



Newborn health and survival: opportunities for evidence based research

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Saving Newborn Lives / Save the Children-US

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Credit to Dr Joy Lawn, Global neonatal update lecture



Save the Children

Outline

1. What is the epidemiological evidence base?
2. Are global research priorities evidence based?
3. What are the major research priorities for newborn health?
4. What is the potential role for an INDEPTH working group?



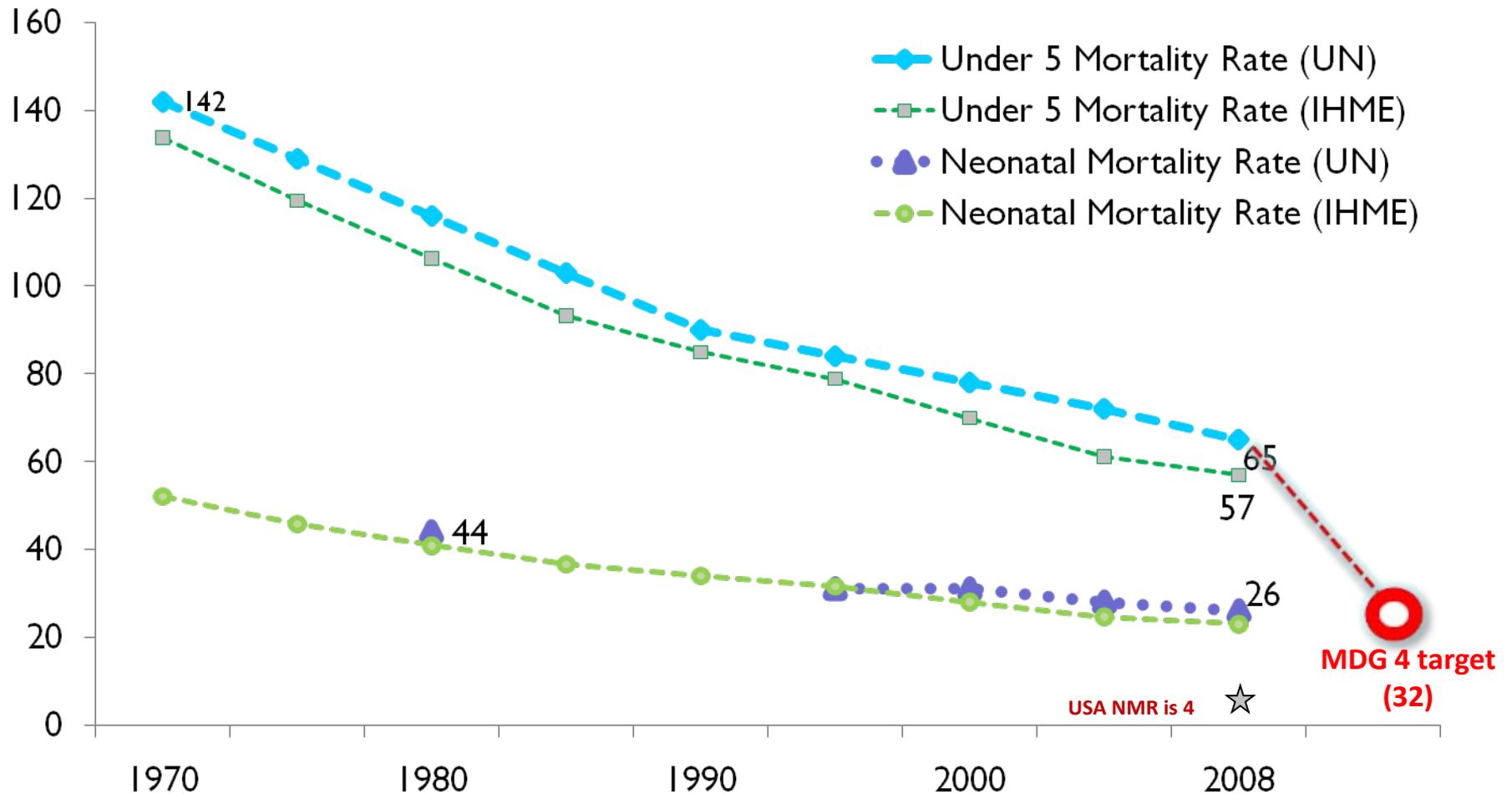


Question 1

What epidemiological evidence is there to guide a global newborn research agenda

– where, when and why?

Global progress to MDG 4



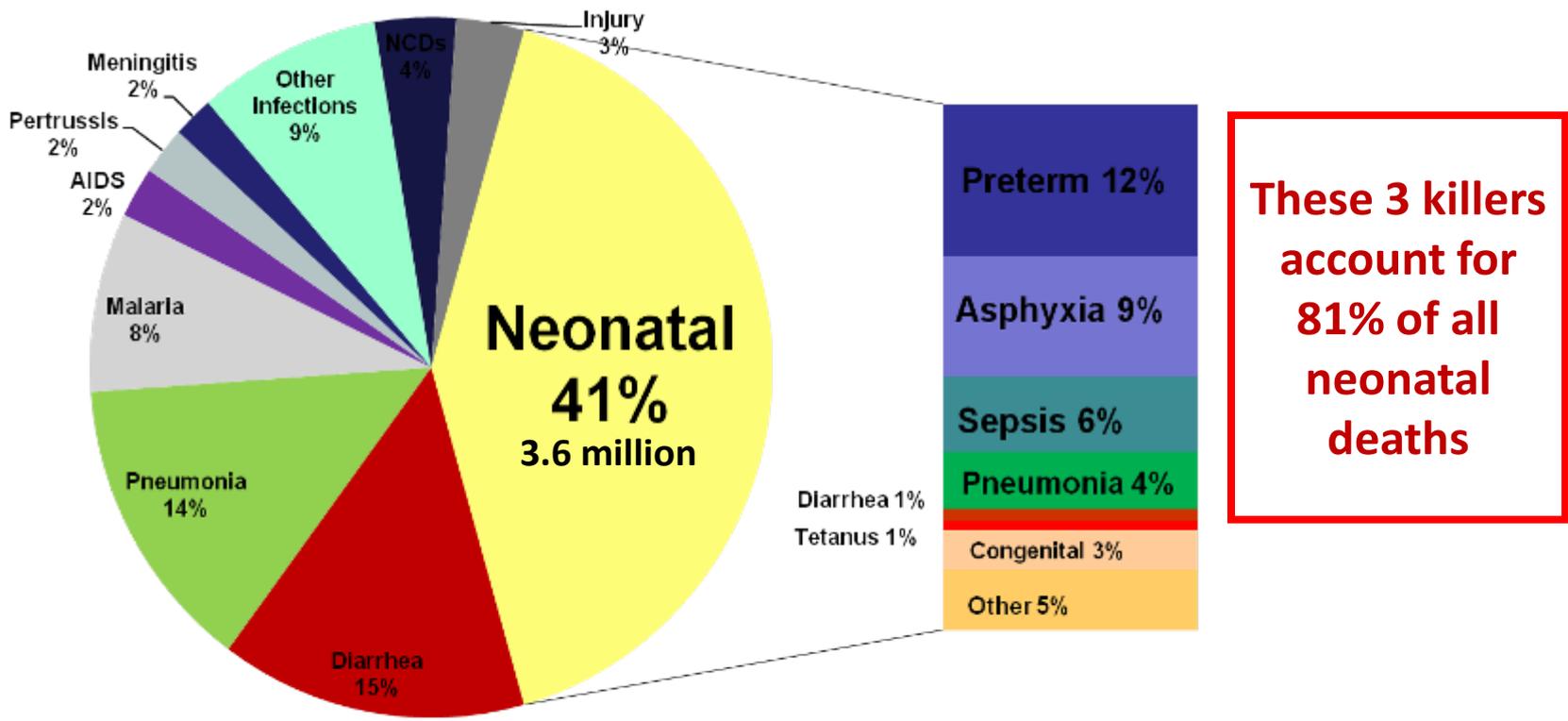
3.6 million neonatal deaths, 41% of under 5 deaths

Links closely with maternal health and MDG 5

2010 is a tipping point for progress

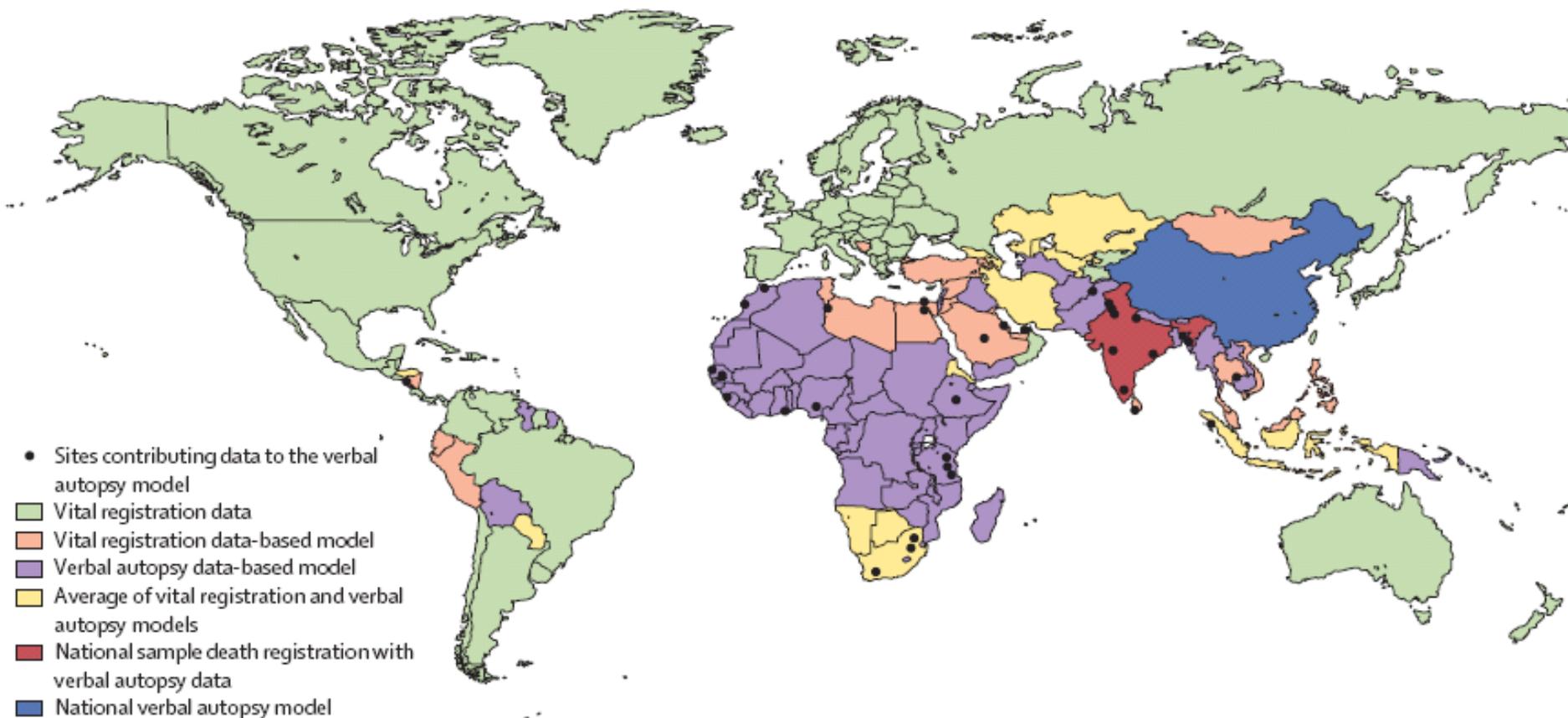
WHY? Estimated causes of newborn death

Almost all deaths due to preventable conditions



In ALL regions, deaths in the neonatal period are a major contributor to mortality - 27% to 54% of under-five deaths

WHY? Data sources for cause of death (2008)



Data advances

1. More countries with Vital Registration (72 up from 46)
2. India and China have national data inputs (~30% of deaths)
3. Increased quantity and quality of verbal autopsy data

WHERE? Newborn and maternal survival is linked

Countries with the highest numbers of neonatal deaths are similar to those with high maternal deaths **and stillbirths**

	Ranking for numbers of neonatal deaths (2008)	Ranking for numbers of maternal deaths (2008)
India	1	1
Nigeria	2	2
Pakistan	3	8
China	4	13
DR Congo	5	3
Ethiopia	6	5
Bangladesh	7	6
Indonesia	8	7
Afghanistan	9	4
Tanzania	10	9

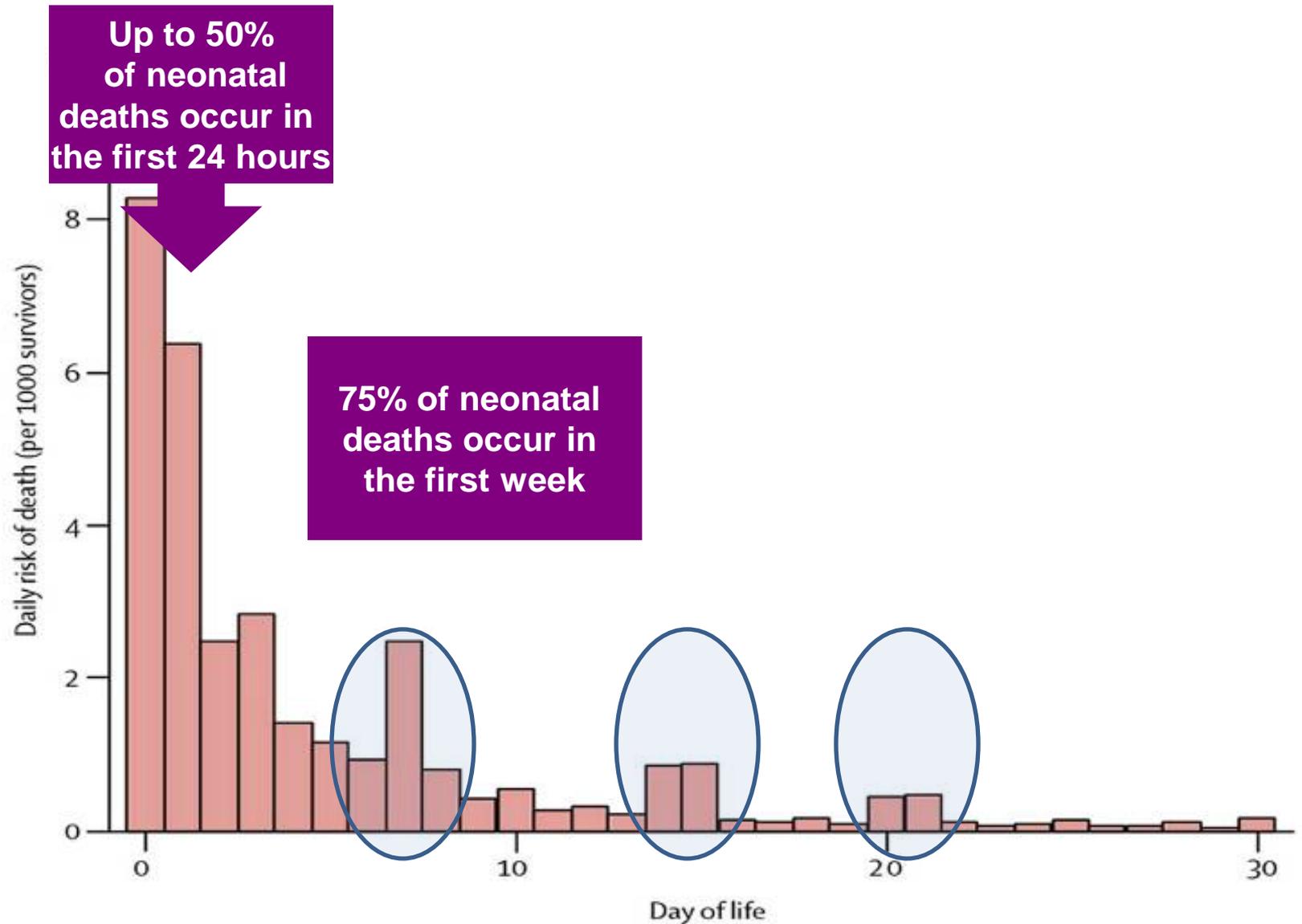
**2.4 million
neonatal
deaths**

**340,000
maternal
deaths**

**Approx
67%
of global
total**

**Approx
65%
of global
total**

WHEN? The first days of life are critical



Question 2

Are the global research priorities evidence based?



Research investment in newborn health USA (example of high income country)

- Health and development budget per year:
 - Total of ~\$116 billion
- “Perinatal” research allocated ~ \$335 million of NIH funding of per year, less than 2% of NIH annual budget
- Preterm birth research especially underfunded
 - eg breast and ovarian cancer - \$18,000 per case vs preterm birth - \$1,200 per case

**Newborn health research funding is low
relative to the burden**

Research investment in newborn health

Low income countries

- 10/90 gap – 10% of R&D funds allocated to 90% of the global burden of disease (Global Forum for Health Research)
- No systematic tracking of newborn research funding
 - BMGF ~\$10 million/yr Saving Newborn Lives for work in 18 countries including research
 - NIH Global Network ~ \$6 million/yr
 - USAID, particularly through Johns Hopkins University
 - DFID knowledge center for MNCH (ICH/LSHTM)

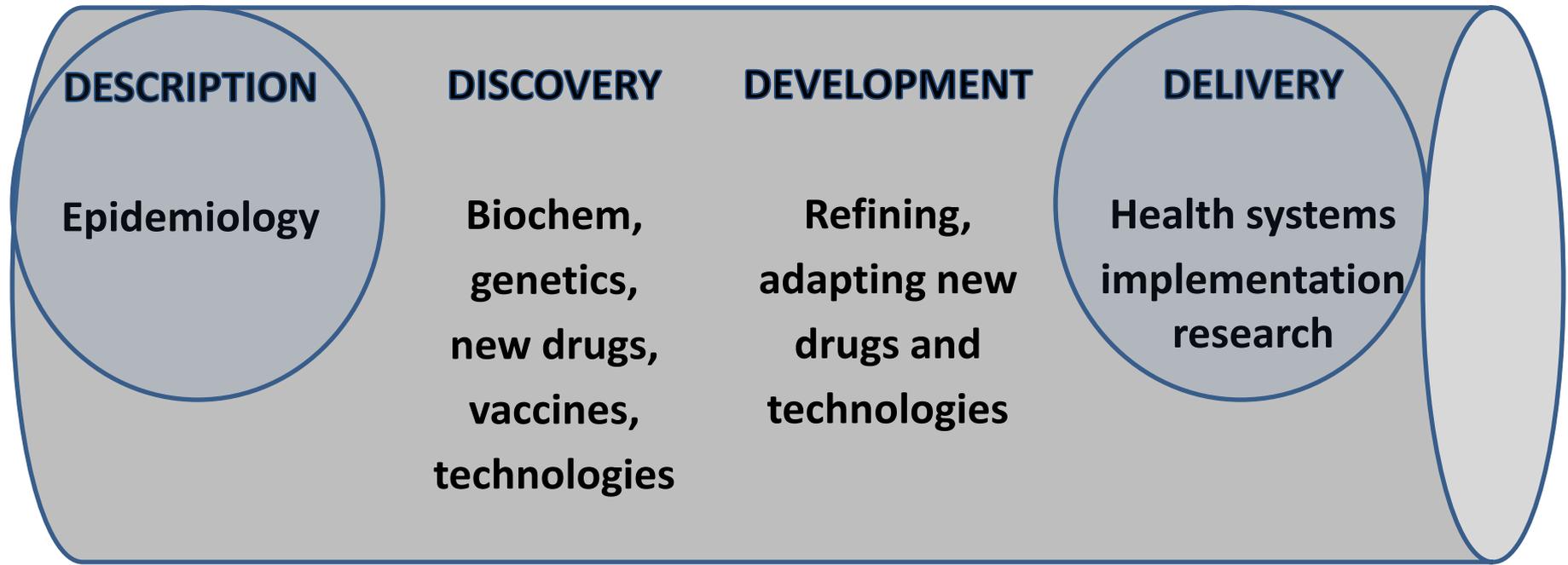
Approx \$20 million a year
\$5 invested per neonatal death...

Mismatch of burden and current research

	BURDEN	FOCUS NOW
Where? (numbers)	South Asia (2 million) Sub Saharan Africa (1 million)	High income countries (1%)
Where? (rates)	Emergencies/post conflict Rural poor Urban poor Marginalized groups	High income families, Urban areas
Where in the health system?	At home (60 million births) basic health centres on the way to care (>2 million neonatal deaths)	Hospitals
When?	Birth and the first few hours of life	Intensive care
Why?	Neonatal infections Intarpartum related deaths Preterm birth Stillbirths	Greater focus on care than on prevention

} 99%

The research pipeline



TYPICAL
TIMING

5-15 yrs
(higher cost,
higher risk)

5-10 yrs

< 5yrs

Delay getting from bench...to bedside...to bush!

Question 3

What are the research priorities for newborn health and how can we advance these?





DELIVERY of solutions for neonatal infections

THE BURDEN

- ~970,000 neonatal deaths each year, including ~80,000 due to neonatal tetanus
- Many of the deaths are among preterm babies
- Acute morbidity and long term disability - no systematic estimates yet

Coverage and constraints

–neonatal infections

Prevention

- Antenatal care: Quality gap
- Intrapartum and PNC: Hygiene, breastfeeding

Case management

- Barriers to accessing early care
- Lack of capacity (staff, drugs, supplies)
- Policy barriers for what to give, where and by whom, e.g. “gold standard” antibiotic regimen which may block community-based treatment



Scaling up sepsis case management – research questions

- Are **shorter course or switch course** antibiotics, or **oral-only** antibiotic regimens effective? New multi-site study.
- Can we develop an algorithm to **screen newborns needing antibiotic treatment** when identified through active surveillance?
- What are the **optimal, locally adapted delivery approaches** for newborn infection management as part of community-based packages?



Need for health systems / policy research to address existing preventive home practices and evaluation, costing for facility interventions and quality improvement (*PIDJ 2009*)



DELIVERY

of solutions for preterm birth complications

THE BURDEN

- ~970,000 neonatal deaths each year. 58% of babies in low and middle income countries are not weighed at birth
- Preterm babies are also at greater risk for infections
- Acute morbidity and long term disability - no systematic estimates yet

Priorities for reducing preterm deaths

Upimaji wa nyayo za mtoto mchanga



- Identification: gestational age, foot size
- No effective primary prevention of preterm labour
- Antenatal steroids: new IJE evidence review
- Extra care of preterm babies including clean, safe delivery, support for breastfeeding and thermal care, and Kangaroo Mother Care
- Early treatment and care for complications such as breathing problems, and infections



Coverage and constraints – preterm complications

Prevention

- Large gains in coverage for malaria IPTp but effect small
- Antenatal steroids – major effect but very low coverage
- Traditional practices can be barriers to improved simple care – thermal care and immediate, exclusive breastfeeding

Case management

- Kangaroo Mother Care – new meta-analysis revealing large mortality effect, BUT:
 - Coverage is low - often only available at referral centres
 - Lack of knowledge and acceptance
 - Lack of capacity - trained staff, supervision



Knowledge ≠ implementation

Newspaper headline August 2007



Kangaroo Mother Care

Government tells mothers to use charcoal stoves as incubators



OPINION

DAILY MONITOR
WEDNESDAY, AUGUST 8, 2007



Research questions: bringing services closer to home, monitoring at facility and household, novel approaches to staff shortages



DELIVERY

of solutions for intrapartum-related neonatal deaths ("birth asphyxia")

THE BURDEN

- ~730,000 neonatal deaths each year
- 60 million home births
- Acute morbidity and long term disability

Priorities for reducing intrapartum-related deaths

Prevention

- Prevention through antenatal care including management of pre-eclampsia and multiple pregnancy
- Skilled care at birth
- Basic and comprehensive emergency obstetric care

Case management

- Resuscitation
- Care of babies with neonatal encephalopathy





DELIVERY

of solutions for stillbirths

THE BURDEN

- An estimated 3.2 million stillbirths each year
- 1.02 million occur during childbirth
- Closely linked with maternal and neonatal deaths

Priorities for reducing stillbirths



1. Data collection gap

- Most stillbirths are uncounted, up to half are at home
- Globally 75% of child death data comes from Demographic Health Survey (DHS) data – which is currently not reliable for stillbirth rates

2. Data consistency gap

- Definition confusion for “stillbirth”
- Multiple cause of death classification systems
- Lack of consistency in attributing cause of death





DELIVERY

of integrated MNCH

packages to reduce

neonatal deaths

Single interventions with some evidence of benefit for neonatal outcomes

Box 2 Neonatal health interventions reviewed

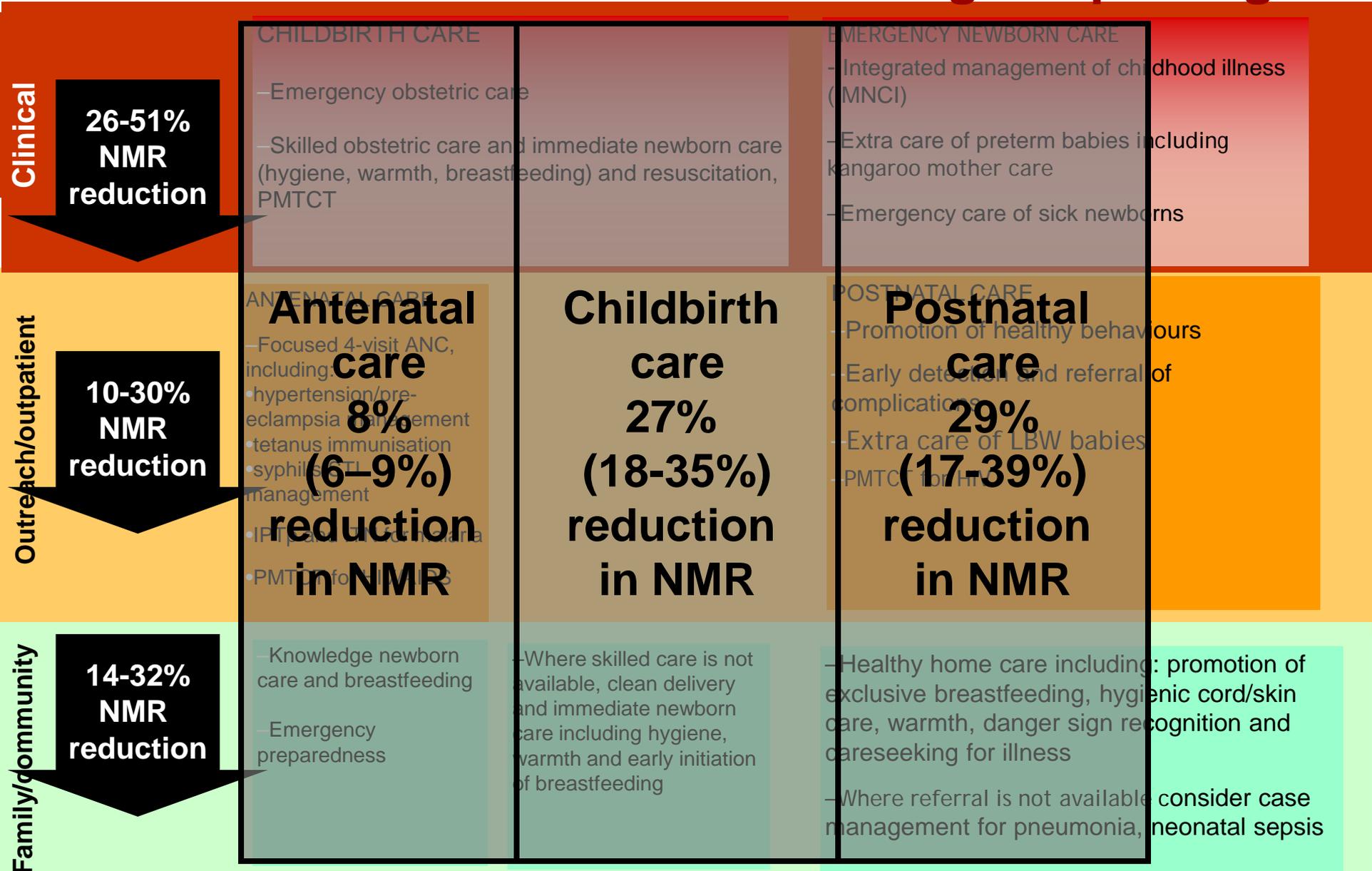
Antenatal interventions	Intrapartum interventions	Postnatal interventions
<ul style="list-style-type: none"> • Iodine supplementation^a • Maternal deworming^a • Syphilis screening and treatment^a • Tetanus toxoid immunization^a • Antibiotics for preterm premature rupture of the membranes^b • Antibiotics for UTI/STD/asymptomatic bacteriuria^b • Balanced protein-energy supplementation^b • Malaria chemoprophylaxis, including IPT^b • Malaria prevention using impregnated bednets^b • Periconceptual folic acid supplementation^b • Antenatal folic acid supplementation • Antibiotics for bacterial vaginosis • Antibiotics for preterm labour • Birth preparedness and emergency planning • Corticosteroids for preterm labour • Iron supplementation • Maternal pneumococcal immunization • Multiple micronutrient supplementation • Pre-eclampsia and eclampsia prevention and treatment • Promotion of smoking cessation in pregnancy • Vitamin A supplementation • Zinc supplementation 	<ul style="list-style-type: none"> • Clean delivery practices^a • Vaginal and newborn skin antisepsis^b • Antepartum haemorrhage treatment • Assisted vaginal delivery • Corticosteroids for preterm labour • Diagnosis and management of breech, multiple births • Emergency obstetric care • Emergency transport for obstetric complications • Labour surveillance and use of partograph • Prevention of maternal-to-child transmission of HIV • Prevention of preterm labour: magnesium, calcium, fish oil • Skilled birth attendants • Treatment of pregnancy-induced hypertension 	<ul style="list-style-type: none"> • Breastfeeding^a • Prevention and management of neonatal hypoglycaemia^a • Care in peripheral health facilities^b • Hepatitis B vaccination^b • Kangaroo mother care^b • Maternal health education^b • Newborn resuscitation^b • Pneumonia case management^b • Prevention and management of neonatal hypothermia^b • Prevention of ophthalmia neonatorum^b • Topical emollient therapy^b • TBA/CHW training^b • ARV treatment for HIV • Birth spacing • Care of LBW infants • Delayed umbilical cord clamping • Emergency transport • Hyperbilirubinaemia treatment • Injectable antibiotics • Newborn presumptive treatment

^aClear evidence of efficacy, highly recommended for inclusion in the package.
^bSome evidence of efficacy, recommended for inclusion in the package.

ARV=antiretroviral; CHW=community health worker; HIV=human immunodeficiency virus; IPT=intermittent preventive therapy; IPT-2=intermittent preventive therapy-2; IPT-3=intermittent preventive therapy-3; IPT-4=intermittent preventive therapy-4; IPT-5=intermittent preventive therapy-5; IPT-6=intermittent preventive therapy-6; IPT-7=intermittent preventive therapy-7; IPT-8=intermittent preventive therapy-8; IPT-9=intermittent preventive therapy-9; IPT-10=intermittent preventive therapy-10; IPT-11=intermittent preventive therapy-11; IPT-12=intermittent preventive therapy-12; IPT-13=intermittent preventive therapy-13; IPT-14=intermittent preventive therapy-14; IPT-15=intermittent preventive therapy-15; IPT-16=intermittent preventive therapy-16; IPT-17=intermittent preventive therapy-17; IPT-18=intermittent preventive therapy-18; IPT-19=intermittent preventive therapy-19; IPT-20=intermittent preventive therapy-20; IPT-21=intermittent preventive therapy-21; IPT-22=intermittent preventive therapy-22; IPT-23=intermittent preventive therapy-23; IPT-24=intermittent preventive therapy-24; IPT-25=intermittent preventive therapy-25; IPT-26=intermittent preventive therapy-26; IPT-27=intermittent preventive therapy-27; IPT-28=intermittent preventive therapy-28; IPT-29=intermittent preventive therapy-29; IPT-30=intermittent preventive therapy-30; IPT-31=intermittent preventive therapy-31; IPT-32=intermittent preventive therapy-32; IPT-33=intermittent preventive therapy-33; IPT-34=intermittent preventive therapy-34; IPT-35=intermittent preventive therapy-35; IPT-36=intermittent preventive therapy-36; IPT-37=intermittent preventive therapy-37; IPT-38=intermittent preventive therapy-38; IPT-39=intermittent preventive therapy-39; IPT-40=intermittent preventive therapy-40; IPT-41=intermittent preventive therapy-41; IPT-42=intermittent preventive therapy-42; IPT-43=intermittent preventive therapy-43; IPT-44=intermittent preventive therapy-44; IPT-45=intermittent preventive therapy-45; IPT-46=intermittent preventive therapy-46; IPT-47=intermittent preventive therapy-47; IPT-48=intermittent preventive therapy-48; IPT-49=intermittent preventive therapy-49; IPT-50=intermittent preventive therapy-50; IPT-51=intermittent preventive therapy-51; IPT-52=intermittent preventive therapy-52; IPT-53=intermittent preventive therapy-53; IPT-54=intermittent preventive therapy-54; IPT-55=intermittent preventive therapy-55; IPT-56=intermittent preventive therapy-56; IPT-57=intermittent preventive therapy-57; IPT-58=intermittent preventive therapy-58; IPT-59=intermittent preventive therapy-59; IPT-60=intermittent preventive therapy-60; IPT-61=intermittent preventive therapy-61; IPT-62=intermittent preventive therapy-62; IPT-63=intermittent preventive therapy-63; IPT-64=intermittent preventive therapy-64; IPT-65=intermittent preventive therapy-65; IPT-66=intermittent preventive therapy-66; IPT-67=intermittent preventive therapy-67; IPT-68=intermittent preventive therapy-68; IPT-69=intermittent preventive therapy-69; IPT-70=intermittent preventive therapy-70; IPT-71=intermittent preventive therapy-71; IPT-72=intermittent preventive therapy-72; IPT-73=intermittent preventive therapy-73; IPT-74=intermittent preventive therapy-74; IPT-75=intermittent preventive therapy-75; IPT-76=intermittent preventive therapy-76; IPT-77=intermittent preventive therapy-77; IPT-78=intermittent preventive therapy-78; IPT-79=intermittent preventive therapy-79; IPT-80=intermittent preventive therapy-80; IPT-81=intermittent preventive therapy-81; IPT-82=intermittent preventive therapy-82; IPT-83=intermittent preventive therapy-83; IPT-84=intermittent preventive therapy-84; IPT-85=intermittent preventive therapy-85; IPT-86=intermittent preventive therapy-86; IPT-87=intermittent preventive therapy-87; IPT-88=intermittent preventive therapy-88; IPT-89=intermittent preventive therapy-89; IPT-90=intermittent preventive therapy-90; IPT-91=intermittent preventive therapy-91; IPT-92=intermittent preventive therapy-92; IPT-93=intermittent preventive therapy-93; IPT-94=intermittent preventive therapy-94; IPT-95=intermittent preventive therapy-95; IPT-96=intermittent preventive therapy-96; IPT-97=intermittent preventive therapy-97; IPT-98=intermittent preventive therapy-98; IPT-99=intermittent preventive therapy-99; IPT-100=intermittent preventive therapy-100.

**Antenatal (22)
 Intrapartum (13)
 Postnatal (22)**

Newborn lives saved at 90% coverage of packages



Pre-pregnancy

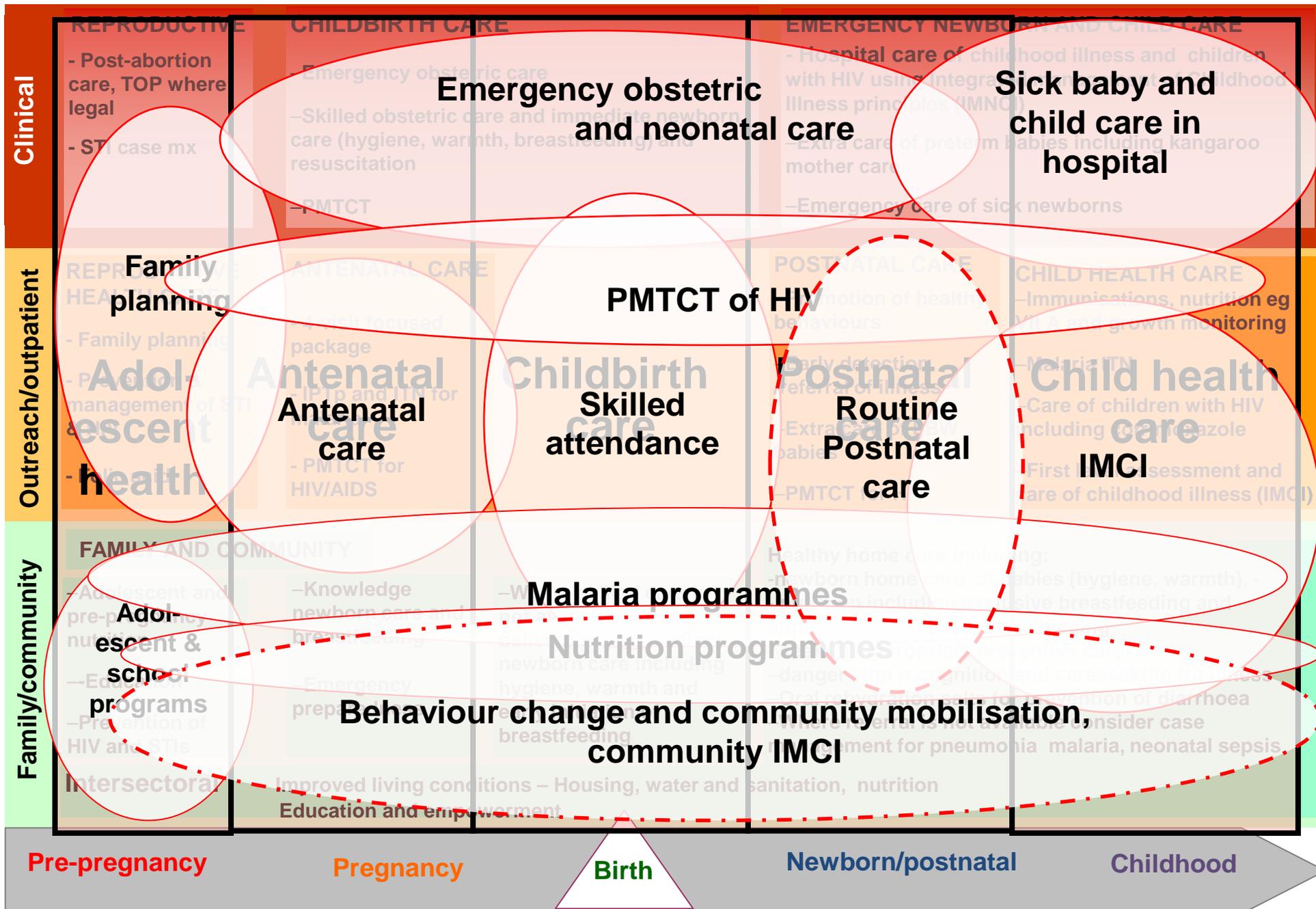
Pregnancy

Birth

Newborn/postnatal

Childhood

Reality for integrated service delivery



Priorities for DELIVERY research for health system packages

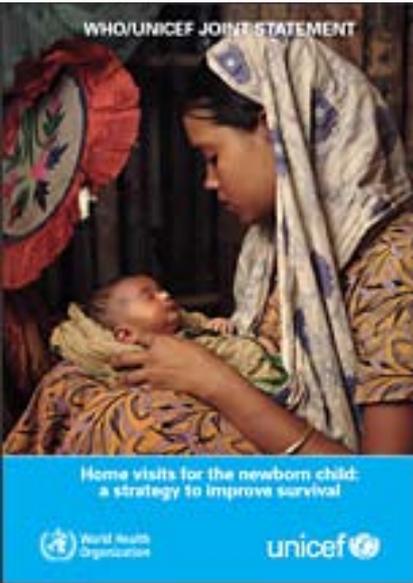
1. Routine postnatal care for mother and baby
2. Treating neonatal infections (and maternal postnatal complications) especially where referral is not possible
3. Extra care of preterm babies in the community, and linking to improved facility care, KMC
4. Integrated service delivery in practice, e.g. in settings with high HIV/AIDS prevalence through PMTCT and early feeding support
5. Improved facility-based care, especially improved neonatal care at district hospital level

**Priority for implementation research:
Answering HOW and WHO and WHERE questions**

Integrated postnatal care – where and when?

Evidence from Bangladesh:

3 arm RCT with >10,000 births, baseline neonatal mortality rate 41 per 1000 live births



Consensus statement on home visits: mothers and newborns to be visited within 24 hours and again on day 3 and day 7 if possible, by health professionals or appropriately trained CHW.

**Early postnatal visits reduce newborn deaths.
A first visit within 2 days of birth may reduce deaths by 67%.
Need to test integrated, scalable packages, especially in Africa as the cadre and package content will vary.**

Lessons learned from newborn health research in Asia

- **Major impact is achievable** through community intervention packages
- In high NMR settings (>60), up to 50% decline can be achieved through **behaviour change / community mobilisation**, even without antibiotics or other “medical” care

Effect of community-based newborn-care intervention package implemented through two service-delivery strategies in Sylhet district, Bangladesh: a cluster-randomised controlled trial

Abdullah H Baqui, Shams El-Arifeen, Gary L Darmstadt, Saifuddin Ahmed, Emma K Williams, Habibur R Seraji, Ishtiaq Mannan, Syed M Rahman, Rasheduzzaman Shah, Samir K Saha, Uzma Syed, Peter J Winch, Amnesty Lefevre, Mathuram Santoshan, Robert E Black, for the Projahnmo Study Group*

HOWEVER

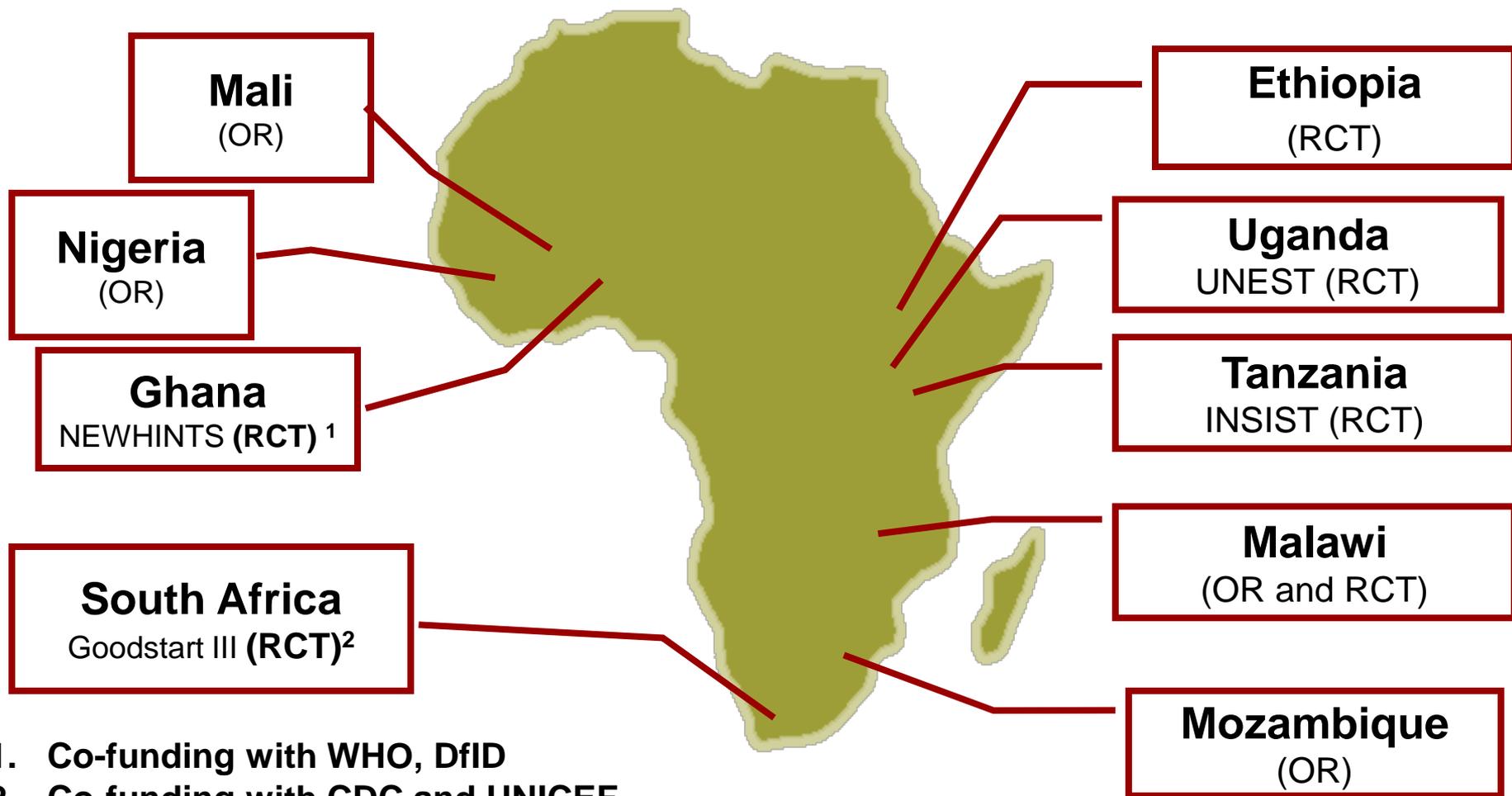
- Only 2 are in the public sector and several do not link to the health system
- Only 2 have cost data published and these are not comparable

THEREFORE

- Packages need adaptation and assessment in Africa
- Must consider getting to scale in the design, including comparable cost
- Operationalise links with the health system, especially in African context



Adapting, testing and costing community-based, integrated newborn health packages in Africa



1. Co-funding with WHO, DfID
2. Co-funding with CDC and UNICEF

RCT = Randomized Control Trial
OR = Operations Research

Question 4

What role can a newborn interest group within INDEPTH play in answering these questions?



DESCRIPTION

DISCOVERY

DEVELOPMENT

DELIVERY

DESCRIPTION

- Pregnancy surveillance
 - Gestational age
 - IUGR and preterm birth and overlap
 - SB and neonatal death misclassification
 - SB to ENND ratios
- Standard verbal and social autopsy tools and hierarchies
- Coverage of care

Epidemiology Research Agenda

Improving estimates, understanding relationships, determinants

Improving data, tools, collection systems, local use of data



DESCRIPTION

DISCOVERY

DEVELOPMENT

DELIVERY

DELIVERY

- Newhints (Kintampo)
- UNEST (Iganga)
- INSIST (Mtwara/IHI)
- Home visit package
- mHealth

DISCOVERY & DEVELOPMENT



Summary

- **3.6 million newborn deaths** occur each year. We know what, when, where, why.
- **Attention to newborn survival is increasing** but not comparable to the global burden.
- **Three preventable causes** account for over 80% of newborn deaths and solutions exist.
- **Clear role for INDEPTH** – particularly in description and delivery research





Thank you!



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