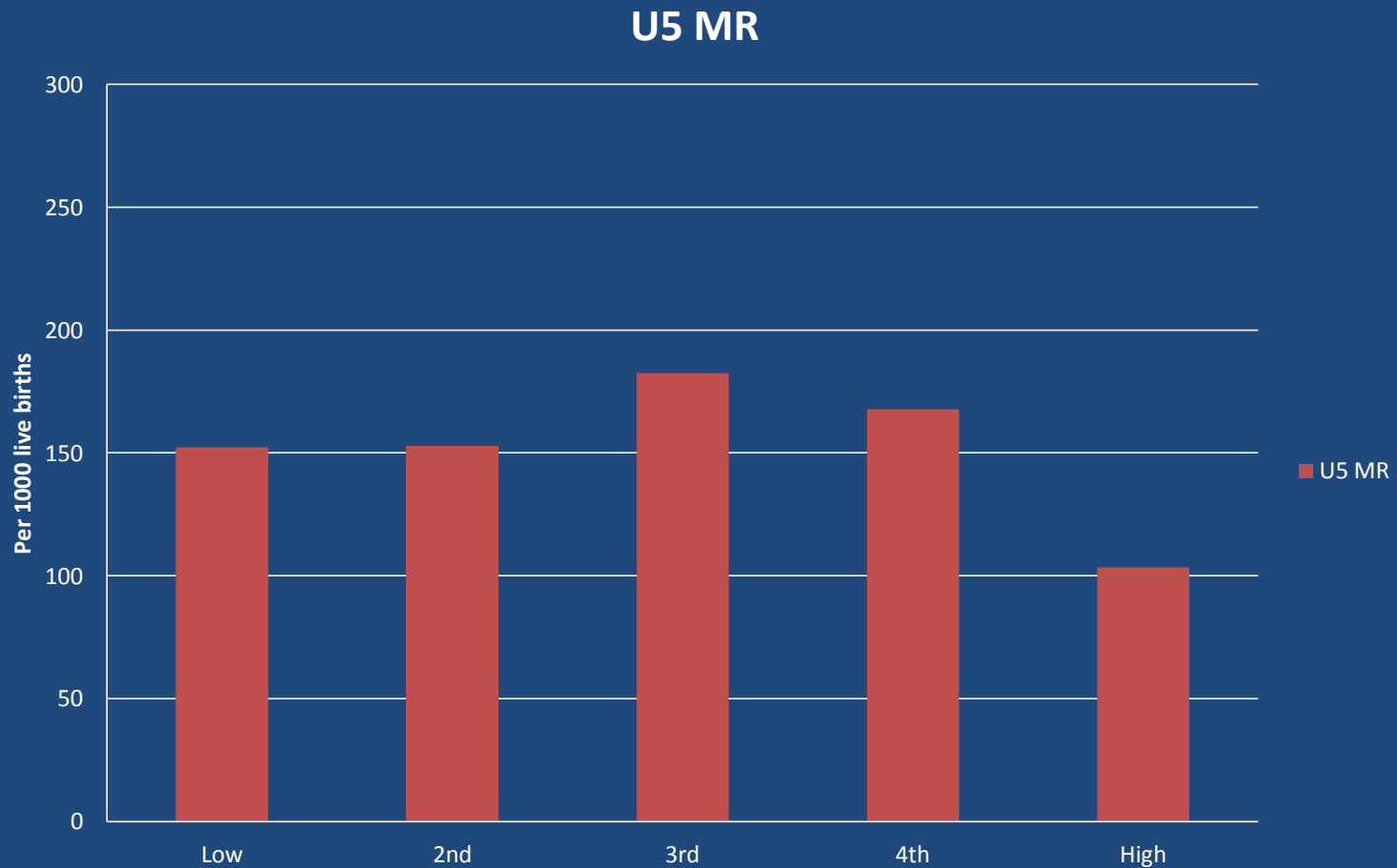
# Under 5 mortality, Brazil 1996, by wealth quintile (from DHS data)



# Under 5 mortality, Cambodia 2000, by wealth quintile (from DHS data)

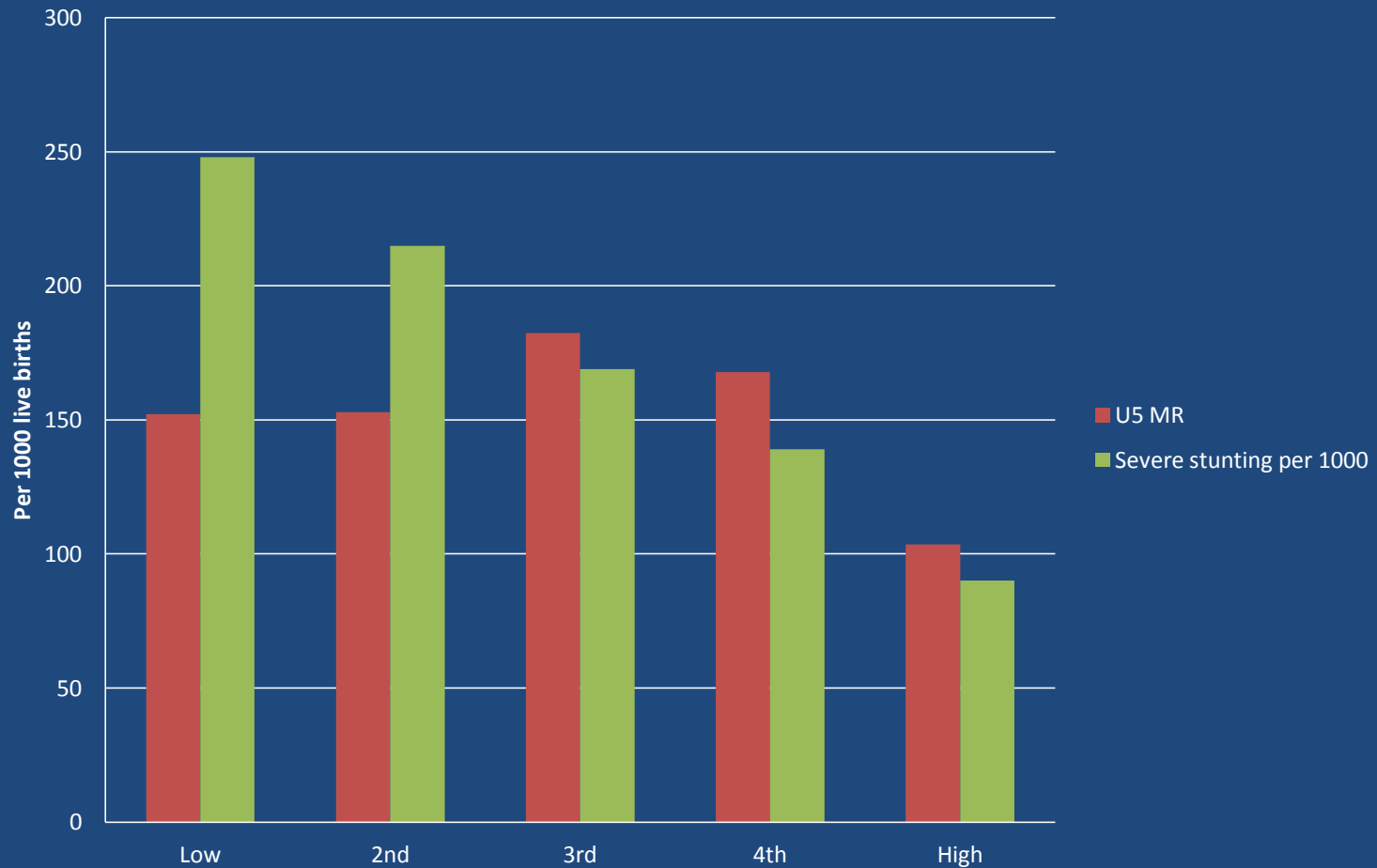


# Child mortality in Eritrea by wealth quintile





# Child mortality in Eritrea by Wealth Quintile



# Child mortality in Asia in 1912

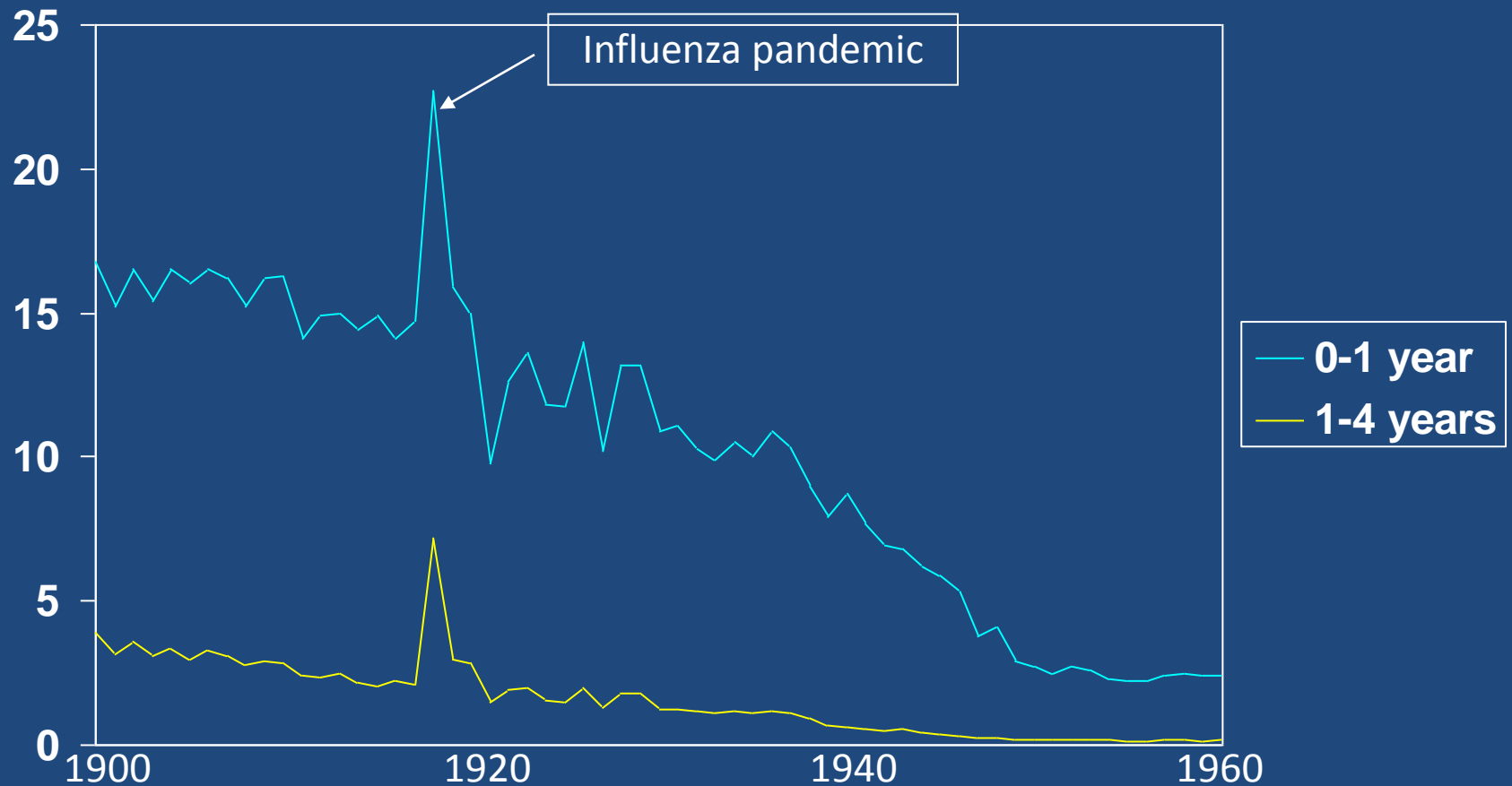
- All children at risk
  - Few children at low risk – urban elites
    - CMR around 150
    - Pneumonia risk around 30/1000 children born
  - Many children at medium risk – rural dwellers
    - CMR about 250
    - Pneumonia risk around 50/1000 children born
  - Few children at very high risk – urban poor
    - CMR very high, maybe 500-800/1000 in some areas
    - Pneumonia risk may be *500 or more*

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# Pneumonia in the USA 1900-60

Rate of mortality due to pneumonia or influenza per 1000 child years

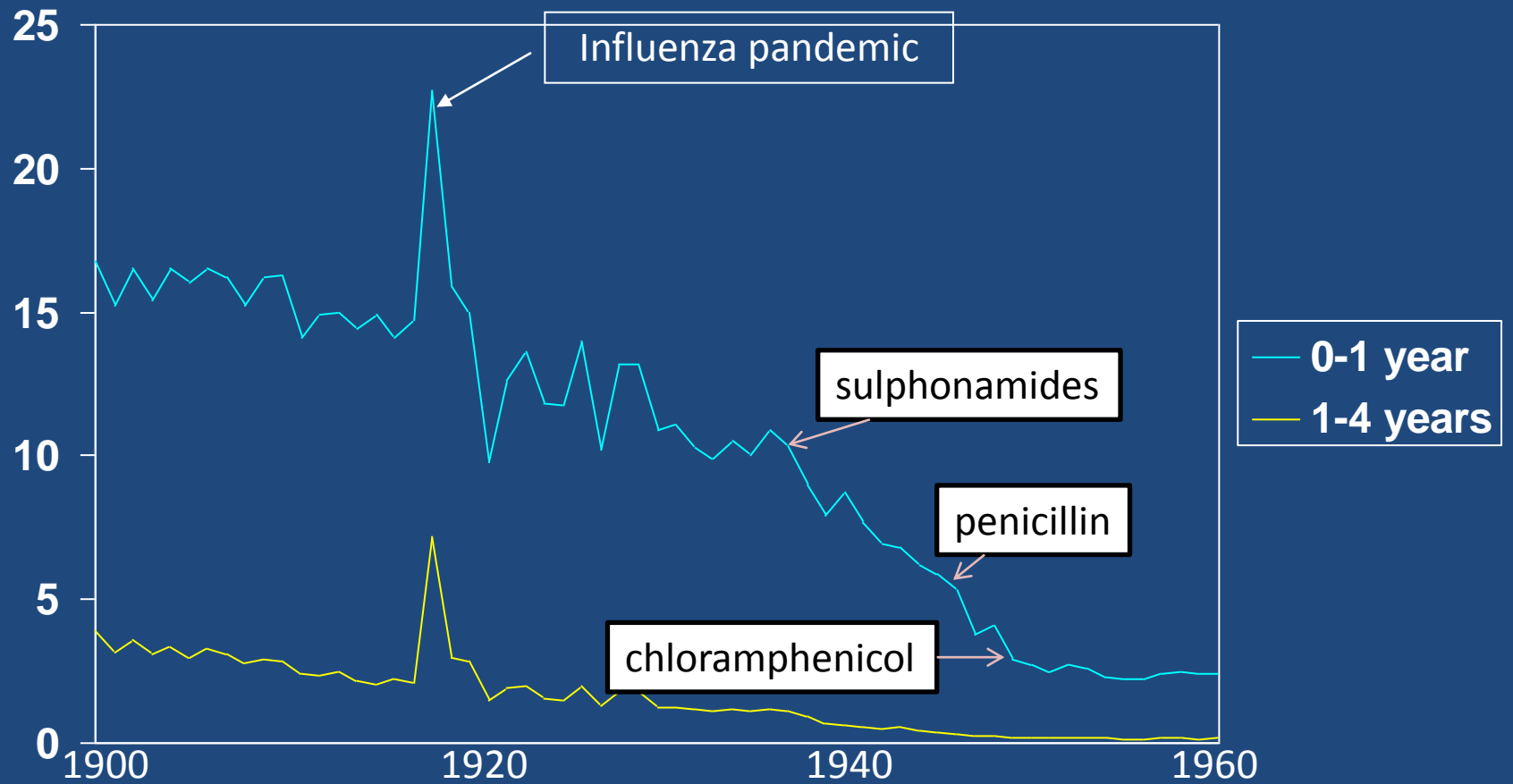


# What happened in the USA between 1900 and 1960?

- Nutrition
  - Major campaign against artificial feeding and wet nursing
  - Household refrigeration → less diarrhoea
- Housing
  - Reduced indoor air pollution
  - Better housing, less crowding
  - Better sanitation
- Treatment
  - Antibiotics, since 1937

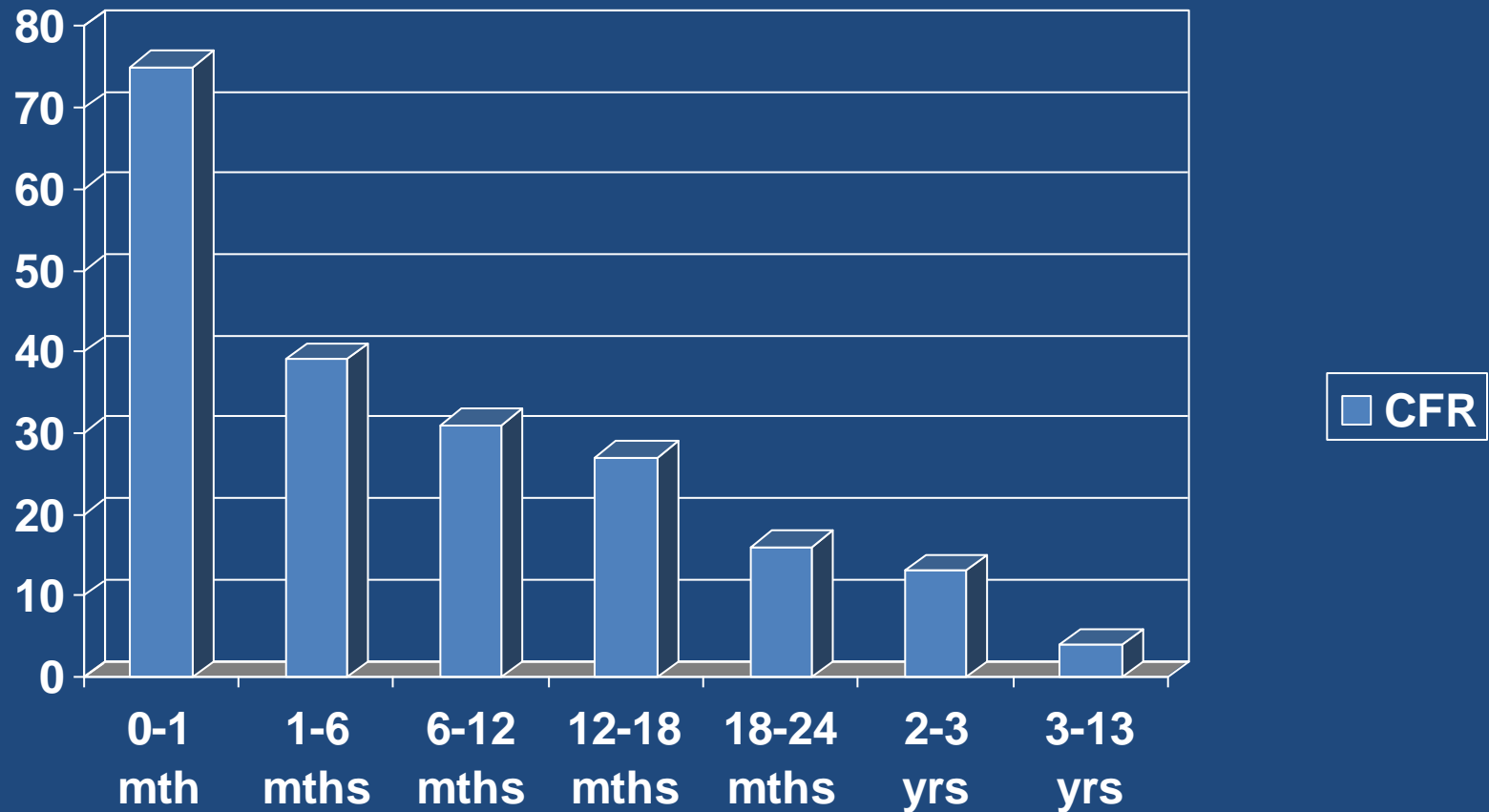
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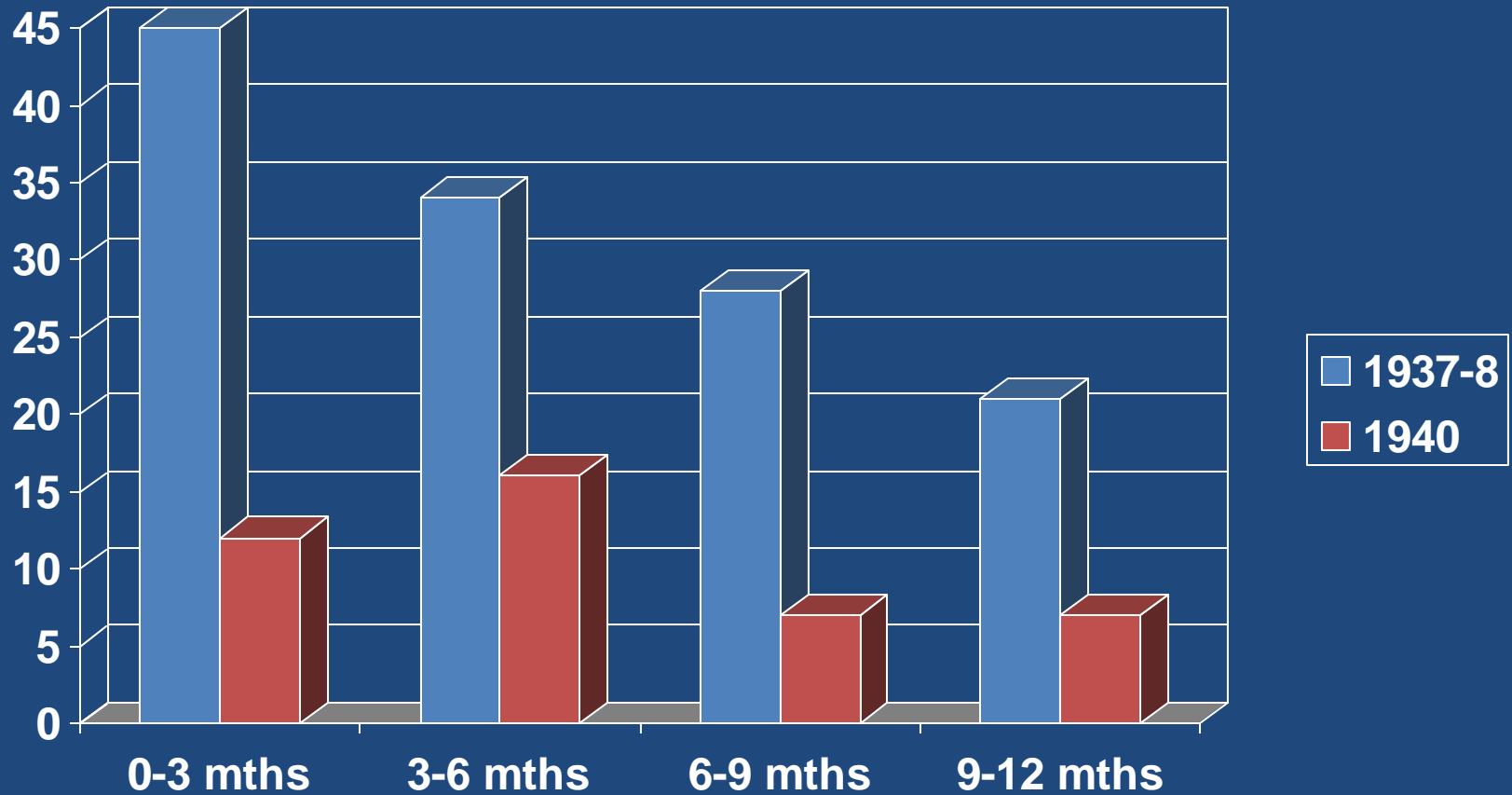


Vital statistics rates in the United States

# Case fatality rate of pneumonia by age, New York 1926-33



# Impact of sulphonamides on outcome of childhood pneumonia, Chicago, 1937-40

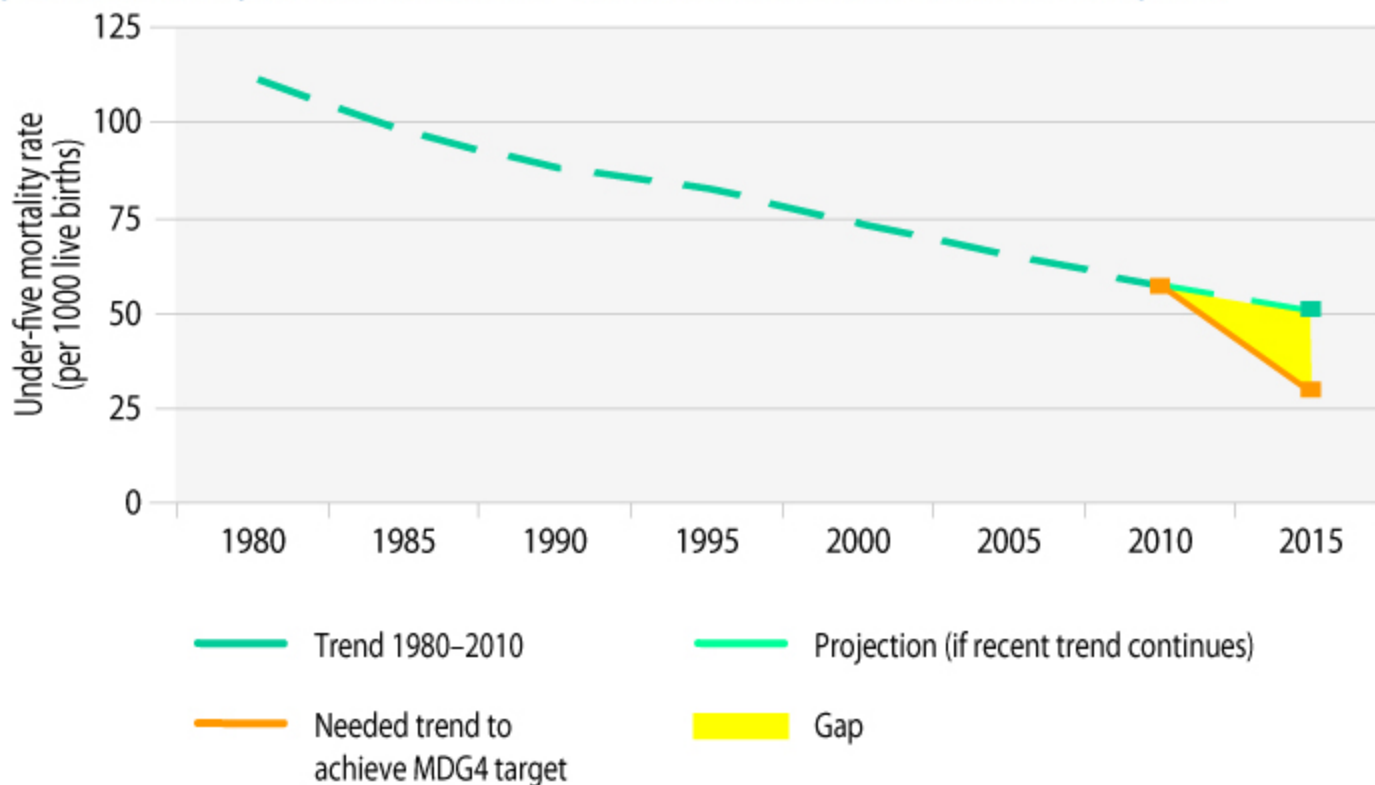




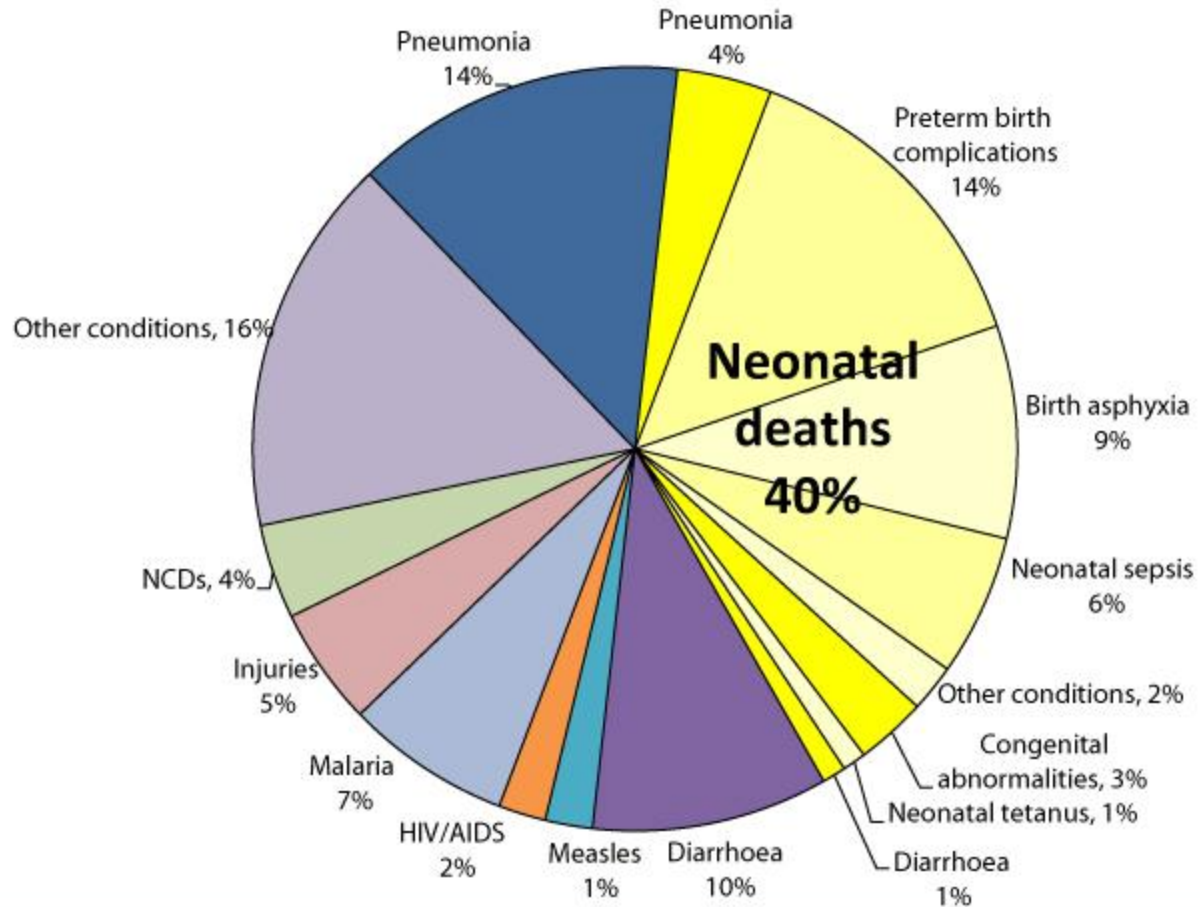


Update: 25 April 2012

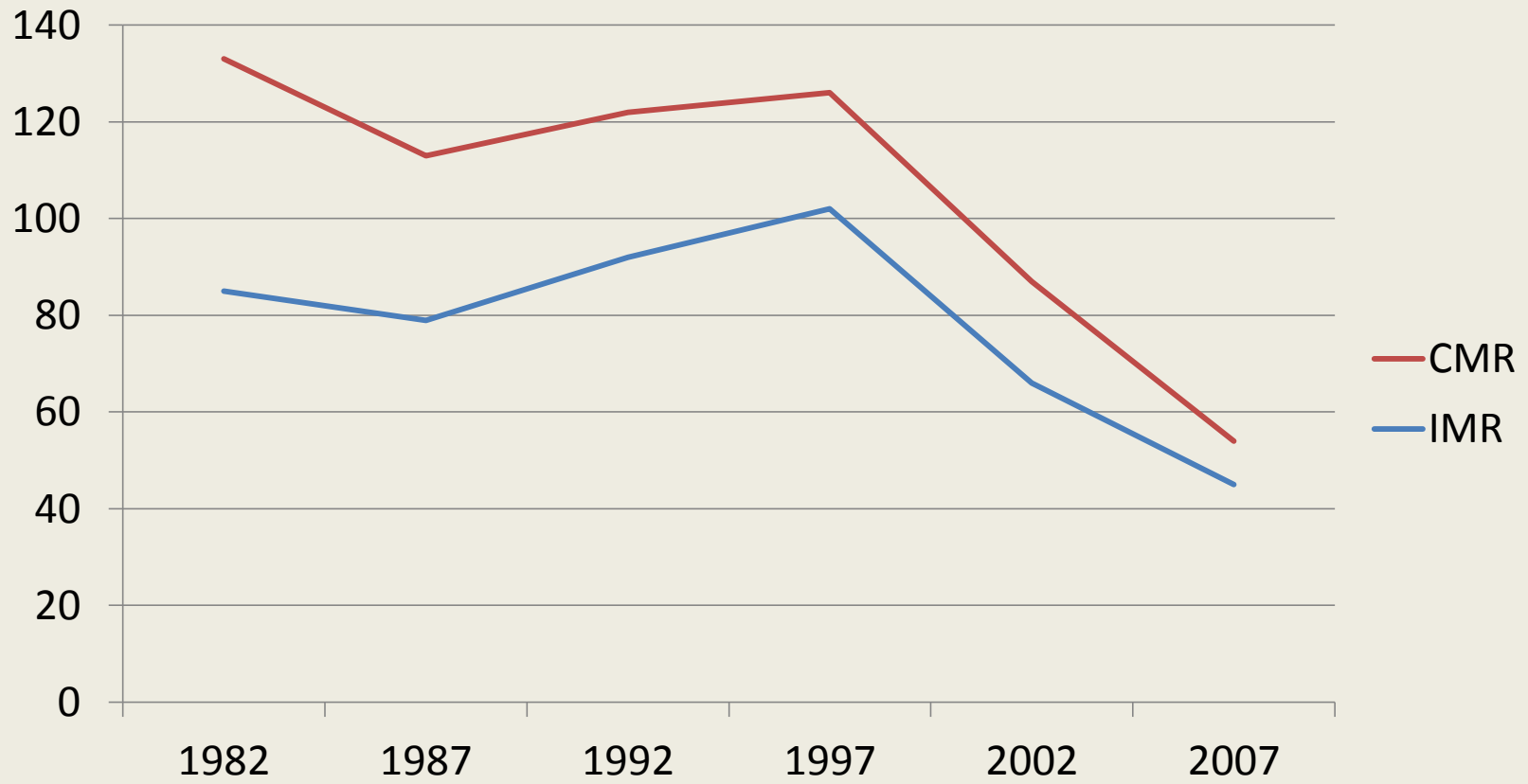
MDG4 target: To reduce by two-thirds, between 1990 and 2015, the under-five mortality rate



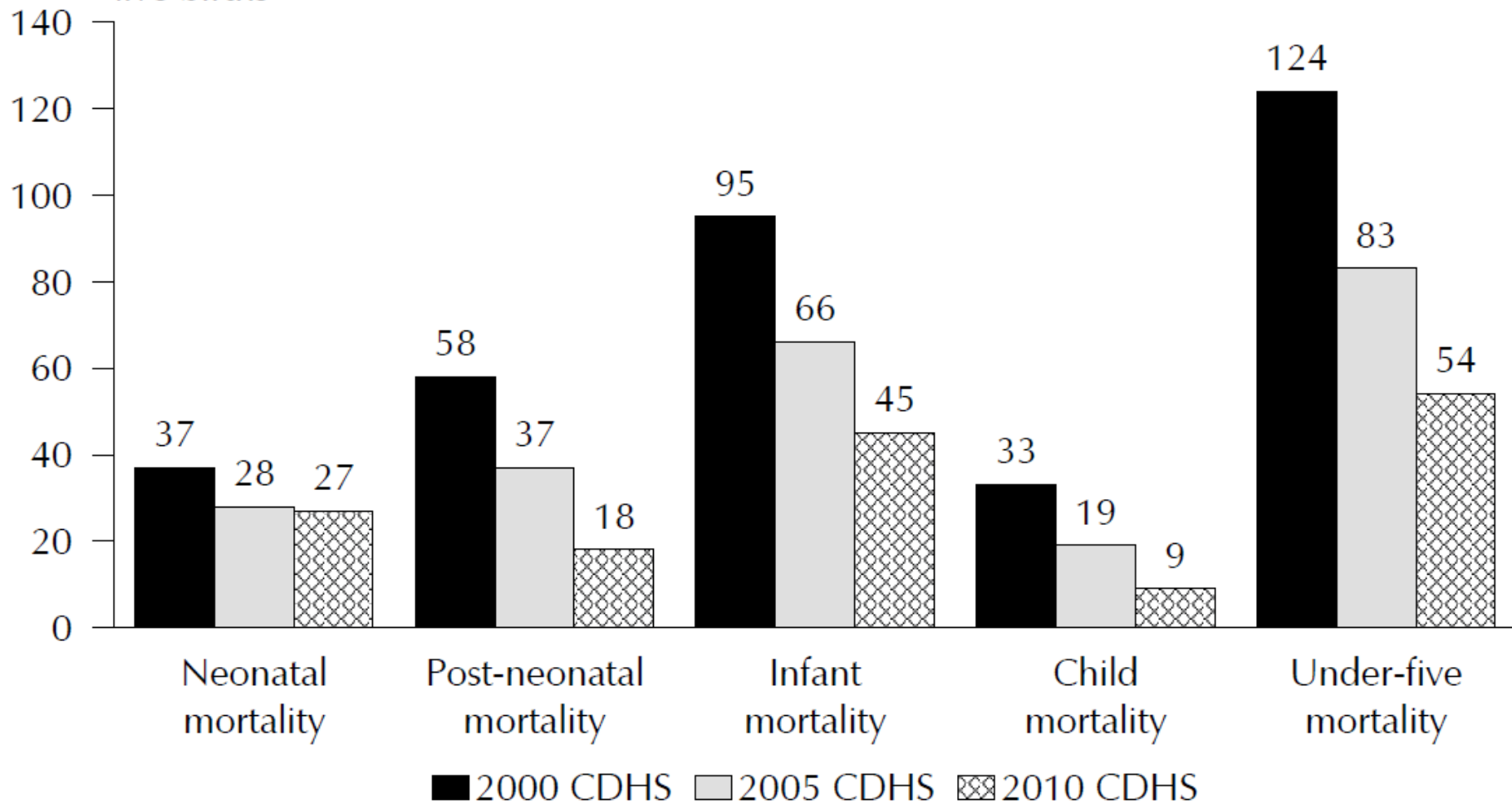
Source: World Health Organization. *World Health Statistics 2012*. Geneva, WHO, 2012.



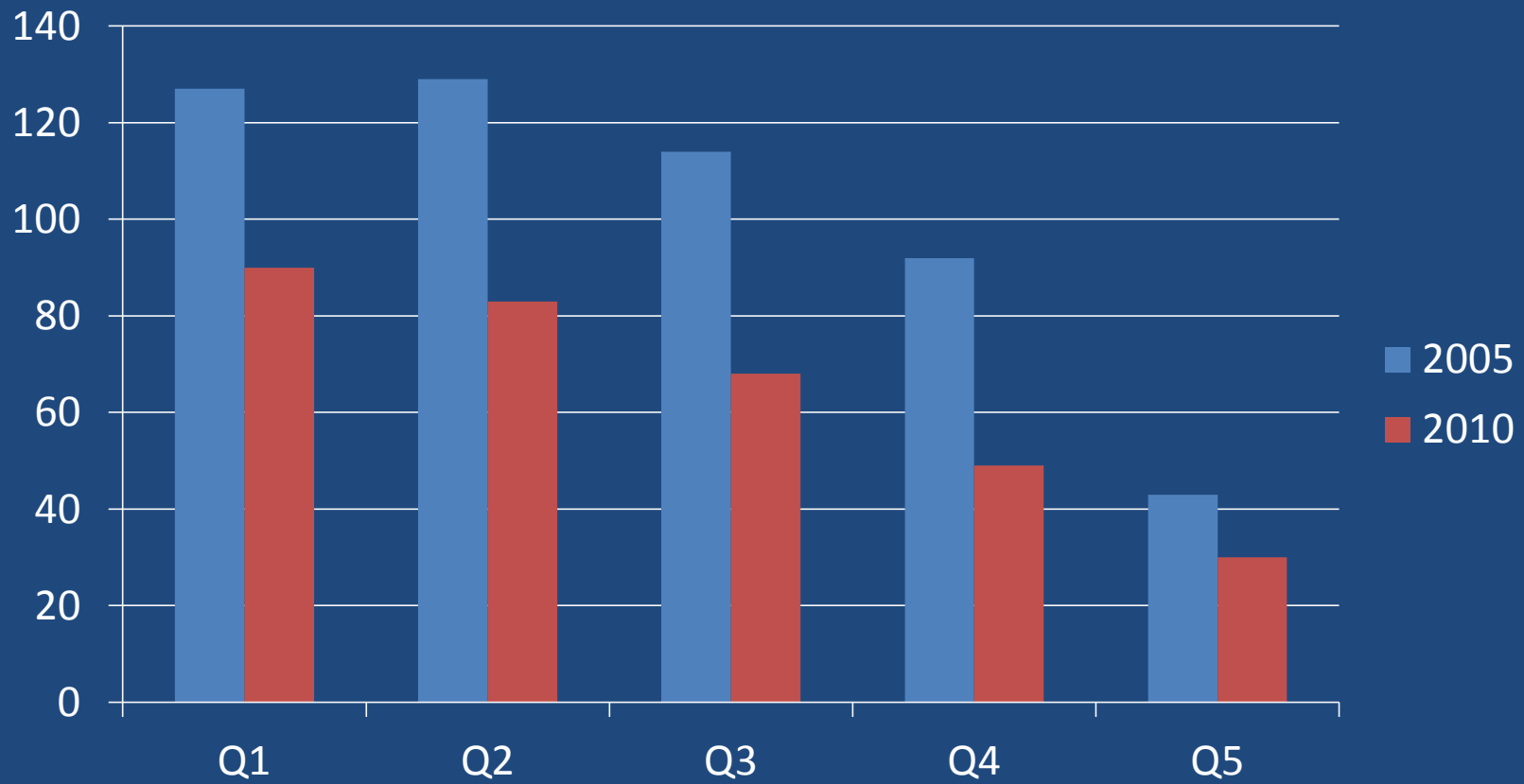
# Infant and Under 5 mortality in Cambodia, 1982-2007



Deaths per 1,000  
live births



# Cambodia, child mortality by wealth quintile - 2005,2010





THAILAND

LAOS

Otdar Mean Chey

Banteay  
Mean Chey

Siem Reap

Preah Vihear /  
Steung Treng

Mondol Kiri /  
Rattanak Kiri

Battambang / Pailin

Kampong Thom

Kratie

Pursat

Kampong  
Chhnang

Phnom  
Penh

Kampong  
Cham

Kampong  
Speu

Prey  
Veng

Preah Sihanouk /  
Koh Kong

Kandal

Svay  
Rieng

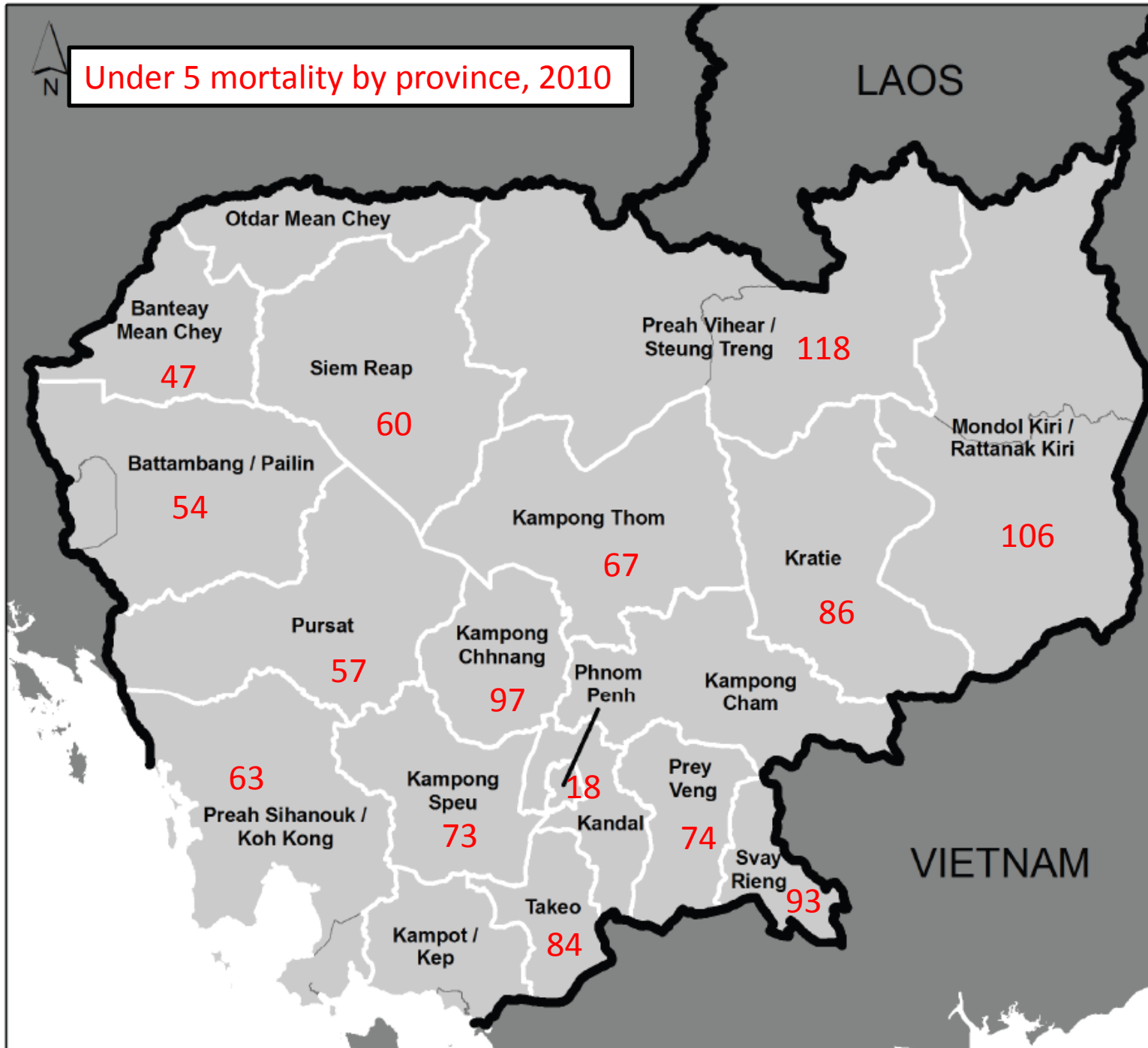
VIETNAM

Kampot /  
Kep

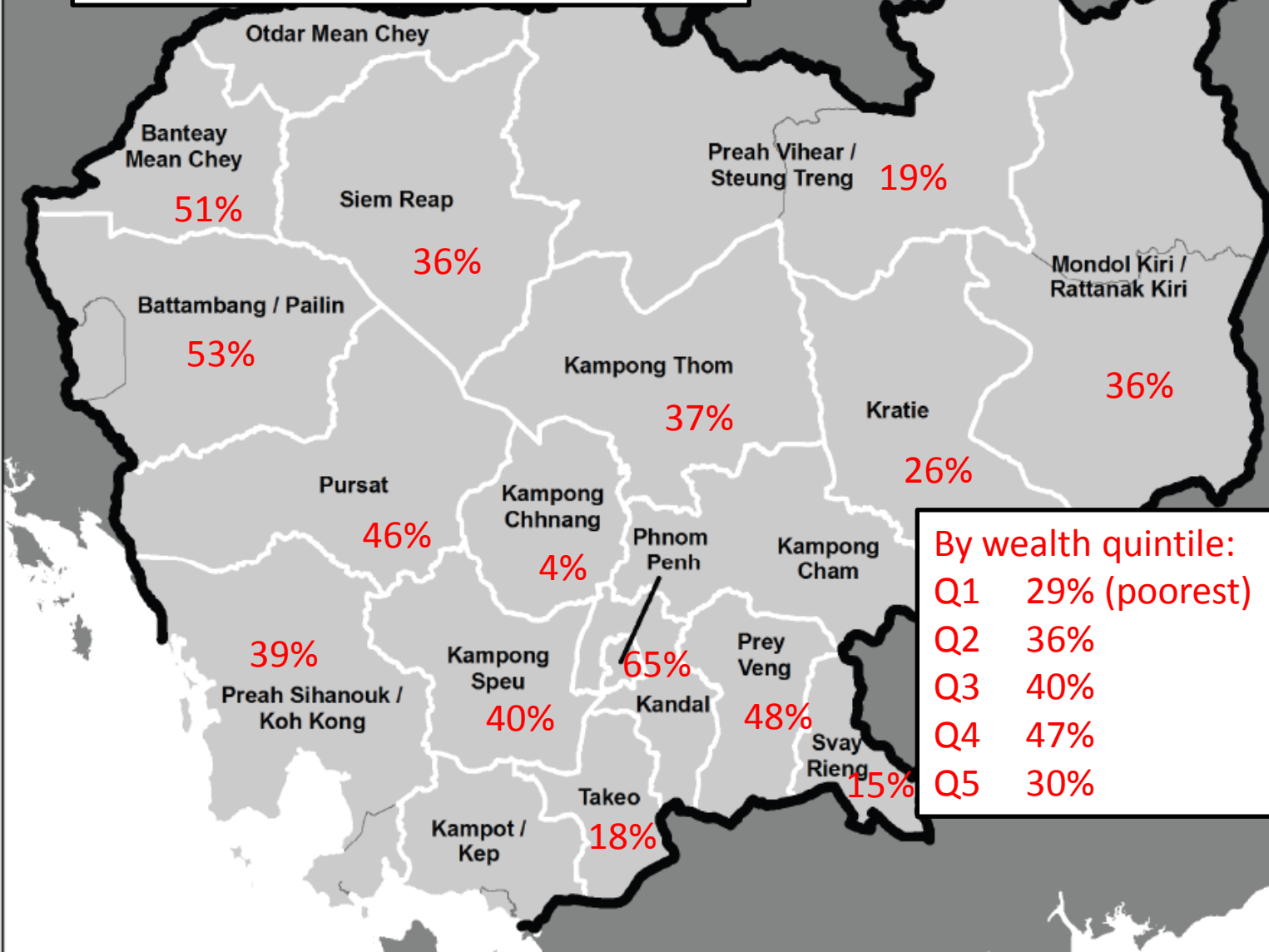
Takeo



Under 5 mortality by province, 2010



**Under 5 mortality reduction 2005-2010**  
Overall reduction – 35%  
By province:

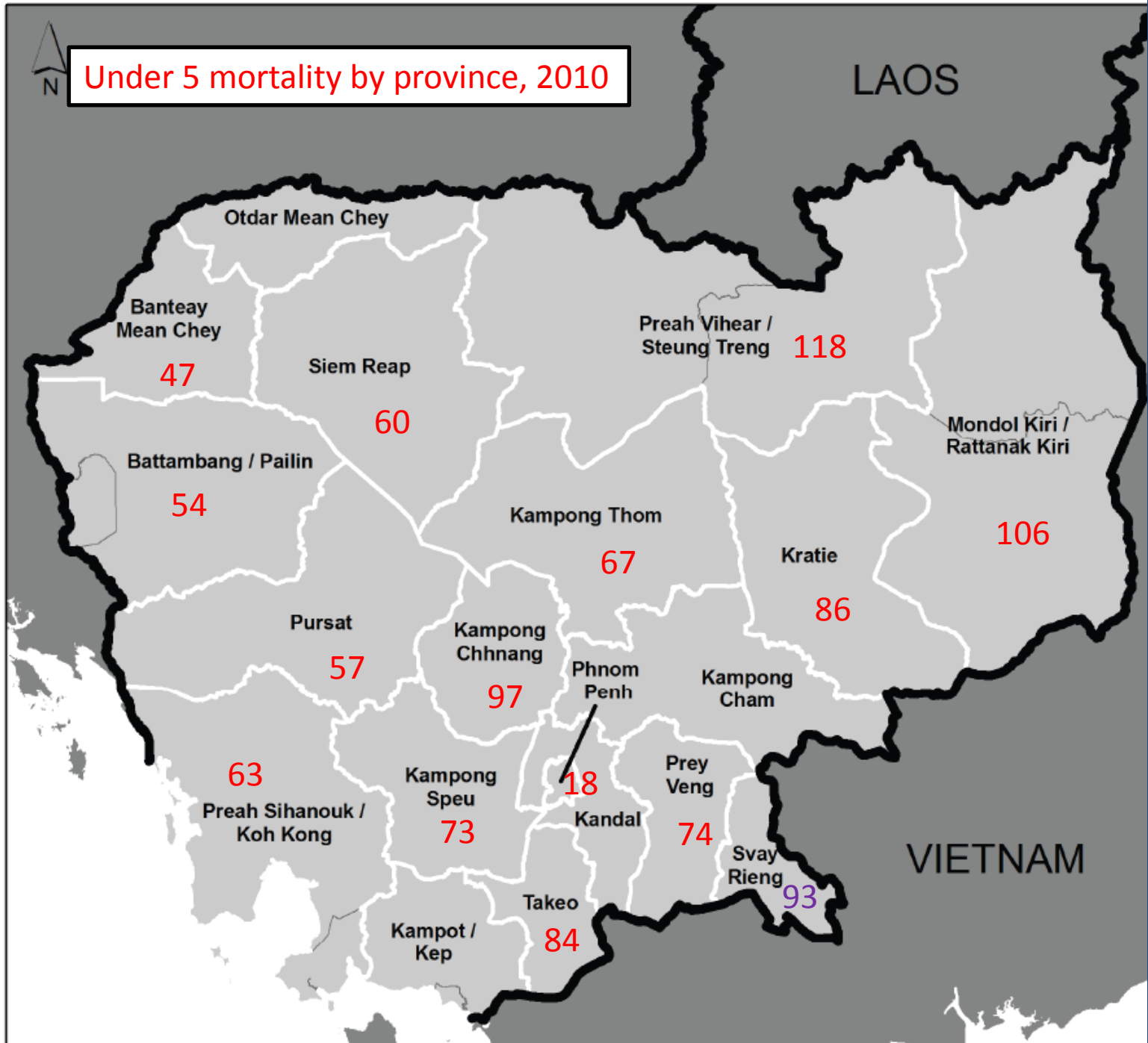




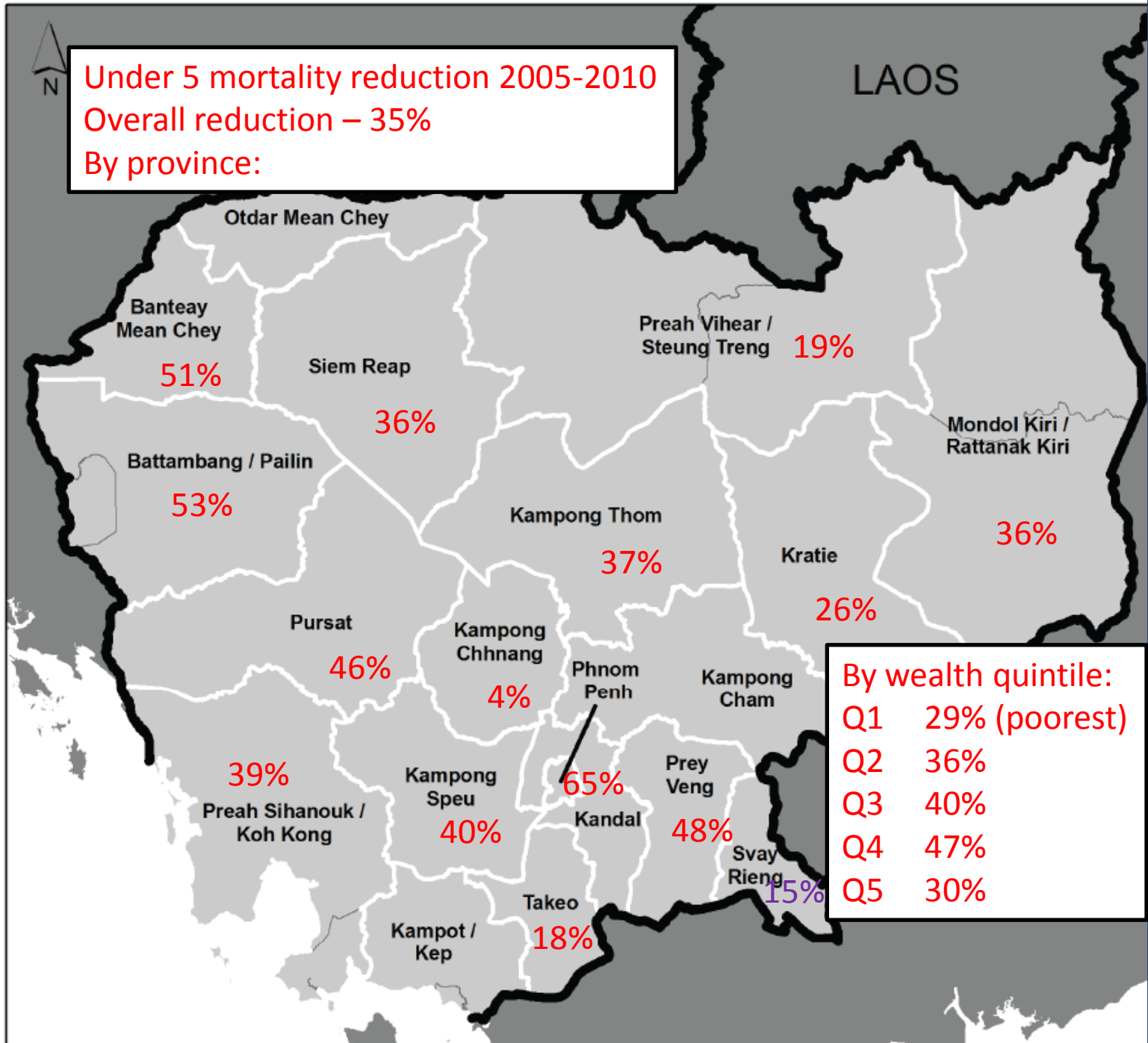
# High mortality areas

- Remote
- Poor
- Lack of primary care
- Lack of community based care
  
- *What is the cause of the deaths and how can they be prevented?*

Under 5 mortality by province, 2010



**Under 5 mortality reduction 2005-2010**  
**Overall reduction – 35%**  
**By province:**



**By wealth quintile:**

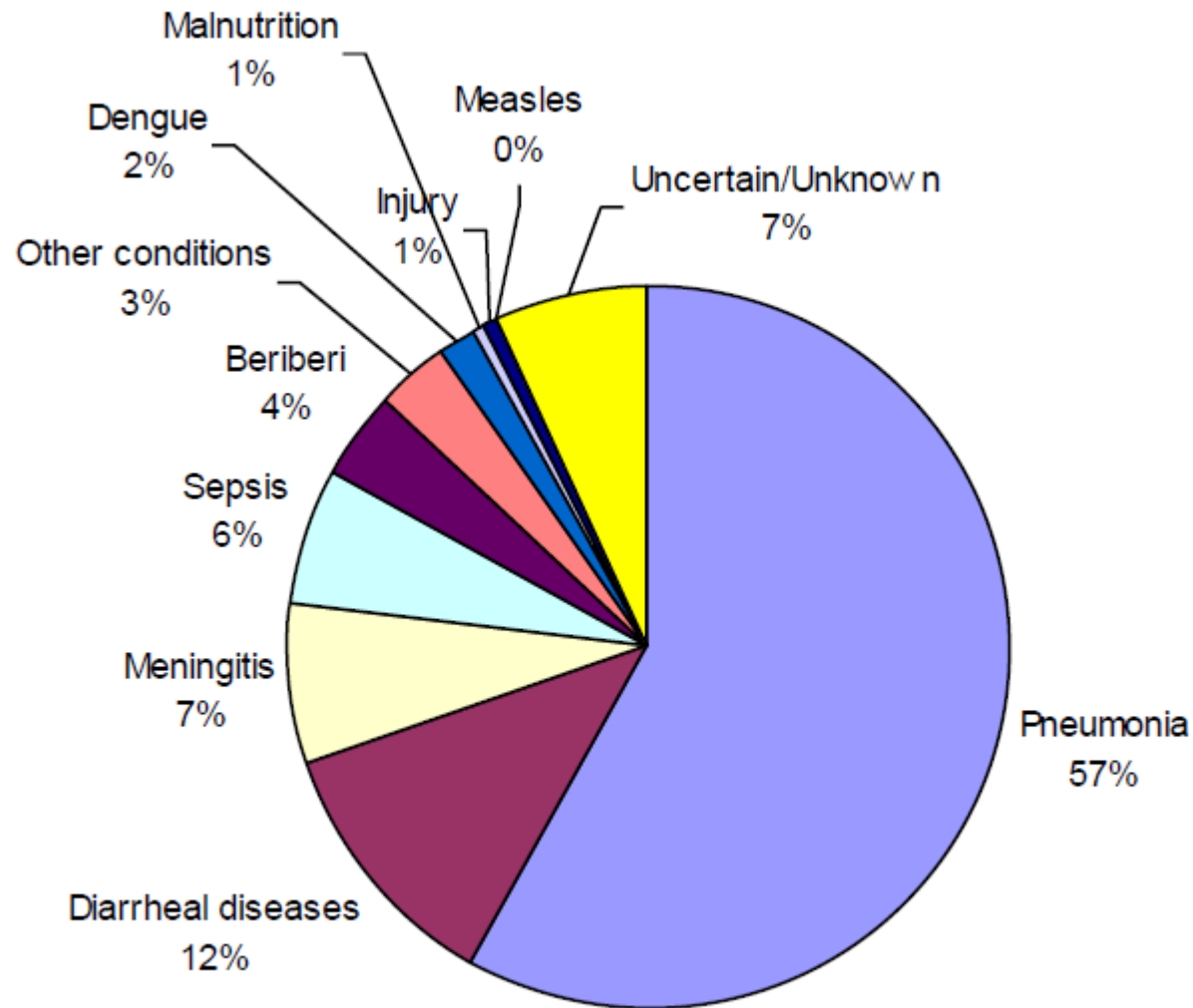
Q1	29% (poorest)
Q2	36%
Q3	40%
Q4	47%
Q5	30%

# Cambodia child mortality study

- Retrospective study of child mortality
- 352 villages in Svay Rieng Province with 390 known deaths in children under 5 years of age
- 367 deaths investigated by verbal autopsy
- Only 10% of deaths in neonates

Data courtesy Dr S. Jack, WHO

# Causes of post-neonatal mortality



# So for Cambodia...

- Actual neonatal mortality – underestimated
- Actual child mortality – unknown
- Cause of death estimates from WHO – way off
- Really on track for MDG4 - unlikely

# Millenium Development Goals

1. End hunger and extreme poverty
2. Universal primary education
3. Promote gender equity
4. Promote child survival
5. Promote maternal health and survival
6. Combat AIDS, tuberculosis and malaria
7. Promote environmental sustainability
8. Promote a global partnership for development

# MDG4

## *Goal 4: Reduce Child Mortality*

Reduce by two-thirds between 1990 and 2015, the under five mortality rate.

### *Health Indicators:*

- **Under five mortality rate**
- Infant mortality rate
- Proportion of one year old children immunised against measles



# Casualties of MDG4

- Short-termism (2015 now close)
- Data quality
- Equity

# Post 2015 global health goals

- Emphasis on equity within countries
- Recognize that data quality has been a casualty and must be corrected
- National ownership
- Child survival remains important, but must be accompanied by markers of health and nutrition
  - Stunting under consideration

# Conclusions

- Child mortality remains high in many parts of the developing world, including Asia
- Underestimation of mortality is a major problem
  - Non-reporting of neonatal deaths
  - MDG4 effect
- Pneumonia is the dominant cause of child mortality in Asia

# GAPP approach (Global Action Plan for Pneumonia)

- Nutrition
  - Major nutritional problems persist in Asia
- Environment
  - Improve housing, ↓ indoor air pollution
- Treatment
  - All children have the *right* to effective treatment
- Vaccines
  - Control measles, pertussis
  - Pneumococcal conjugate vaccine introduction should be evaluated in Asia