

Pneumonia, Malaria and Diarrhoea in Africa: Trends and Treatment Effectiveness

Theresa Diaz, MD MPH
Chief Knowledge Management and
Implementation Research Unit, Health Section,
UNICEF New York

iCCM 2014

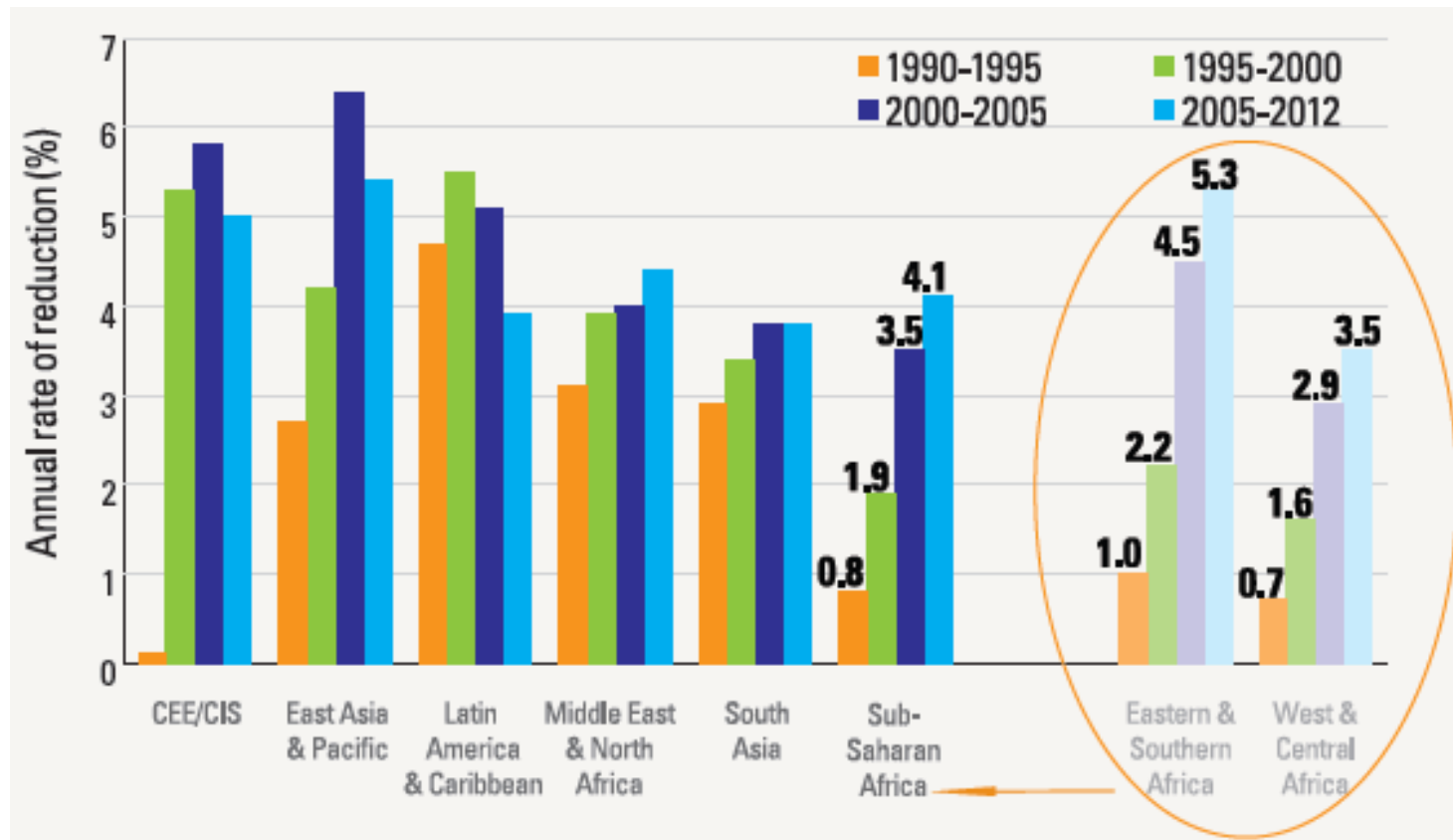
**Integrated Community Case Management (iCCM):
Evidence Review Symposium**
3-5 March 2014, Accra, Ghana

Overview

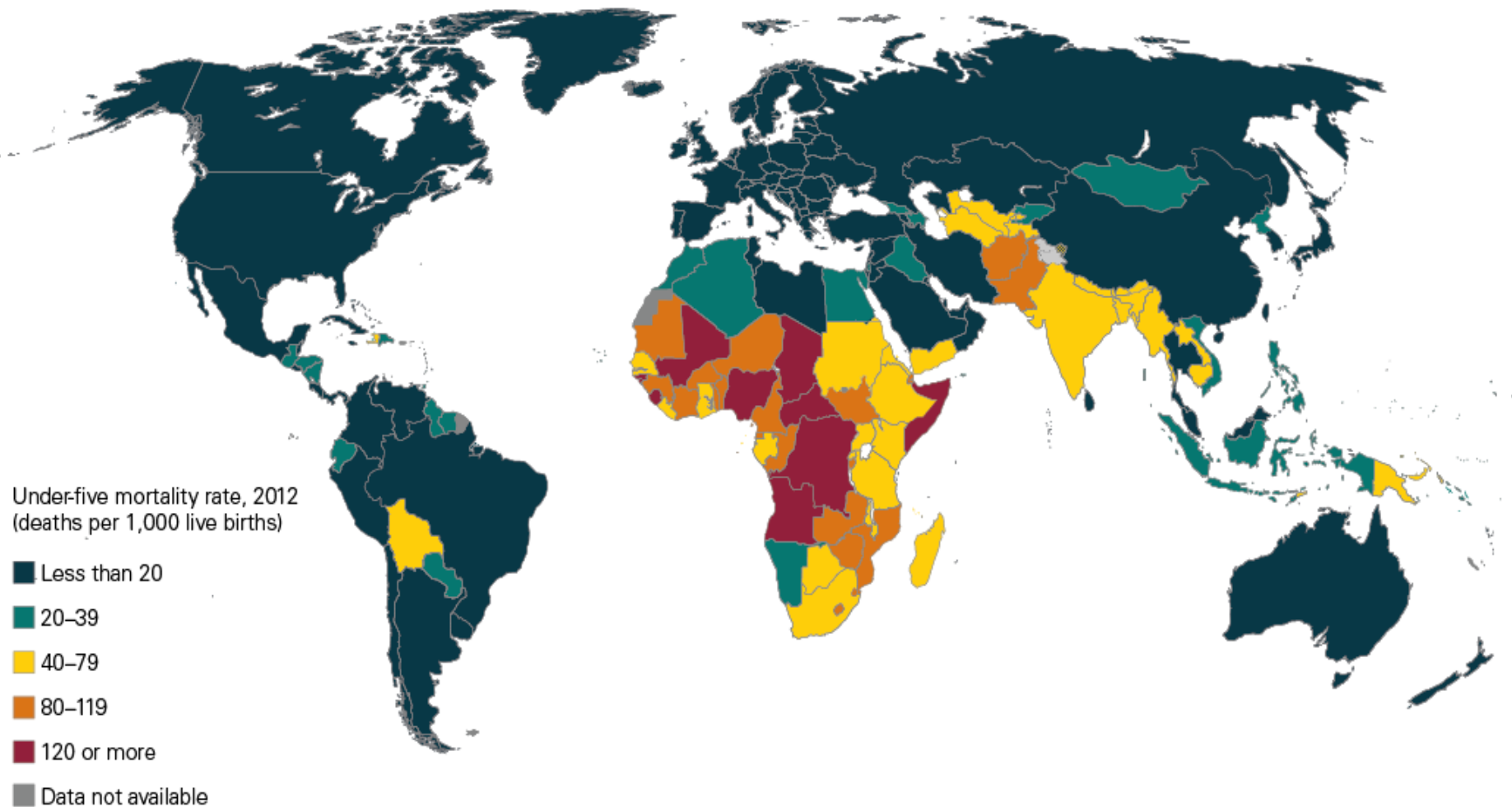
- Mortality trends
- Effectiveness of treatments and recommendations
- Trends in health seeking and treatment coverage

Sub-Saharan Africa has substantially accelerated its reduction

Annual rates of reduction (ARR) in the under-five mortality rate, %, by region, since 1990



Children in Sub-Saharan Africa and Southern Asia face a higher risk of dying before their fifth birthday



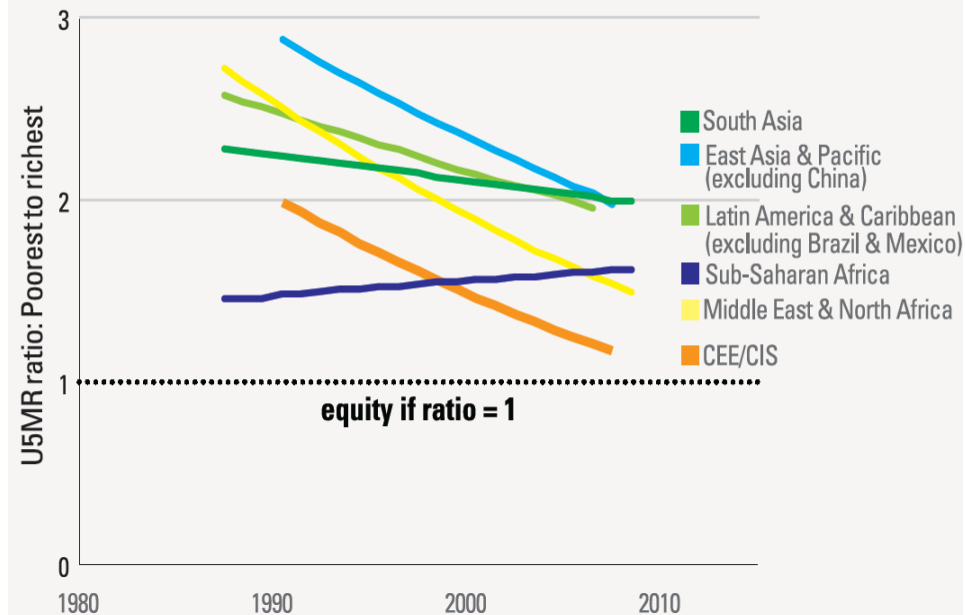
Note: This map is stylized and not to scale. It does not reflect a position by UN IGME agencies on the legal status of any country or territory or the delimitation of any frontiers.

Source: IGME 2013.

Exciting new findings on disparities

- Many regions have reduced disparities in under-five mortality between the poorest and the richest except Sub-Saharan Africa and South Asia
- Under-five mortality rate has declined among even the poorest in all regions

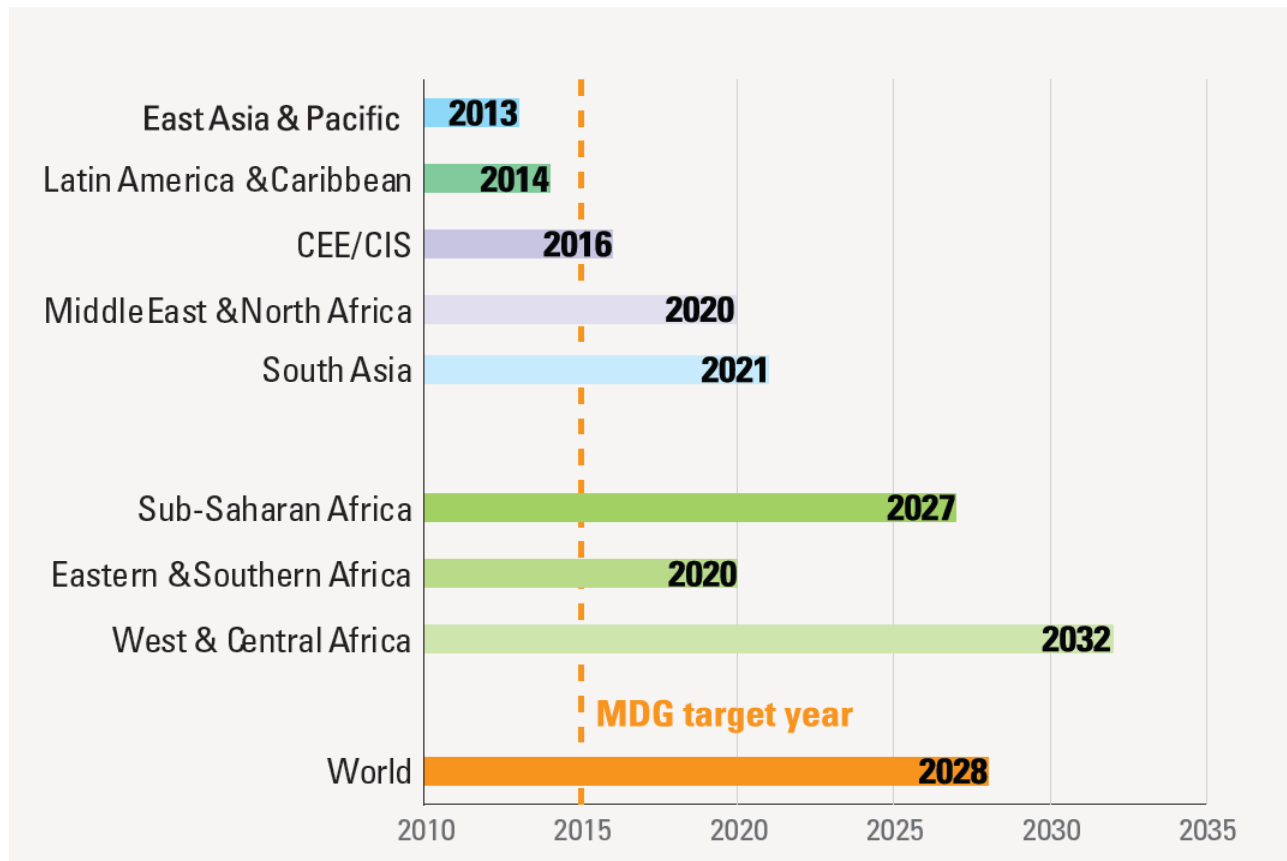
Ratio of under-five mortality rates, poorest households to richest, by region, 1987–2008



Source: UNICEF analysis based on Pedersen, J., et al., Levels and Trends in Inequity and Child Mortality: Evidence from DHS and MICS surveys', working paper, unpublished, 2013.'

Still, progress is insufficient to achieve MDG4 target by 2015 and substantial acceleration is required

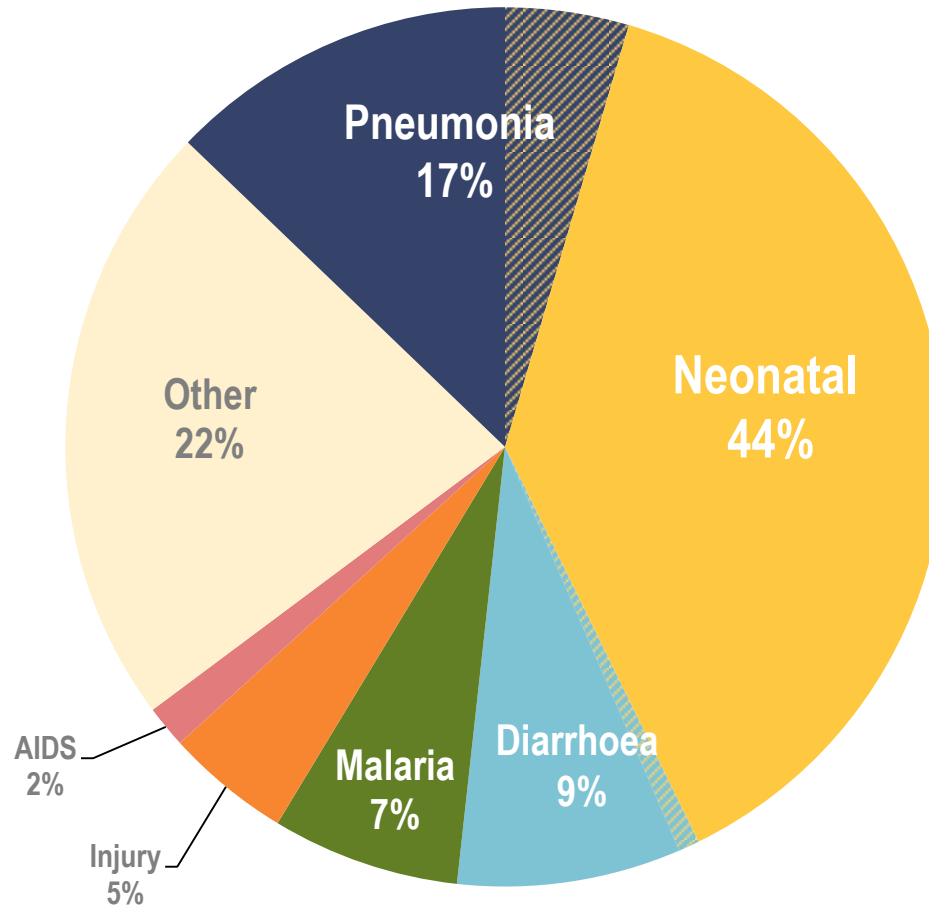
Achievement of MDG 4 by year, globally and by region, if current trends continue in all countries



Source: UNICEF analysis based on IGME 2013.

Infectious diseases such as pneumonia, diarrhoea and malaria are the leading killers of children under age 5; roughly 44% of deaths in children under 5 occur during the neonatal period

Global distribution of deaths among children under age 5, by cause, 2012

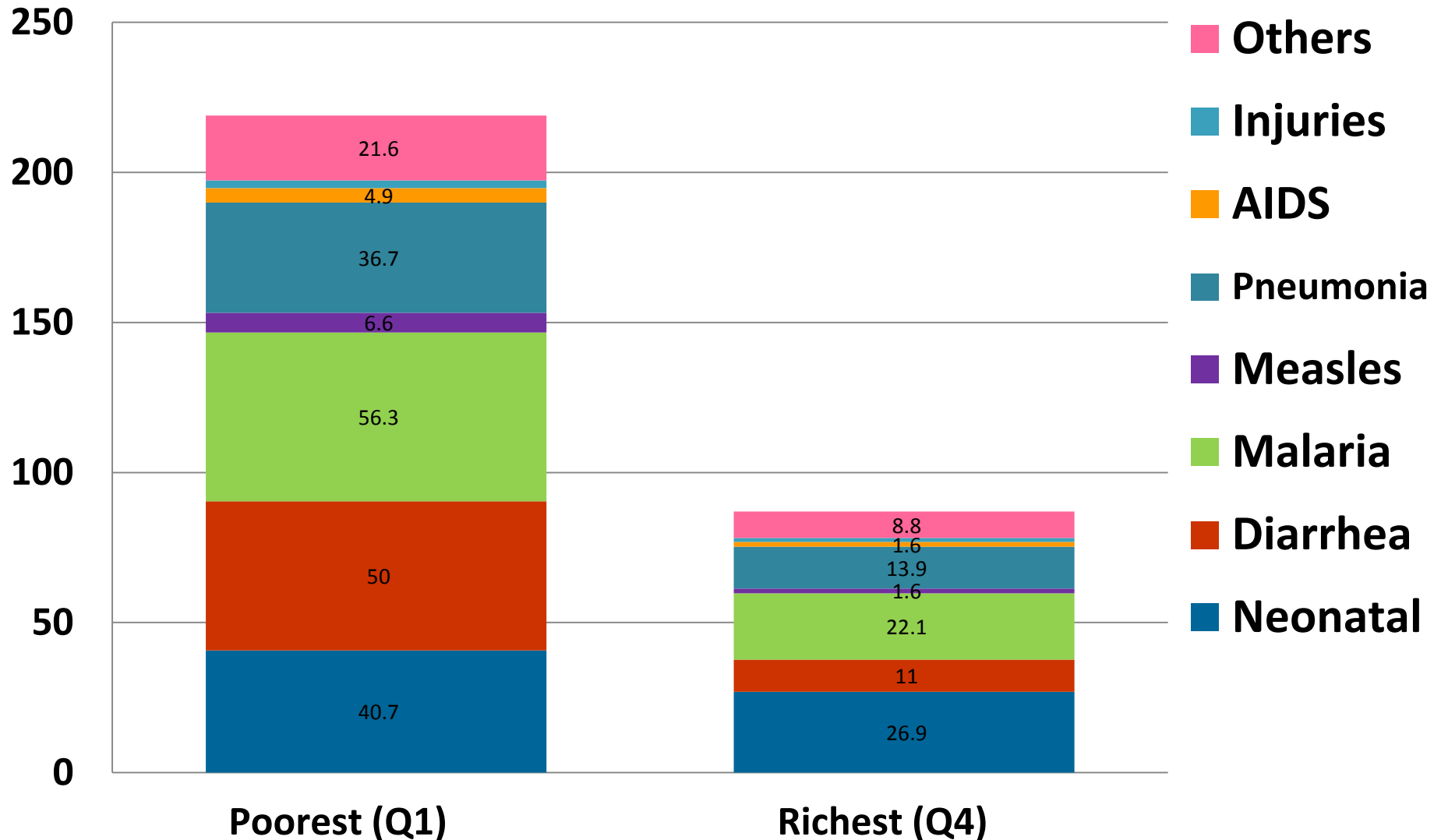


Estimates are rounded, and therefore may not sum to 100%.

Source: UNICEF analysis based on IGME 2013, WHO and CHERG 2013.

Analyzing Mortality causes in poor compared to rich children (Nigeria 2011)

(Under Five Mortality Rate per 1000 Live Births)



Pneumonia



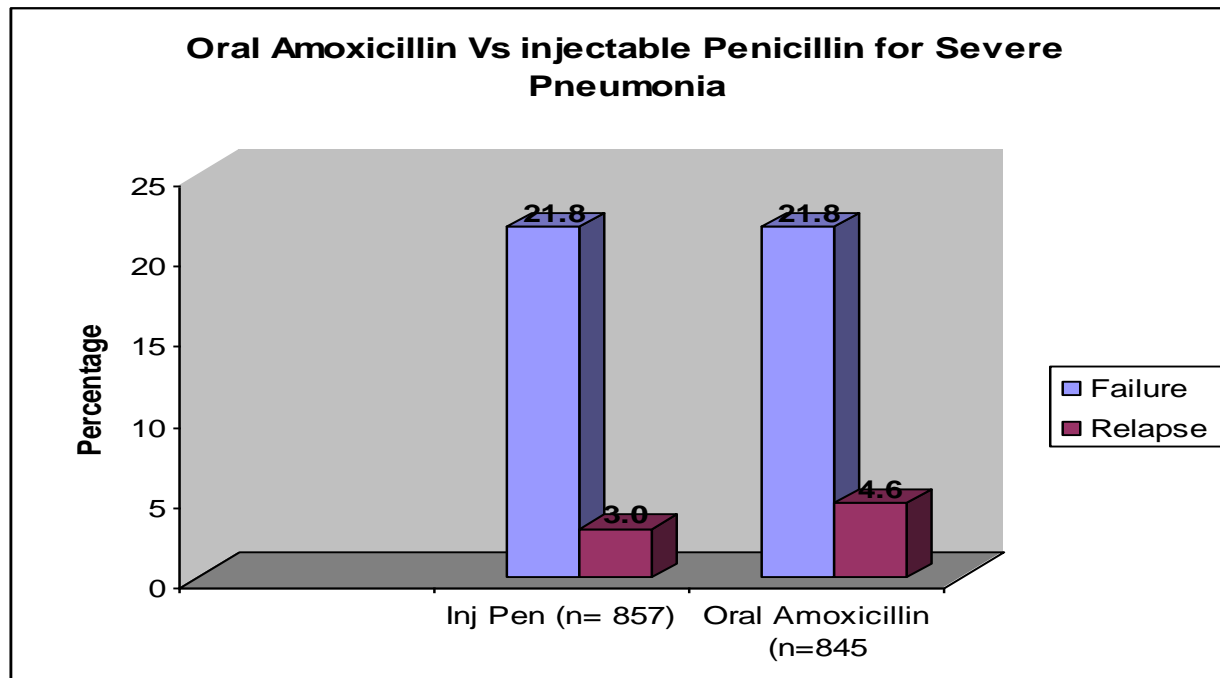
Which antibiotic is better for pneumonia?

Kabra SK. Cochrane Database Syst Rev 2006;3:CD004874

Comparisons	OR
Ambulatory	
Amoxicillin better than cotrimoxazole	1.33 (1.05-1.67)
Azithromycin equal erythromycin	1.17 (0.70-1.95)
Azithromycin equal amoxicillin-clav	1.02 (0.54-1.95)
Amoxi-clav equal cefpodoxime	0.69 (0.18-2.60)
Hospital	
Inj Procaine Penicillin better than cotrimoxazole	2.64 (1.57-4.45)
Inj Penicillin + gentamicin better than chloramphenicol	1.61 (1.02-2.55)
Inject penicillin equivalent to oral amoxicillin	1.03 (0.81-1.31)

Why oral Amoxicillin for chest in-drawing Pneumonia?

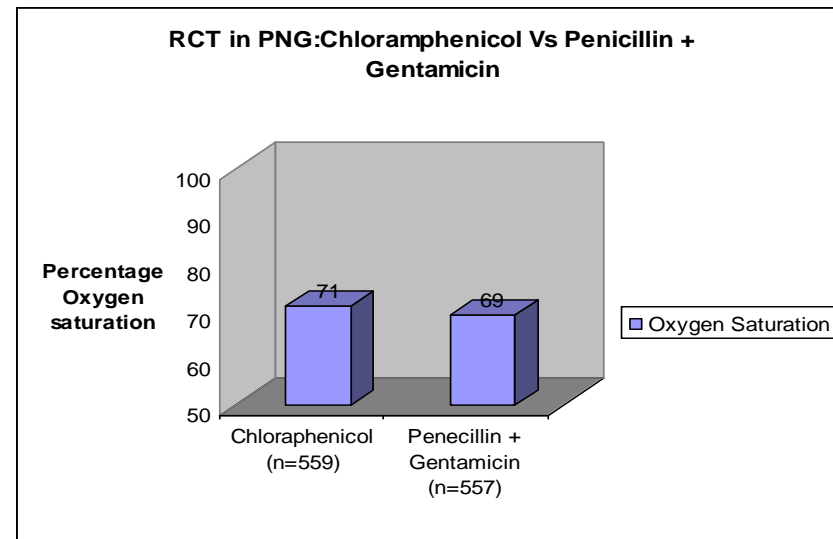
Amoxicillin Penicillin Pneumonia International Study (APPIS) conducted a multicentre trial in 8 countries:



Clinical outcome for oral amoxicillin and injectable penicillin was comparable

Penicillin + Gentamicin Vs Chloramphenicol for Very Severe Pneumonia

- Open RCT in Papua New Guinea:
 - Chloramphenicol (n= 559) Vs Penicillin + Gentamicin daily (n= 557)
 - Outcome similar in both regimens
- Multicentre RCT in 8 sites in 7 countries (n= 958) with Ampicillin:
 - Higher treatment failure and more deaths in Chloramphenicol group



Gentamicin plus Ampicillin is better choice for very severe pneumonia

Pneumonia Treatment



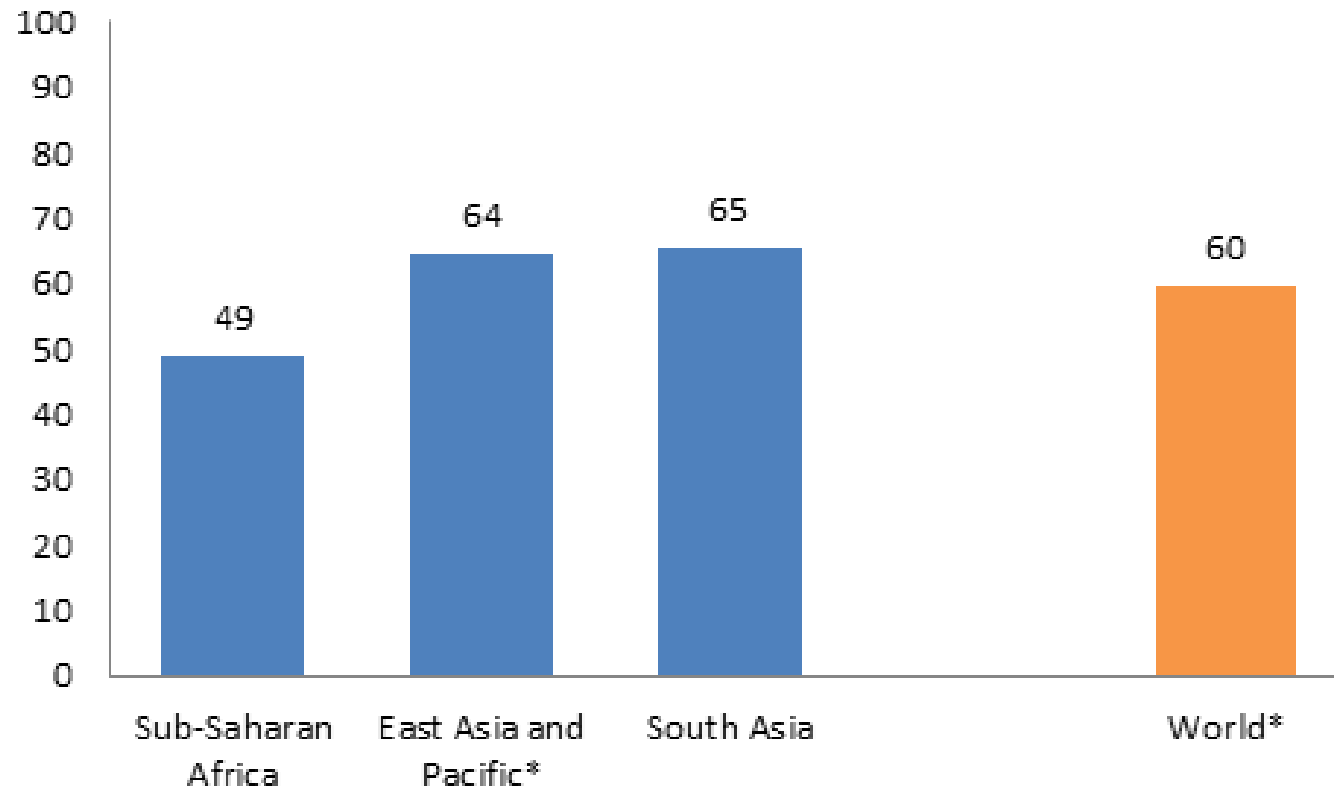
WHO Regimen Recommendations

- Oral amoxicillin twice daily for 5 days for treatment of fast breathing and chest in drawing pneumonia in children 2-59 months*
- Injectable ampicillin plus gentamicin for very severe pneumonia in children 2-59 months of age

*In high HIV settings, chest in-drawing pneumonia is managed as severe pneumonia

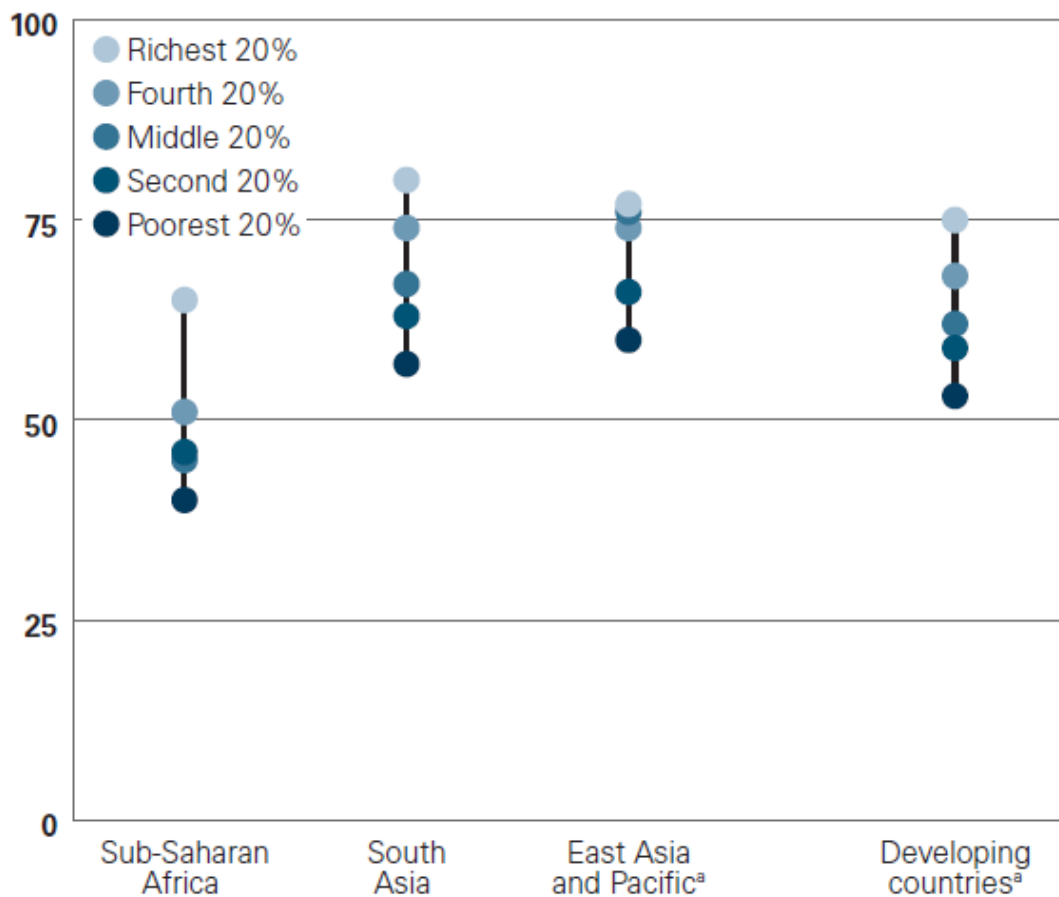
Too few children with pneumonia are receiving appropriate care, especially in Sub-Saharan Africa

Proportion of children under five with suspected pneumonia taken to an appropriate health-care provider, 2007–2012



Gaps in appropriate careseeking for suspected childhood pneumonia exist across household wealth quintiles

Share of children under age 5 with suspected pneumonia taken to an appropriate healthcare provider or facility, by household wealth quintile and region, 2006–2011 (per cent)

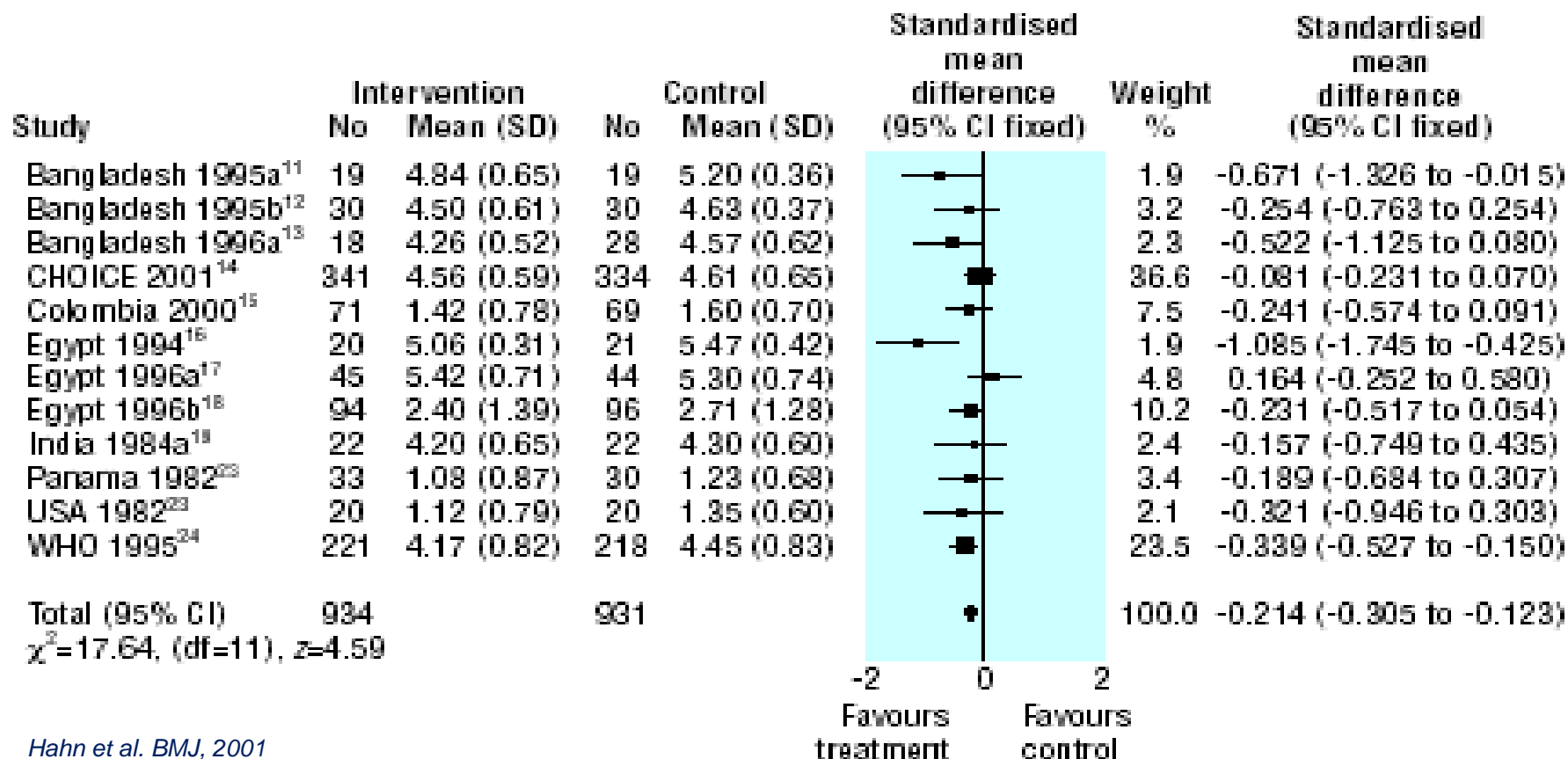


Diarrhoea



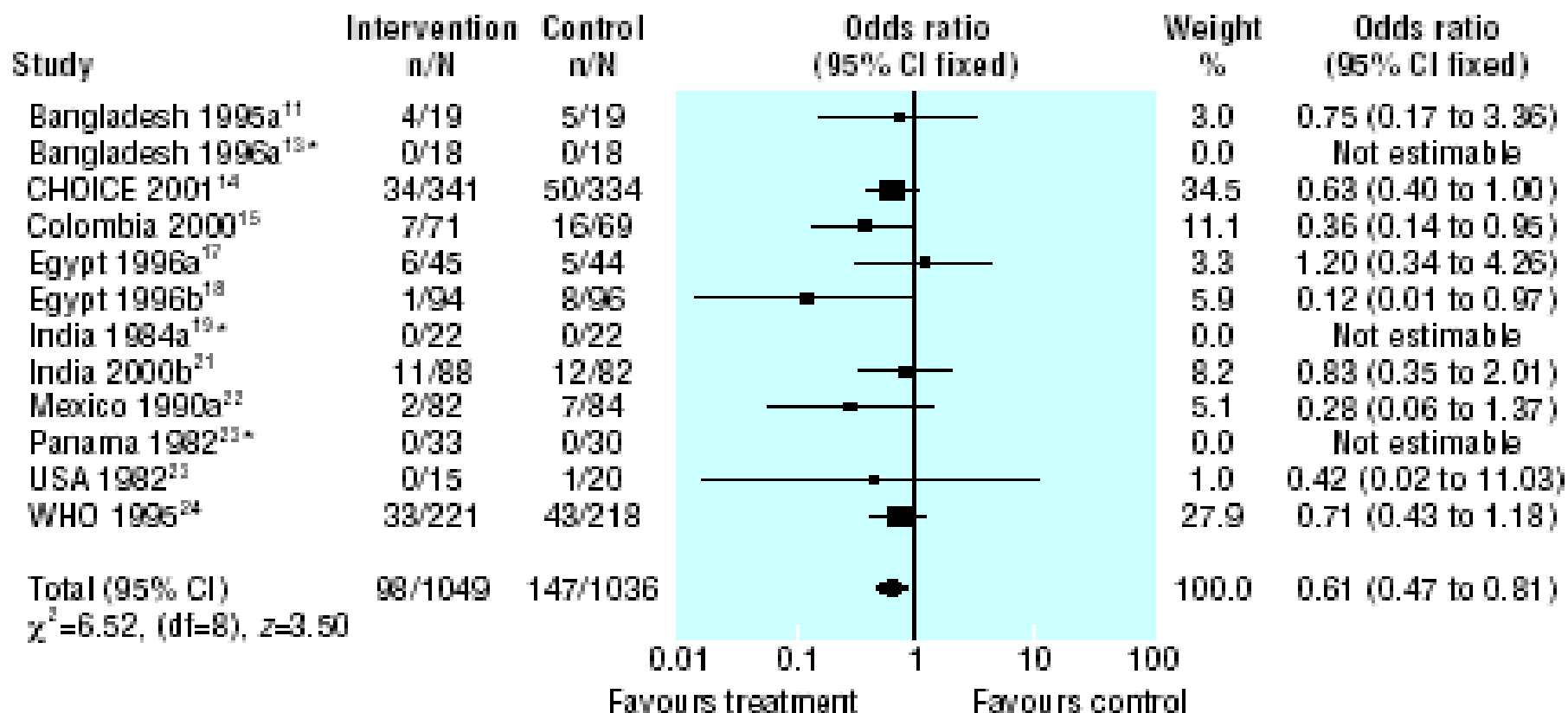
Meta-analysis of studies comparing reduced osmolarity and standard WHO ORS

Stool output



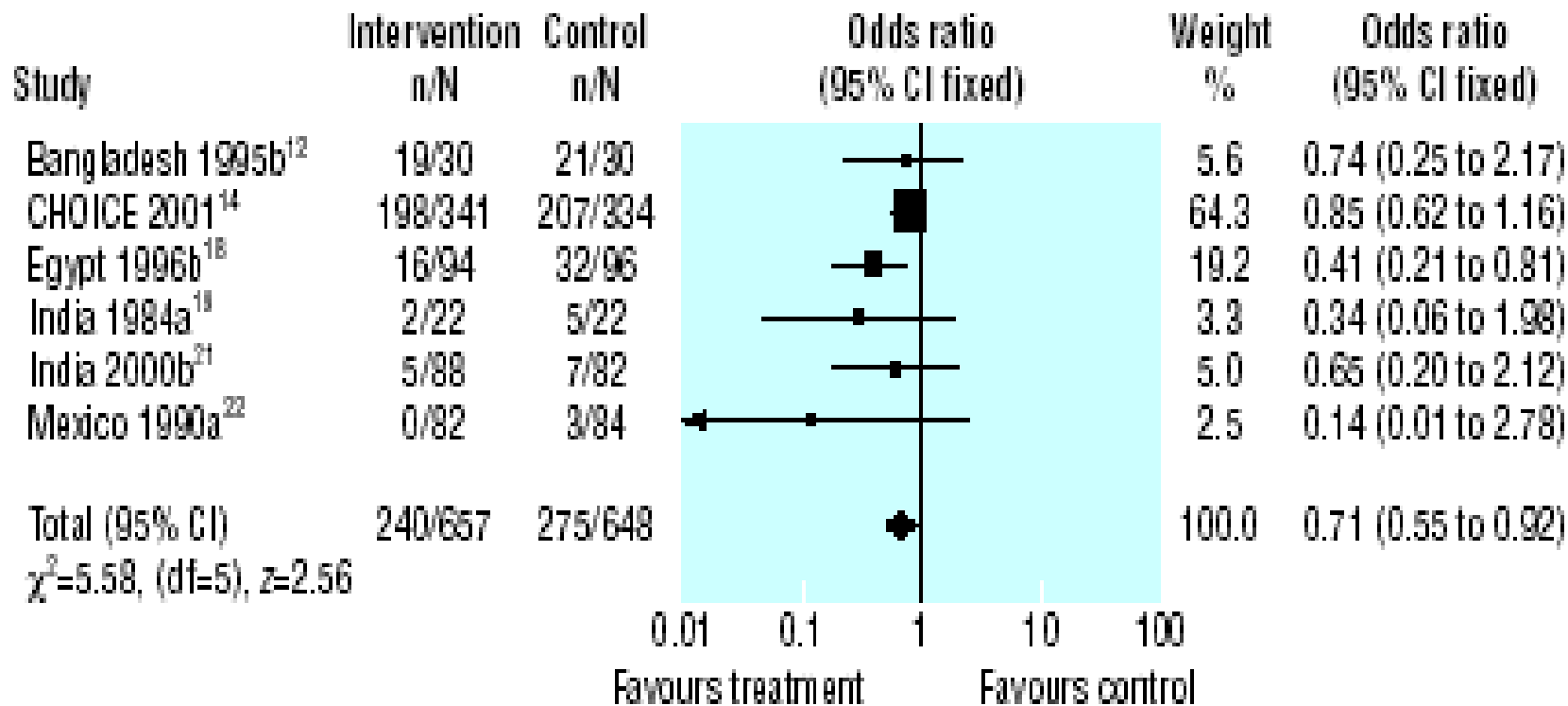
Meta-analysis of studies comparing reduced osmolarity and standard WHO ORS

Unscheduled intravenous infusion in children

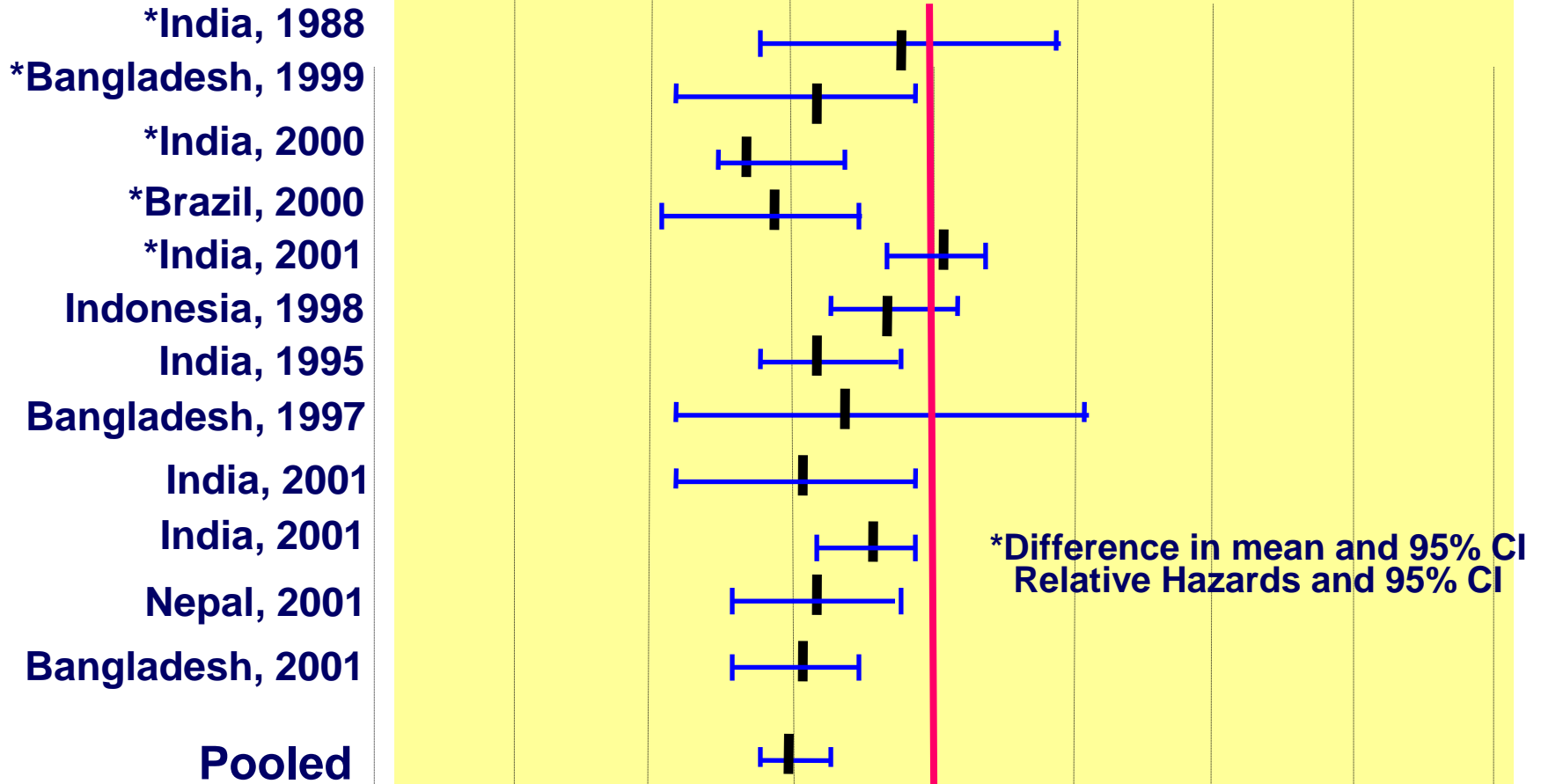


* No patients required intravenous infusion

Meta-analysis of studies comparing reduced osmolarity and standard WHO ORS Vomiting



Effect of Zinc Treatment on Duration of Acute Diarrhoea/Time to Recovery



Therapeutic Effects of Zinc on Diarrhoea Severity

<u>Country</u>	<u>Diarrhoea Outcome</u>	<u>Percent Reduction</u>
India	Frequency	18
India	Frequency	39
Bangladesh	Output	28
India	Output	38
Brazil	Frequency	59

Potential impact of ORS and Zinc treatments

- Low Osmolarity **ORS**¹

- 39% fewer unscheduled IV fluids than ORS
- 29% less episodes of vomiting than ORS
- Decreased diarrheal output



- **Zinc**²

- 25-29% reduction in duration of diarrhoea
- 40% reduction in treatment failure or death in persistent diarrhoea
 - Prevents reoccurrence of diarrhoea for 3 to 4 months.



1: Hahn S, BMJ. 2001 Jul 14;323(7304):81-5

2: Zinc Investigators' Collaborative Group, Am J Clin Nutr 2000 & Niessen L. et al. Bul. WHO, 2009, 87:472-480

Recommendations for management of diarrhoea: 2004

WHO/UNICEF JOINT STATEMENT

- Liberal use of low-osmolarity ORS to correct and prevent dehydration

- Zinc for 10-14 days to shorten duration and severity of diarrhoea

- Continued feeding and additional fluids

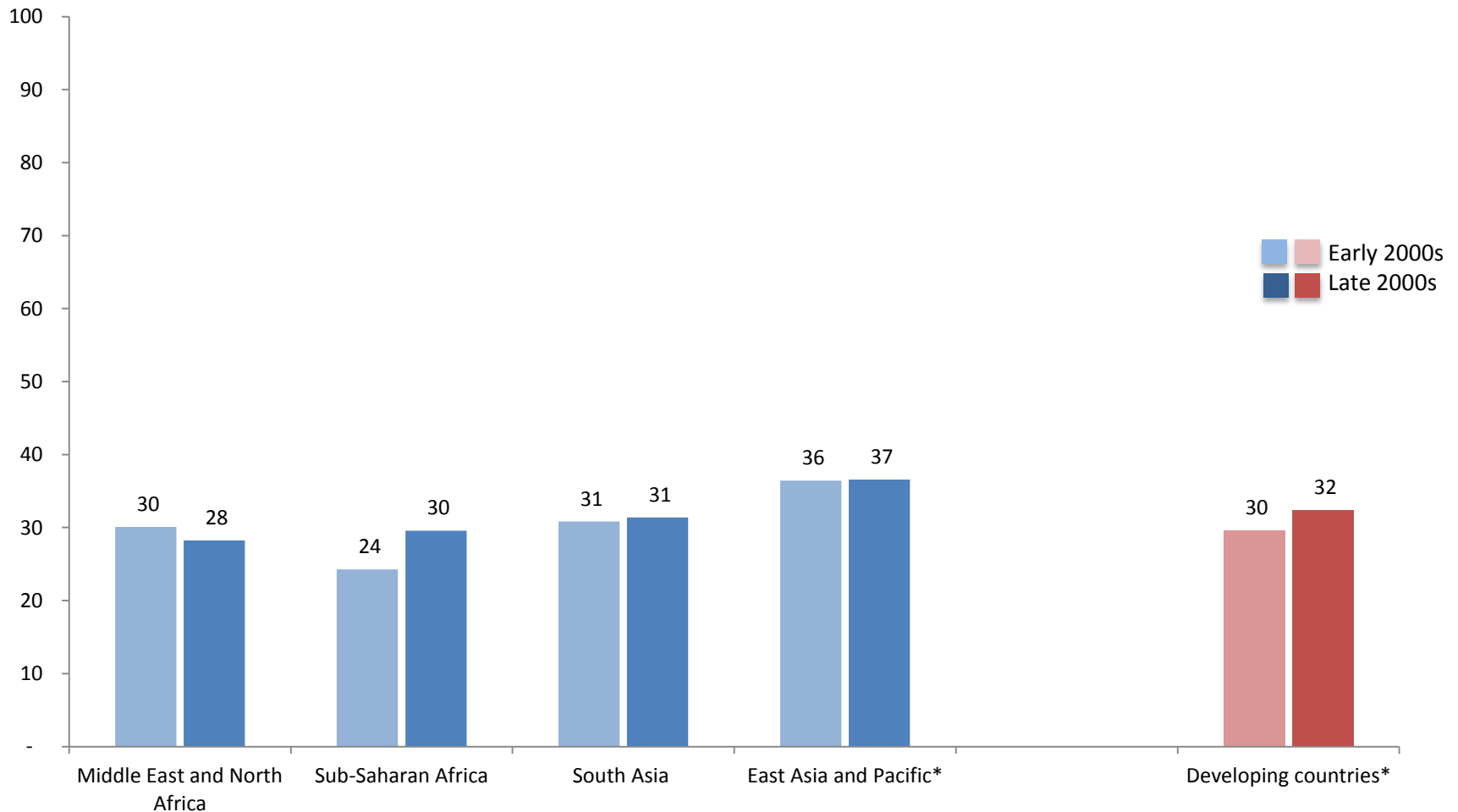
CLINICAL MANAGEMENT OF
ACUTE DIARRHOEA



unicef

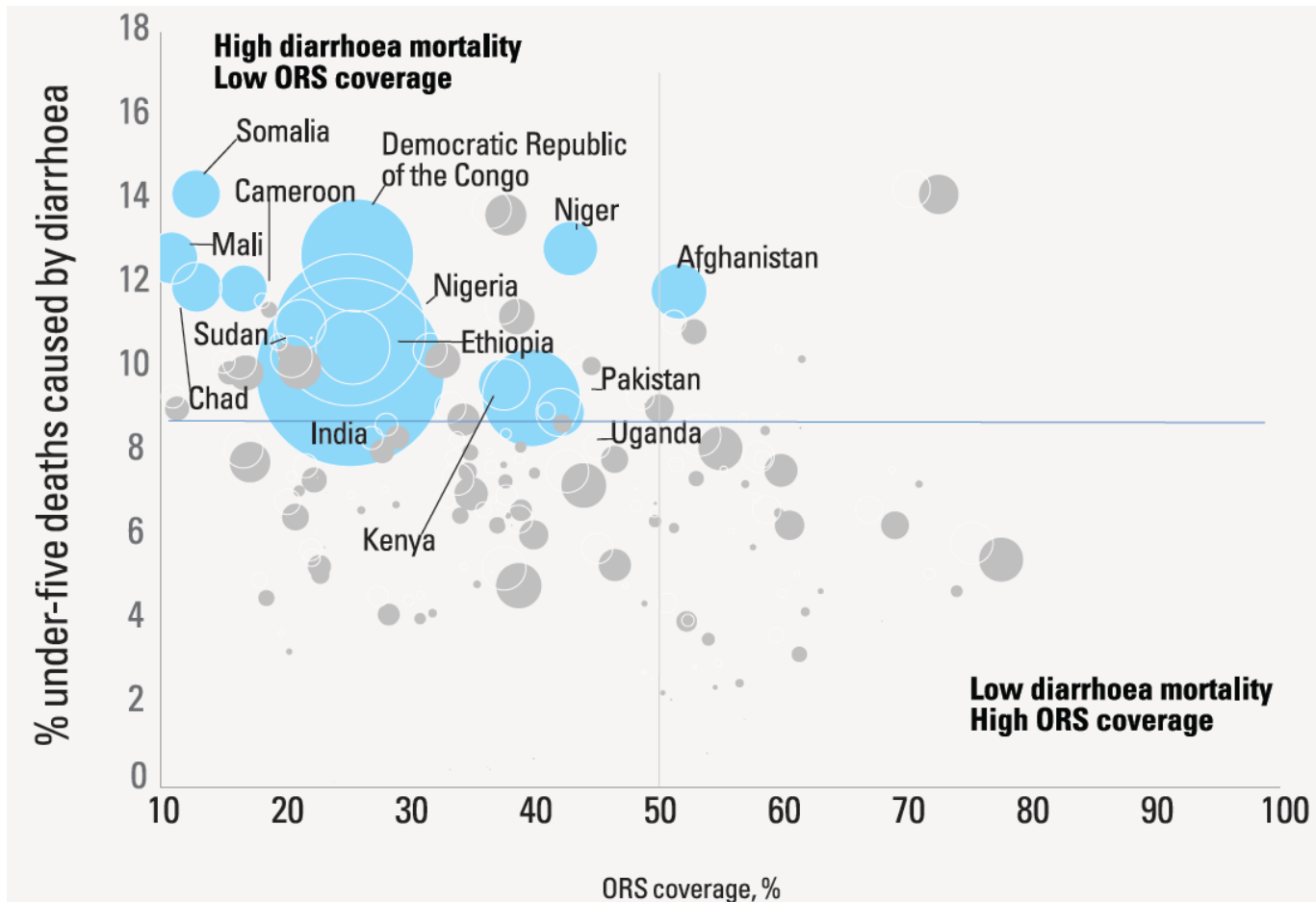


Only a third of children with diarrhoea in developing countries receive ORS and this trend remains stagnant



Lowest ORS coverage in countries with the highest levels diarrhoea deaths among children

Childhood diarrhoea deaths and ORS coverage



Source: UNICEF analysis based on IGME 2013, WHO and CHERG 2013, and UNICEF global databases 2013.

Malaria



Why combination therapy?

The potential value of drug combinations, notably those including an artemisinin derivative (ACT)

- to improve efficacy,
- delay development of drug-resistance and prolong the useful therapeutic life of antimalarial drugs

WHO Informal Consultation on "Use of Antimalarial Drugs"

(November 2000, Geneva):

Why Artemisinin-based combinations?

Artemisinins

- Rapid and sustained reduction of the parasite biomass
- Rapid resolution of clinical symptoms
- Reduction of gametocyte carriage
- Duration of treatment = 2-3 days in combination (7 days in monotherapy)
- Broad stage specificity
- No reported resistance thus far

Treatment of fever/malaria

- Artemisinin-based combination therapies (ACT) are more effective to treat falciparum malaria in most areas
- Where ACT is introduced, use laboratory-based diagnosis with microscopy or rapid diagnostic tests (RDTs)
- Treat malaria according to national guidelines such as for vivax malaria

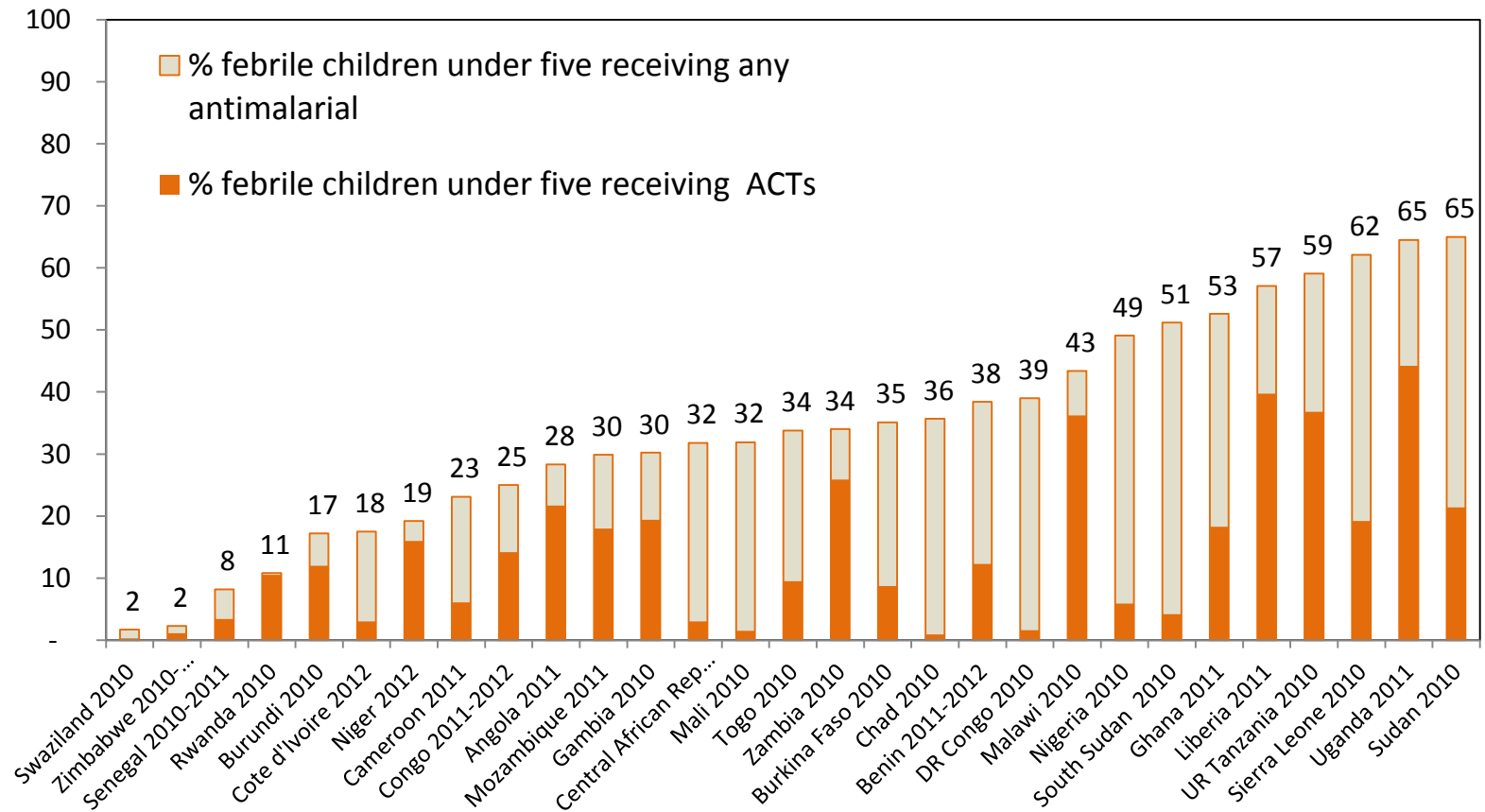
Thirty-five countries are responsible for 98% of the total malaria deaths worldwide...

To achieve the 2015 targets, achieving malaria control goals in the following countries is essential:

- **30 countries in Africa: Nigeria, Democratic Republic of Congo, Uganda, Ethiopia, Tanzania**, Sudan, Niger, Kenya, Burkina Faso, Ghana, Mali, Cameroon, Angola, Cote d'Ivoire, Mozambique, Chad, Guinea, Zambia, Malawi, Benin, Senegal, Sierra Leone, Burundi, Togo, Liberia, Rwanda, Congo (Brazzaville), Central African Republic, Somalia, and Guinea Bissau
- **5 countries in Asia-Pacific: India**, Myanmar, Bangladesh, Indonesia and Papua New Guinea

Despite improving treatment rates, many African children are still given less effective medicines

Percentage of febrile children under five receiving any antimalarial * and percentage of febrile children under five receiving artemisinin-based combination therapy (ACT), African countries 2009–2012

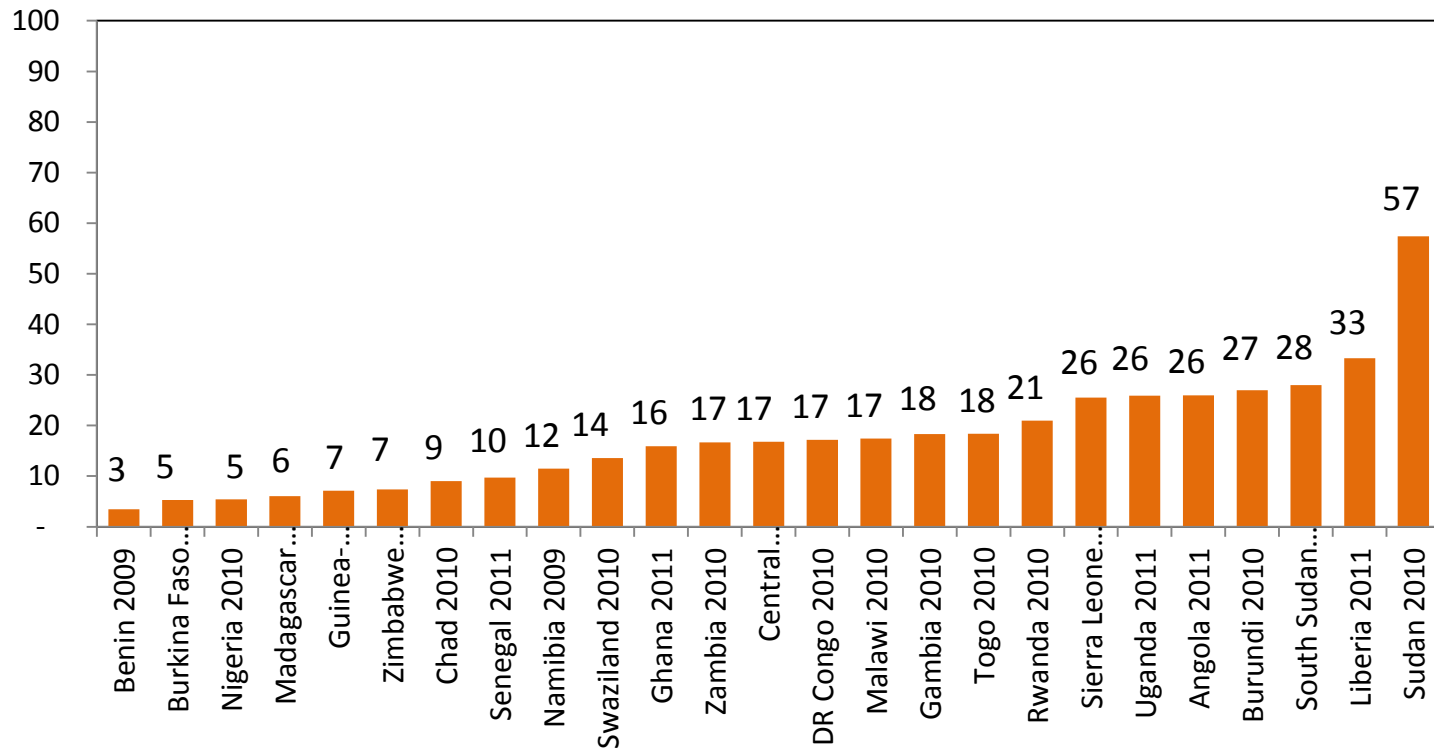


* Note that this indicator should be interpreted with caution because it refers to antimalarial treatment among all febrile children, rather than among confirmed malaria cases.

Source: UNICEF global databases 2013, based on DHS, MICS and MIS.

Malaria diagnostic testing

Percentage of children under 5 with fever receiving a finger or heel stick for malaria testing, African countries with available data 2009–2012



In most countries, the percentage of febrile children under 5 receiving malaria testing is less than **30 percent** - rural areas are lagging behind in most countries.

Summary

- Mortality rates in children are highest in sub-Saharan Africa
- Top causes of death are pneumonia, malaria and diarrhoea
- There are disparities by wealth quintile in mortality rates and causes of death
- There are effective treatments for pneumonia, malaria and diarrhea and diagnostics for malaria
- However, children, especially those in the poorest quintile in sub-Saharan Africa, are often not accessing or receiving these treatments or diagnostics

**HOW CAN WE BEST
ACCELERATE THE INCREASE
IN THE PROPORTION OF
CHILDREN IN AFRICA WITH
PNEUMONIA, DIARRHOEA,
AND MALARIA THAT RECEIVE
APPROPRIATE TREATMENT?**