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:

- Eradicated NTDs:
  - 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

Disease eradication: zero cases world wide,
Disease elimination: 1 case in 10,000 in endemic area.
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.
Leishmania Life Cycle and Reservoirs

Visceral leishmaniasis
Leishmania donovani  Human Reservoir

Cutaneous leishmaniasis
Leishmania major, and others: Animal reservoir

Promastigote
Amastigote
World Wide Distribution of Leishmaniasis (90 countries)
Visceral Leishmaniasis
50% cases worldwide

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**
Nepal
Bangladesh
Visceral Leishmaniasis
India
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
Training of Village ASHAs to identify VL cases
Training Session for ASHAs
ASHA Training, India

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

referral rate

Before | 1st training | 2nd training
10%    | 27%         | 50%

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)

Is PKDL a reservoir for transmission?
Tarawa village, Saran District

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

<table>
<thead>
<tr>
<th>Dates</th>
<th>04/13</th>
<th>10/13</th>
<th>04/14</th>
<th>10/14</th>
<th>04/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asymp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PKDL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
Visceral Leishmaniasis Cases

Start of VL elimination program

Is the VL elimination program working?
Visceral Leishmaniasis in Nepal

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