



Infectious Diseases: an Upcoming Threat

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- **“to write about infectious disease is almost to write of something that has passed into history . . . the most likely forecast about the future of infectious disease is that it will be very dull”.**

Dr. David O. White

Introduction

- Era of Sustainable Development Goal (SDG) from Millennium Development Goal (MDG).
- Goal 3 of SDG is: Ensure healthy lives and promote well-being for all at all ages.
- Infectious diseases: from control to elimination.
- By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and 'other' communicable diseases.
- Bangladesh is preparing to eliminate the 'three diseases'- AIDS, tuberculosis and malaria.

Methods

- **Consultation with the relevant Global documents & literature**
- **4th HPNSP**
- **National strategy plan on three diseases**
 - **4th National Strategic Plan for HIV and AIDS Response 2018-2022.**
 - **National Strategic Plan for TB Control 2018-2022.**
 - **National Strategic Plan for Malaria Elimination. A path to the phased elimination of malaria from Bangladesh 2017-2021.**

Treatment targets 90-90-90



TESTED



ON TREATMENT

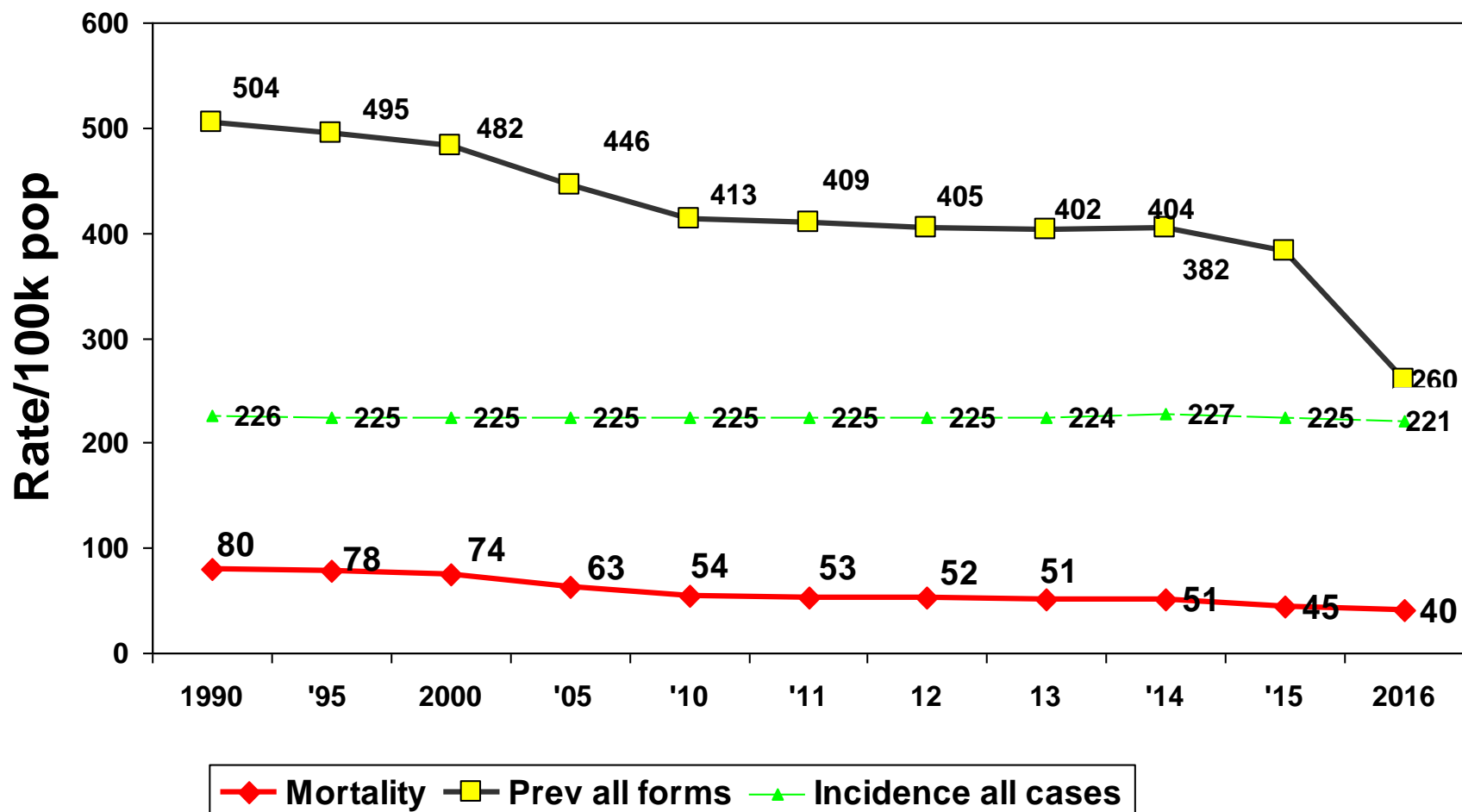


VIRALLY SUPPRESSED



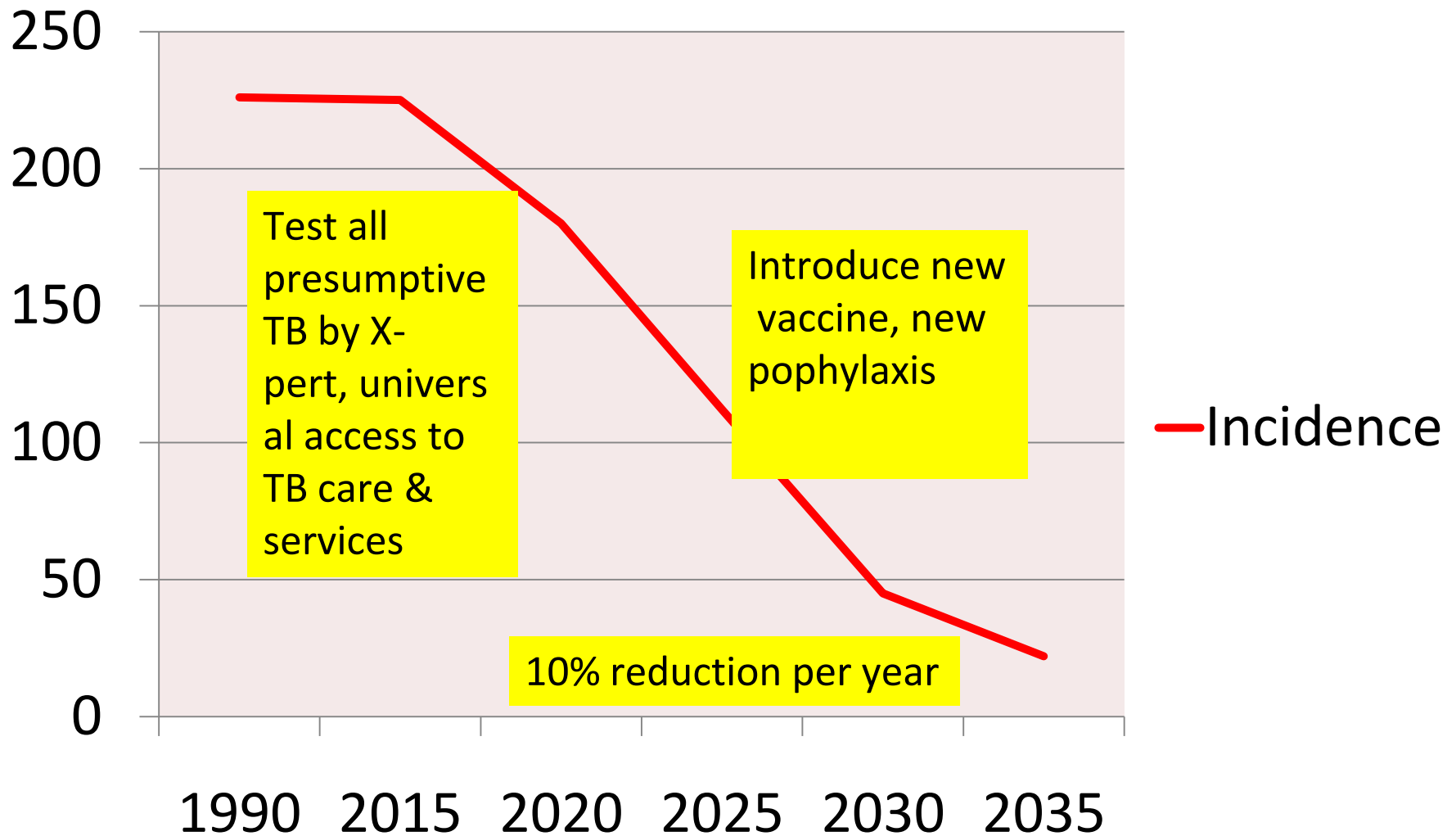
Achievements in terms of Impact

Global TB Report 2016/TB Prevalence Survey, Bangladesh



Projection Incidence

Bangladesh target inline with End TB



Planned Phased Elimination

| Districts | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 3 ^a | | | | | | | | | | | | | | |
| 2 ^b | | | | | | | | | | | | | | |
| 8 ^c | | | | | | | | | | | | | | |
| 51 ^d | | | | | | | | | | | | | | |

Key:

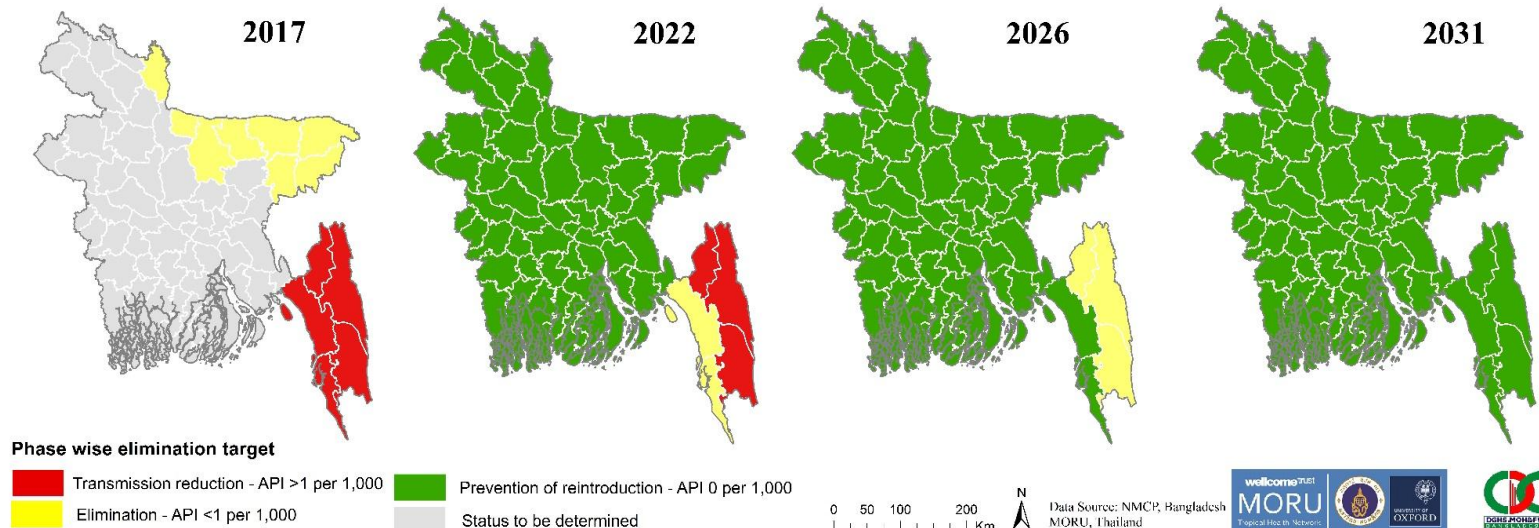
| |
|--|
| Transmission reduction - API >1 per 1,000 |
| Elimination - API <1 per 1,000 |
| Prevention of reintroduction - API 0 per 1,000 |
| Status to be determined |

a). 3 CHT districts: Khagrachari, Rangamati, Bandarban.

b). Chittagong and Cox's Bazar

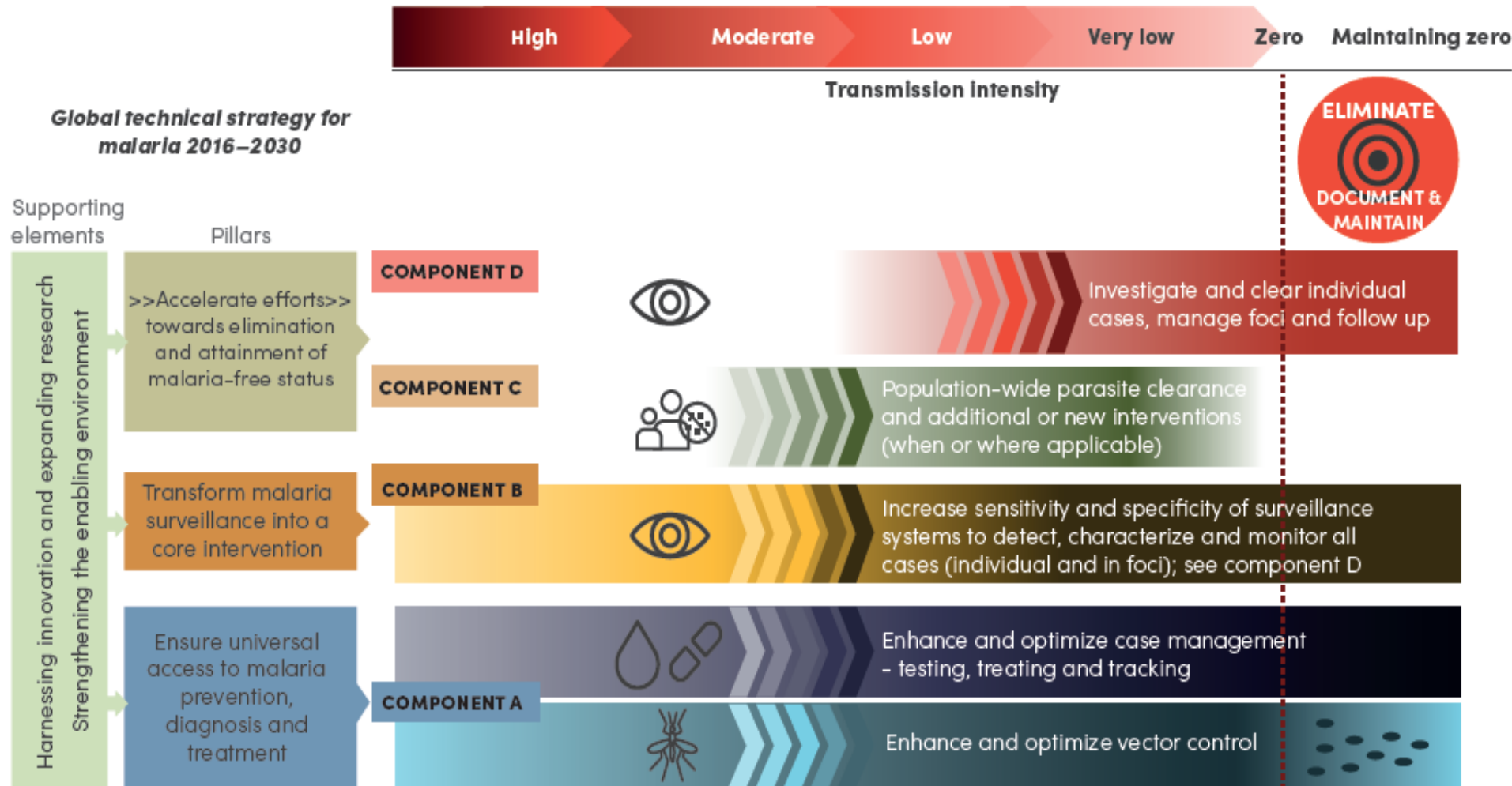
c). Sherpur, Mymensingh, Netrokona, Kurigram, Sylhet, Hobigonj, Sunamgonj, Moulvibazar.

d). Remaining districts



Accelerating along the Continuum: Intervention Packages

Global technical strategy for malaria 2016–2030



Acceleration – as represented by arrow bars (>>>>>) here – relates to time-limited efforts made across all components in order to (1) achieve universal/optimal coverage in malaria prevention and case management (Component A**), and increase sensitivity and specificity of surveillance systems so they are able to detect, characterize and monitor all malaria cases and foci (**Component B**); and (2) bring malaria transmission to sufficiently low levels (with or without population-wide parasite clearance and other strategies, **Component C as an option**) where remaining cases can be investigated/cleared and foci can be managed and followed up (**Component D**).*

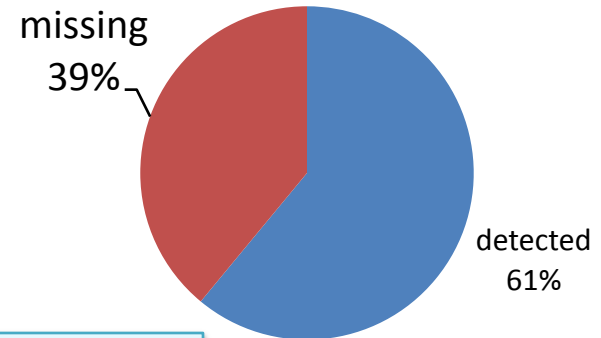
Challenges:

Increase Case Detection to Achieve END TB Target

DS TB CDR all forms 61%



Child TB proportion : 4%



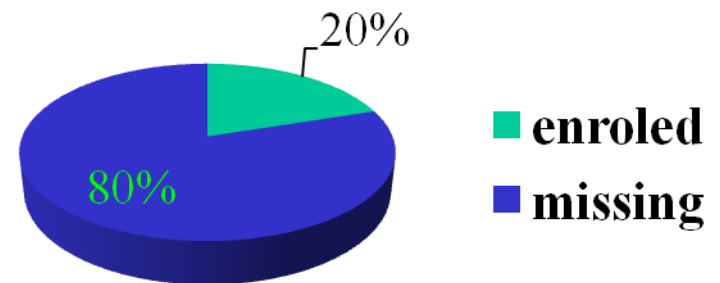
- Urban TB

DR-TB only 20% enrolled

- Hard to reach areas

- Private Sector involvement
- Mandatory Notification

- TB/HIV

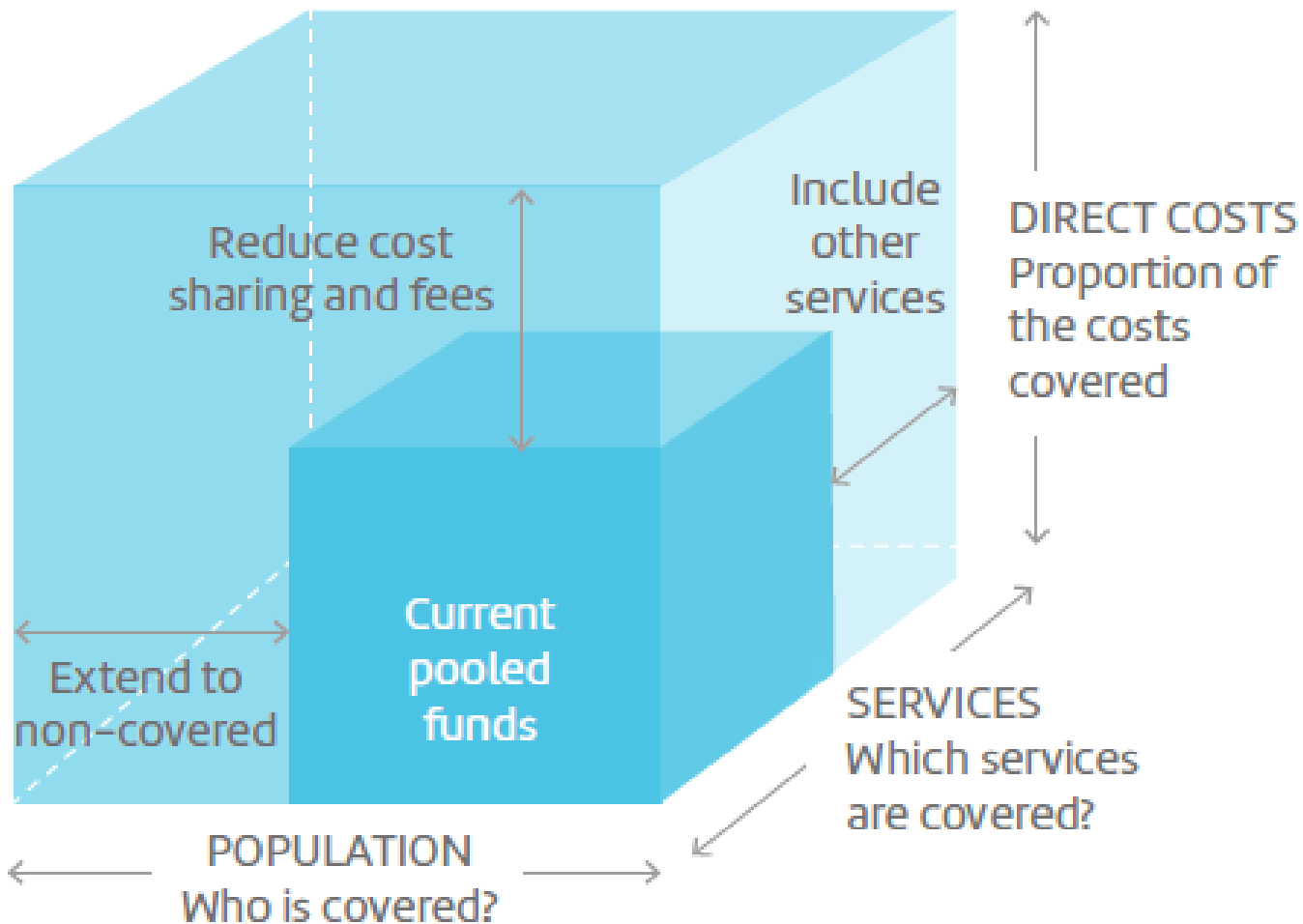


- Scaling up STR

Major Challenges to Overcome

- **Scaling out the high impact (effective) interventions considering commitment of Universal Health Coverage (UHC)**
- **Addressing drug resistance**
- **Monitoring and surveillance of the progress**

Three dimensions of UHC (“the UHC cube”)



Source: WHO, 2010 (79)

Some major factors that underlie disease emergence and reemergence

| The Microbial Agent | The Human Host | The Human Environment |
|--------------------------------------|--|--|
| Genetic adaptation and change | Human susceptibility to infection | Climate and weather |
| Polymicrobial diseases | Human demographics and behavior | Changing ecosystems |
| | International trade and travel | Economic development and land use |
| | Intent to harm (bioterrorism) | Technology and industry |
| | Occupational exposures | Poverty and social inequality |
| | Inappropriate use of antibiotics | Lack of public health services |
| | | Animal populations |
| | | War and famine |
| | | Lack of political will |

Key areas of vulnerability to emerging infectious diseases in South Asia

Factor: Population size and density

- **Situation in South Asia**
 - South Asia is home to one quarter of world's population, with Bangladesh and India being amongst the most densely populated countries in the world.
- **Association with vulnerability to emerging and epidemic infections**
 - Absolute population size and the intensity of contact between people are key determinants-along with transmissibility of the infectious agent and the susceptibility of the population to infection-that determine the scale of an outbreak of an infection that is transmitted from person to person.

Factor: Land use

- **Situation in South Asia**
 - The rate of land use change in most of South Asia is now slow.
 - Where land can be agriculturalized it has been, and much of the land is already extensively cropped. The rate of forest growth is positive in India, there being net reforestation.
- **Association with vulnerability to emerging and epidemic infections**
 - Changes in land use may alter ecosystems and the interaction of animal hosts with humans, giving rise to new opportunities for amplification and /or spill over to humans.

Factor: Biodiversity

- **Situation in South Asia**
 - **South Asia is not especially bio-diverse but India may be a hot spot of bat to human virus sharing.**
- **Association with vulnerability to emerging and epidemic infections**
 - **The impact of declining biodiversity is variable, and may act to either increase or decrease the emergence of infectious diseases.**

Factor: Insect and tick vectors

- **Situation in South Asia**
 - **Mosquito and tick vectors are widely present for some serious infections**
- **Association with vulnerability to emerging and epidemic infections**
 - **As Zika virus has shown, the presence of competent vectors can lead to dramatic introductions and transmission of pathogens.**

Factor: Livestock density

- **Situation in South Asia**
 - **Cattle and goats are raised in large numbers across South Asia.**
 - **As incomes increase the demand for meat will increase and livestock farming will intensify.**
- **Association with vulnerability to emerging and epidemic infections**
 - **Livestock may act as intermediate hosts for a range of zoonotic infections including CCHF, fascioliasis, bovine TB, brucellosis, and leptospirosis from cattle; and fascioliasis, brucellosis, Orf virus, and Q fever from sheep. Rift Valley fever could be introduced successfully to South Asia.**

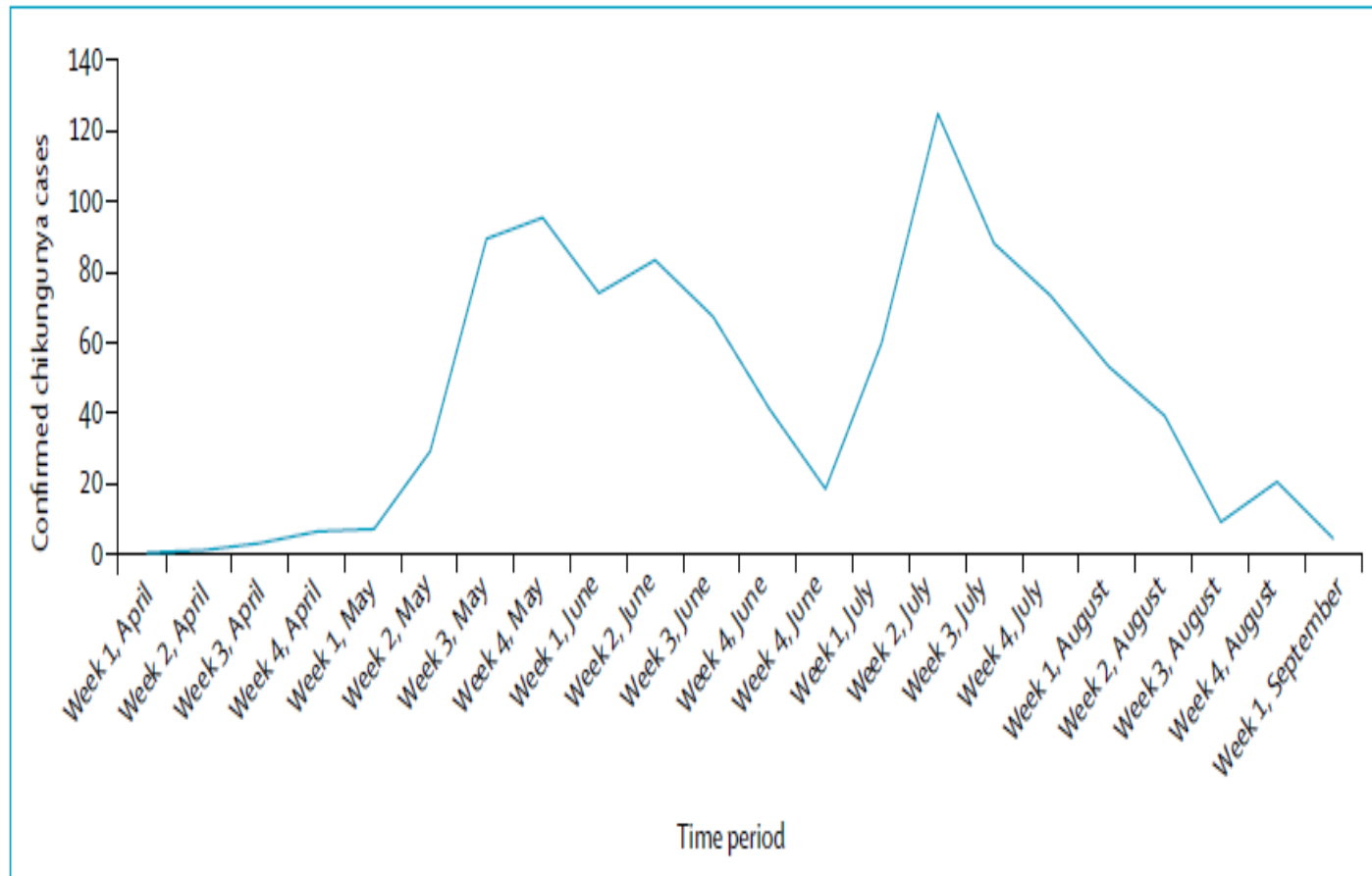
Factor: Poverty and human development index

- **Situation in South Asia**
 - South Asia has had a period of sustained economic growth, declining poverty rates, and improved human development. Nevertheless the region is home to a very large number of poor people with poor infrastructure.
- **Association with vulnerability to emerging and epidemic infections**
 - Poverty is a risk factor for almost every infection, but is a particular vulnerability for epidemic infections. Poverty is associated with crowding, poor sanitation, poor nutrition, and poor access to preventive, diagnostic, and therapeutic healthcare. It is no coincidence that Ebola raged out of control in three of the poorest.

Factor: Healthcare systems

- **Situation in South Asia**
 - **The public healthcare systems in South Asia are poor, with patchy coverage, limited resources, overcrowding, and inadequate infrastructure**
- **Association with vulnerability to emerging and epidemic infections**
 - **Healthcare systems can contribute to the emergence and transmission of infectious diseases in several ways:**
 - **Resistance to antibacterial, antiviral, and anti-malarial drugs can be promoted by poor use of these drugs**
 - **Healthcare settings can amplify infections. The introduction and transmission of MERS-CoV in Korea is a good example**

- Bangladesh remains vulnerable to Dengue, and Chikungunya infection. More cases of CHIK infection is expected from diff pats of BD in coming years.



Chikungunya outbreak (cases confirmed by PCR) in 17 districts of Bangladesh, April 1 - Sept 7, 2017

- **Outbreak of measles among unvaccinated as happened in Sitakundu, Chittagong**
- **Flu in elderly patients with COPD (mostly unvaccinated)**
- **Large number of animal bites happened at Fulbaria, Mymensingh Nov 2017**
- **Outbreak of sore throat (with death) at camp and high incidence of Hepatitis C related CLD among Forcefully Displaced Myanmar Nationals**

Fox bite, Fulbaria, Mymensingh





A. 10/10/19
 The picture was taken in a camp and shows a lot of people living in the area. It is a very poor area and the people are very poor. The picture shows the people living in the area and the people are very poor. The picture shows the people living in the area and the people are very poor.



Antimicrobial Resistance

- **Multi drug resistant infections threats**
 - **Carbapenem-Resistant Enterobacteriaceae (CRE)**
 - **Methicillin-Resistant *Staphylococcus Aureus* (MRSA)**
 - ***Clostridium difficile***
 - ***Neisseria gonorrhoeae***
 - **MDR Typhoid- hint of ceftriaxone resistance**
 - **Nosocomial infections**
 - **ICU related**

Charminar: Muhammad Quli Qutb Shah to celebrate the end of a deadly plague; 1591



Post-kala-azar dermal leishmaniasis in the Indian subcontinent: A threat to the South-East Asia Region Kala-azar Elimination Programme.



PKDL from Bangladesh: confluent macular rash involving most of the face (courtesy of Dr. Dinesh Mondal). PKDL; post-kala-azar dermal leishmaniasis.

Cutaneous leishmaniasis in immigrant workers returning to Bangladesh - An emerging problem



Velvety erythematous lesion over the nose

Potential outbreak of existing disease

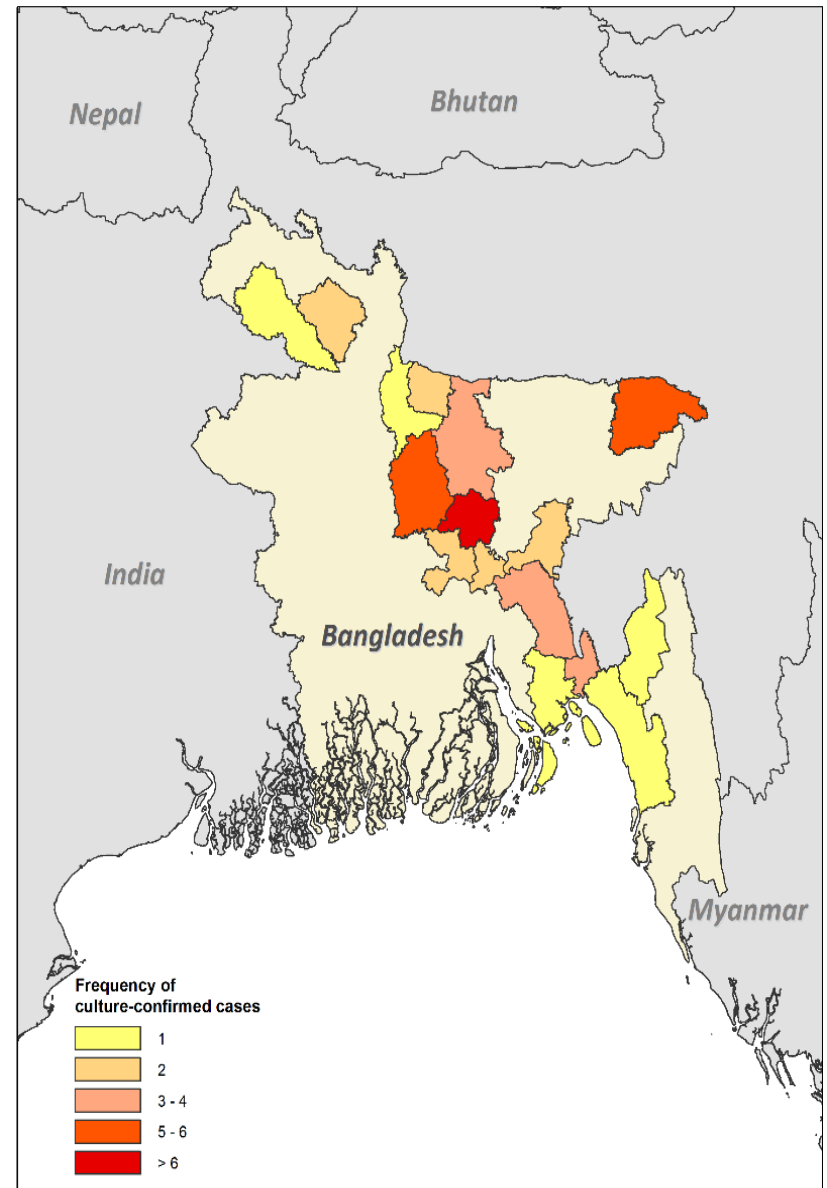
- **DHF**
- **Chikungunya virus infection**
- **Nipah infection**
- **Typhus- CHDs**
- **Leptospirosis**
- **Anthrax**
- **Systemic fungal infections**
- **Japanese Encephalitis**
- **Melioidosis in diabetics**

- Melioidosis is caused by the highly pathogenic gram-negative bacillus *Burkholderia pseudomallei* commonly found in soil.
- A recent regression model predicted 16,931 cases annually in Bangladesh with a mortality rate of 56%.
- Clinicians often discard it as contamination at bed side after receiving the culture report as pseudomonas.

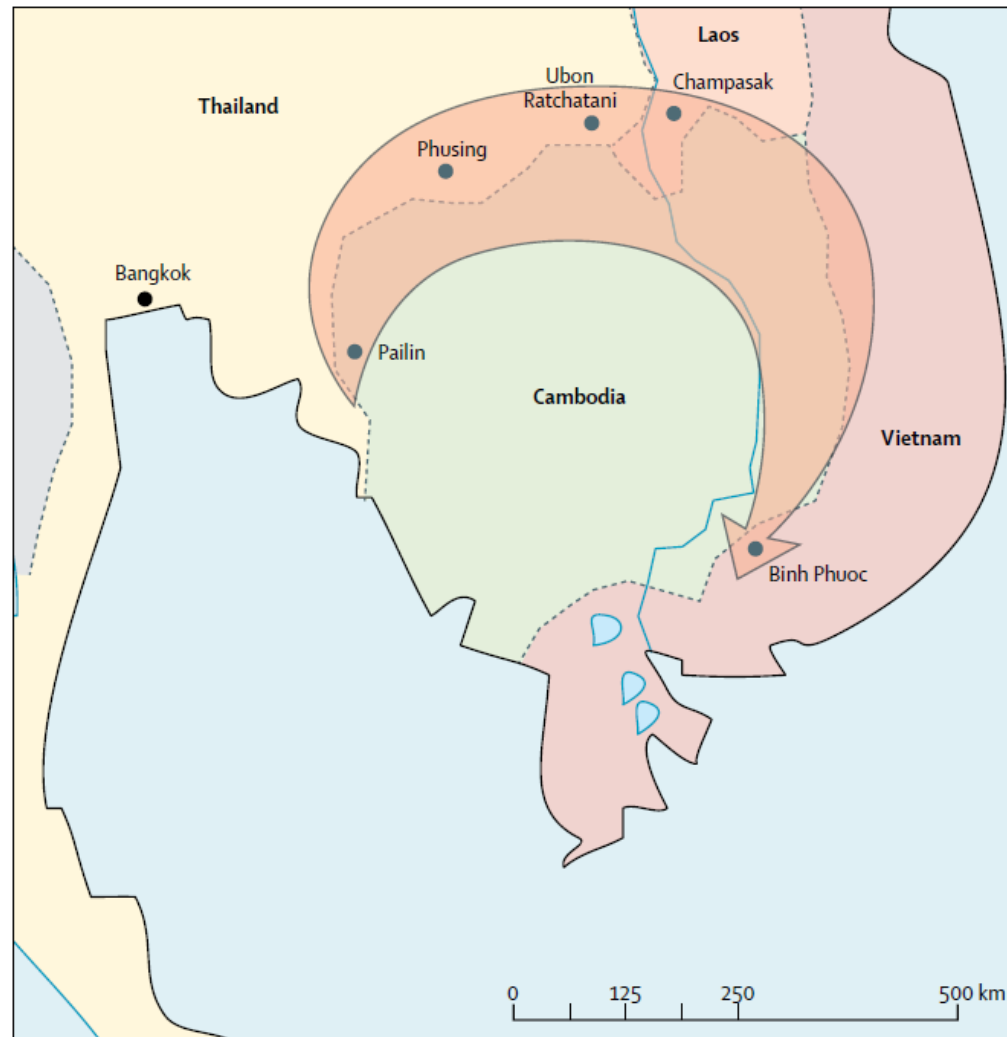
Predicted global distribution of *Burkholderia pseudomallei* and burden of melioidosis

Direk Limmathurotsakul^{1,2,3*}, Nick Golding¹, David A. B. Dance^{4,5}, Jane P. Messina⁶, David M. Pigott¹, Catherine L. Moyes¹, Dionne B. Rolim⁷, Eric Bertherat⁸, Nicholas P. J. Day^{2,5}, Sharon J. Peacock^{2,9,10} and Simon I. Hay^{1,11,12}

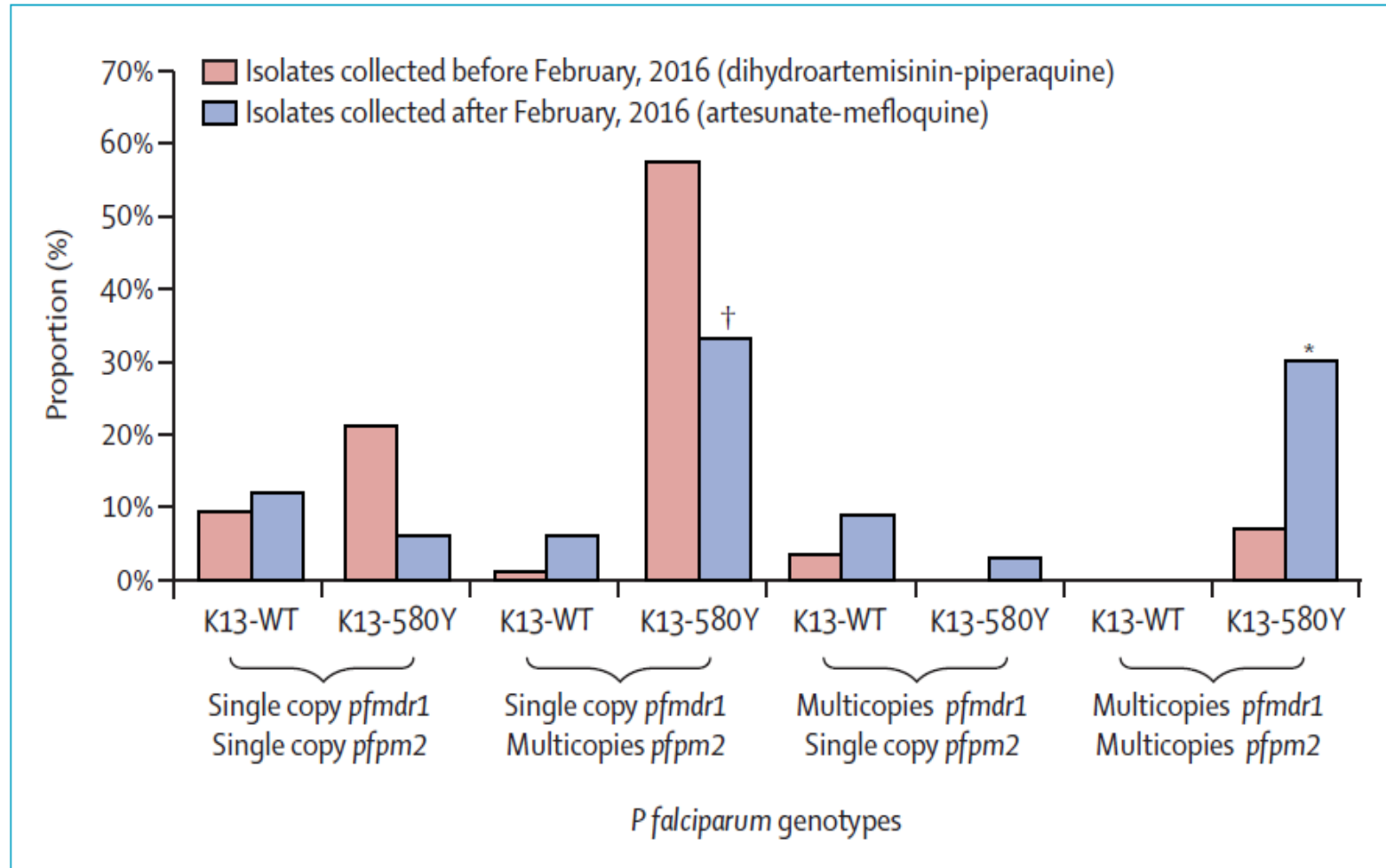
- **First case of Melioidosis reported from Bangladesh was in 1964, a 29 years old British sailor who travelled through Chittagong and fell into cyclone.**
- **So far, 49 culture confirmed Melioidosis cases were detected from 16 districts of Bangladesh. Among them Gazipur, Sylhet, Tangail is the most prevalent. This is just the tip of the iceberg.**
- **Almost all (>95%) cases were diabetic.**
- **Microbiological diagnostic capacity and skills are seriously lacking. Only one centre in Bangladesh diagnosed 99% of the cases.**



Transnational spread of multidrug resistant *PfPailin*



Emergence of *Plasmodium falciparum* triple mutant in Cambodia



Temporal increase in the proportion of *Plasmodium falciparum* triple mutants

Priority Seven Diseases (WHO 2015)

- **The prioritization was based on a number of factors bordering on the likelihood to cause severe outbreaks necessitating public health emergency in the near future and inadequacy or nonavailability of medical countermeasures.**
 - **Crimean-Congo haemorrhagic fever**
 - **Filovirus diseases (Ebola virus disease and Marburg)**
 - **Highly pathogenic emerging Corona viruses relevant to humans (MERS Co-V and SARS)**
 - **Lassa fever**
 - **Nipah**
 - **Rift Valley Fever**
 - **A “new disease”-**
 - **Refers to any hitherto unknown disease that may emerge and require urgent action to contain or prevent epidemics.**

Surveillance

- **Capacity to detect existing pathogens is limited**
 - **Microbiology is in infancy & still diagnosis of most cases of enteric fever based on obsolete the Widal test.**
- **To detect new pathogen requires beyond level 2 lab-**
 - **Capacity very limited.**

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Thank you