Strengthening immunization systems in East Africa

AFRICA HEALTH CONGRESS AND EXHIBITION at Gallagher Convention Centre, Johannesburg, South Africa from 29th May 2019

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Disclosure

Relationships with commercial interests:

- **NONE**
- **No conflict of interest**

Outline

- Review current status of child health in East Africa
- Review current immunization indicators
- Review current barriers to immunization in East Africa
- To propose possible strategies to strengthen immunization in East Africa

Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis

Li Liu, Shefali Oza, Daniel Hogan, Jamie Perin, Igor Rudan, Joy E Lawn, Simon Cousens, Colin Mathers, Robert E Black

- **Infections contributed 51.8% of the 6.3million under 5 deaths in 2013**
- **Pneumonia 15%, Diarrhea 9.2%, Malaria 7.3%**
- 50% of U5 deaths occur is Sub Saharan Africa

THE LANCET Online Publications, 1 October 2014

www.thelancet.com Published online October 1, 2014 http://dx.doi.org/10.1016/S0140-6736(14)61698-6

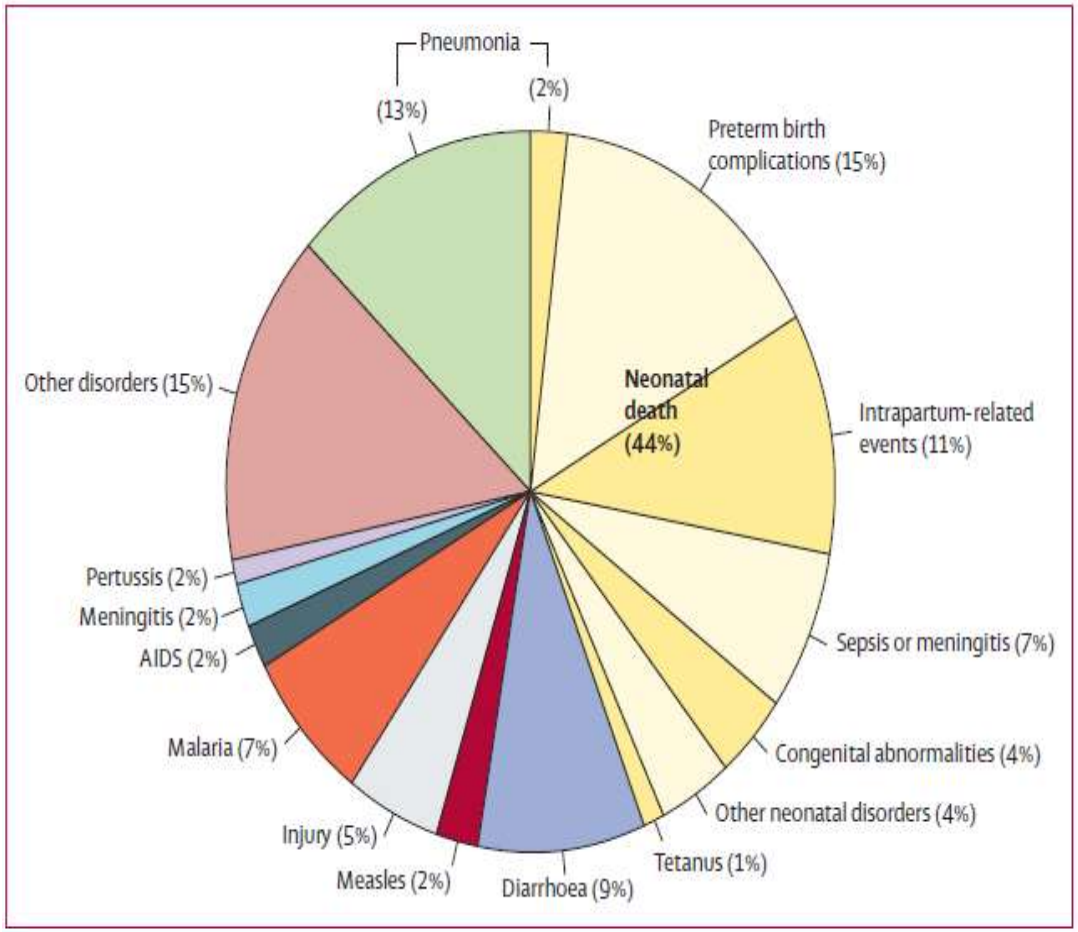
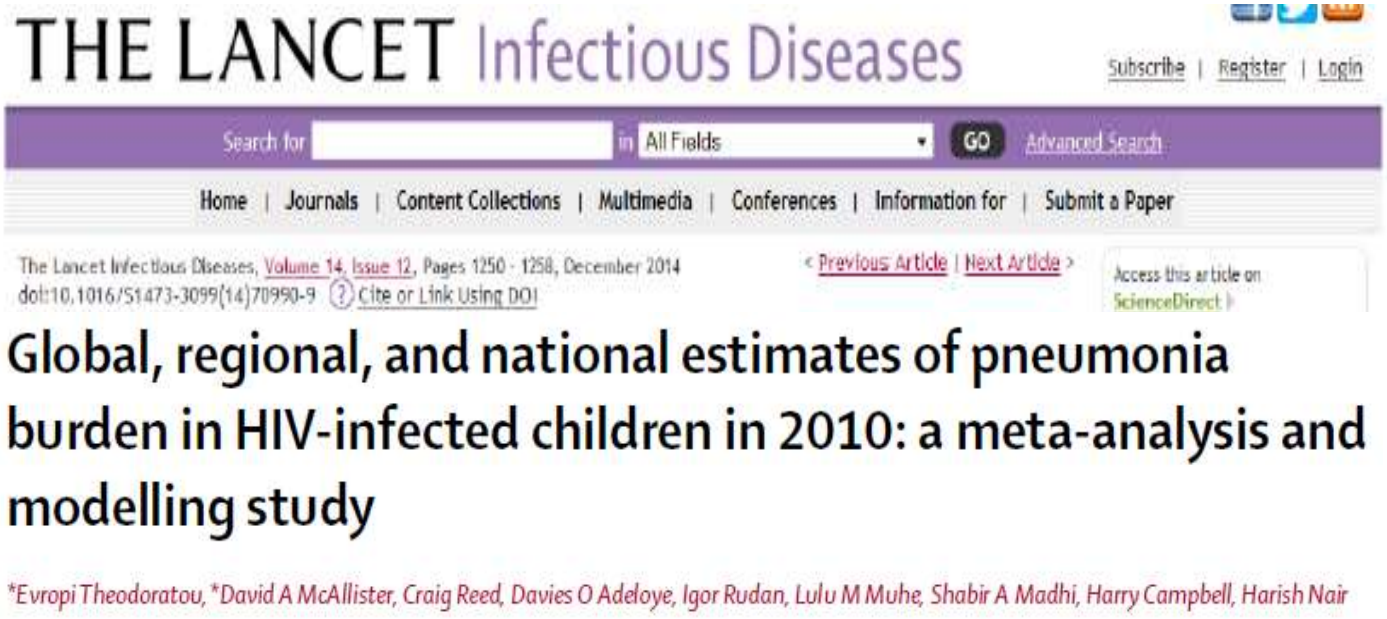


Figure 2: Global causes of child deaths in 2013

- **70% of all child deaths in the EA – due to:**
  - **LRTI (pneumonia) =19%,**
  - **Diarrhoea (18%),**
  - **Malaria (8%),**
  - **Measles, (4%),**
  - **HIV/AIDS (3%),**
  - **Neonatal conditions.**

Pneumonia causes 799,000 deaths annually in children 1-59 months (45% in 1-6 months age group); and 44% (2.76 mil)of under-5 deaths occur in first month of life, 20% (412,000) of which is due to pneumonia/sepsis.



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The Lancet Infectious Diseases, Volume 14, Issue 12, Pages 1250 - 1258, December 2014
doi:10.1016/S1473-3099(14)70990-9 Cite or Link Using DOI

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Global, regional, and national estimates of pneumonia burden in HIV-infected children in 2010: a meta-analysis and modelling study

*Evropi Theodoratou, *David A McAllister, Craig Reed, Davies O Adeloye, Igor Rudan, Lulu M Muhe, Shabir A Madhi, Harry Campbell, Harish Nair

- **6.5 odds for admission with all-cause pneumonia in HIV-infected compared to HIV-uninfected**
- **1.2 million PNA episodes and 85,400 deaths were directly attributable to HIV**
- **90% PNA episodes & 93% 0f PNA deaths in HIV-infected children U5 occurred in SSA**

www.thelancet.com Published online November 10, 2016 http://dx.doi.org/10.1016/S0140-6736(16)31593-8

Global, regional, and national causes of under-5 mortality in 2000–15: an updated systematic analysis with implications for the Sustainable Development Goals

Li Liu, Shefali Oza, Dan Hogan, Yue Chu, Jamie Perin, Jun Zhu, Joy E Lawn, Simon Cousens, Colin Mathers, Robert E Black

- Studied 2000-2015 child deaths among the 194 countries
- There were 5.9 million U-5 deaths, including 2.7 million newborns
- Of these 5.9 million deaths, 3.6 million happened in 10 Asian and African countries - India, Nigeria, Pakistan, the Democratic Republic of Congo, Ethiopia, China, Angola, Indonesia, Bangladesh and Tanzania
- The leading causes of U5 deaths were complications due to premature birth (17.8%, 1.1 million deaths), **pneumonia (15.5%, 0.9 million deaths)** and death during birth (11.6%, 0.7 million deaths)

www.thelancet.com Published online November 10, 2016 http://dx.doi.org/10.1016/S0140-6736(16)31593-8

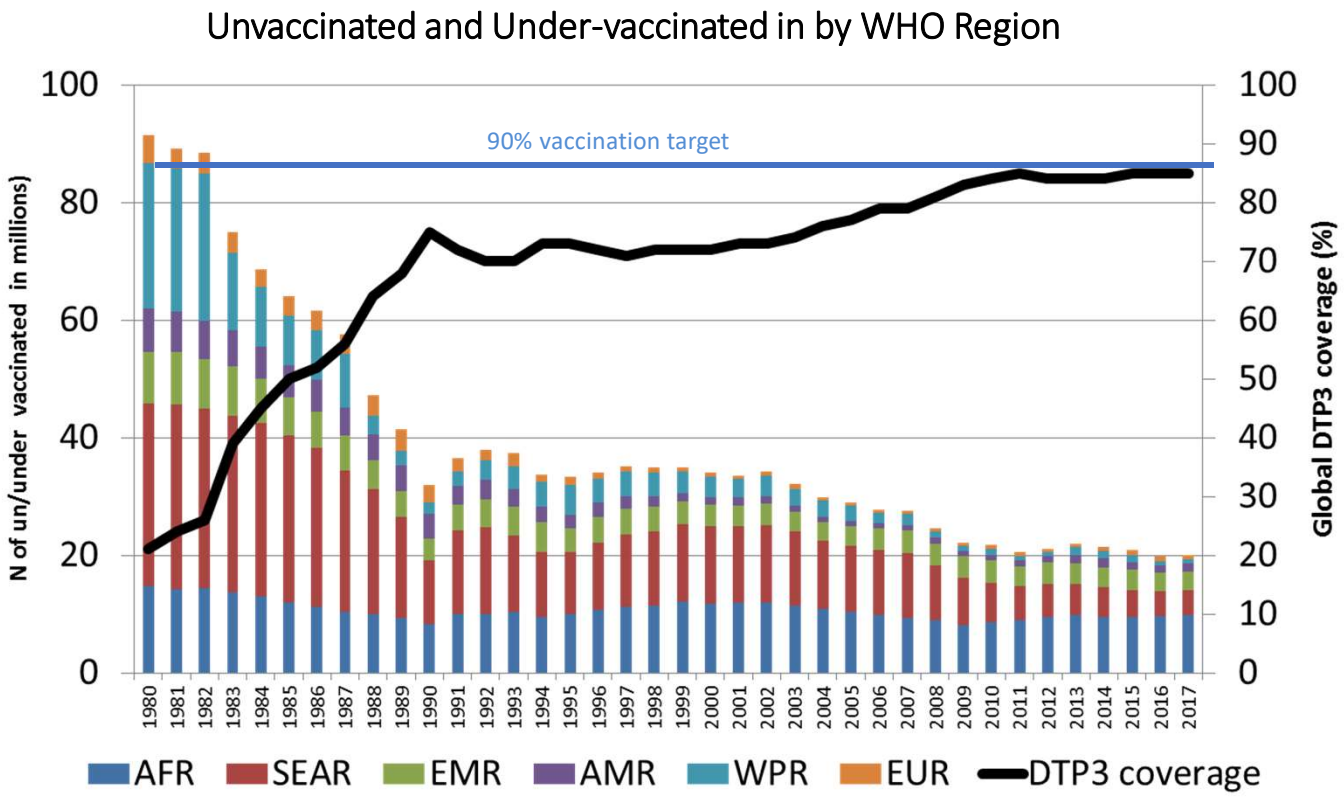
Global, regional, and national causes of under-5 mortality in 2000–15: an updated systematic analysis with implications for the Sustainable Development Goals

Li Liu, Shefali Oza, Dan Hogan, Yue Chu, Jamie Perin, Jun Zhu, Joy E Lawn, Simon Cousens, Colin Mathers, Robert E Black

- Countries with the highest U-5 deaths (≥100deaths/1000 births) include Angola, CAR, Chad, Mali, Nigeria, Sierra Leone and Somalia.
  - In these countries **pneumonia, malaria and diarrhoea** were the leading causes of death

- Countries with the lowest U-5 deaths (<10 deaths/1000 births) which include the Russian Federation and the USA
  - The leading causes of death include congenital abnormalities, complications due to premature birth and injuries

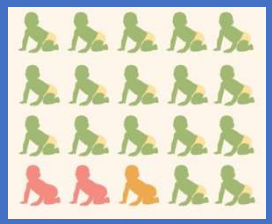
Significant progress has been made but gains are at risk: a number of infants miss their vaccination



DTP3 coverage remains at 85% in 2017, leaving 19.9 million children vulnerable to vaccine preventable diseases

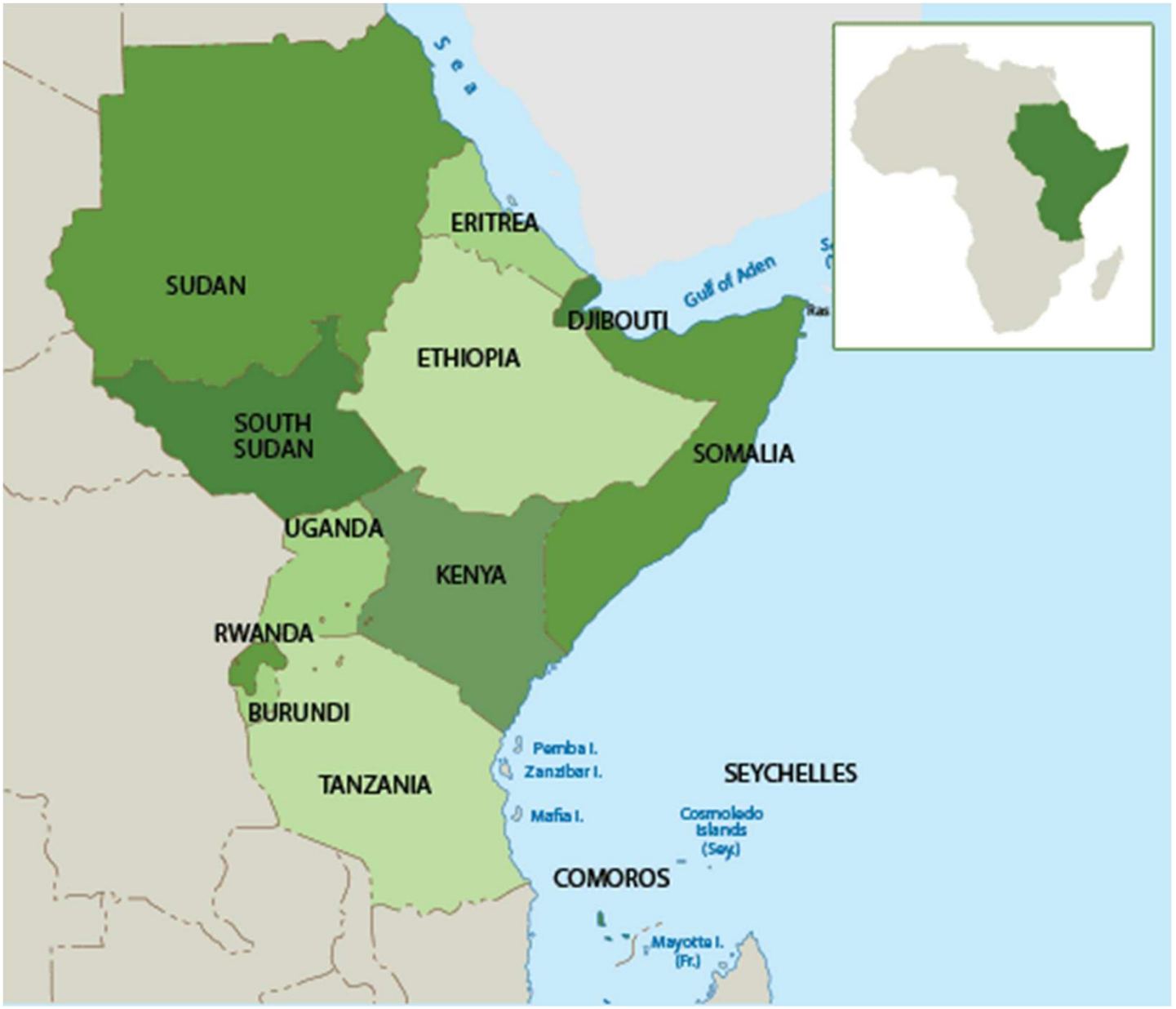
Since 2015, the percentage of children who received their full course of three dose diphtheria-tetanus-pertussis (DTP3) routine immunizations remains at 85%, with no significant changes in any region during the past year. This falls short of the global immunization coverage targets of 90%, one of the targets set out in the Global Vaccine Action Plan.

Out of 20 infants, 2 are completely left out, while 1 started but didn't complete the 3-dose course.



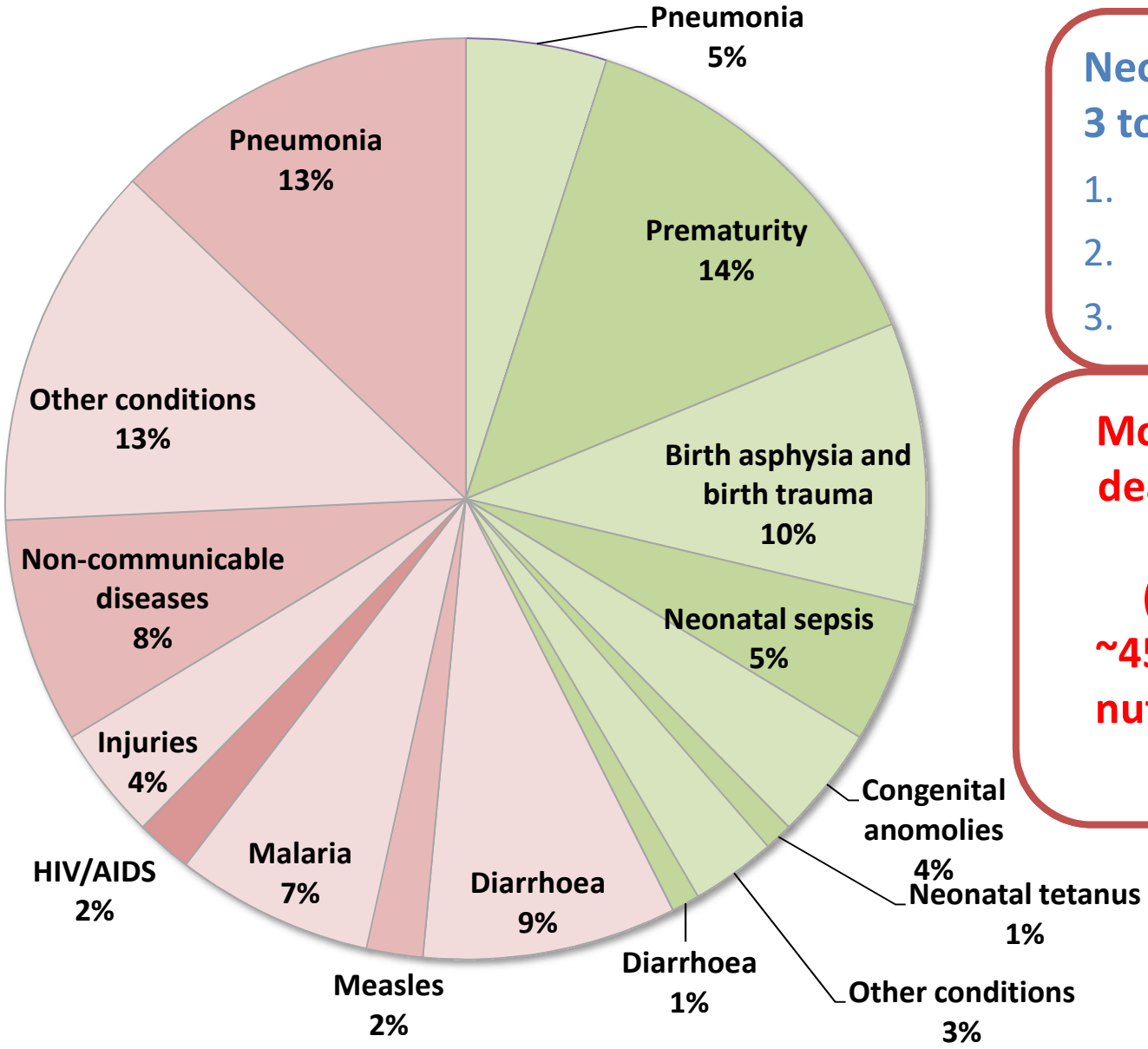
: https://data.unicef.org/topic/child-health/immunization/

Eastern Africa



THE KENYA SITUATION

KENYA - Causes of Under Five Mortality



Neonatal accounts for 44%.
3 top priorities to address:

1. Preterm birth
2. Birth complications
3. Neonatal infections

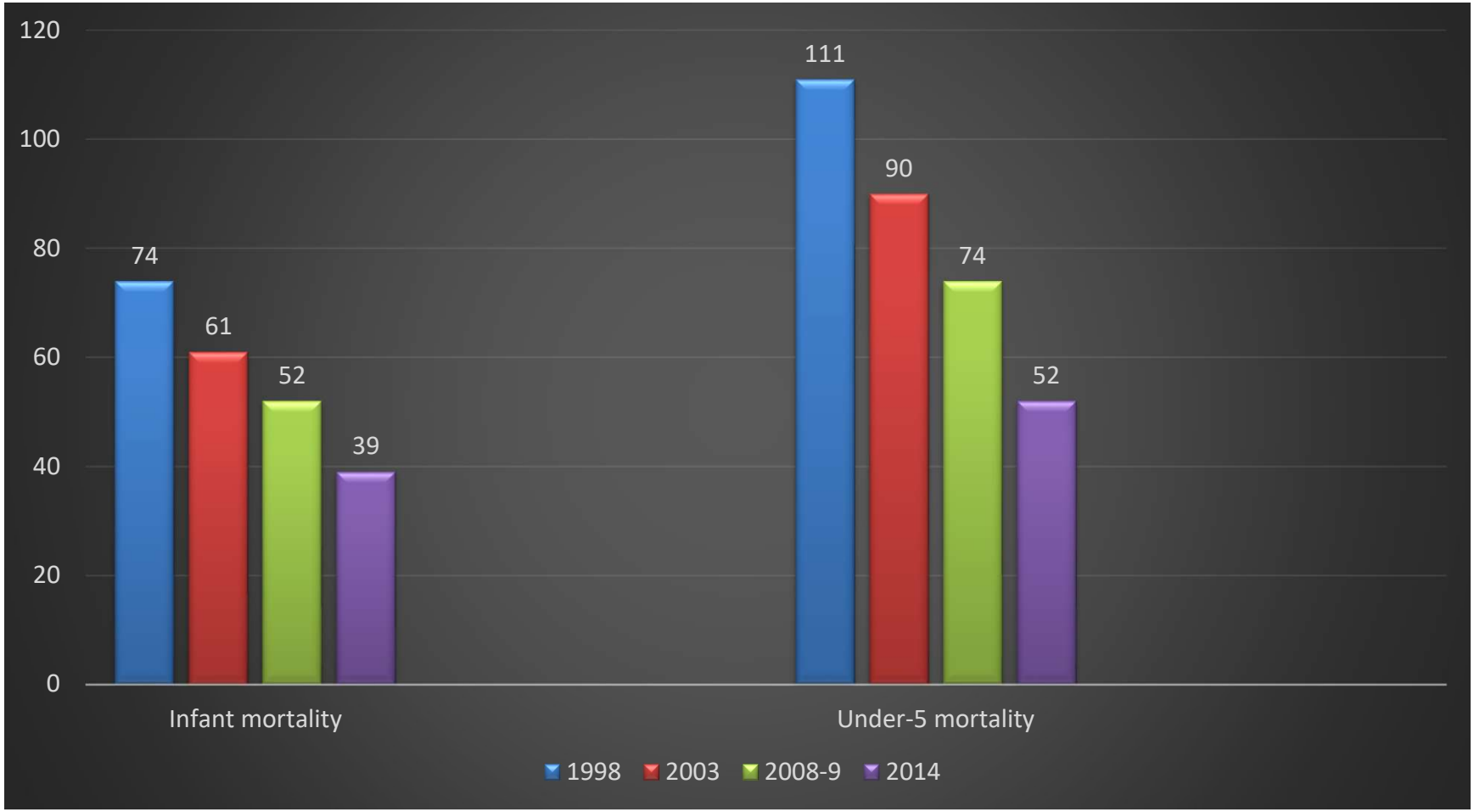
More than a third of all U5 deaths due to pneumonia, diarrhea and malaria (i.e. are preventable!) ~45% attribution of under-nutrition across the board.

Source: WHO. Global Health Observatory http://www.who.int/gho/child_health/en/index.html); Child deaths - UN Inter-agency Group for Child Mortality Estimates. Levels and Trends in Child Mortality. Report 2013; Stillbirths - Lawn et al *The Lancet* stillbirth series 2011. 377 (9775) p1448 – 1463

2016 Mortality Indicators - Kenya

- Under 5 Mortality Rate: 49.2/1000 live births N=73,533 (44.9F, 53.2 M)
- Infant Mortality Rate: 39/1000 live births N = 34,326
- Neonatal Mortality Rate: 22.6/1000 live births n=34,326
- HIV Prevalence – 5.4% (62.3% are female adults)
- Causes of death from communicable diseases, maternal, prenatal and nutrition conditions contribute 55.1% of all cause mortality.
- Vaccination coverage – 61% (DPT3 – 89%, measles 80%)

Trends in child mortality 1998-2014



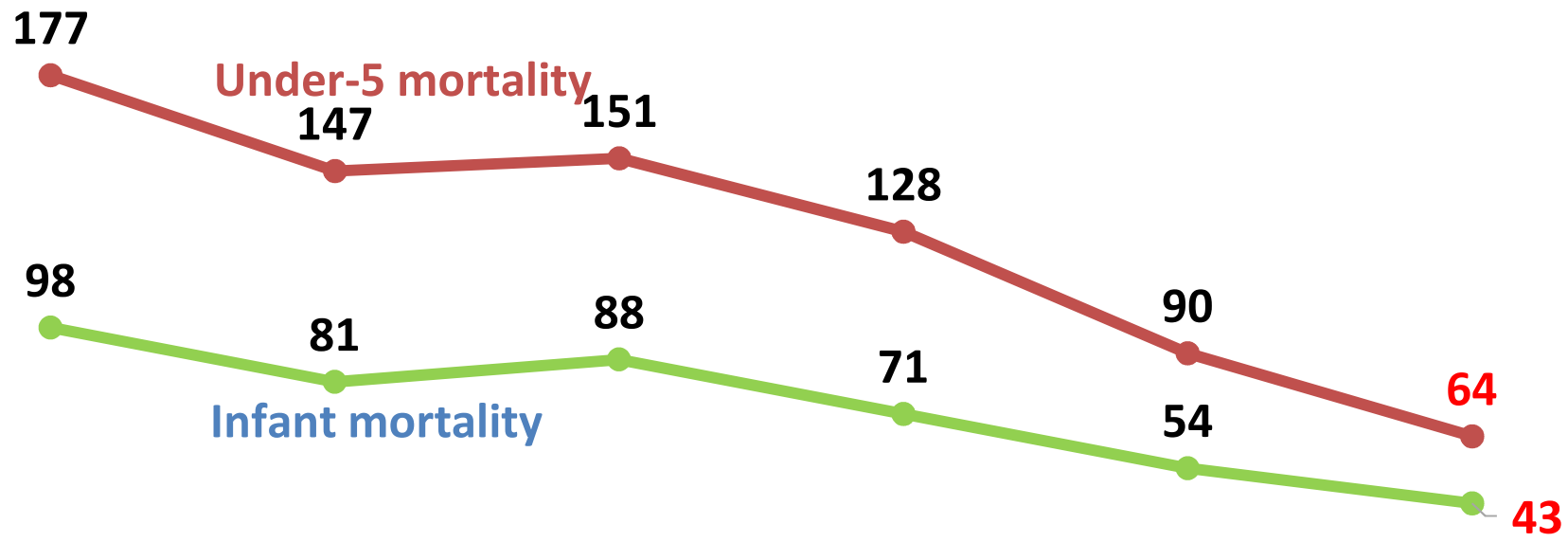
Child Health Indicators

Proportion of under-five children with suspected pneumonia taken to health provider	**66%**
Proportion of children under five years old with diarrhoea receiving ORS and Zinc	**7.5%**
Proportion of children under-five sleeping under insecticide-treated bed nets	**54%**
Proportion of 1 year-old children receiving all doses of the pentavalent vaccine	90%
Proportion of 1 year-old children vaccinated against measles	**87%**
Proportion of children fully vaccinated	**68%**

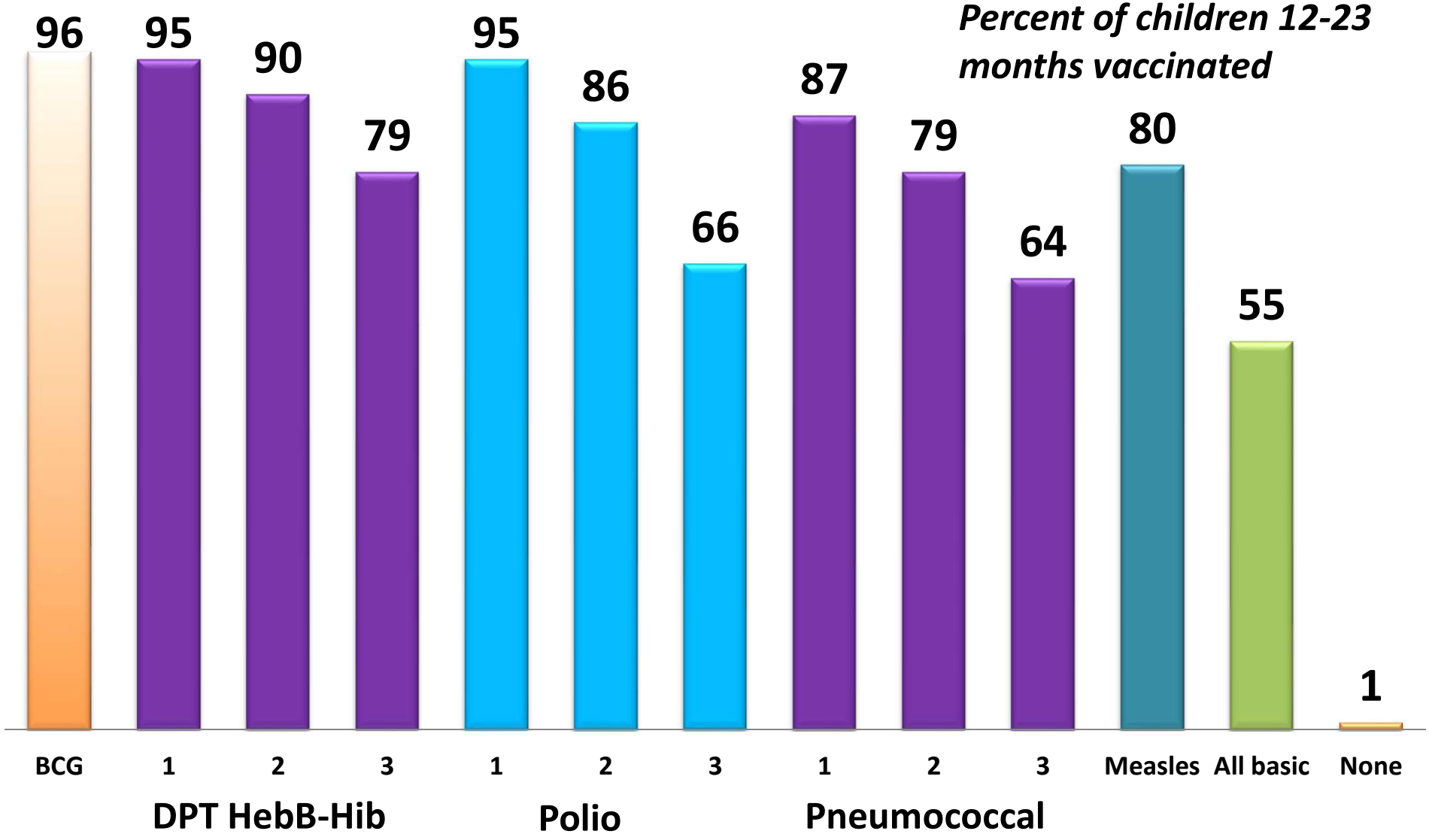
THE UGANDA SITUATION

Trends in Childhood Mortality

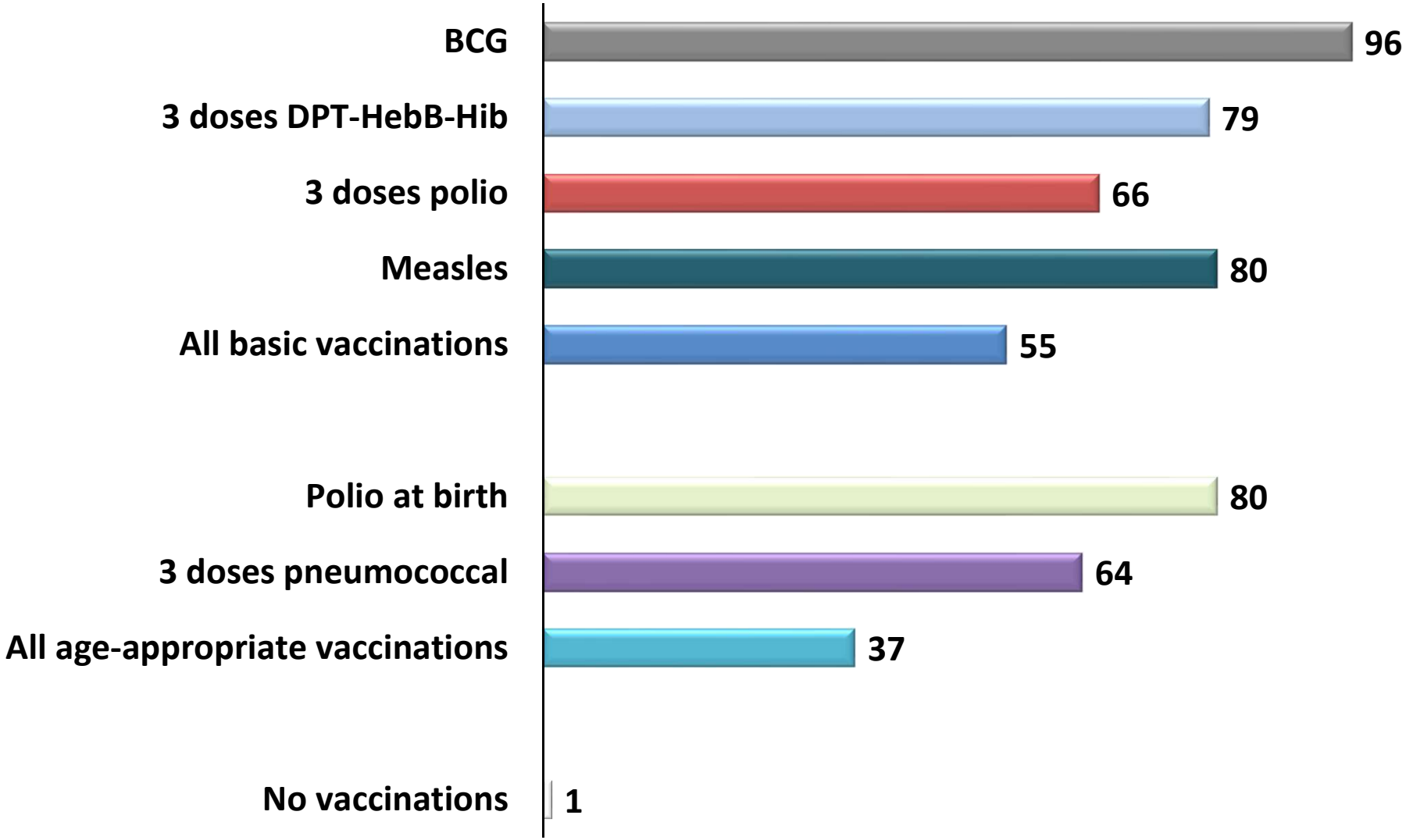
Deaths per 1,000 live births for the five-year period before the survey



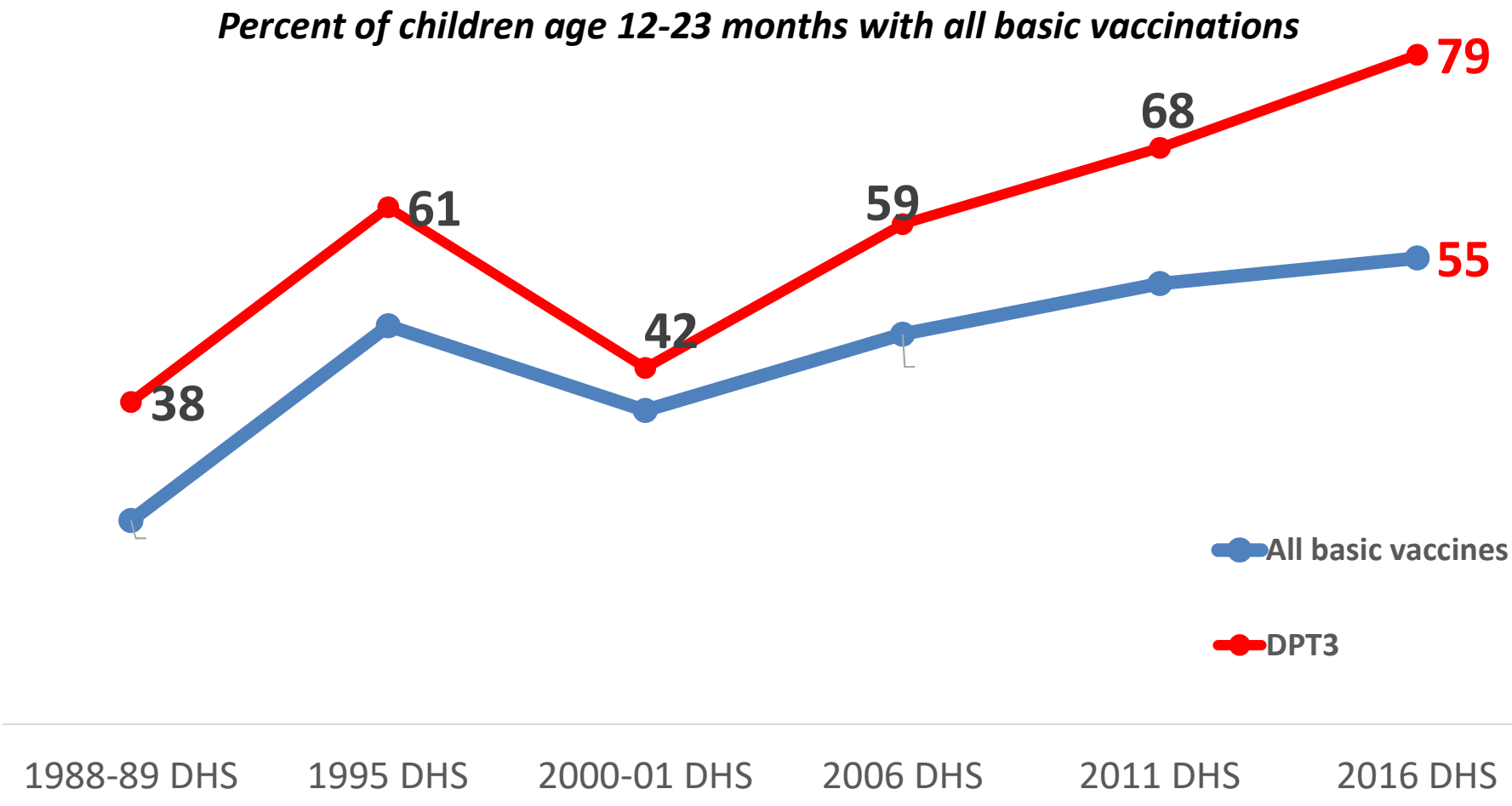
Childhood Vaccinations



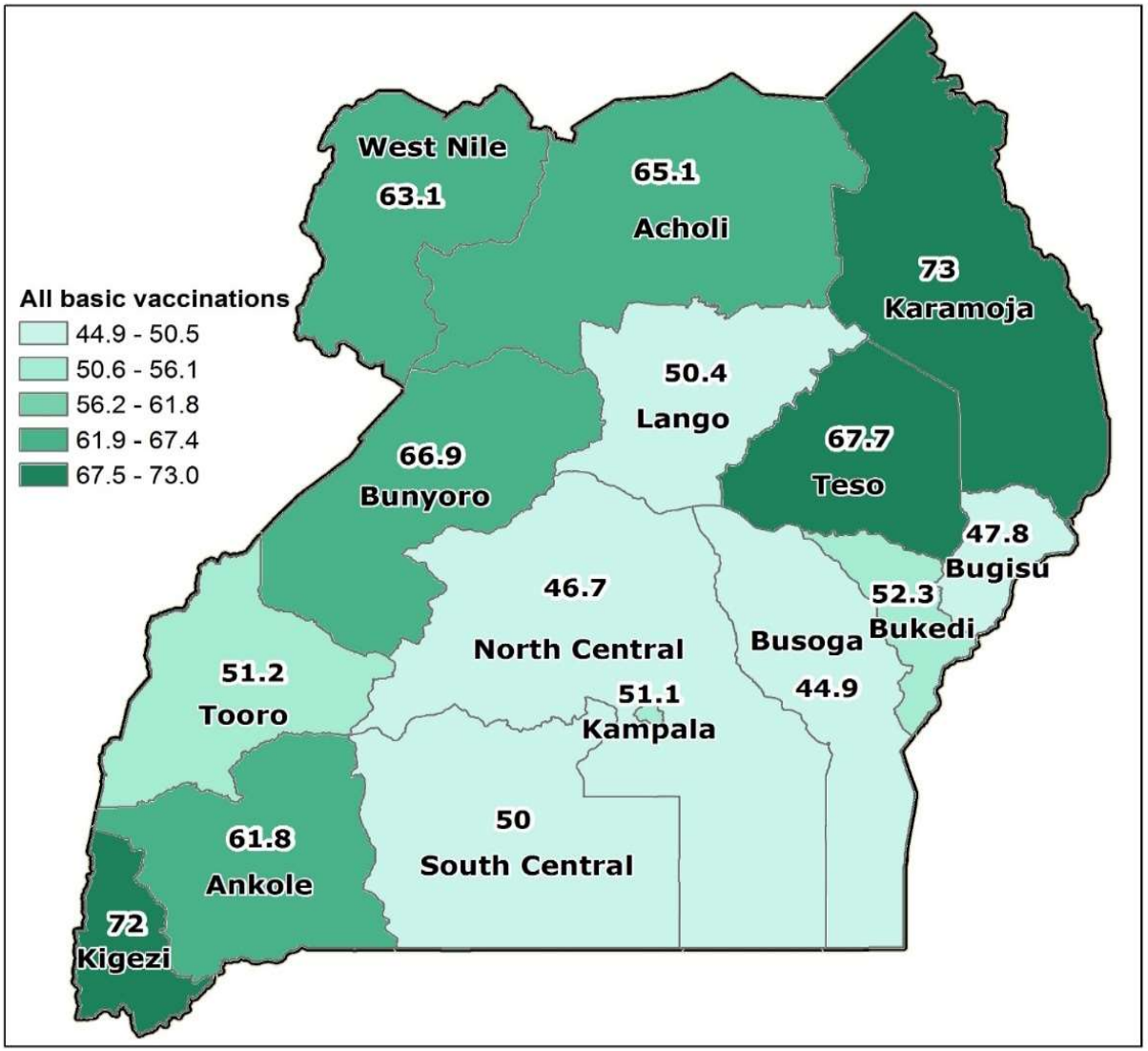
Percent of children age 12-23 months vaccinated



Trends in Basic Vaccination Coverage

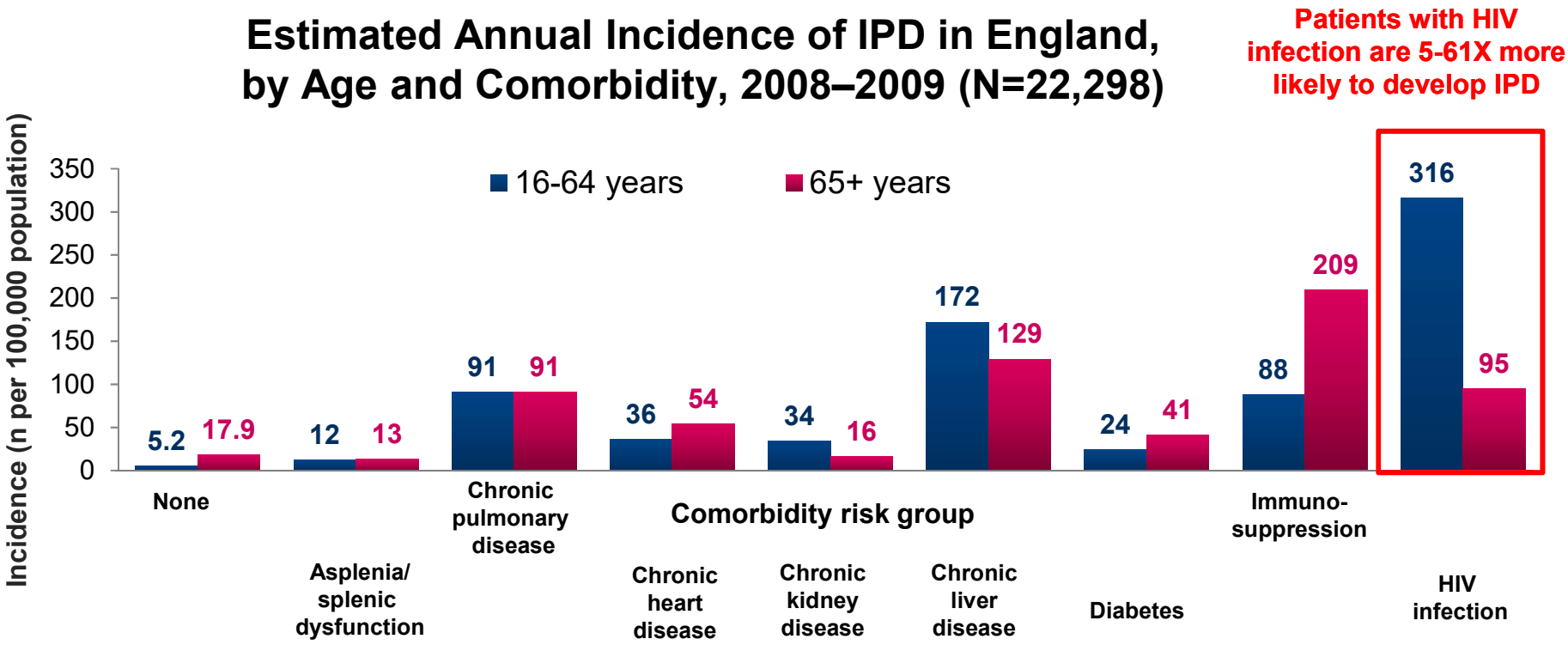


Children 12-23 months who received ALL basic vaccinations



Other Cross Cutting Issues

Comorbidities Can Increase Invasive pneumococcal disease



1. van Hoek AJ, et al. *J Infect*. 2012;65:17-24.

HIV=human immunodeficiency virus; IPD=invasive pneumococcal disease.

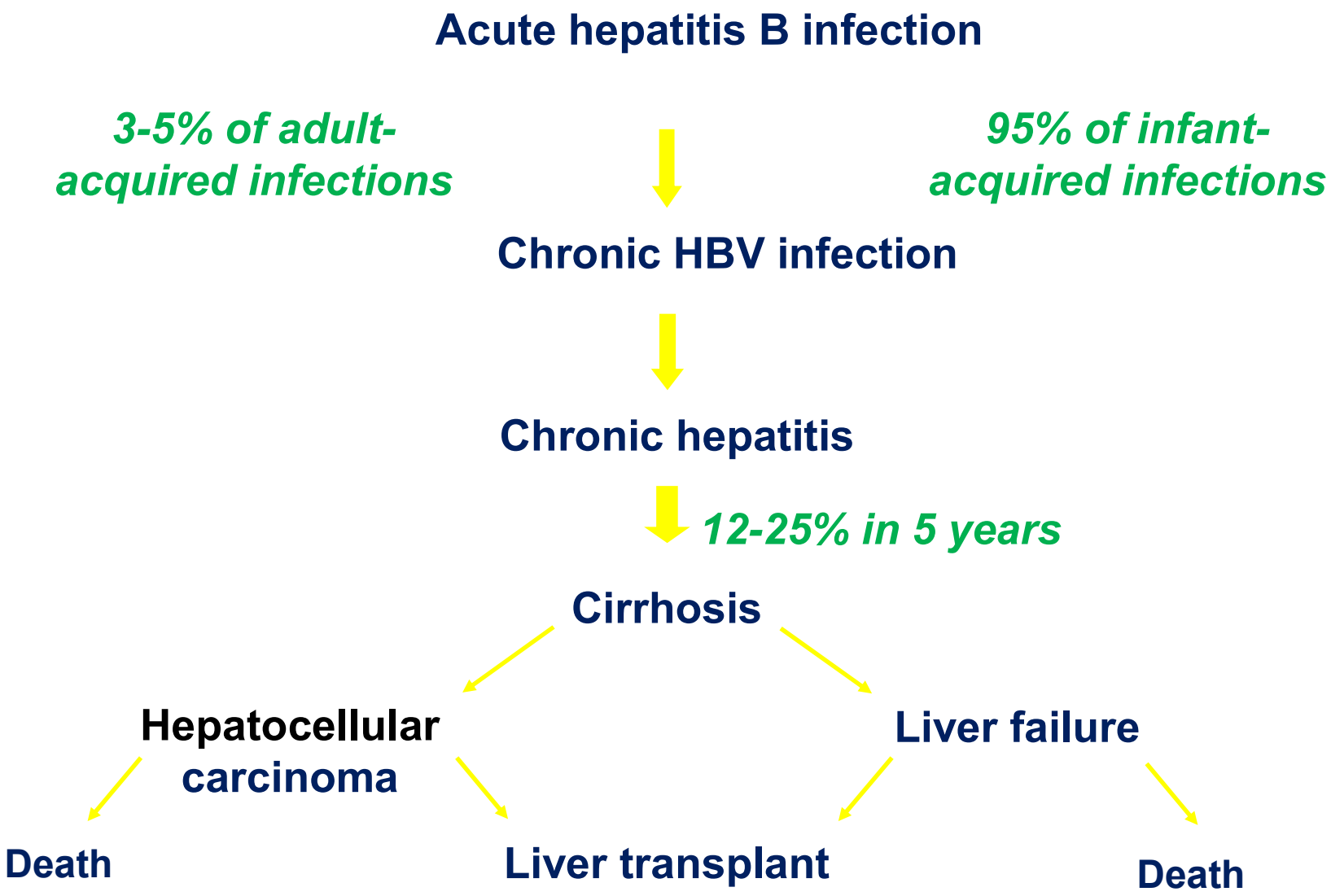
Impact of HIV on IPD among adults

- HIV-infected adults infected more commonly with "paediatric" pneumococcal serotypes[1]
- Patients infected with HIV often experience an elevated number of comorbidities, which increases their risk of IPD[2,3]
- Patients infected with HIV (even those on HAART) remain at substantial risk for IPD and mortality despite HAART, even those with normal CD4 counts[4,5]
- Patients With HIV Infection Are More likely to Experience Recurrent IPD[6]

Jones 1998; Karstaedt 2001, Feikin 2010, von Mollendorf 2016, Burgos 2012

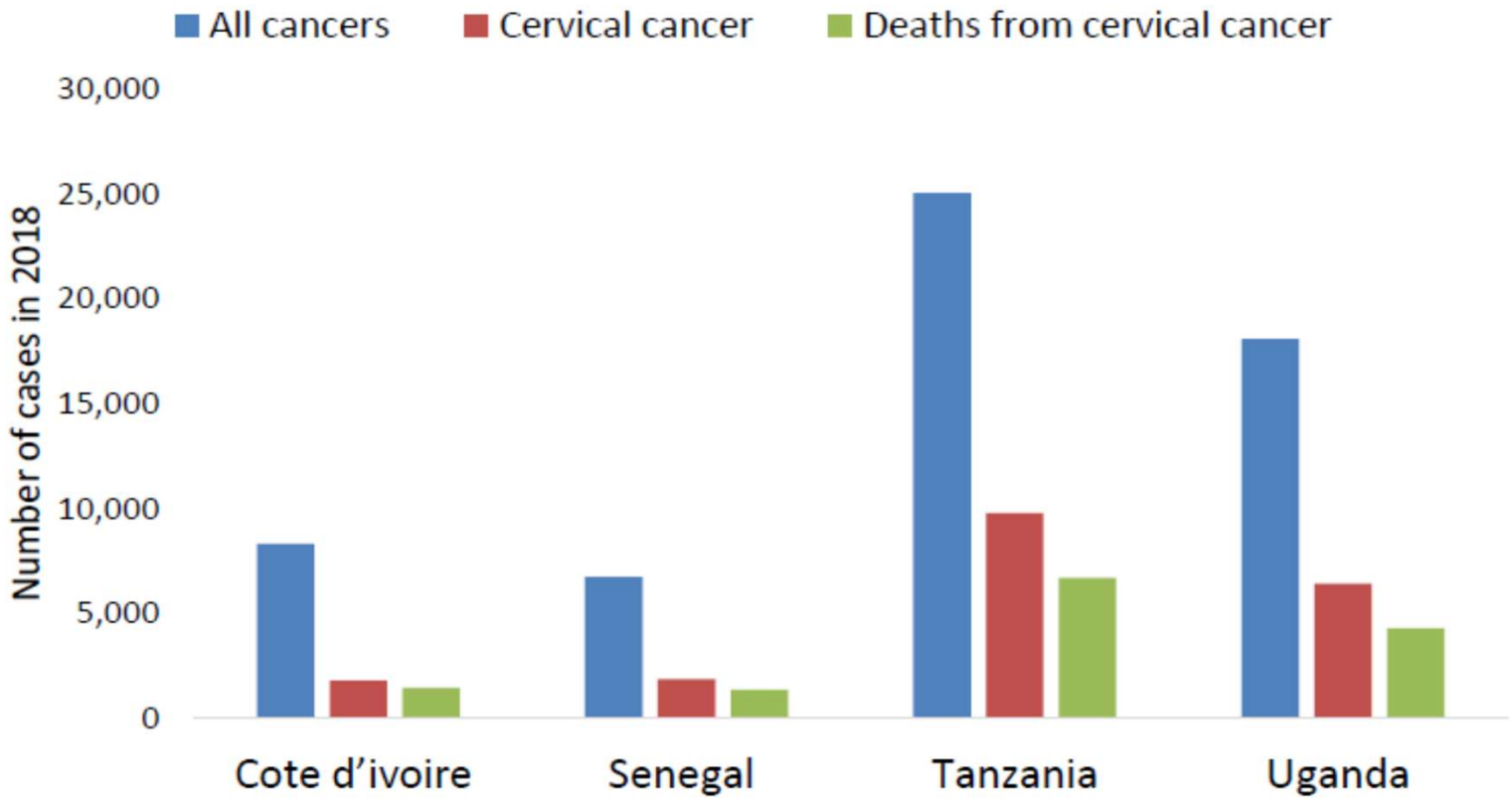
1. Crothers K, et al. Pulmonary complications of human immunodeficiency virus infection. In: Mason RJ, et al, eds. *Murray and Nadel's Textbook of Respiratory Medicine.* 5th ed. Philadelphia, PA: Saunders Elsevier; 2010:1914-1949. **2.** Weiss JJ, et al. *AIDS Patient Care STDS*. 2010; 24:39-48. **3.** Kyaw MH, et al. *J Infect Dis.* 2005;192:377-386. **4.** Yin Z, et al. *AIDS*. 2012;26:87-94. **5.** Cohen AL, et al. *AIDS*. 2010;24:2253-2262. **6.** Grau I, et al. *HIV Med*. 2009;10:488-495. **7.** World Health Organization (WHO). Initiative for Vaccine Research. Acute Respiratory Infections. http://www.who.int/ vaccine_research/diseases/ari/en/index3.html. Accessed August 27, 2013. **8.** Centers for Disease Control and Prevention. *MMWR Morb Mortal Wkly Rep.* 2012;61:816-819.

Hepatitis B as an emerging threat



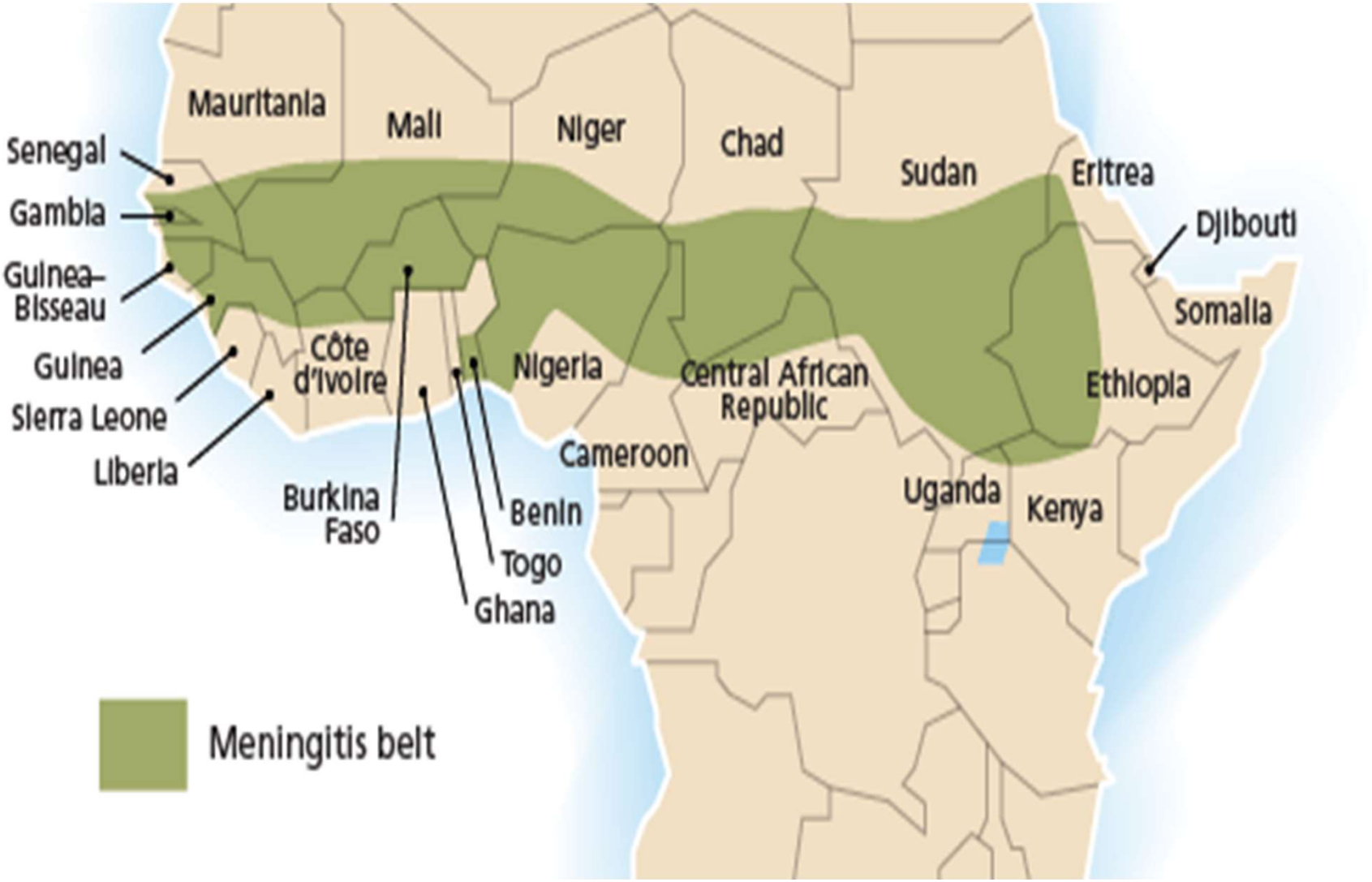
Recurrent measles outbreaks - co-exists or causes malnutrition

Poor performance of dose 2 of Human papillomavirus (HPV)



Commonest viral infection of the rep tract (> 100 types); Can cause cervical cancer, other cancers & genital warts; & > 85% of cervical cancer deaths are in L/MIC

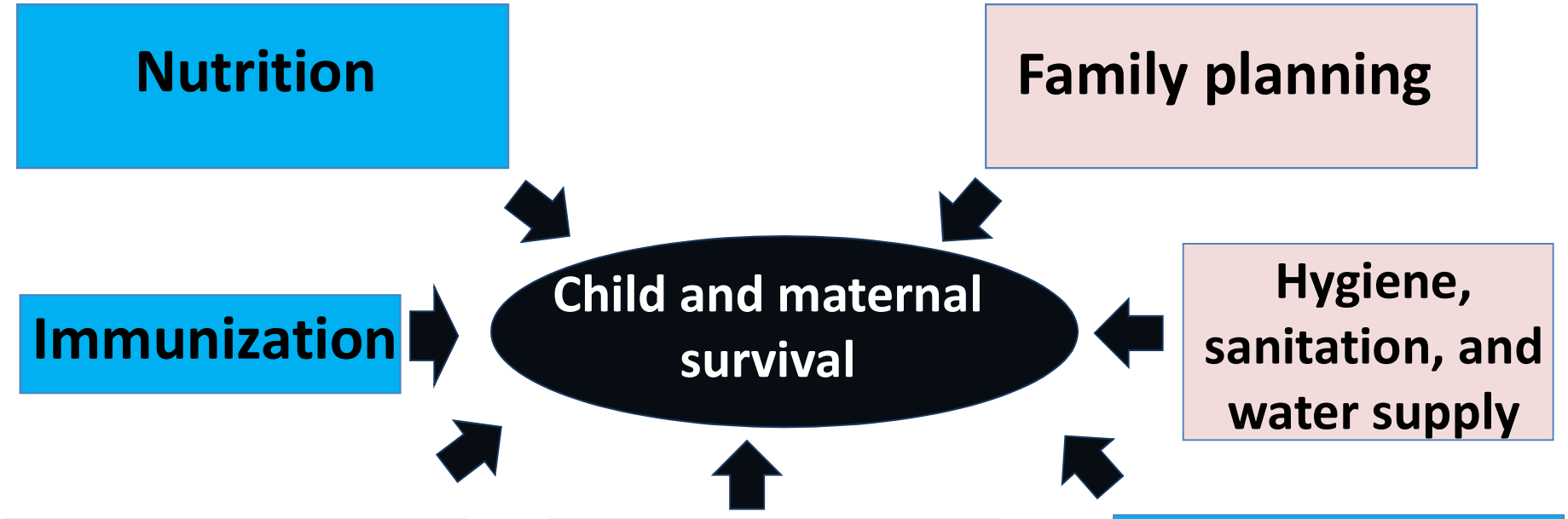
Meningitis etiology changing serotypes even along the Meningitis Belt



Tetanus as a new problem in the older child

Formulating Solutions

Ending preventable child deaths



Prevention and Treatment of Infectious diseases

- Pneumonia
- Diarrhea
- Malaria
- AIDS/PMTCT

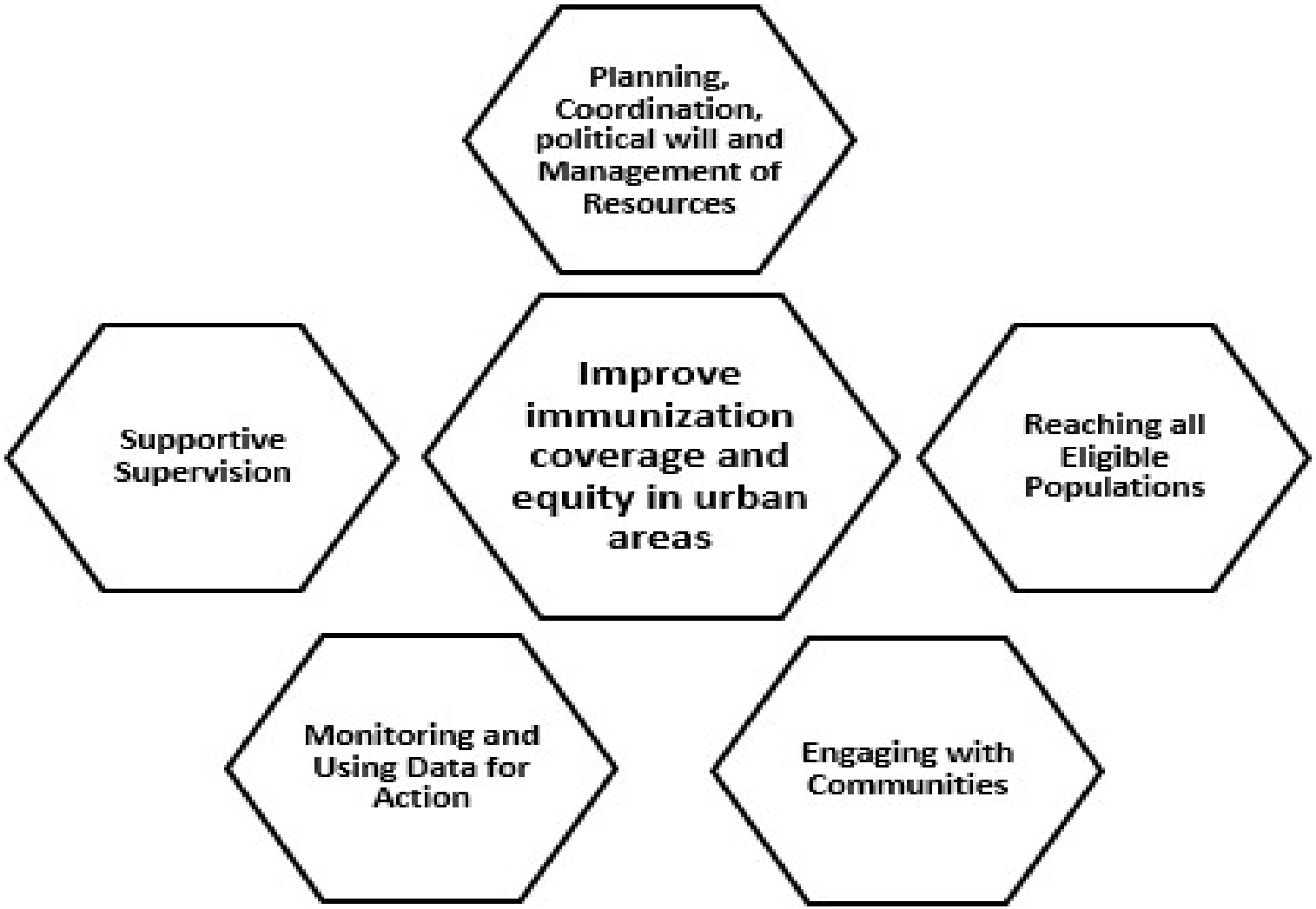
Enabling Environment

- Education
- Empowerment of women
- Economic growth
- Environmental factors (e.g. water supply, sanitation, hygiene)

Neonatal interventions

- Preterm birth complications
- Intra-partum events
- Neonatal infections
- Congenital abnormalities

Multifaceted approach to decrease the number of un/under vaccinated children



Driving & sustaining demand for vaccination

Governments and supply-side actors are responsible for fostering demand in two ways: "**stimulating**" (promoting, generating) and "**sustaining**"

Demand includes three primary actions:

- "**seeking**" (individual behavior)
- "**supporting**" (expressing a social norm)
- "**advocating**" (organized action to influence decision-makers)

Demand is a *behavior* requiring more than acceptance and is not directly measurable as coverage

unicef

The Global Action Plan for the Prevention and Control of Pneumonia (GAPP) Identifies Preventative Measures

Pneumonia morbidity and mortality could be reduced 50% if the following interventions are implemented

- Case management with Integrated Management of Childhood Illness (IMCI)
  - Community-based
  - Facility-based
- **Vaccination**
  - **Pneumococcal conjugate**
  - Hib
  - Pertussis
- Improvement of nutrition/low birth weight
  - Breastfeeding
  - Complementary feeding after 6 months
  - Micronutrient intake
- Control of indoor air pollution
- Prevention and management of HIV infection

WHO. Global Action Plan for the Prevention and Control of Pneumonia. http://whqlibdoc.who.int/publications/2008/9789241596336_eng.pdf. Accessed June 5, 2011.

Interventions

- Other interventions besides vaccines to prevent pneumonia cases/deaths
  - Improved nutrition/micronutrient supplementation
  - Encourage breastfeeding
  - Reduced indoor air pollution
  - Case management
    - Early access to appropriate antibiotics/oxygen therapy
- Advantages of PCV immunization compared to other interventions:
  - PCV has proven effectiveness
  - Immunization programs available in low-income countries
  - Prevention prevents having to treat

There is need to establish collaborative efforts with other regions

- MENA Network
  - Network for influenza surveillance
- ECAVI – SAVIC/NESI/Consortium Of Christian Relief And Development Organizations in Ethiopia
  - Research
  - Training – online vaccinology course
  - ECAVI vaccinology course
- Paediatric associations (KPA/UPA/PAT/KEPRECON)
  - Frequent CMEs on vaccine matters
  - Vaccinology symposia during annual conferences
- VACFA & AfroADVAC – Wits University
  - Vaccinology course

There is need for improved surveillance for VPDs

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DOI: 10.1111/irv.12628

NON-COMMISSIONED: REVIEW, EXPERT COMMENTARY, MEETING REPORT

WILEY

Influenza surveillance in Middle East, North, East and South Africa: Report of the 8th MENA Influenza Stakeholders Network

Suleiman Abusrewil[1] | Abdulrahman Algeer[2] | Alanoud Aljifri[3] | Fatima Al Slail[3] | Melissa K. Andrew[4] | Mohamed Awad Tag Eldin[5] | Salah Al Awaidy[6] | Nissaf Ben Alaya[7] | Jalila Ben Khelil[8] | Ghassan Dbaibo[9] | Fawzi Derrar[10] | Omar Elahmer[11] | Nada Ghosn[12] | Guelsah Gabriel[13] | Cindy Grasso[14] | Mohamed Hassan[15] | Siddhivinayak Hirve[16] | Yusuf Kamal Mirza[17] | Yousef Moh'd Rateb[18] | Jalal Nourlil[19] | Marta C. Nunes[20] | Idris Omaima[21] | Oliver Ombeva Malande[22] | Mitra Saadatian-Elahi[23] | Valentina Sanchez-Picot[14] | Malik Sk. Mamunur Rahman[24] | Hesham Tarraf[21] | Sibongile Walaza[25]

Recent publication from our influenza surveillance network

Need for more research on current and new vaccines – and vaccine health systems

PLOS ONE | https://doi.org/10.1371/journal.pone.0212270 February 14, 2019

RESEARCH ARTICLE

Barriers to effective uptake and provision of immunization in a rural district in Uganda

Oliver Ombeva Malande[1,2,3]*, Deogratias Munube[1,2,4], Rachel Nakatugga Afaayo[1], Kisakye Annet[5], Bongomin Bodo[5], Andrew Bakainaga[5], Elizabeth Ayebare[6], Sam Njunwamukama[1], Edison Arwanire Mworozi[1,2,4], Andrew Munyalo Musyoki[7]

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Barriers to immunization identified in Hoima study

- Some of the facilities have no vaccine fridges
- Delivery of the gas to the various facilities is hampered by transport and funding difficulties
- Poor geographical and road terrain – hard to reach areas
- Inadequate immunization health promotion and education – to caretakers
- Program or system in place for identification, reporting and management of Adverse Events Following Immunization (AEFIs) is NOT well understood.

PLOS ONE | https://doi.org/10.1371/journal.pone.0212270 February 14, 2019

Training

- **Vaccinology Course for health professionals**
  - This year is 5th edition, annual 5-day course, held every year in June
  - Over 400 health professionals have now been trained
  - The goal is to train a critical mass of mid-level vaccine managers (targeting 1000 in the next 5-10 years) across the entire region.
  - Last years course had 90 participants from 12 African countries
- **Refresher trainings for health workers at District level involved in Vaccines –**
  - Kanungu, Wakiso, Kaberamaido, Hoima, Yumbe, Kampala
- **Resources – Downloadable from ECAVI website - On any vaccine related country information**

ECAVI 4TH Vaccinology Course 2018

Training urban immunization health care workers in Wakiso District

Training rural vaccine health workers in Western Uganda

During a vaccines CME at a tertiary Hospital, Kampala Uganda

Participating at a practical training session for vaccinators at Wakiso Health Centre

Participating at a practical training session for vaccinators at Wakiso Health Centre

Facilitating a vaccinology symposium at the annual paediatric scientific conference

Our recent expert opinion jointly written by ECAVI and WHO Uganda on introduction of Hep B birth dose

Supplement article

PanAfrican Medical Journal

Commentary

Delayed introduction of the birth dose of Hepatitis B vaccine in EPI programs in East Africa: a missed opportunity for combating vertical transmission of Hepatitis B

Bongomin Bodo[1,&], Oliver Ombeva Malande[2,3]

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Key words: Hepatitis B, Expanded Program for Immunization (EPI), East Africa

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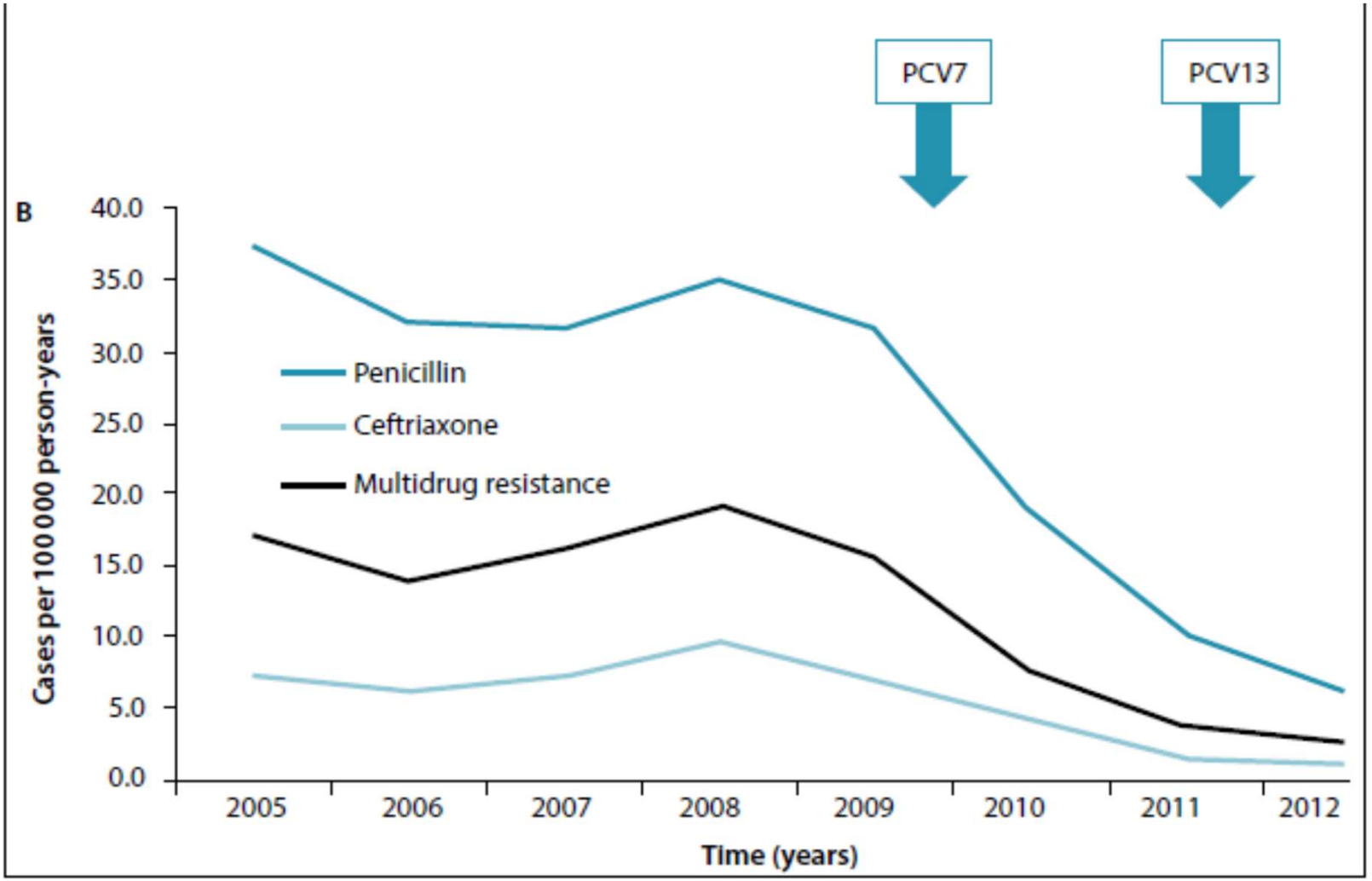
Vaccination is an important strategy for addressing antibiotic resistance?

- Vaccination is a very effective way to stop infections thus preventing need for antibiotics.
    - The global increase in disease caused by drug-resistant bacteria, due to overuse and misuse of antibiotics – vaccination protects against these diseases
    - It is more difficult and costly to treat antibiotic-resistant infections
        - For example, one child immunized and protected fro pneumonia prevents an estimated 11 million days of antibiotic use each year.
    - Flu vaccine effectively use prevents need for “unnecessary” antibiotics commonly wrongly prescribed in URTIs
- Use of vaccines for common diseases will help preserve antibiotics for needed cases eg Group A Strep for which we do not yet have vaccines.
- New vaccines targeting Staph, Klebsiella, C.difficile could protect people against diseases that are increasingly difficult to treat.

Rates of disease by non susceptible isolates among children < 2 years of age in SA, 2005- 2012 (PCV7 and PCV13 were introduced in 2009 and 2011 respectively)



A J Brink,[1] MB ChB, MMed (Clin Micro); G A Richards,[2] MB BCh, PhD, FCP (SA), FRCP SAMJ May 2015, Vol. 105, No. 5

How a successful immunization programme can be measured

- Coverage: national – province – district –catchment area/pop
- Impact: reductions in incidence and mortality of VPDs and U5MR
- Equity: All children have equal uptake of vaccination (not only equal access but actual uptake)
- Cost-effectiveness: Effectively delivered programme
- Demand: Parent satisfaction with services, vaccination as a norm, sustained demand for vaccines, resilient demand
- Safety: Vaccination services are safe, AEFI are effectively investigated
- Data: Data is timely and of high quality, easy accessible
- Cold chain and supplies: Well distributed and resilient cold chain. Effective and responsive supply chains
- Outbreak response: Sensitive surveillance and rapid and effective response
- Health worker satisfaction: HWs who are accountable, proud of their work and feel appreciated.
- Disease elimination / eradication
- Self-sufficiency: A well-integrated programme that is independent of external support, PHC/UHC.
- Political support: A programme that is strongly supported by local and national leaders, legislation and NGOs.

10 Key Burden Priority areas

1. Hesitancy and negative messaging – antivaccine groups
2. Adverse events following immunization (AEFIs) – Id/Reporting
3. Measles and tetanus in the older child as re-emerging diseases
4. Need to introduce Hep B birth dose & Rubella Vaccine into the N-EPIs
5. Polio eradication bottle necks
6. Influenza virus as an emerging threat – surveillance & vaccine
7. Cold chain and vaccine stockouts/transportation/delivery to rural & remote areas of Africa
8. Health worker training & support supervision
9. HPV vaccine uptake – especially the second dose
10. Maternal Vaccination to prevent disease in early infancy

The East Africa Centre For Vaccines and Immunization (ECAVI)

Our Motto: One more.....

- One more child saved from pneumonia through vaccination
- One more child saved from Diarrhoeal death through vaccination
- One more woman saved from cervical cancer through vaccination
- One more Child saved from a measles death through vaccination
- One more health professional advocating for vaccines
- One more East Africans informed about the importance of vaccines
- One more..... one more..... One more.....

The future belongs to those who believe in the beauty of their dreams

Together – we can win the war against vaccine preventable illnesses

May our choices reflect our hopes, not our fears…