Neglected Tropical Diseases (N = 20; 149 countries)

1. Buruli ulcer
2. Chagas disease
3. Cysticercosis
4. Dengue
5. Dracunculiasis
6. Echinococcosis
7. Fasciolosis
8. Sleeping sickness
9. Leishmaniasis
10. Leprosy
11. Lymphatic filariasis
12. Mycetoma
13. Onchocerciasis
14. Rabies
15. Scabies
16. *Schistosomiasis*
17. *Soil-transmitted helminthiasis*
18. Snake bite envenoming
19. Trachoma
20. Yaws

Added in 2017

(WHO 2017)

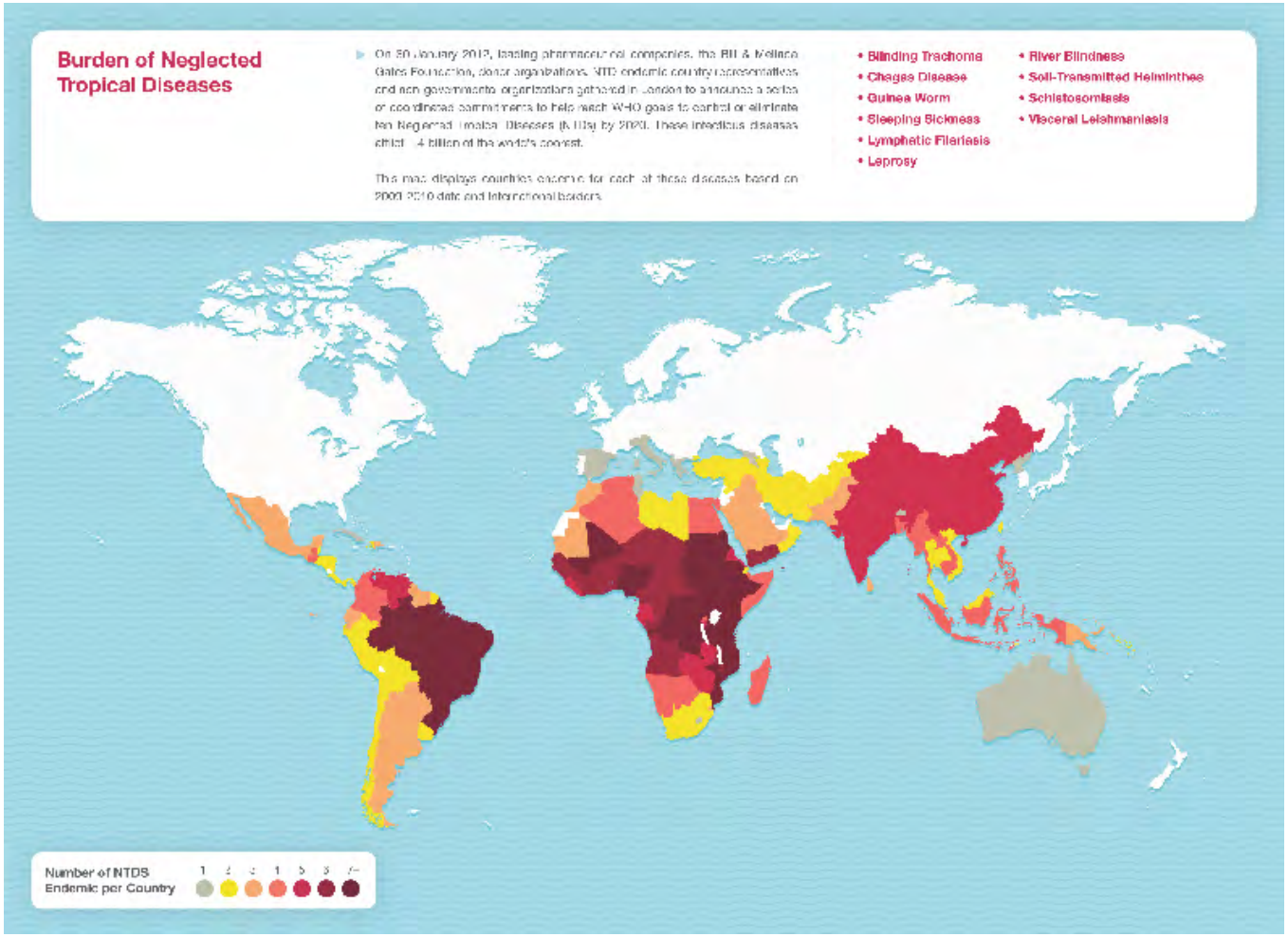
Neglected Tropical Diseases (NTDs)

- 1 billion affected...
- in 149 countries...
  > 70% with ≥ 2 NTDs...
  100% of LICs > 5 NTDs at once
- 534,000 deaths annually

(WHO 2017)

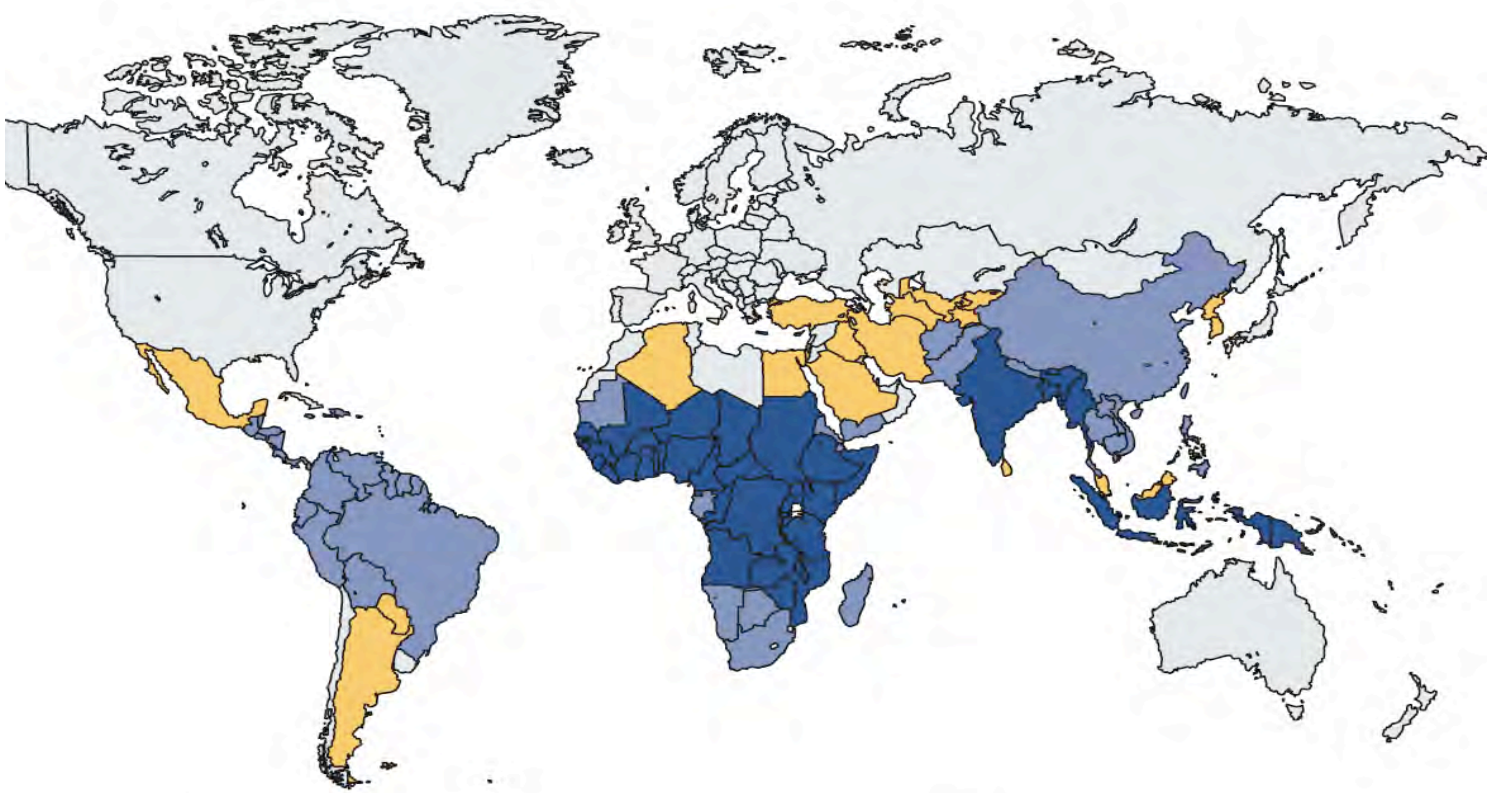
Why Neglected?

- The poorest Countries
- Weak Infrastructure
- Inadequate epidemiology, statistics, surveillance
- Inadequate R&D for Drugs, Diagnostics and Vaccines
- Inadequate Training for Medical Personnel
- Inadequate support from richer countries



http://unitingtocombatntds.org/resource/burden-map-neglected-tropical-diseases ; accessed Feb 9, 2018

Distribution of Malaria



Why is Malaria not an NTD?
Mainly poor populations

World Health Assembly involving ministries of health from 194 member countries each year in Geneva makes resolutions including

Disease eradication: zero cases world wide,

Disease elimination: 1 case in 10,000 in endemic area.

Eradicated

Smallpox (1977)

Polio (soon, 2-3 countries left)

Eradicable NTDs

Dracunculiasis (by 2020?)

Yaws (by 2020?)

Regionally Eliminable NTDs

Lymphatic filariasis

Onchocerciasis

Hookworm

Visceral Leishmaniasis

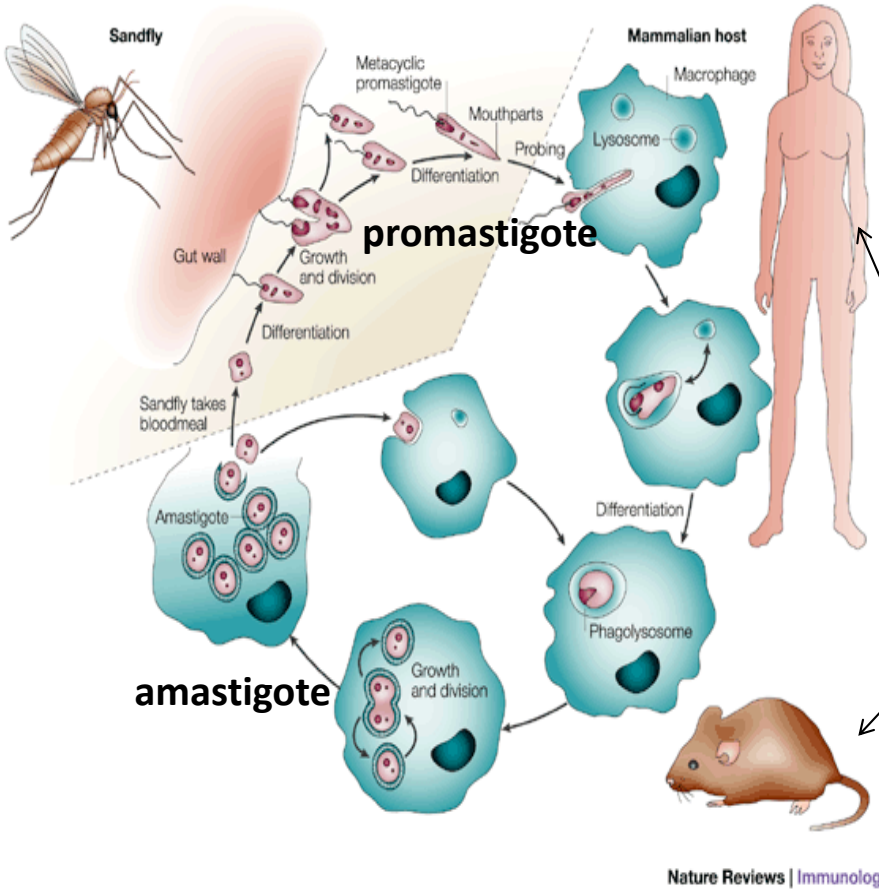
Preconditions for Disease Elimination

- There should only be a human reservoir .
- Must have effective diagnosis and treatment (or vaccine).
- Need to know where the disease is at all times (effective surveillance)
- Need to know who transmits disease. Only symptomatic or can asymptomatic also transmit disease?
- People must get very sick otherwise cannot identify who has disease

Visceral Leishmaniasis

Cutaneous Leishmaniasis

Leishmania Life Cycle and Reservoirs

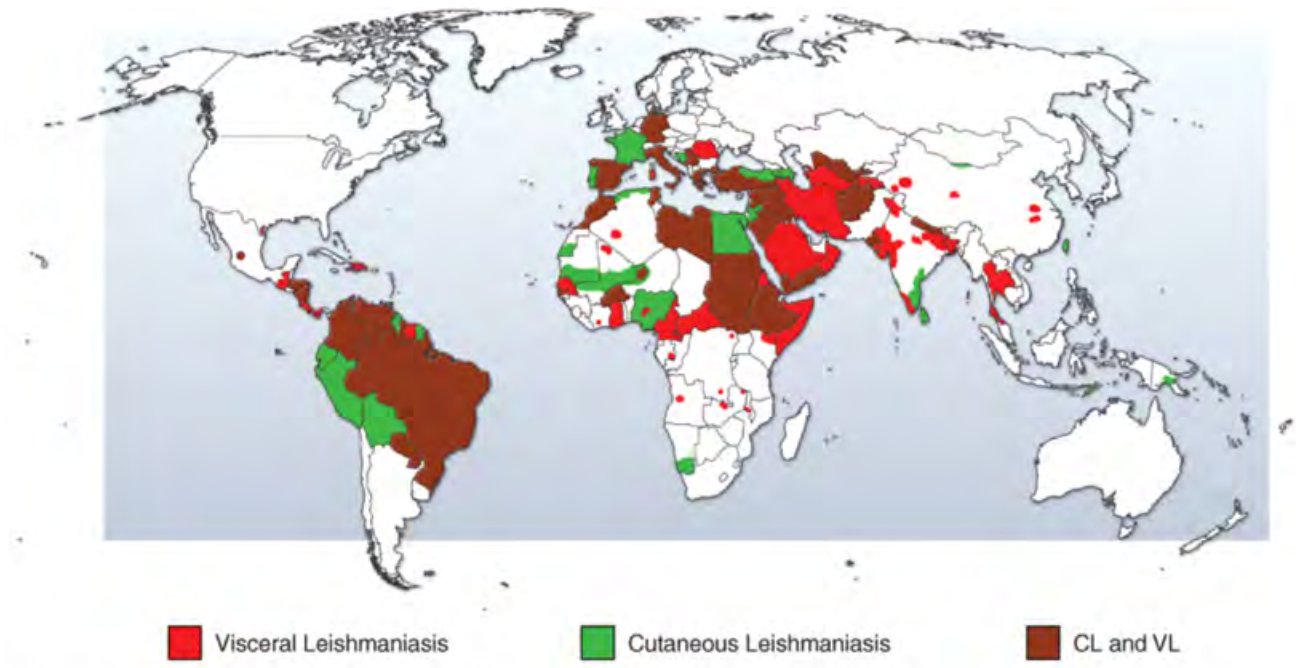


Visceral leishmaniasis
Leishmania donovani *Human Reservoir*

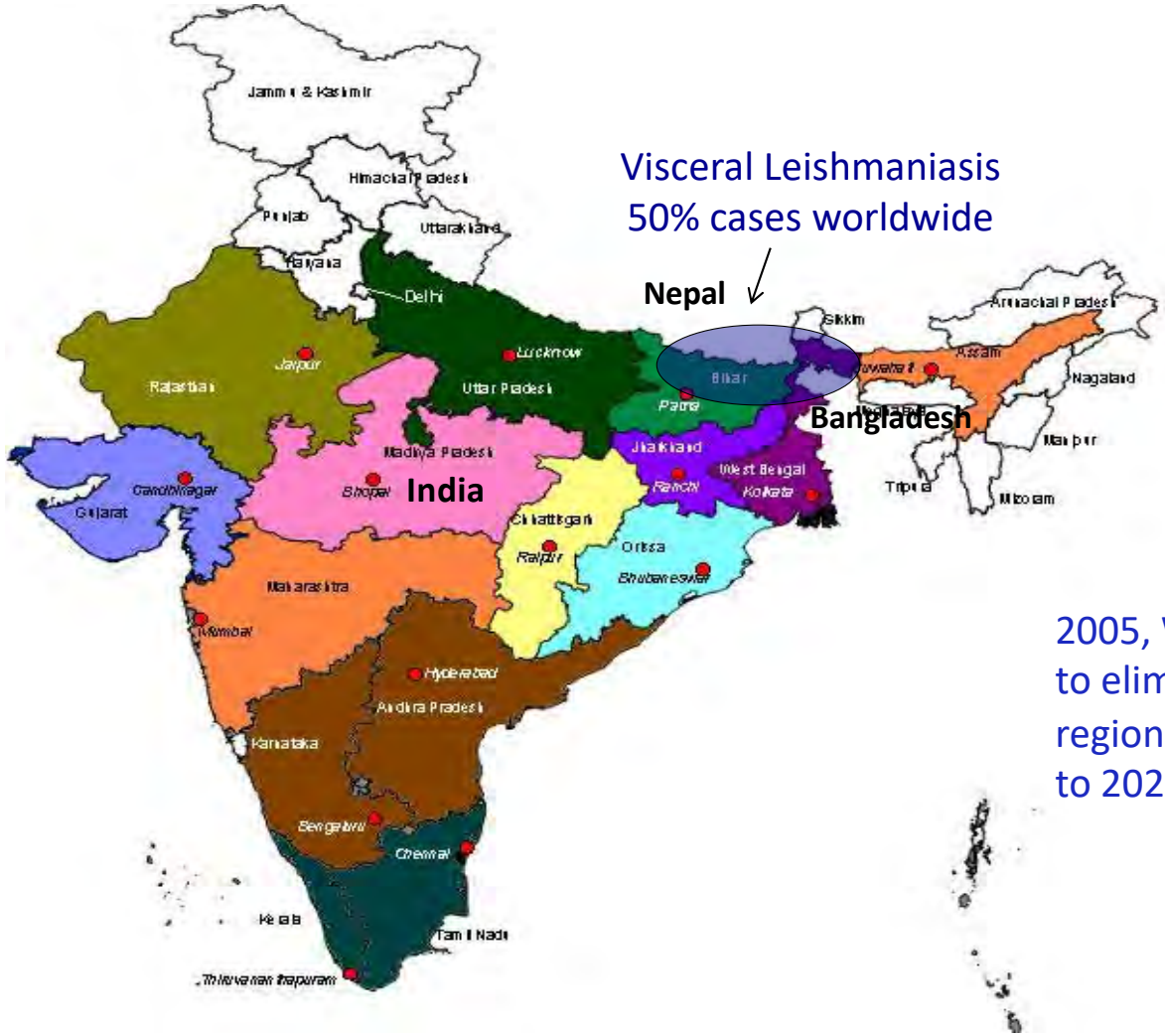
Reservoirs (preferred host)

Cutaneous leishmaniasis
Leishmania major, and others: ***Animal reservoir***

World Wide Distribution of Leishmaniasis (90 countries)



Source: Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine, 18th Edition*: www.accessmedicine.com



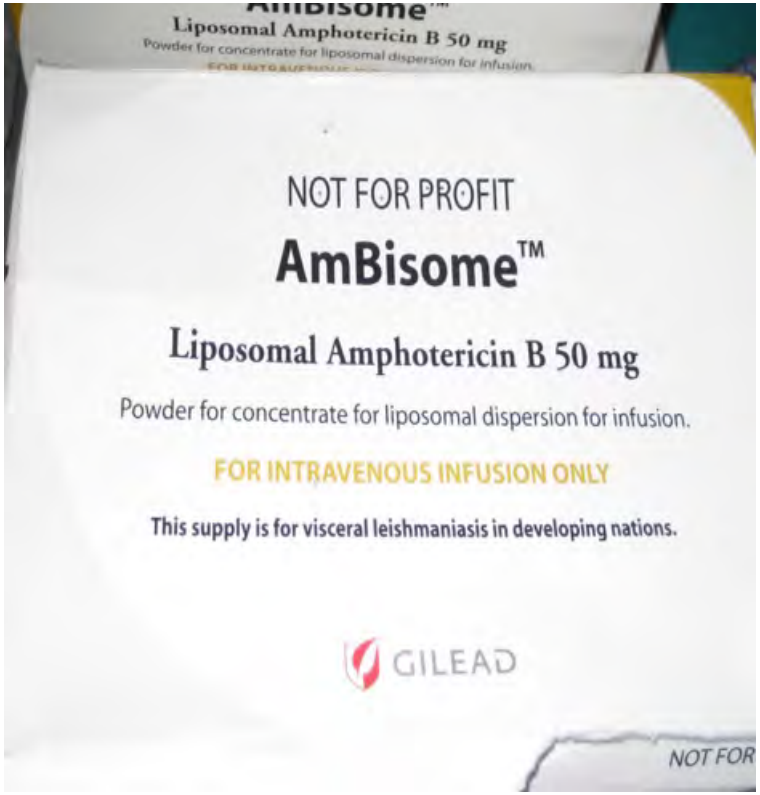
2005, WHA proposed to eliminate VL in this region by 2015, extended to 2020

Preconditions for Disease Elimination

- There should only be a human reservoir. **Yes** for Visceral, **No** for cutaneous leishmaniasis. ←
- Must have effective diagnosis and treatment.
- Need to know where the disease is at all times (effective surveillance)
- Need to know who transmits disease. Only symptomatic cases or can PKDL also transmit disease?
- People must get very sick; **yes** ←

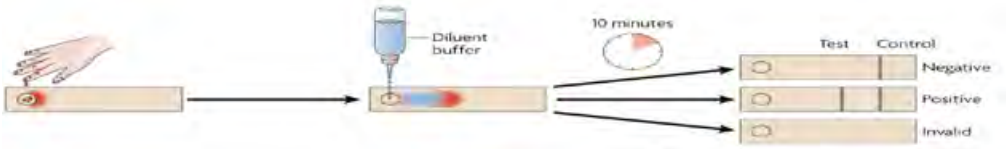
Point of Care Diagnosis and Treatment of VL at the Primary Level

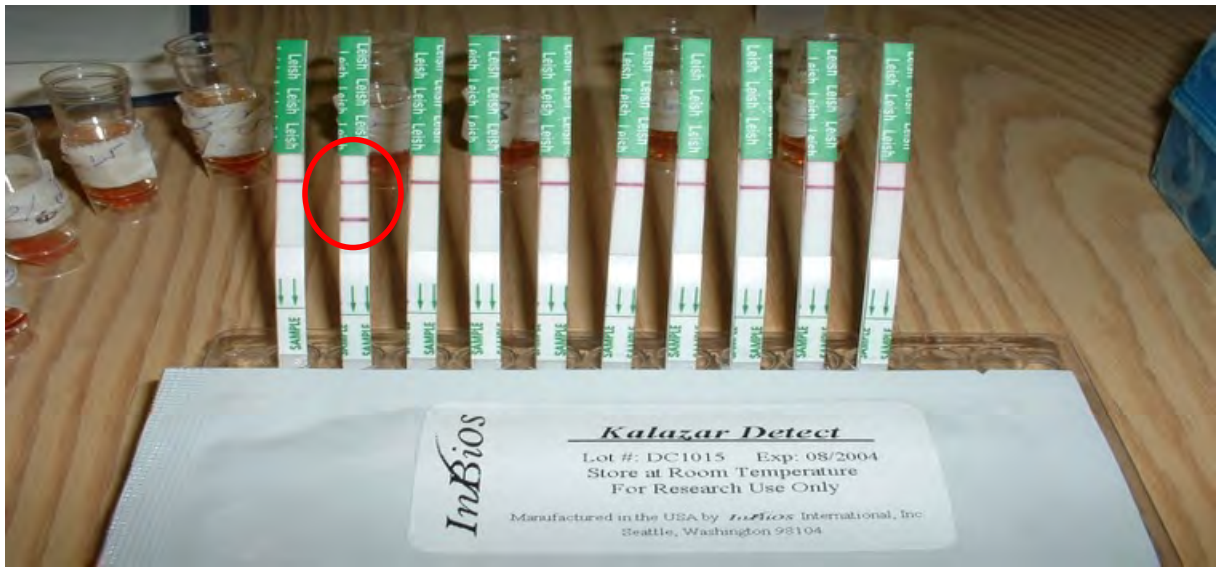
Cost of Diagnostic tests at Primary Health Care Center in Nepal



Box of AmBisome ampules from Gilead

rk39 Rapid Diagnostic Test for Visceral Leishmaniasis



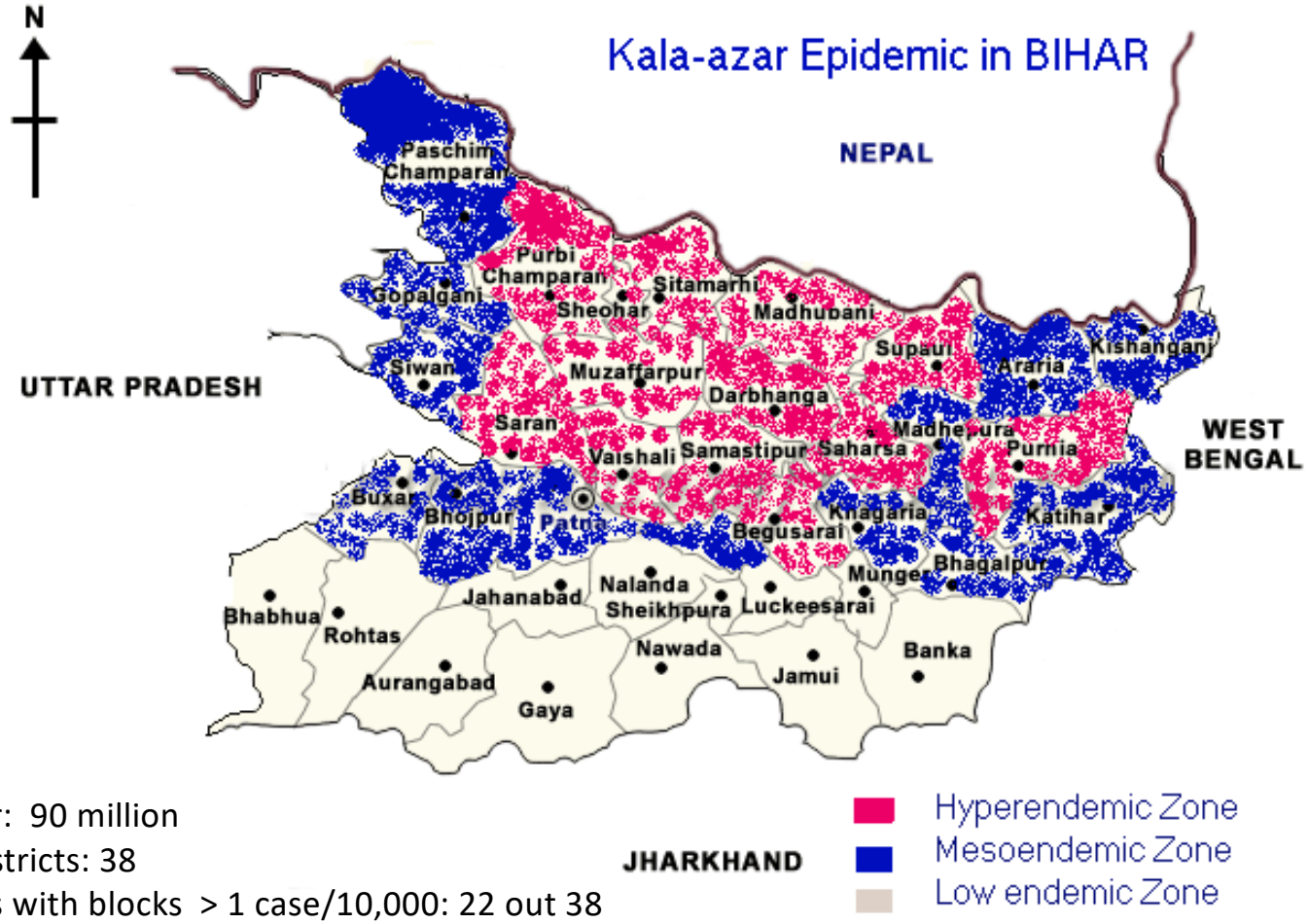


Treatment with AmBisome

Preconditions for Disease Elimination

- There should only be a human reservoir. **Yes** for Visceral not cutaneous leishmaniasis. ←
- Must have effective diagnosis and treatment. **yes** ←
- Need to know where the disease is at all times (effective surveillance)
- Need to know who transmits disease. Only symptomatic cases or can PKDL also transmit disease?
- People must get very sick; **yes** ←


Visceral Leishmaniasis
Nepal
Bangladesh
India
Jammu & Kashmir
Himachal Pradesh
Punjab
Uttaranchal
Haryana
Delhi
Rajasthan
Jaipur
Lucknow
Uttar Pradesh
Bihar
Patna
Sikkim
Arunachal Pradesh
Assam
Nagaland
Manipur
Tripura
Mizoram
Madhya Pradesh
Bhopal
Jharkhand
Ranchi
West Bengal
Kolkata
Gandhinagar
Gujarat
Chhattisgarh
Raipur
Orissa
Bhubaneswar
Maharashtra
Mumbai
Hyderabad
Andhra Pradesh
Karnataka
Bengaluru
Chennai
Kerala
Tamil Nadu
Thiruvananthapuram



Population of Bihar: 90 million
Total number of districts: 38
Number of districts with blocks > 1 case/10,000: 22 out 38

Checking for fever and splenomegaly

World Health Organization

TDR For research on diseases of poverty
UNICEF • UNDP • World Bank • WHO

Training of Village ASHAs to identify VL cases

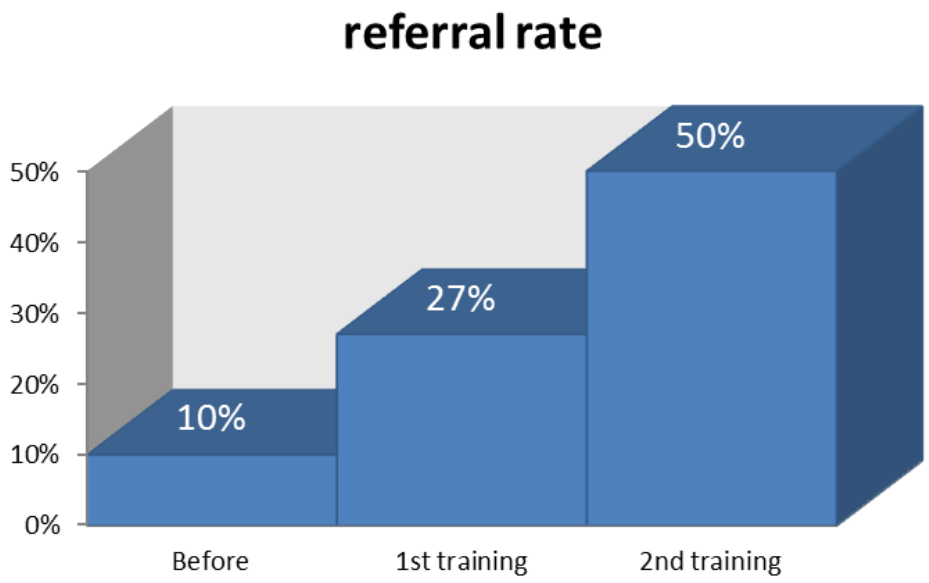
World Health Organization

TDR For research on diseases of poverty
UNICEF • UNDP • World Bank • WHO

Training Session for ASHAs

ASHA Training, India

Approx. **1000 ASHAs** trained in 2 training sessions covering a **population of over 1000,000**.



World Health Organization

TDR For research on diseases of poverty
UNICEF • UNDP • World Bank • WHO

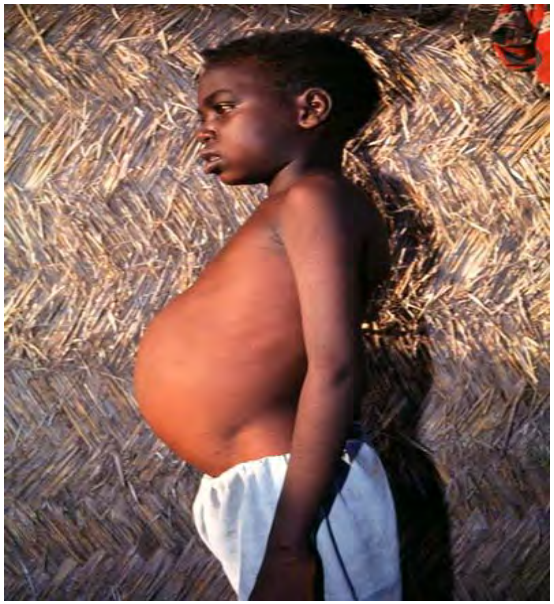
PLoS NTD 8:e2774, 2014

Preconditions for Disease Elimination

- There should only be a human reservoir. yes ←
- Must have effective diagnosis and treatment. yes ←
- Need to know where the disease is at all times (effective surveillance): Yes ←
- Need to know who transmits disease. Only symptomatic cases or can PKDL also transmit disease?
- People must get very sick; Yes ←

Visceral Leishmaniasis

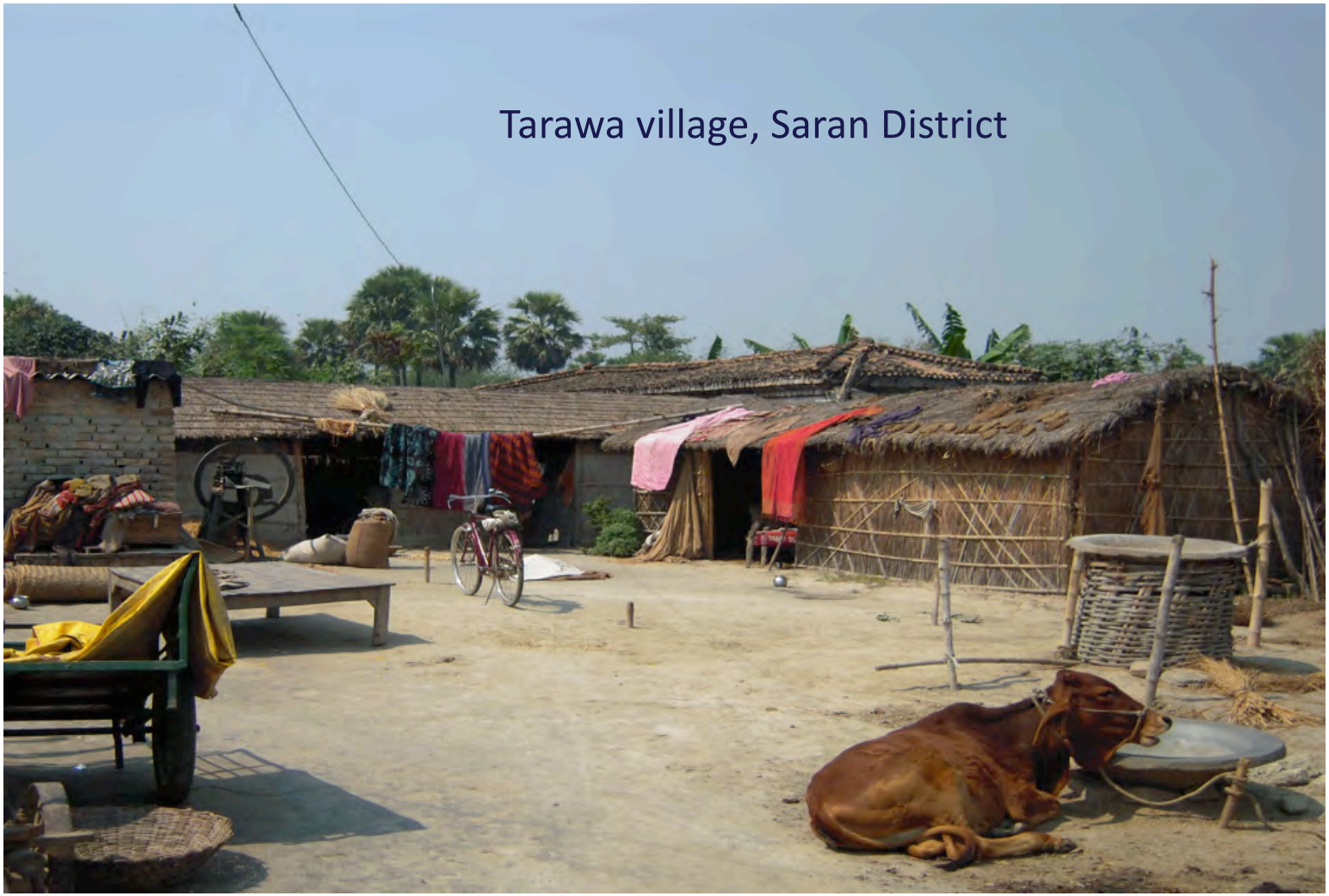
Post Kala-azar Dermal Leishmaniasis (PKDL)



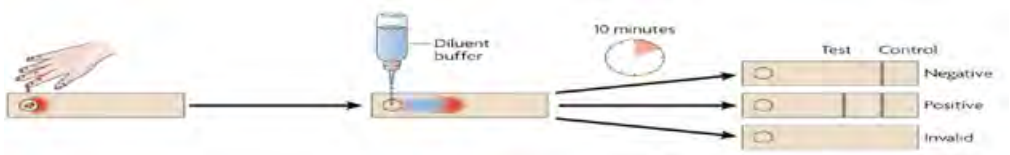
Treatment

10%

Is PKDL a reservoir for transmission ?



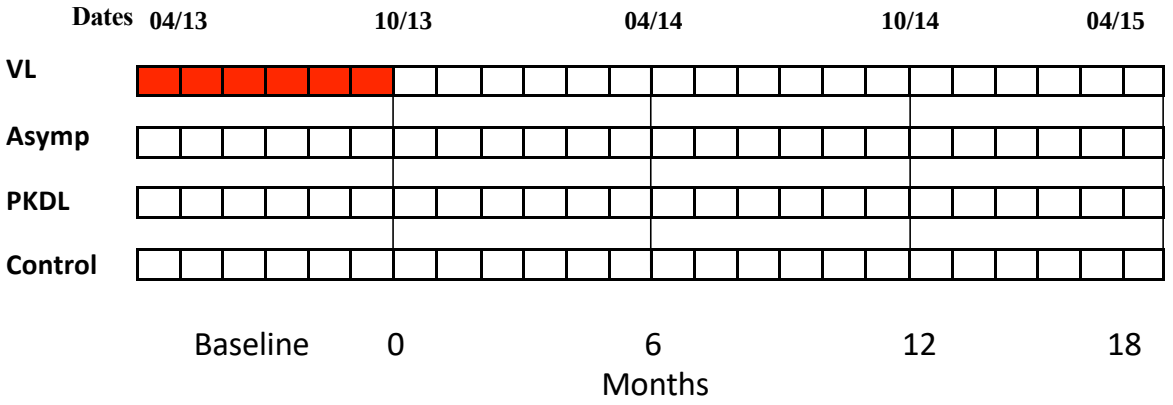
Who are the reservoirs for transmission in these villages ?



rK39 serology antibodies to Leishmania

Households in Baniyapur Village (Saran)

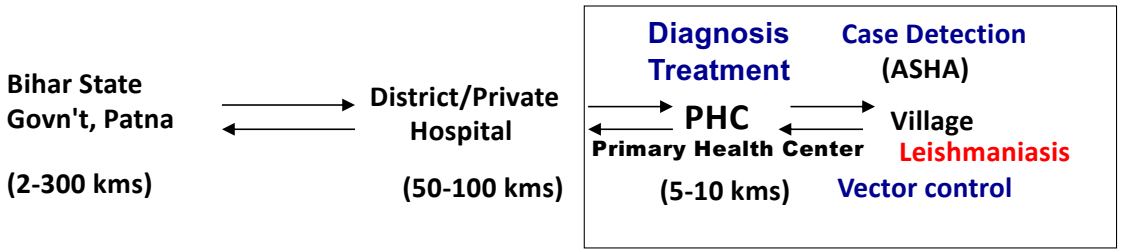
Timeline for transmission to rK39-positive to family members



Timeline with highest transmission (OR>5)

Why is this Information important?

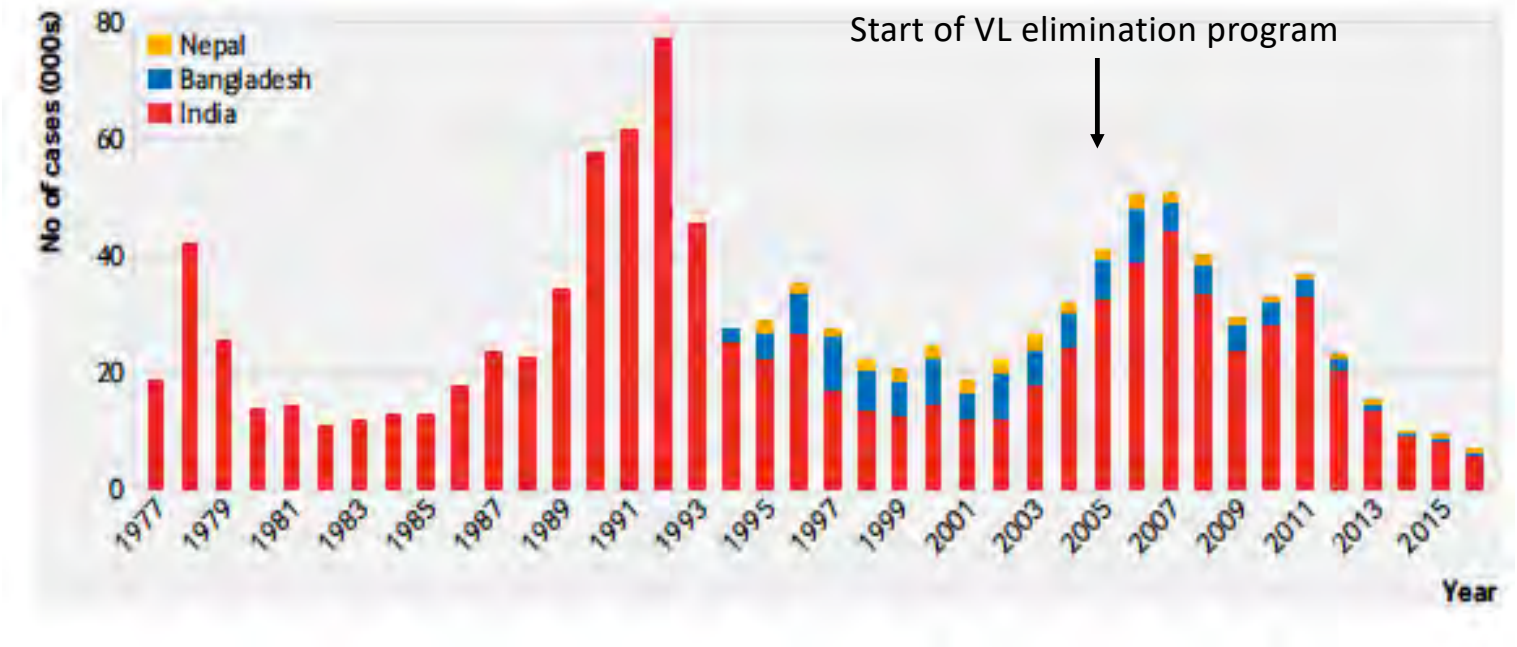
Intensifying case detection and treatment close to endemic villages



As of June 2017, VL elimination target has been reached in Nepal and Bangladesh, India Bihar, cases are down from 20/10,000 to 4/10,000

World Health Organization TDR For research on diseases of poverty UNICEF • UNDP • World Bank • WHO

Visceral Leishmaniasis Cases



Is the VL elimination program working?

Visceral Leishmaniasis in Nepal

VL endemic districts
(fewer than 1:10,000 cases)