

Swiss TPH



Swiss Tropical and Public Health Institute
Schweizerisches Tropen- und Public Health-Institut
Institut Tropical et de Santé Publique Suisse

Alte und "neue" Krankheiten: von Malaria bis Ebola und Zika

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Swiss Tropical & Public Institute, Basel

Naturwissenschaftliche Gesellschaft Winterthur: 27.1.2017



Inhalt

- Kontext
- Malaria und vernachlässigte Tropenkrankheiten sowie «Emerging / re-emerging diseases»
- Zoonosen
- Ebola eine Zoonose
- Die Ebola Epidemie 2014/15 in West-Afrika
- Was lernen wir für die Zukunft ?

Burden of diseases of poverty and NTDs in context

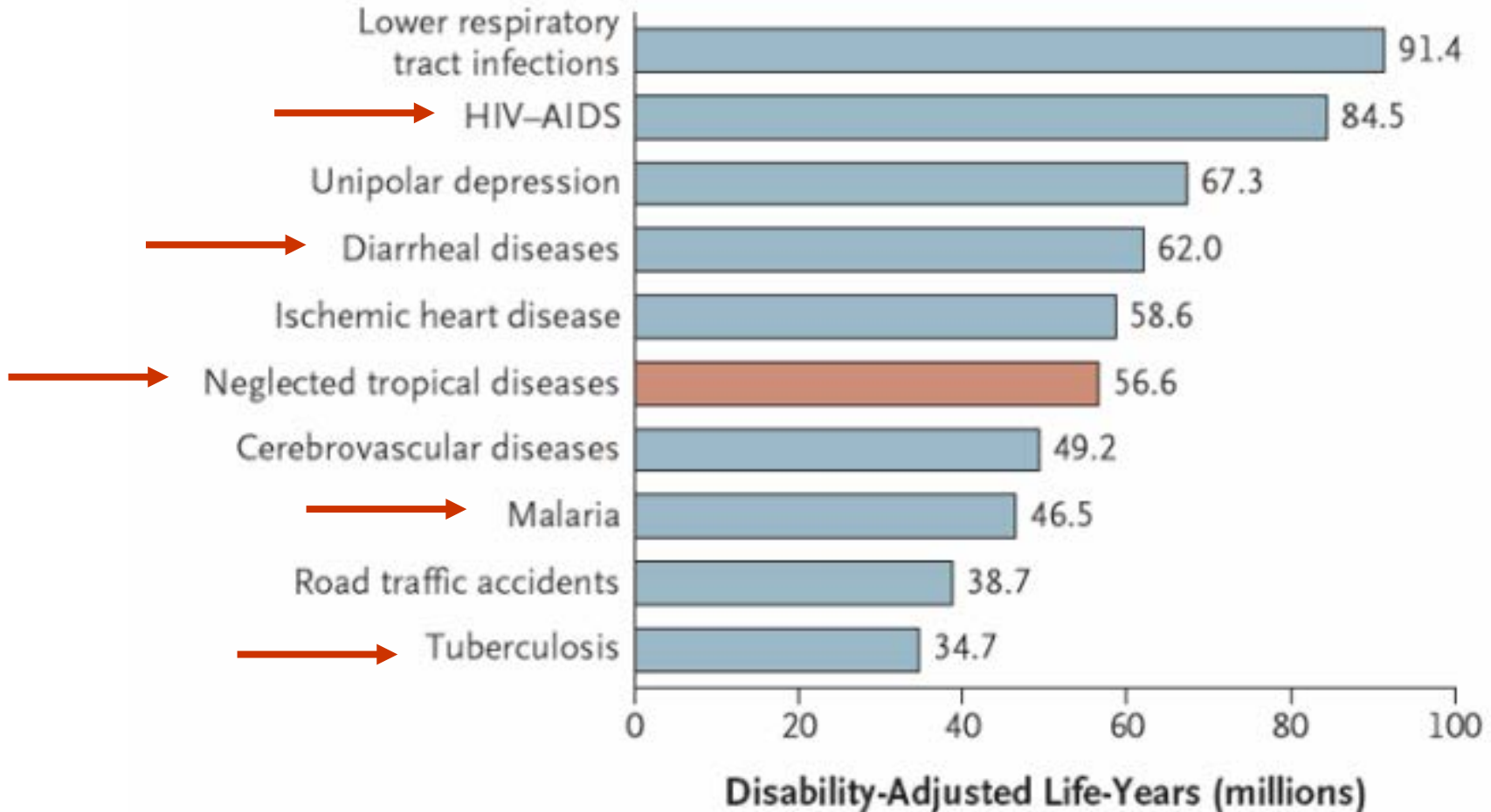


Figure 1. The 10 Leading Causes of Life-Years Lost to Disability and Premature Death.

CURRENT CONCEPTS

Control of Neglected Tropical Diseases

Peter J. Hotez, M.D., Ph.D., David H. Molyneux, Ph.D., D.Sc.,
Alan Fenwick, Ph.D., Jacob Kumaresan, M.B., B.S., Dr.P.H.,
Sonia Ehrlich Sachs, M.D., Jeffrey D. Sachs, Ph.D., and Lorenzo Savioli, M.D.



Bürde der Malaria – pro Jahr:

2'100 mio **exponiert**

300 - 500 mio **infiziert**

100 - 150 mio **erkrankt**

0.7 mio **Todesfälle**

40 mio **gesunde Lebensjahre** (DALYs)

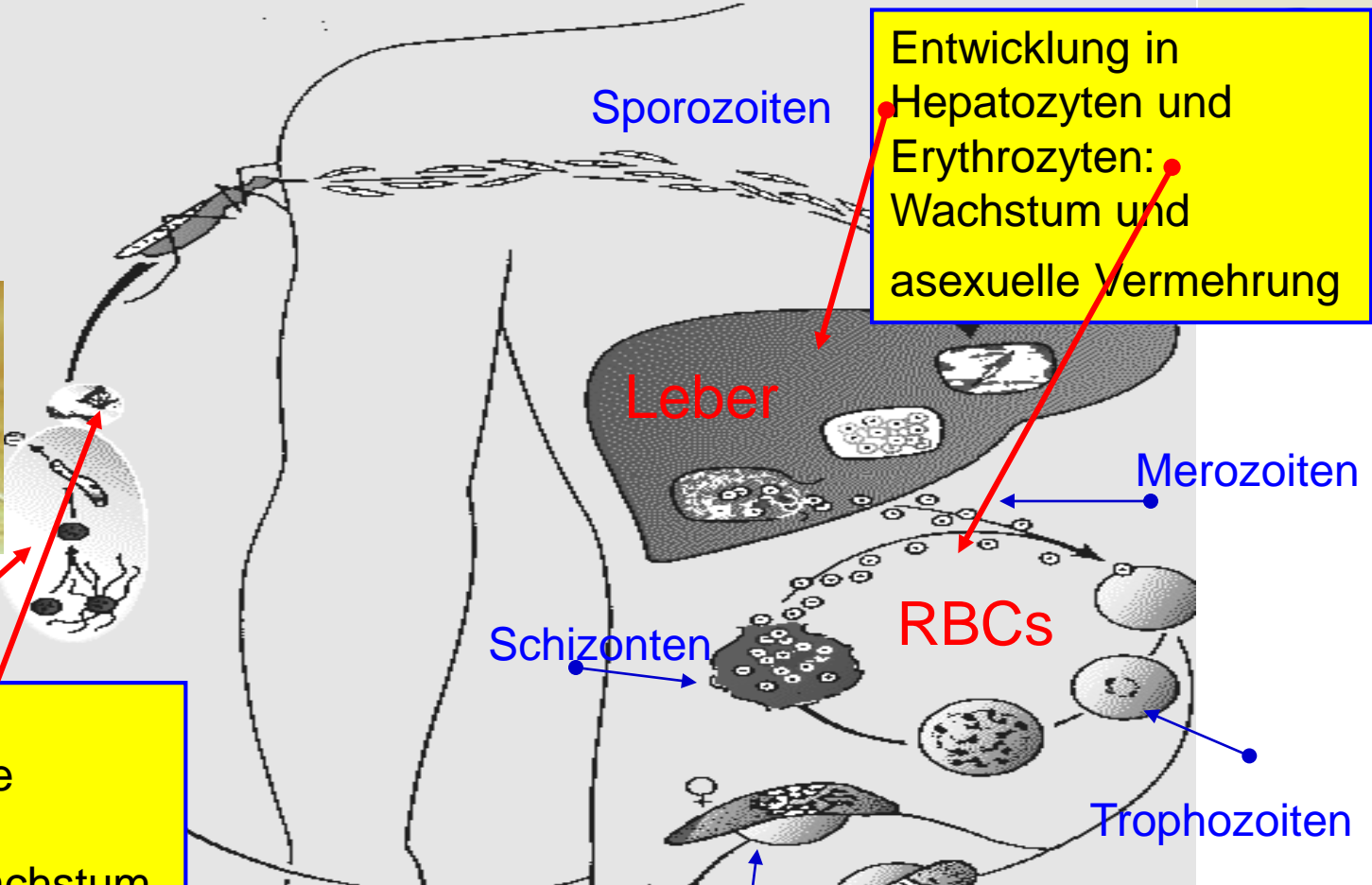
1 Todesfall alle 60 Sekunden

90 % Afrika südlich der Sahara

Europa: 12'000 importierte Fälle/Jahr

Schweiz: ca. 2-300 Fälle/Jahr, davon 1-3 tödlich

Überträger Anopheles



Entwicklung in Hepatozyten und Erythrozyten: Wachstum und asexuelle Vermehrung

Entwicklung vom Mitteldarm bis in die Speicheldrüsen: Rekombination, Wachstum und asexuelle Vermehrung

Komplexität – Virtuosität:

- Zyklus
- Epidemiologie
- Entwicklung der Resistenzen

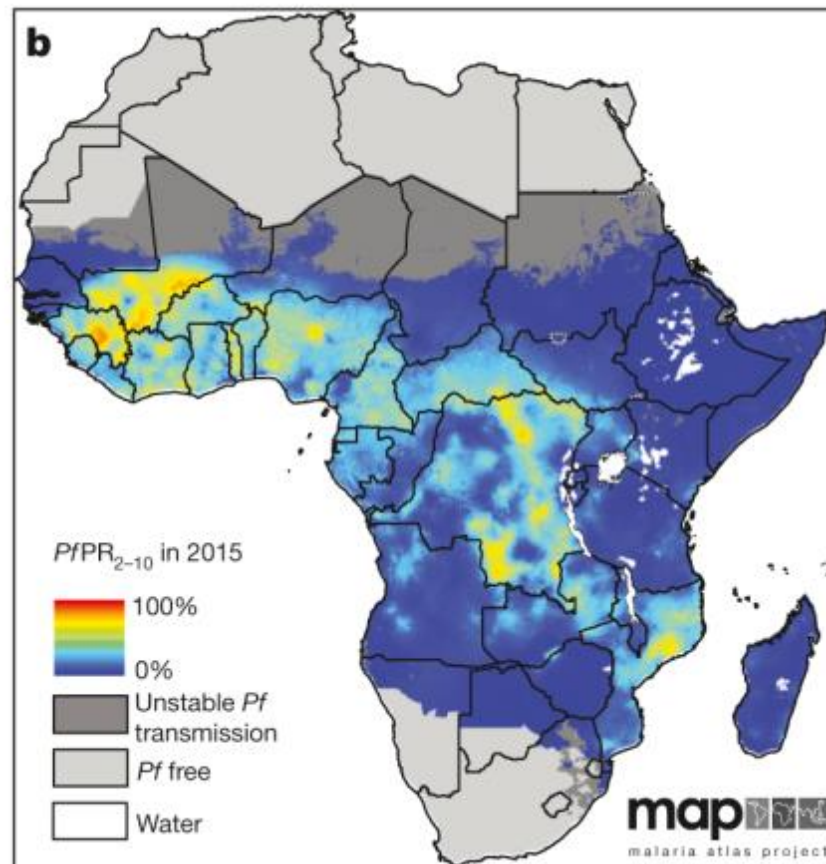
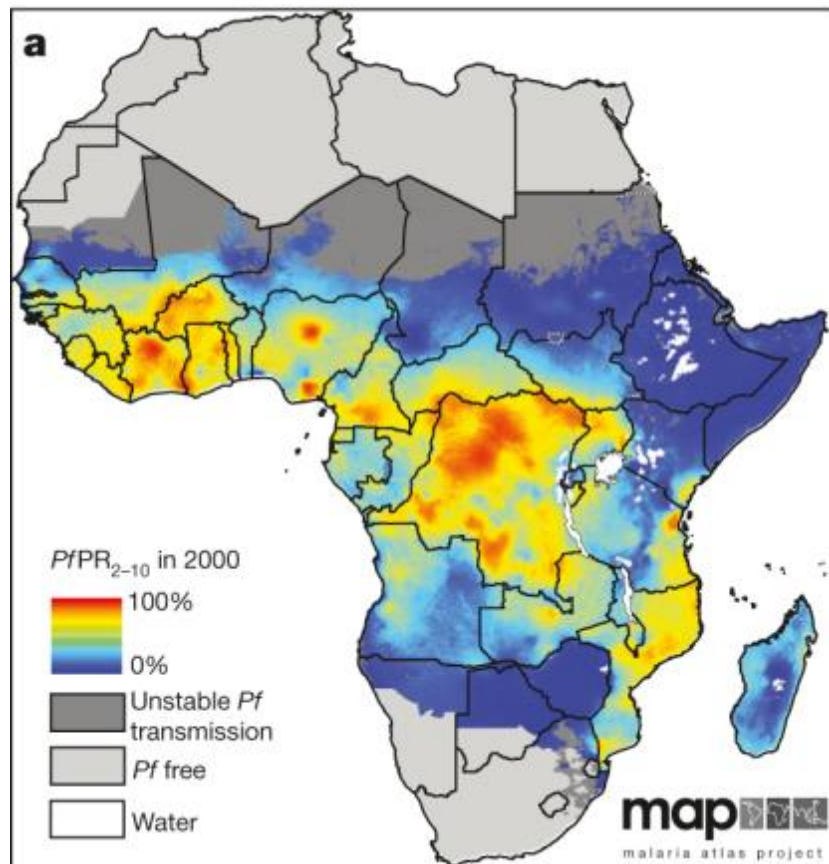
Gesundheitssystems
Kein Impfstoff



Malariagebiete

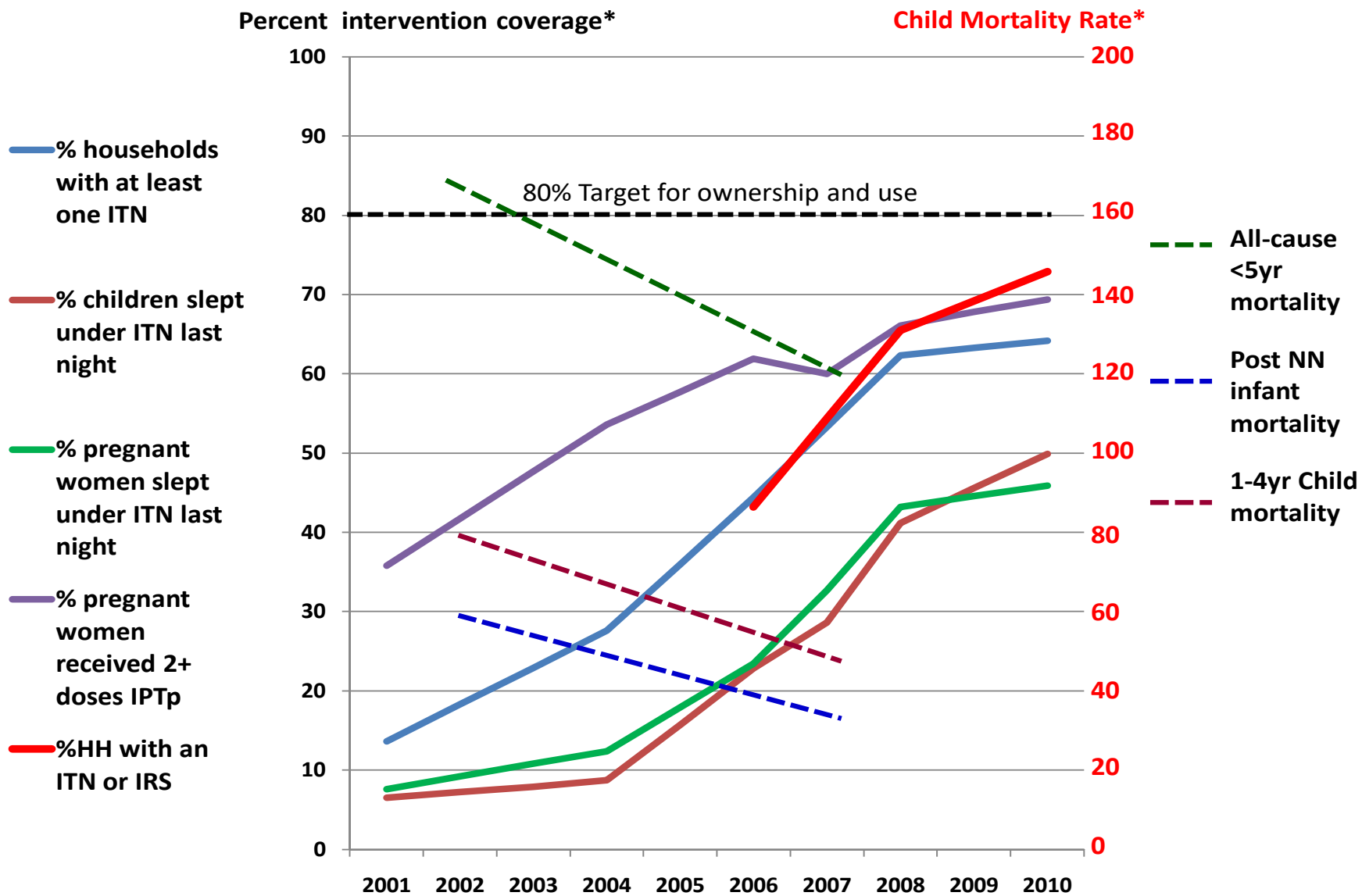
- **Oekologie & Klima**
- **Demographie**
- **Sozio-ökonomie, Kultur**
- **Art der Parasiten & Ueberträger**
- **Struktur & Funktion des Gesundheitswesens / Versorgung**
- **Entwicklungsprojekte**

Malaria prevalence: 2000 to 2015



Malaria mortality: 25% decline globally, 33% decline WHO African region
Over past decade - > 1 million lives saved

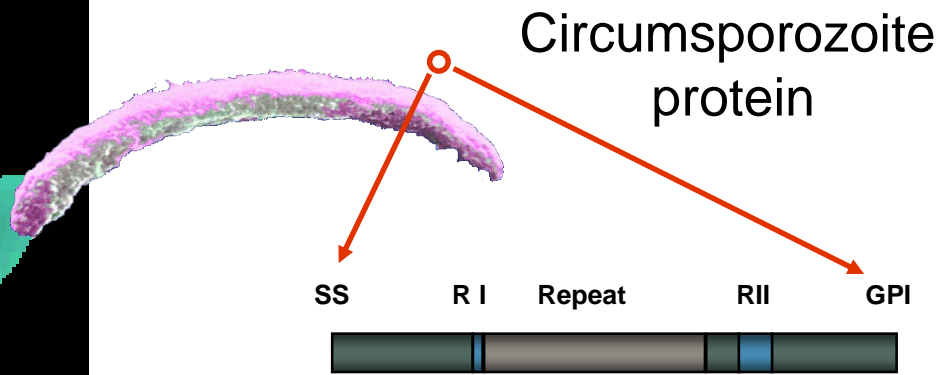
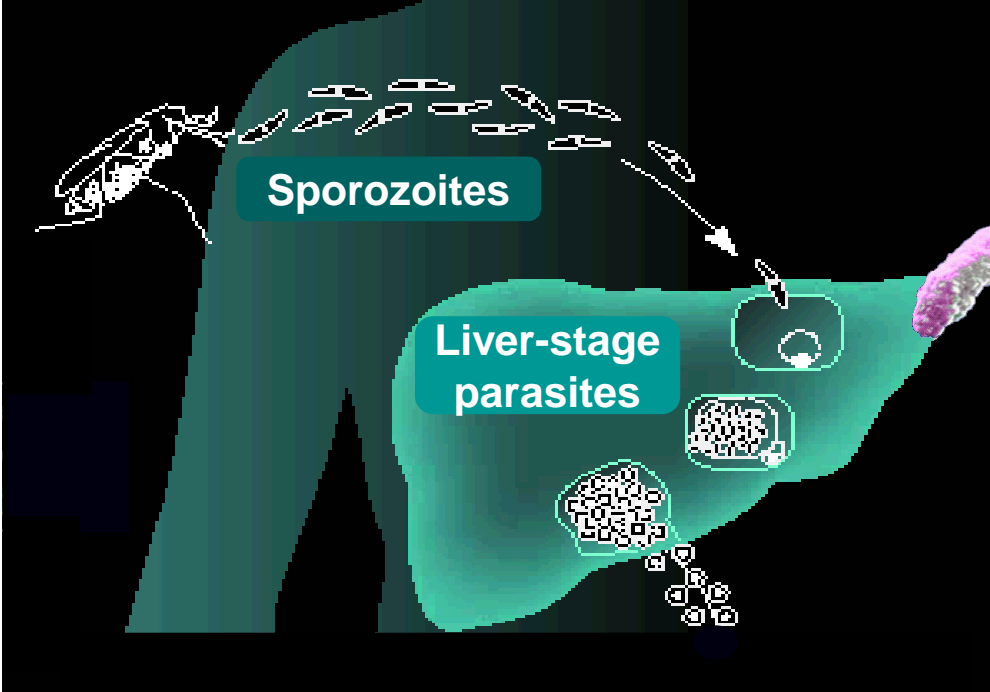
Zambia: Malaria intervention coverage and child mortality declines 2001-2010



* Measured percent coverage per DHS and MIS; Child mortality rates per DHS 2001-2 and DHS 2007

The GSK malaria vaccine candidate (RTS,S/AS)

Genetically engineered central CS-tandem repeat fused with S-antigen of HBs



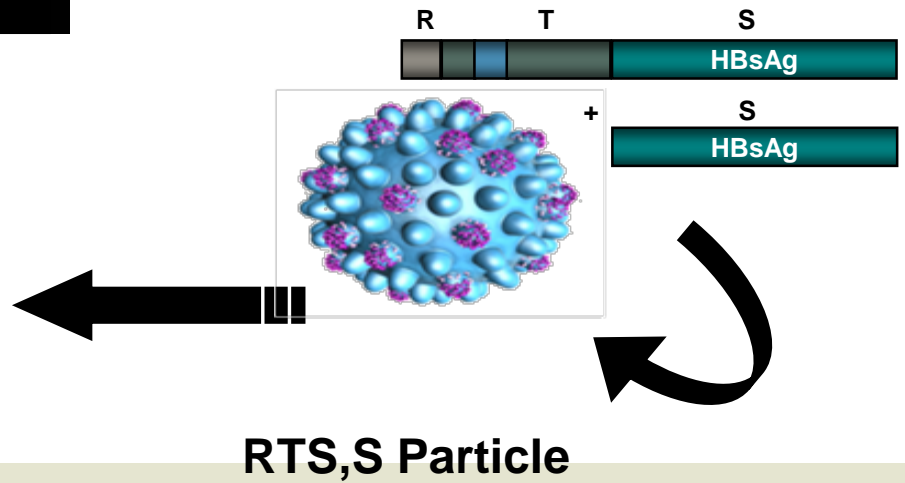
1997: 6/7 protected – phase 2a
 (Stoute et al. 1997)

1998: Field trials The Gambia

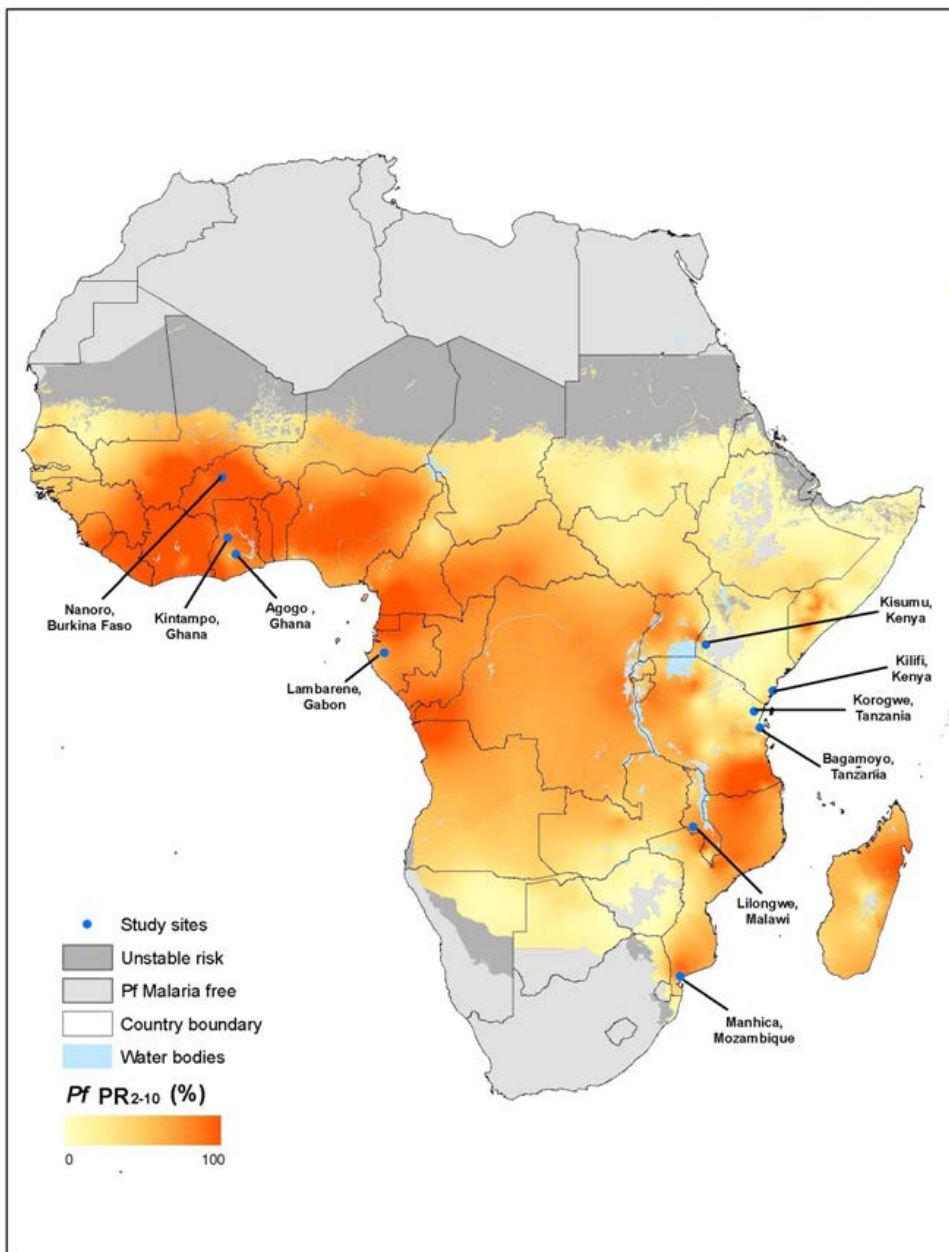
Clinical episodes first two months:
 65 % (38 - 80)

Clinical episodes full trial period:
 16 % (-16 - 39)

(Bojang et al. 2001)



RTS,S Particle



Randomized, controlled, double-blind trial designed to evaluate vaccine efficacy, safety, reactogenicity, and immunogenicity in children up to 32 months after the administration of the first dose of vaccine.

Two age categories:

- Children 6-12 weeks of age: **7100**
- Children 5-17 months of age: **8900**

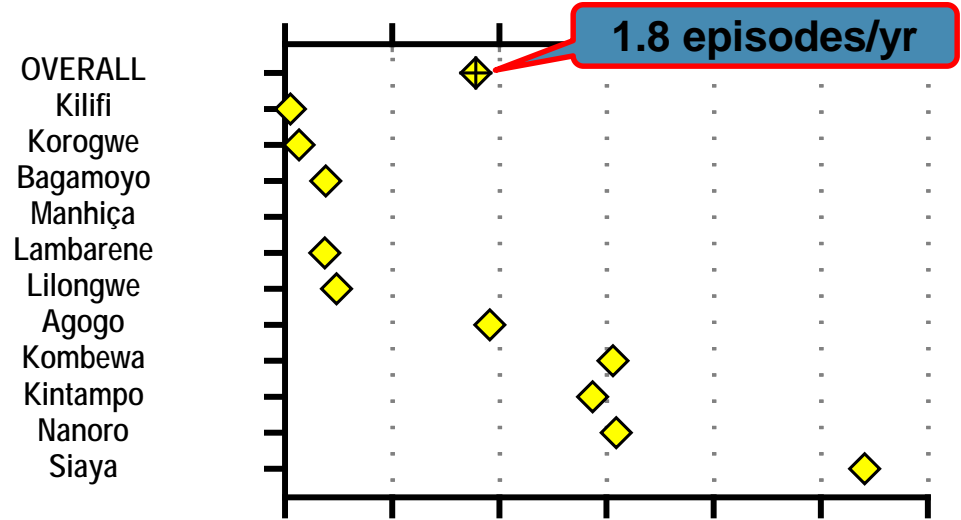
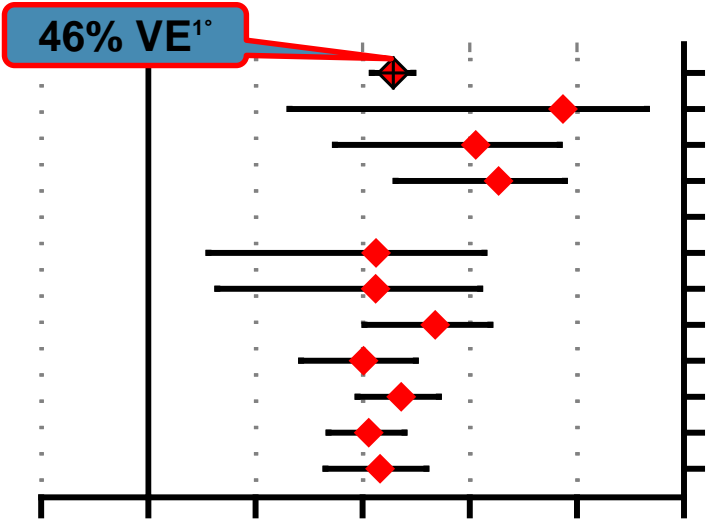
11 centers in 7 African countries

By 31 January 2011: **ALL** enrolled

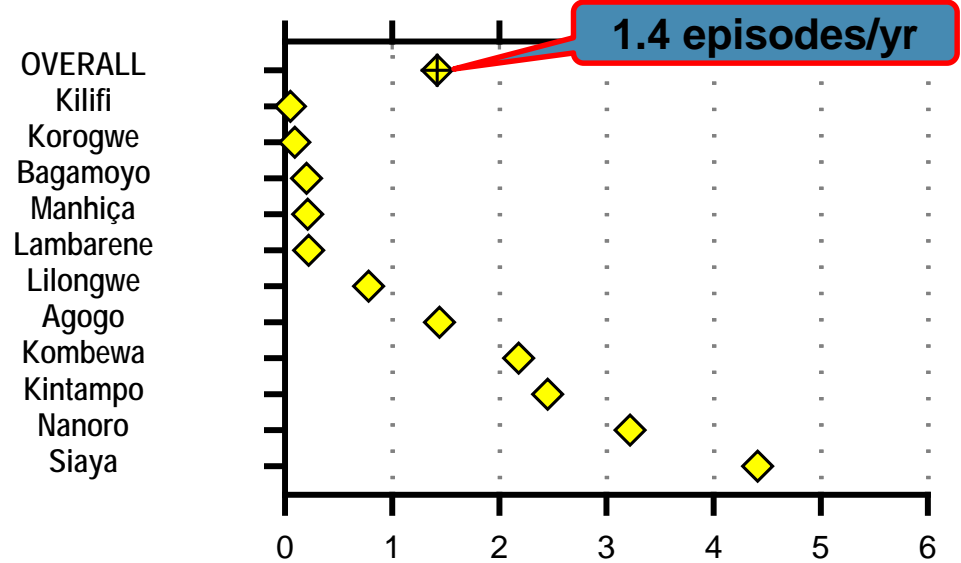
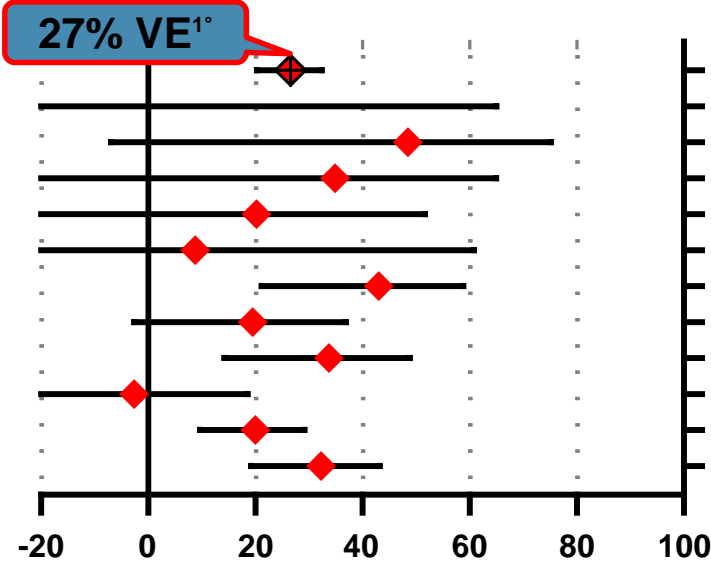
The co-primary endpoints of the trial are: vaccine efficacy against clinical malaria after 12 months of follow-up in each age category.

Vaccine Efficacy over 18 months follow-up [ATP] and Malaria Incidence in Controls

5-17 months



6-12 weeks

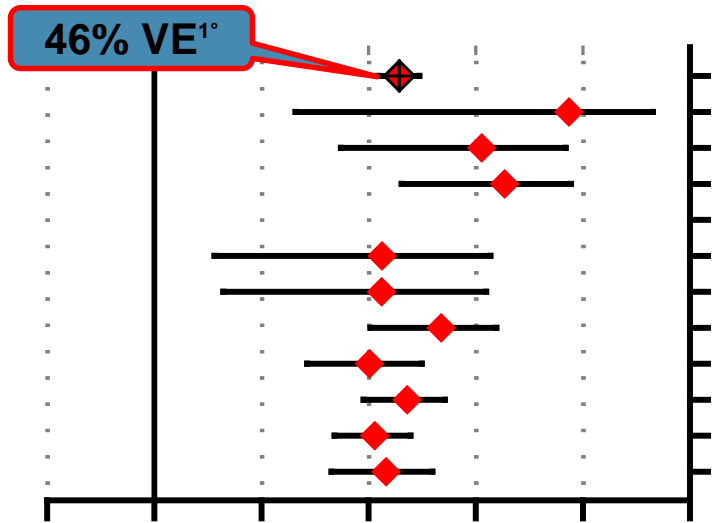


◆ Vaccine Efficacy (% and 95%CI)
 Negative binomial regression

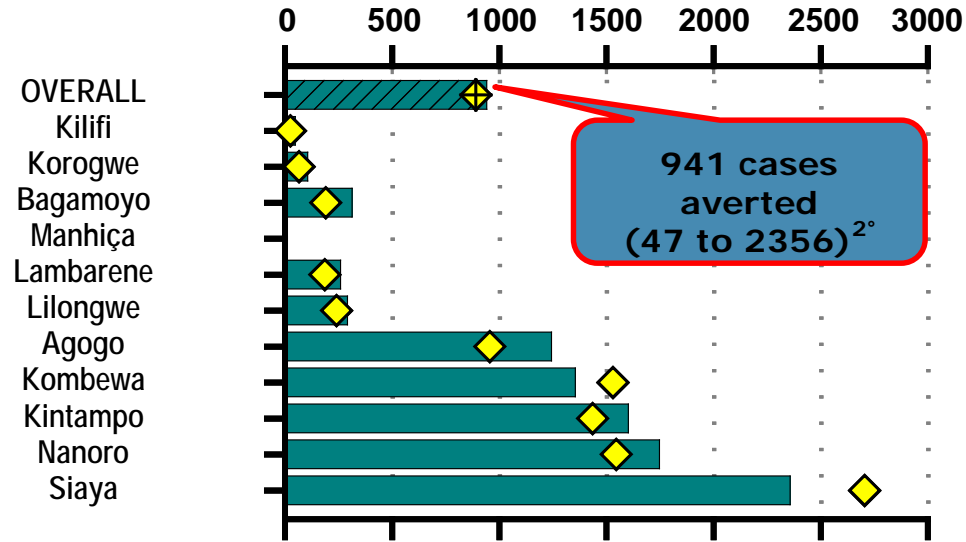
◆ Incidence in control group
 (number of episodes per person year at risk)

Impact of RTS,S/AS01 on clinical malaria over 18 months of follow-up

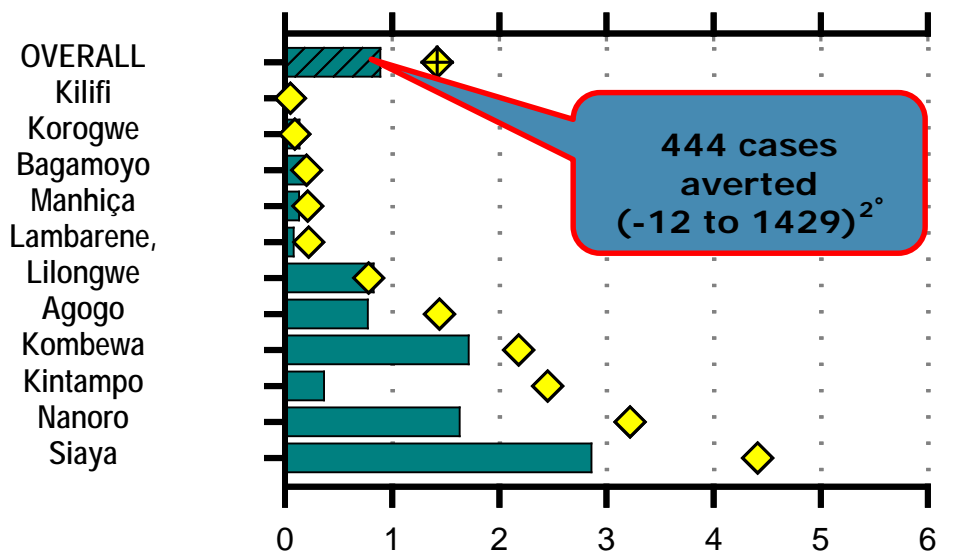
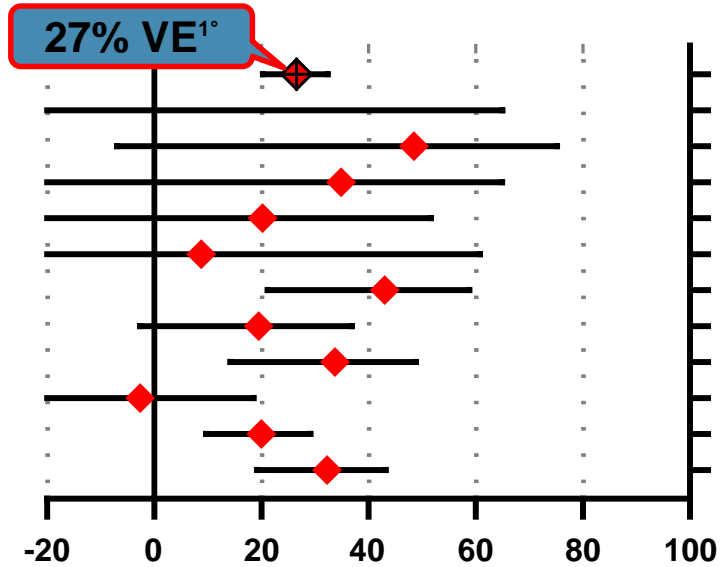
5-17 months



Number of cases averted
(per 1000 children vaccinated)



6-12 weeks



◆ Vaccine Efficacy (% and 95%CI)
Negative binomial regression

◆ Incidence in control group
(number of episodes per person year at risk)

Was es zu erreichen gilt...



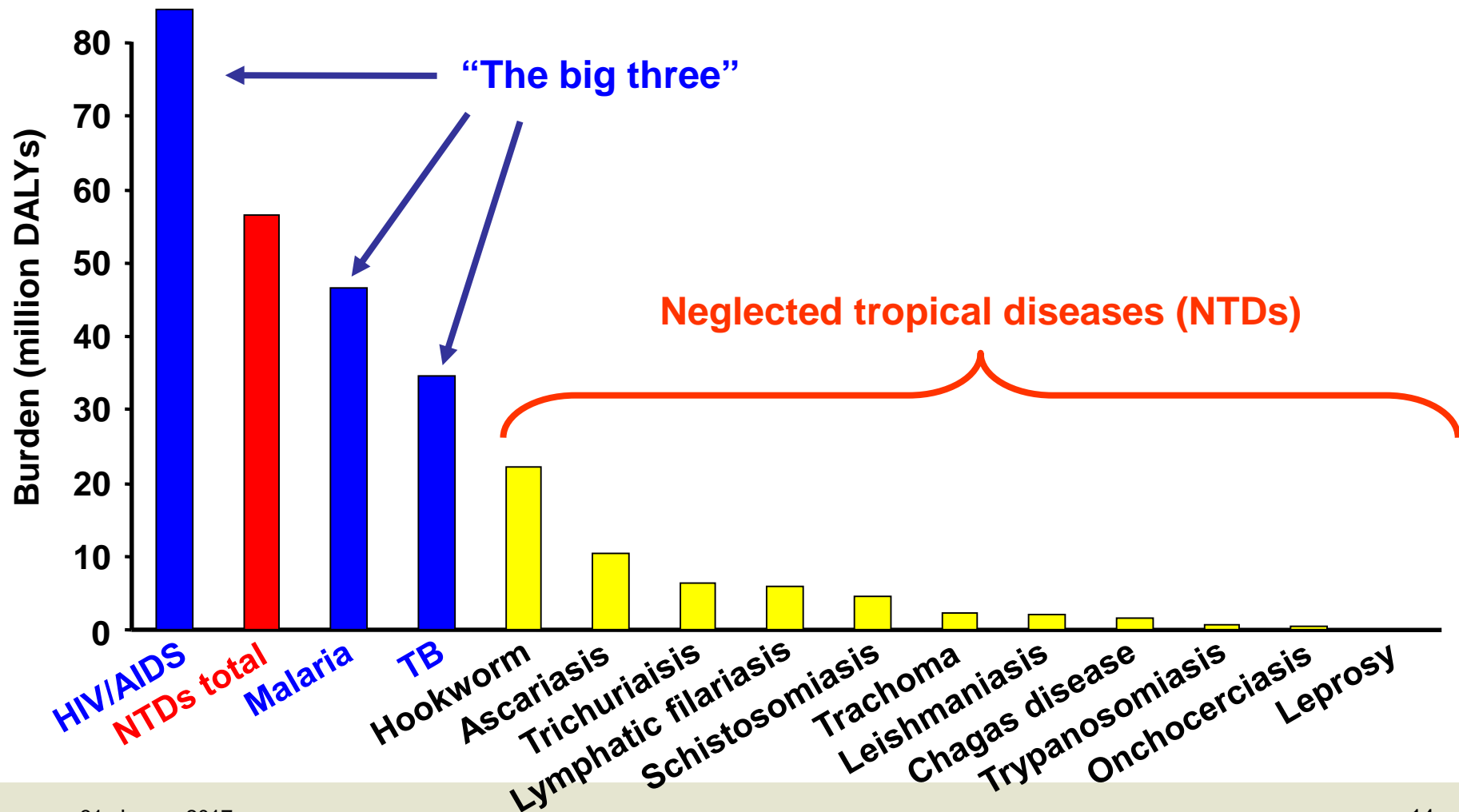
**Auch Impfung – nicht als Zauberschlag
sondern Teil eines integrierten Ansatzes**



**Kombination der Ansätze
angepasst an:
Sozio-kulturelle und sozio-
ökonomische Situation
Verbinden von ökologischem
mit Public Health-Ansatz**



Bürde weltweit – pro Jahr





Emerging – Re-emerging Diseases

Ebola (andere hämorrhagische Viren),
SARS, MERS, Vogelgrippe... → **Zoonoses**

Trypanosomiasis, Dengue, Buruli ulcer, ...

→ **Neglected diseases, re-emerging** ↔

**Umwelt (physisch, sozio-politisch) –
Oeko- und Sozialsysteme**

**1400 Pathogene
800 in Mensch und Tier**

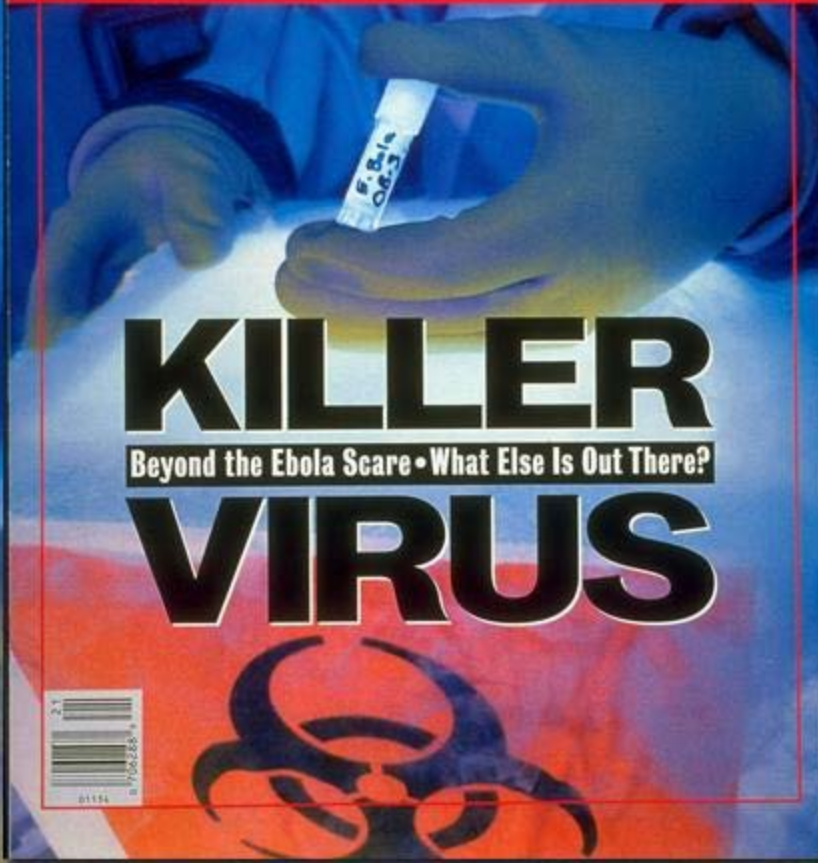
**Neglected diseases
Neglected people
Neglected health and social systems**



CALIFORNIA DREAMING: PETE WILSON'S CHALLENGE

Newsweek

May 22, 2014 \$3.99



KILLER Beyond the Ebola Scare • What Else Is Out There? VIRUS



Zika Virus



COUNTRIES W CONFIRMED ZIKA



- UGANDA
- NIGERIA
- TANZANIA
- EGYPT
- CENTRAL AFRICA
- REPUBLIC
- SIERRA LEONE
- GABON
- INDIA
- MALAYSIA
- PHILIPPINES
- THAILAND
- VIETNAM
- INDONESIA



Dengue



- Dor atrás dos olhos
- Tontura
- Manchas vermelhas
- Dor nas articulações
- Naúseas e vômitos
- Fragueza
- Perda de peso
- Dor de cabeça
- to no nariz e na gengiva

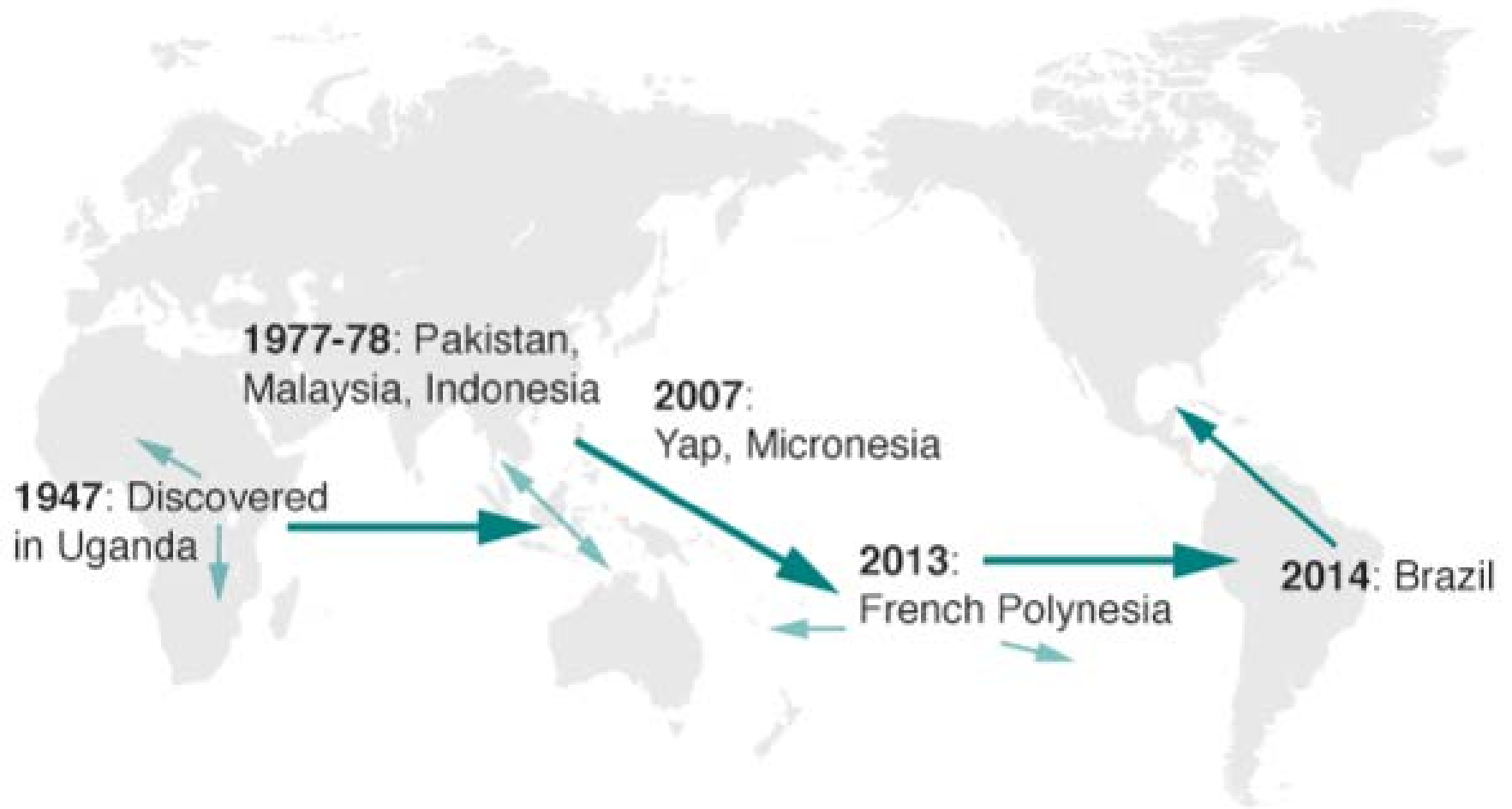
gunya



- Dor de cabeça
- has
- Febre alta
- Dor nas costas
- s vermelhos
- Lesões com pontos brancos e vermelhos na pele
- Dor nas articulações

Fonte: Ministério da Saúde

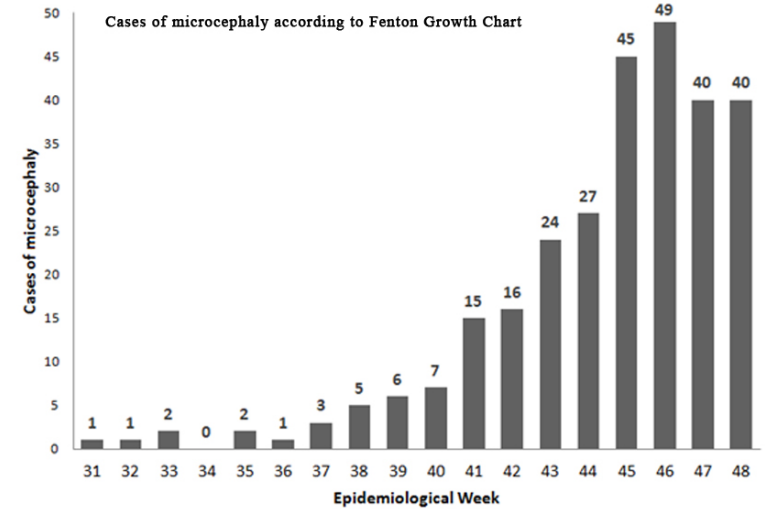
How Zika virus spread from Africa



Source: Lancaster University

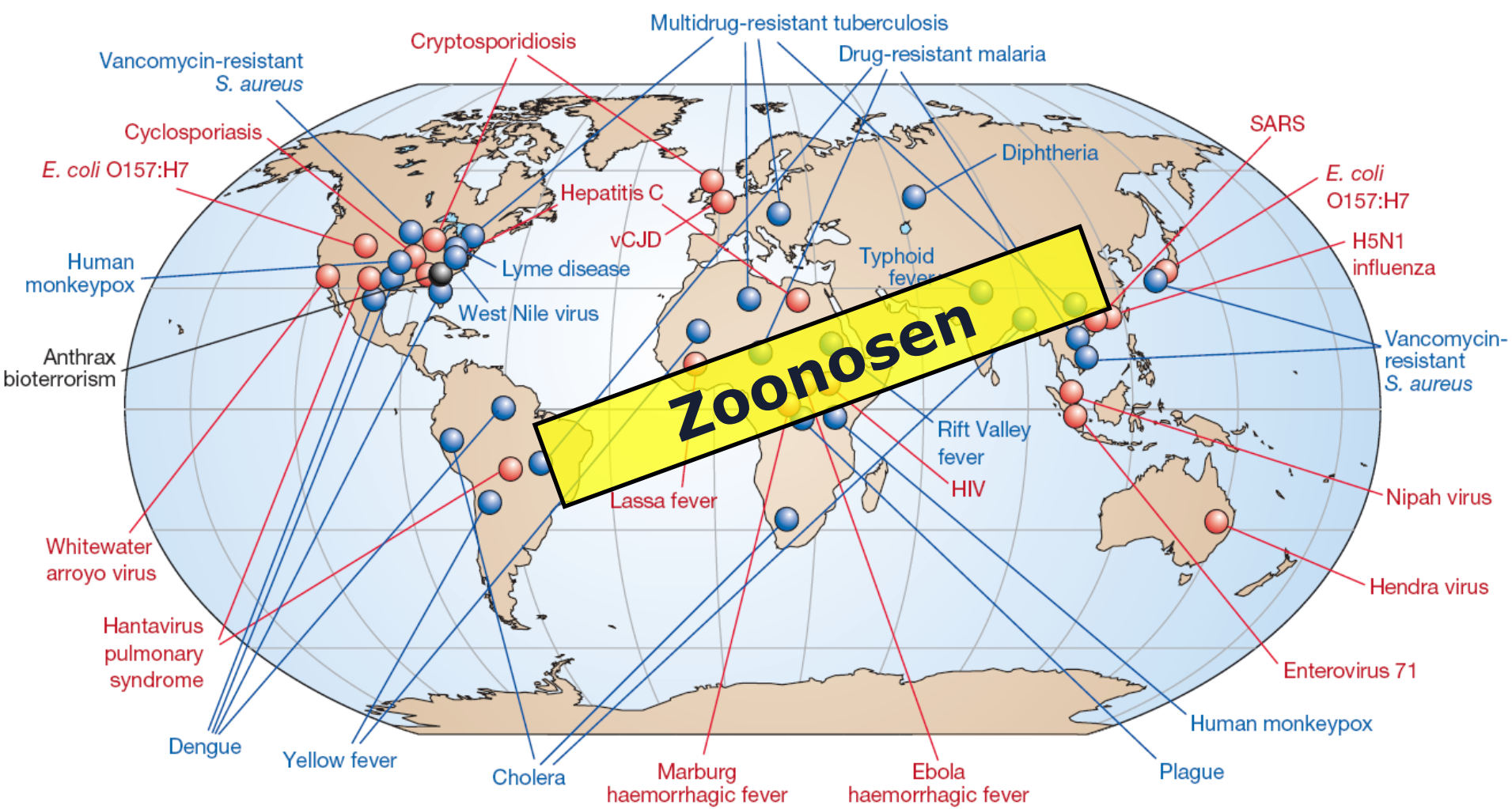


Zika Virus



Emerging global challenges impacting health

Emerging and re-emerging diseases

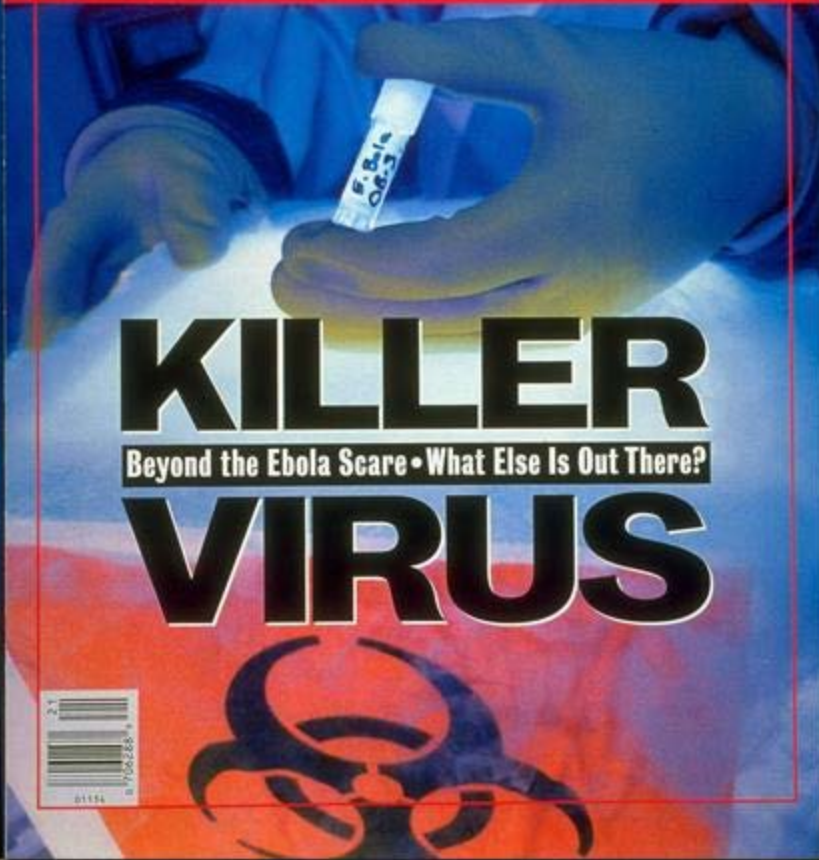




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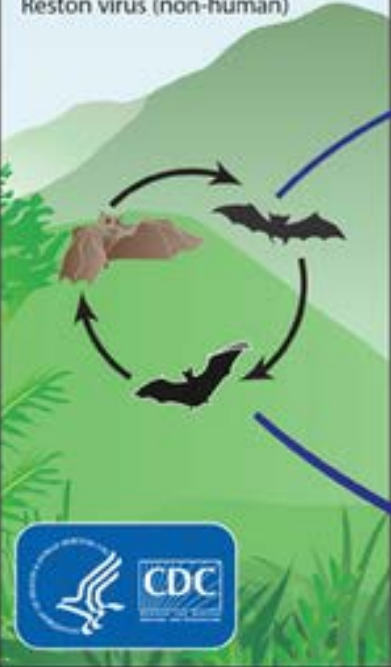


KILLER Beyond the Ebola Scare • What Else Is Out There? VIRUS



Enzootic Cycle

New evidence strongly implicates bats as the reservoir hosts for ebolaviruses, though the means of local enzootic maintenance and transmission of the virus within bat populations remain unknown.

Ebolaviruses:
 Ebola virus (formerly Zaire virus)
 Sudan virus
 Tai Forest virus
 Bundibugyo virus
 Reston virus (non-human)

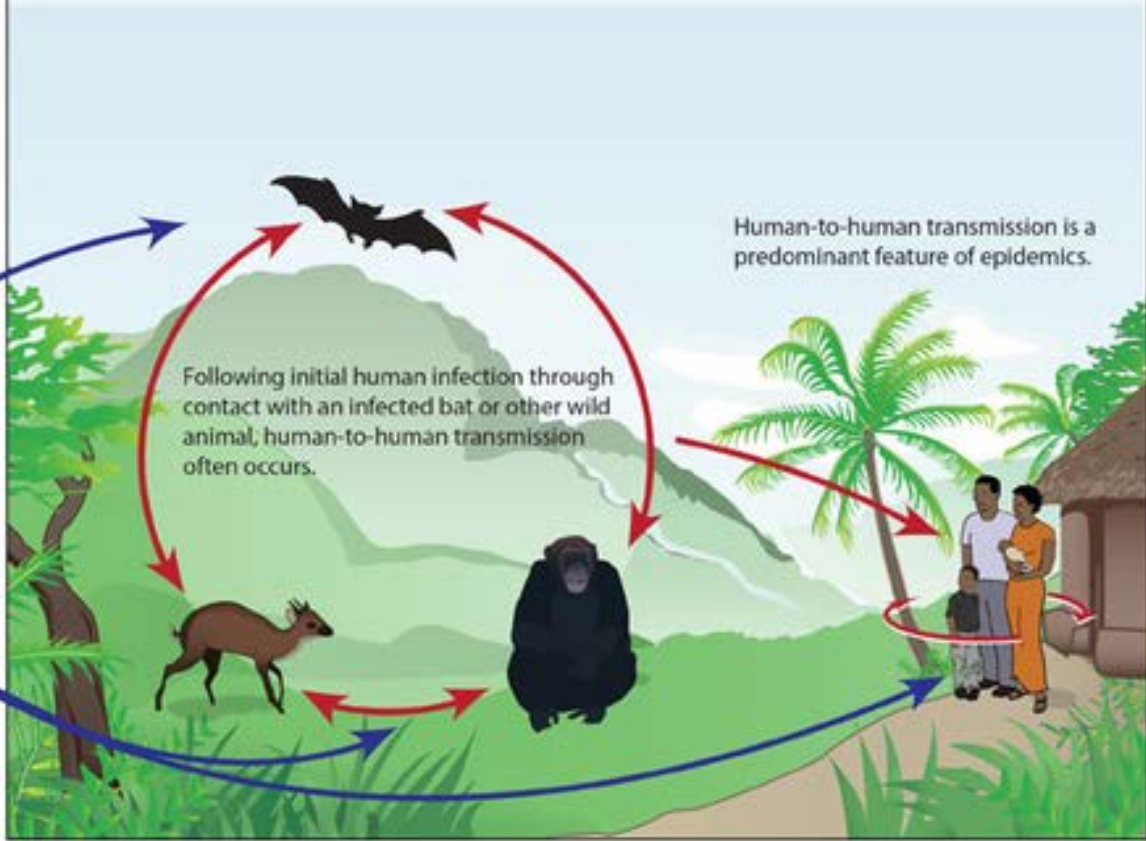




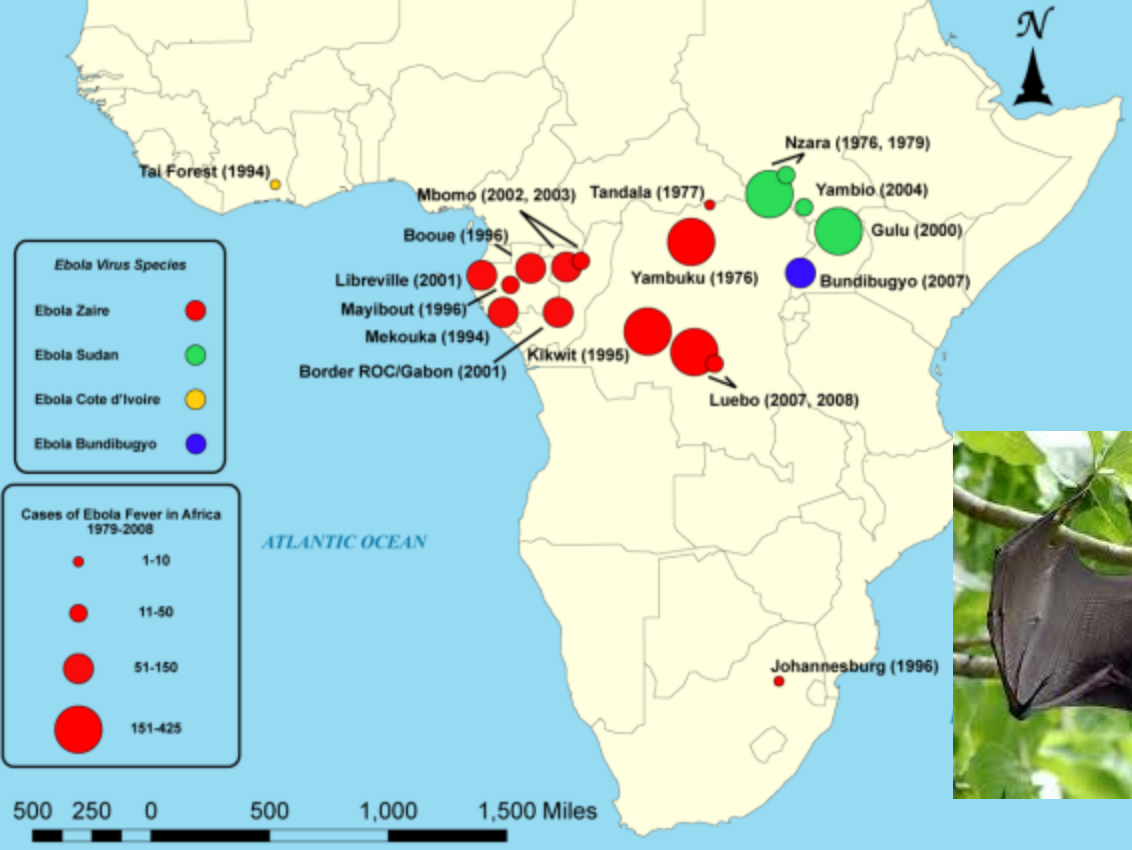
Epizootic Cycle

Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and duikers and may precede human outbreaks. Epidemics caused by ebolaviruses produce acute disease among humans, with the exception of Reston virus which does not produce detectable disease in humans. Little is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.

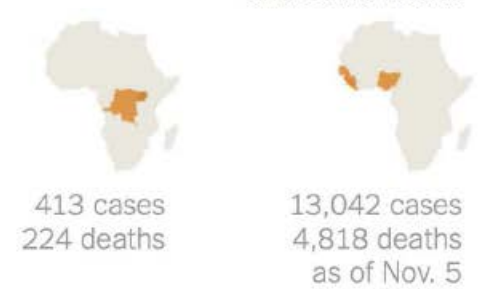
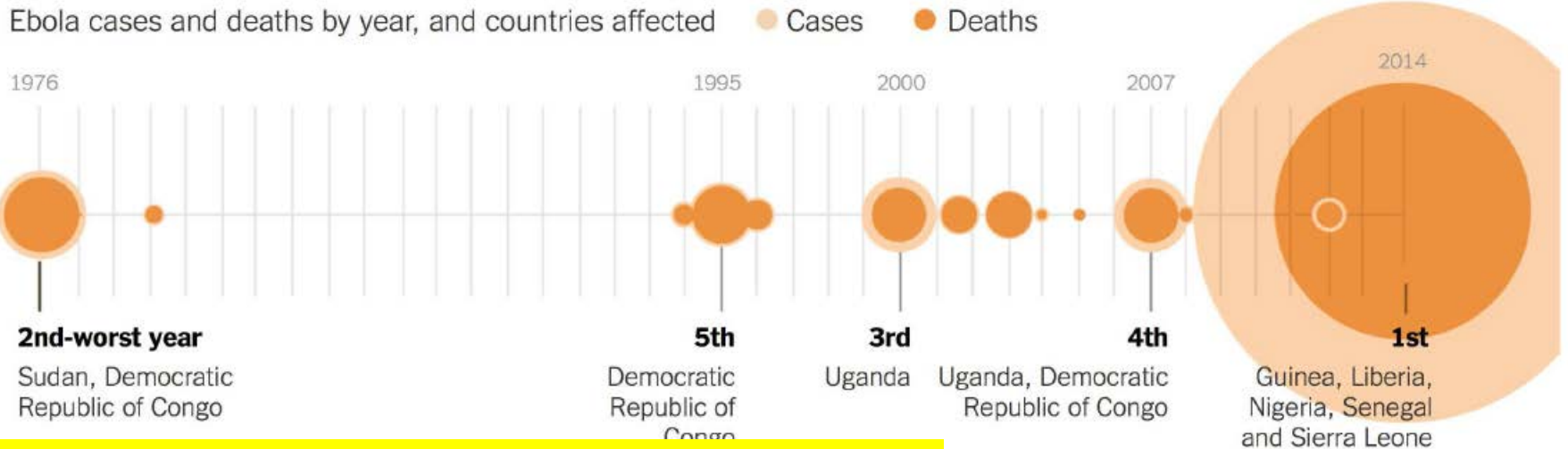
Human-to-human transmission is a predominant feature of epidemics.

Following initial human infection through contact with an infected bat or other wild animal, human-to-human transmission often occurs.





Scale of Ebola outbreaks



- Frühere Ausbrüche:**
- Niedere Bevölkerungsdichte
 - Geringe Bevölkerungsdynamik / Mobilität
 - Basisgesundheitsdienste funktionieren
- Heute**
- Hohe Bevölkerungsdichte
 - Hohe Bevölkerungsdynamik / Mobilität
 - Gesundheitsdienste funktionieren kaum (Peripherie!)

Meliandou, Guinea





Überwachung und Gesundheitssysteme



(Ebola in Guinea, 6 April 2014, © EC/ECHO)

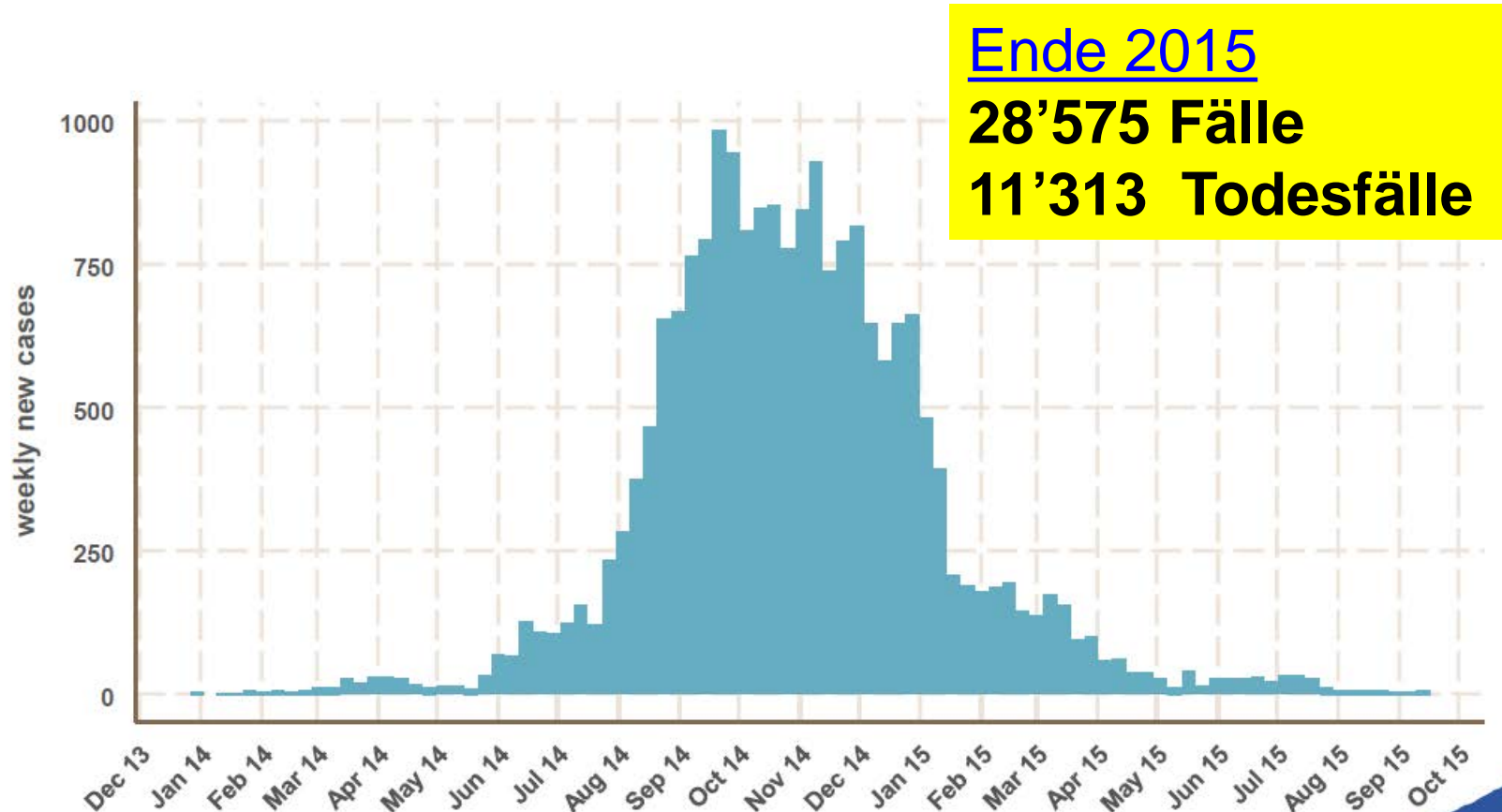
Sichere, akzeptierte Bestattungen



Aufspüren der Kontakte



Chronology of the West African Epidemic

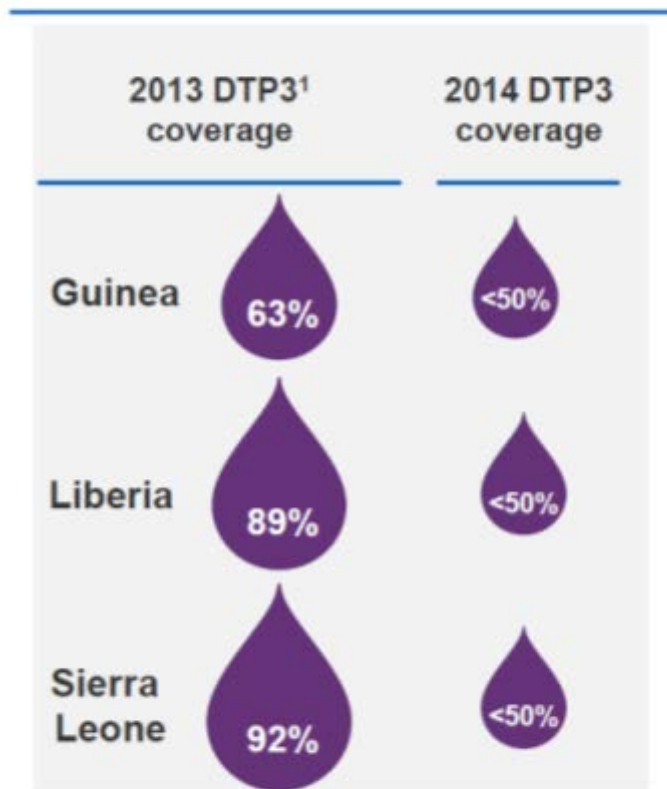


Surveillance – Response-Ansätze:

- Minimal nötige Daten in Raum und Zeit, die rasches Handeln ermöglichen
- Systeme wieder «zum Laufen bringen»

RECOVERY OF HEALTH AND IMMUNISATION SYSTEMS

Ebola has crippled health and immunisation systems



1. Coverage with 3rd dose of a DTP-containing vaccine

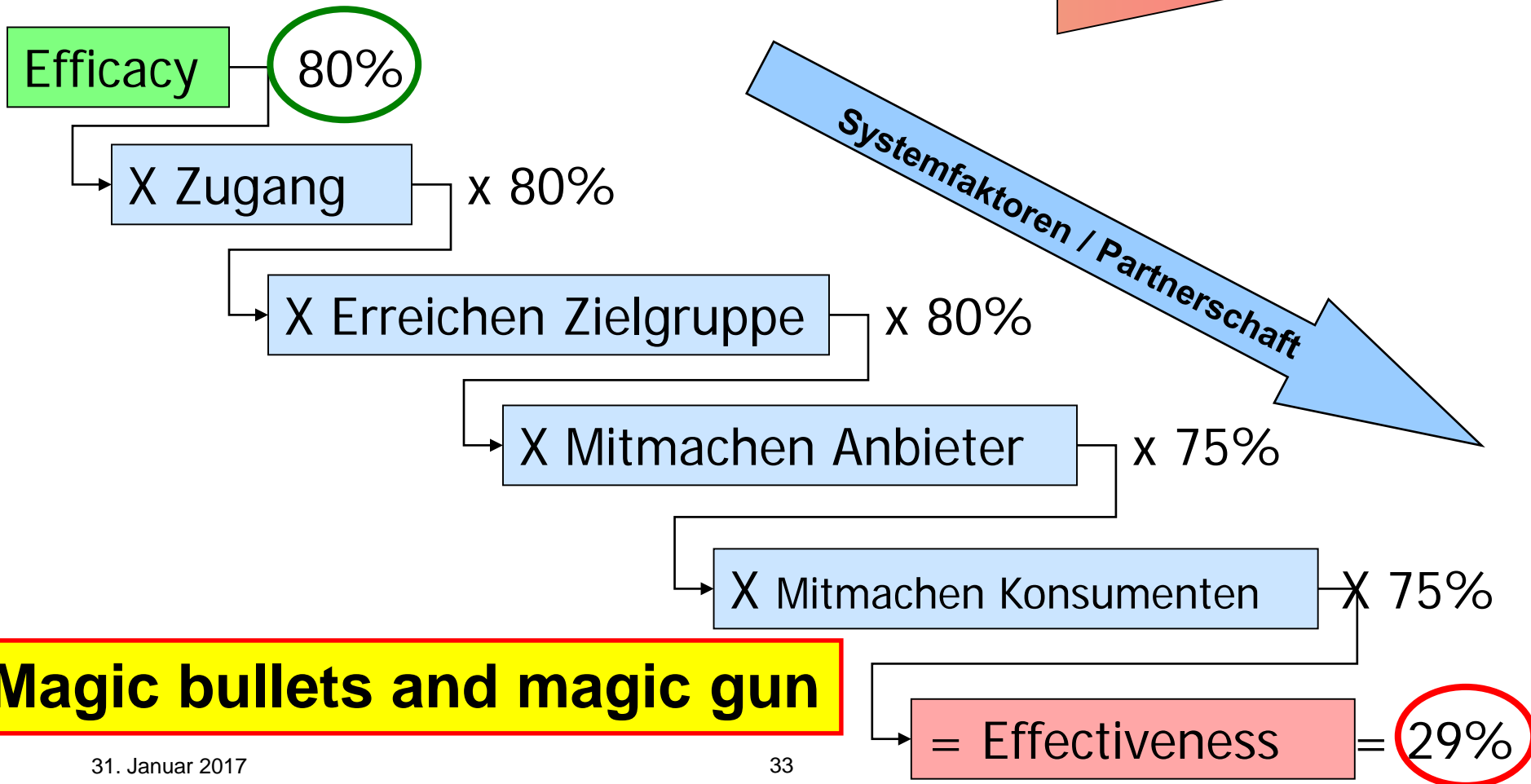


Während 11'313 Erwachsene und Kinder an Ebola verstarben, starben:

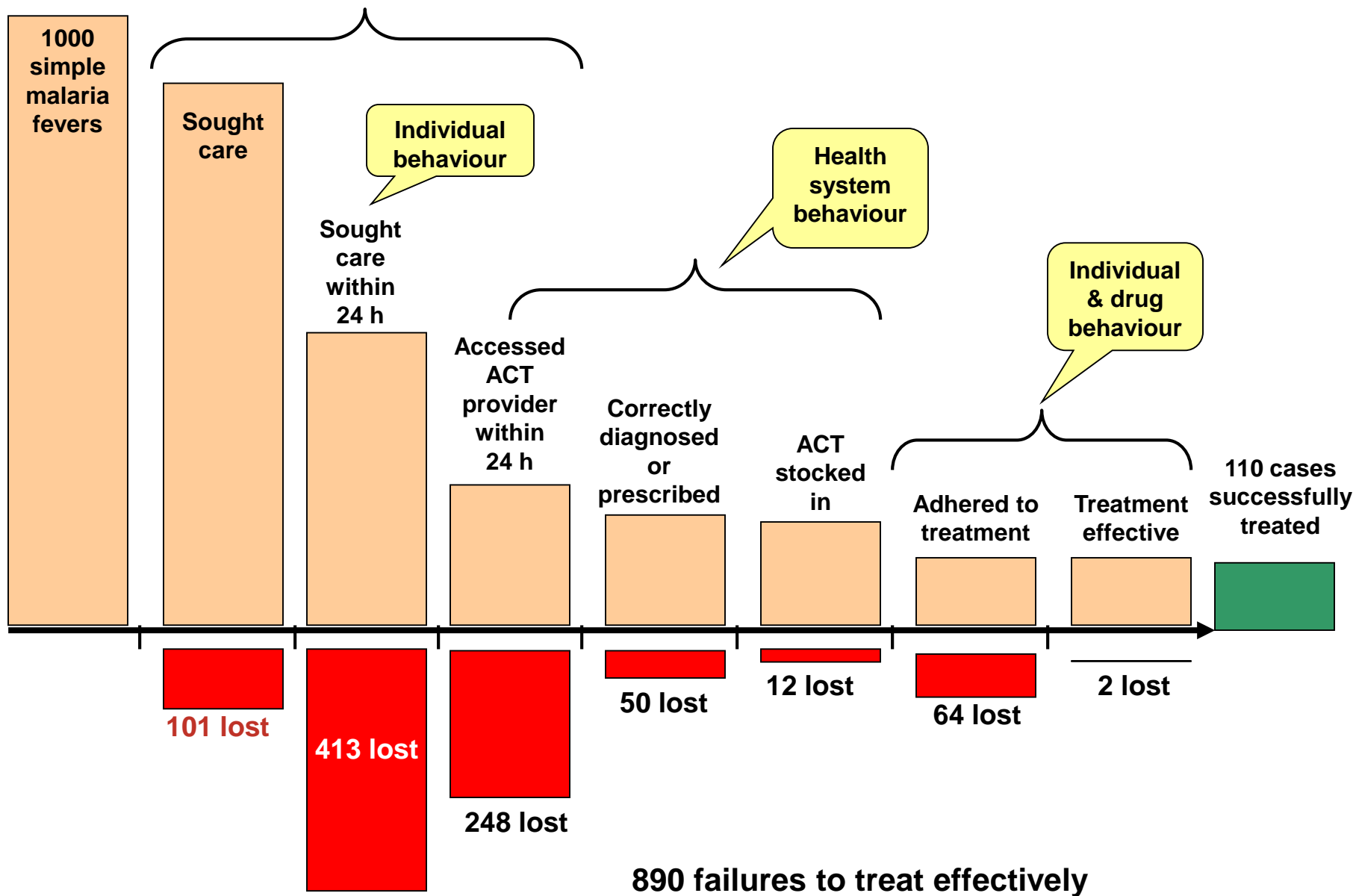
- rund 500'000 Kinder <5Jahren an Malaria und
- rund 900'000 an Atemwegsinfektionen (Lungenentzündung)

Verteilungsgerechte Effectiveness

Von "Efficacy" zu "Effectiveness"



System-Wirksamkeit der Malariabehandlung: Rufiji, Tansania





- Gesamtes Gesundheitssystem funktionsfähig halten
 - Schutzkleidung, Hygiene, Desinfektion
 - Motivation des Personals
- Überwachungssysteme – «surveillance-response» auch an Peripherie (Regierung, NGOs, Bevölkerung)
- Information, Kommunikation, sozio-kulturelle Sensibilität / Verständnis
- Organisation – Logistik – Rollen und Verantwortung müssen sehr gut definiert sein
- Medikamente und Impfstoffe helfen sehr und sollen gefördert werden – aber Prioritätenfrage beachten



Vielen Dank...

