

NEGLECTED TROPICAL DISEASES

AN INTRODUCTION

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Dr. Bhupendra Tripathi, MD
Country Lead – Elimination Programs (NTDs),
BMGF India Country Office,
New Delhi



**People living in poor socio-economic conditions
≈2 billion people globally are at risk for
Neglected Tropical Diseases**



<https://www.gapminder.org/dollar-street>

NEGLECTED TROPICAL DISEASES



Neglected tropical diseases (NTDs) are a diverse set of 20 diseases and disease groups with a singular commonality: their impact on impoverished communities. Together they affect more than 1 billion people with devastating health, social and economic consequences.

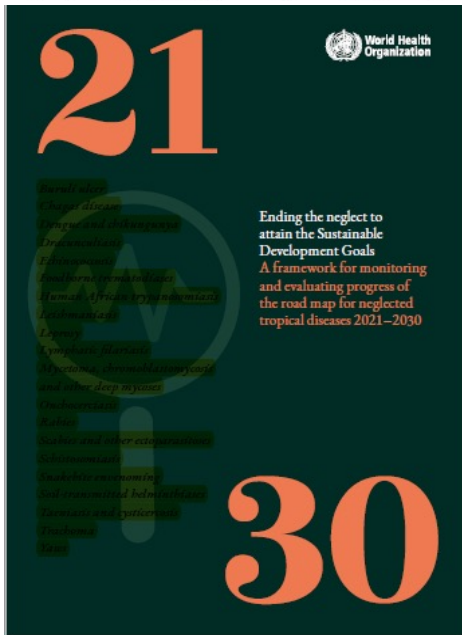
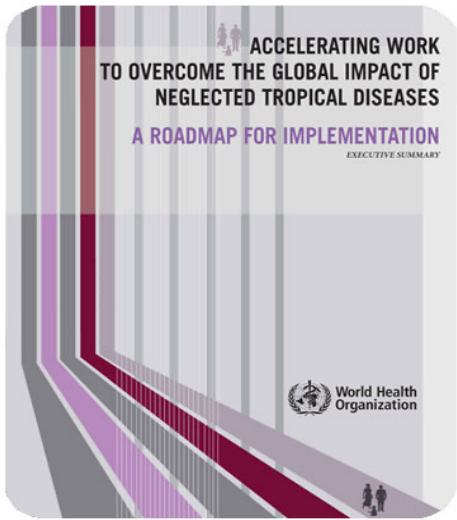
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Distinct diseases/conditions grouped together

1. that require **tropical environments** to be transmitted on a large scale
2. that do not travel widely; therefore, constitute **no immediate global health security threat** to high-income countries; and therefore, get little international attention
3. that **disproportionately affect poor populations**; and cause important morbidity and mortality – including stigma and discrimination - in such populations, justifying a global response
4. that can be **controlled, prevented and possibly eliminated** using effective and feasible solutions; or that are relatively neglected by research when it comes to developing new diagnostics, medicines and other control tools
5. **Impact progress of SDG 3.3**

World NTD Day – 30 Jan

NEGLECTED TROPICAL DISEASES



ERADICATION

- Yaws
- Dracunculiasis (Guinea worm)

ELIMINATION

- Leprosy
- Onchocerciasis
- Human African Trypanosomiasis (gambiense)

ELIMINATION AS A PUBLIC HEALTH PROBLEM

- | | |
|--|---|
| ■ Lymphatic Filariasis | ■ Schistosomiasis |
| ■ Visceral Leishmaniasis | ■ Chagas diseases |
| ■ Rabies | ■ Human African Trypanosomiasis (rhodesiense) |
| ■ Soil transmitted Helminthiasis | |
| ■ Trachoma | |

CONTROL

- | | |
|--|---|
| ■ Dengue | ■ Buruli ulcer |
| ■ Chikungunya | ■ Echinococcosis |
| ■ Snakebite envenoming | ■ Foodborne trematodiasis |
| ■ Scabies & ectoparasites | ■ Leishmaniasis (cutaneous) |
| ■ Taeniasis & Cysticercosis | ■ Chromoblastomycosis & other deep mycosis |
| ■ Mycetoma | |



NEGLECTED TROPICAL DISEASES - INDIA

NTDs	Number of cases in India in 2016	Rank globally	Number of cases globally and percentage of cases found in India (in 2016)
Ascariasis	222.2 million	1	799.7 million (28%)
Hookworm disease	102.4 million	1	450.7 million (23%)
Trichuriasis	67.8 million	1	435.1 million (16%)
Dengue ^a	53.2 million	1	101.1 million (53%)
LF	8.7 million	1	29.4 million (29%)
Trachoma ^b	1.8 million	1	3.3 million (53%)
Cysticercosis	819,538	1	2.7 million (31%)
Leprosy (IHME)	187,730	1	523,245 (36%)
Leprosy (WHO) ^c	135,485 new cases; 88,116 prevalent cases	1	New cases 214,783 (63%); prevalent cases 171,948 (51%)
Cystic echinococcosis	119,320	1	973,662 (12%)
Visceral leishmaniasis	13,530	1	30,067 (45%)
Rabies ^a	4,370	1	13,340 (33%)
India's population in 2016	1.324 billion ^d	2	7.44 billion (18%)

^aIncident cases

^bVisual impairment cases only

^c [4]

^d<http://databank.worldbank.org/data/>

Abbreviations: GBD, Global Burden of Disease Study; IHME, Institute for Health Metrics and Evaluation; LF, lymphatic filariasis; NTD, neglected tropical disease.

<https://doi.org/10.1371/journal.pntd.0006038.t001>

Game changer identification matrix

Area to investigate for "game-changers"

- High ambitions in 2030 roadmap
- Medium ambitions in 2030 roadmap

NTD value chain

- >1M DALYs
- >0,5M and <1M DALYs
- <0,5M DALYs

No bottleneck towards target Critical action required to reach target

WHO 2030 NTD roadmap

		Elimination (interruption of transmission)											Control													
		Eradication				Elimination as a public health problem							Control													
		Guinea Worm	Yaws	HAT (Gambiense)	Leprosy	Onchocerciasis	Chagas disease	HAT (Rhodesiense)	Leishmaniasis (visceral)	Lymphatic filariasis	Rabies	Schistosomiasis	Soil-transmitted helminthiases	Trachoma	Buruli ulcer	Chikungunya	Dengue	Echinococcoses	Foodborne trematodiases	Leishmaniasis (cutaneous)	Mycetoma	Chromoblastomycosis & other deep mycoses	Scabies and other ectoparasitoses	Snakebite envenoming	Taeniasis/cysticercosis	
		~0	1+	0,08	0,03	1,23	0,28	0,08	0,40	1,63	0,78	1,64	1,97	0,18	N/A	1+	2,4	0,12	0,8	0,3	N/A	N/A	4,84	1+	1,3	
Technical progress	Scientific understanding	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Diagnostics	Yellow	Green	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Green	Red	Red
	Effective intervention technology research	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Green	Red	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Strategy and service delivery	Operational and normative guidance	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Planning, governance and program management	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow
	Monitoring & Evaluation	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Enablers	Access and logistics	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Red	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Healthcare infrastructure & workforce	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Advocacy and funding (excl. own Funding)	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Enablers	Collaboration & multisectoral action	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow
	Capacity and awareness building	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Red	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

Overarching global targets for 2030²

90%³

Percentage reduction in people requiring interventions against neglected tropical diseases

75%

Percentage reduction in disability-adjusted life years related to neglected tropical diseases

100

Number of countries having eliminated at least one neglected tropical disease

2

Number of neglected tropical diseases eradicated

Disease	Indicator	2020	2023	2025	2030
TARGETED FOR ELIMINATION AS A PUBLIC HEALTH PROBLEM					
Chagas disease	Number of countries achieving interruption of transmission through the four transmission routes (vectoral, transfusion, transplantation and congenital), with 75% antiparasitic treatment coverage of the eligible population	0	4 (10%)	10 (24%)	15 (37%)
Human African trypanosomiasis (rhodesiense)	Number of countries validated for elimination as a public health problem (defined as <1 case/10 000 people/year, in each health district of the country averaged over the previous five-year period)	0	2 (15%)	4 (31%)	8 (61%)
Leishmaniasis (visceral)	Number of countries validated for elimination as a public health problem (defined as <1% case fatality rate due to primary visceral leishmaniasis)	0	32 (43%)	56 (75%)	64 (85%)
Lymphatic filariasis	Number of countries validated for elimination as a public health problem (defined as infection sustained below transmission assessment survey thresholds for at least four years after stopping mass drug administration; availability of essential package of care in all areas of known patients)	17 (24%)	23 (32%)	34 (47%)	58 (81%)
Rabies	Number of countries having achieved zero human deaths from rabies	80 (47%)	89 (53%)	113 (67%)	155 (92%)

Cross-cutting targets for 2030

Integrated approaches



75%

Integrated treatment coverage index for preventive chemotherapy

40

Number of countries that adopt and implement integrated skin neglected tropical disease strategies

75%⁴

Percentage reduction in number of deaths from vector-borne neglected tropical diseases (relative to 2016) – to achieve WHO’s global vector control response goal

Multisectoral coordination



100%

Access to at least basic water supply, sanitation and hygiene in areas endemic for neglected tropical diseases – to achieve targets 6.1 and 6.2 of Sustainable Development Goal 6

90%

Share of the population at risk protected against catastrophic out-of-pocket health expenditure due to neglected tropical diseases – to achieve target 3.8 of Sustainable Development Goal 3

90%

Share of countries with neglected tropical diseases integrated in national health strategies/plans

Universal health coverage



90%

Share of countries including neglected tropical disease interventions in their package of essential services and budgeting for them

90%

Share of countries with guidelines for management of neglected tropical disease-related disabilities within national health systems

Country ownership



90%

Share of countries reporting on all relevant endemic neglected tropical diseases

90%

Share of countries collecting and reporting data on neglected tropical diseases disaggregated by gender

LYMPHATIC FILARIASIS (LF)

- Caused by three species of parasitic worm: *Wuchereria bancrofti*, *Brugia malayi* and *B. timori*



W. bancrofti

B. malayi

B. timori

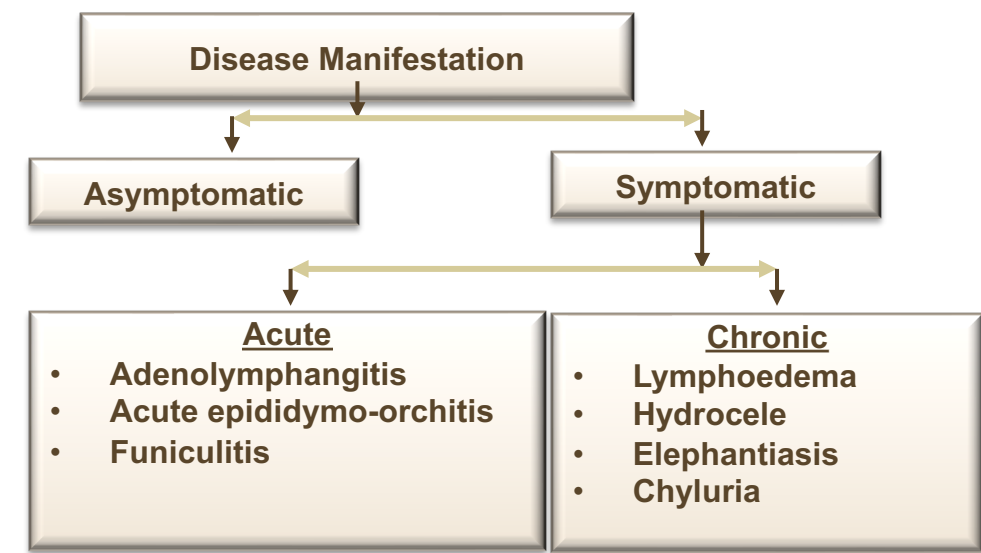
Transmitted to humans by mosquitoes



Lymphoedema

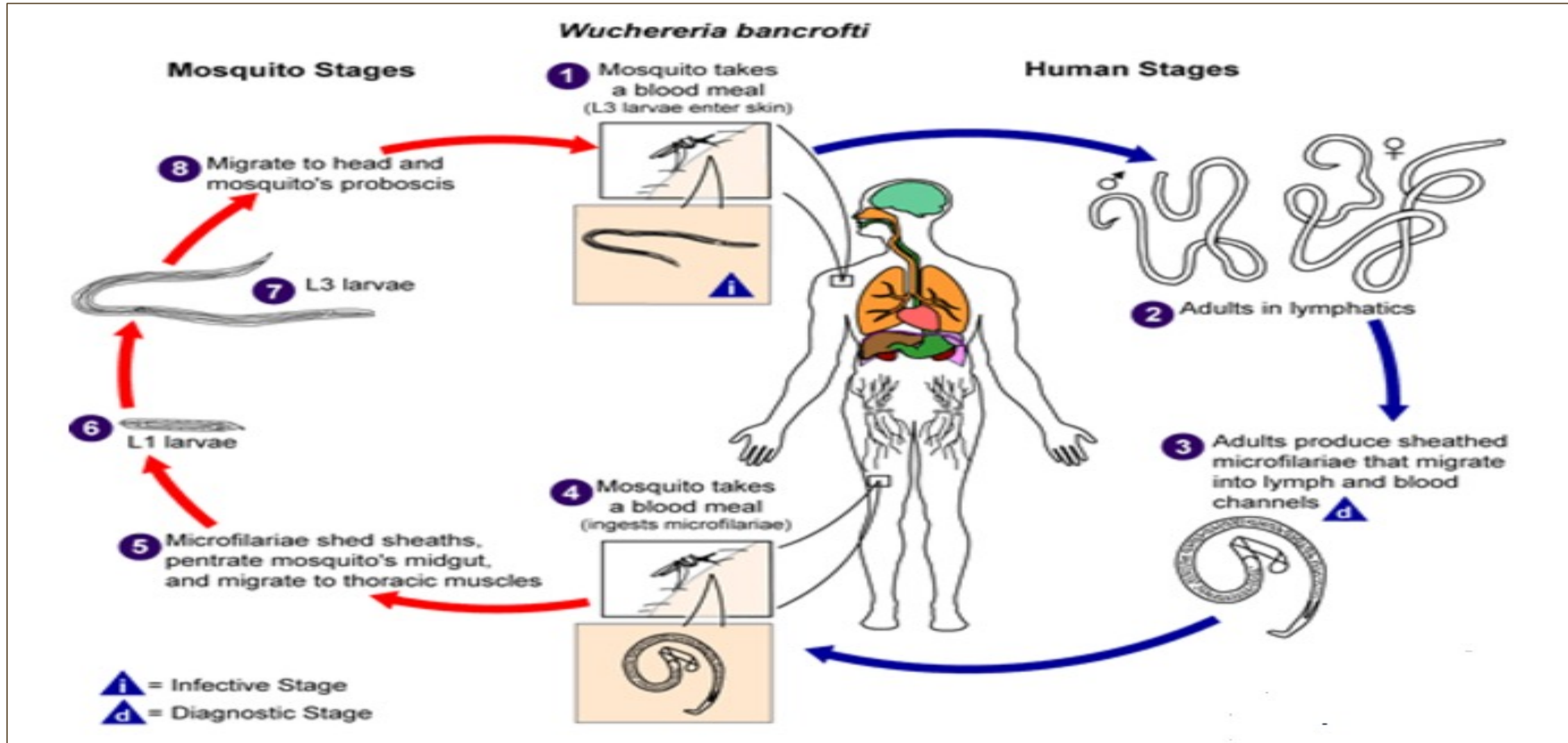


Hydrocoele





LIFE CYCLE OF LF PARASITE



GLOBAL ELIMINATION OF LYMPHATIC FILARIASIS

In 1997, the World Health Assembly resolved to eliminate lymphatic filariasis as a public health problem (WHA resolution 50.29).

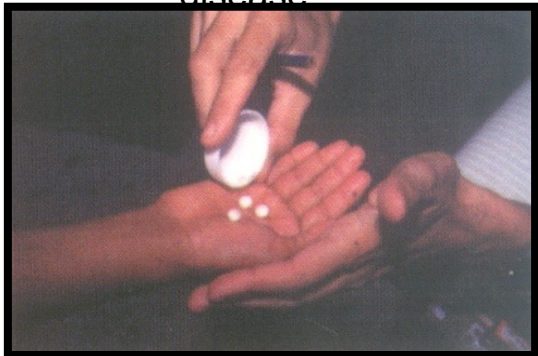
In 2000, the GPELF was launched by WHO with twin pillar strategy with a goal to eliminate LF by 2030

1. Stop the spread of infection: interrupt transmission by MDA

Mass Drug Administration (MDA): Transmission control to prevent the occurrence of new infection by annual MDA with DA (DEC + Albendazole) or with IDA (Ivermectin +DEC + Albendazole)

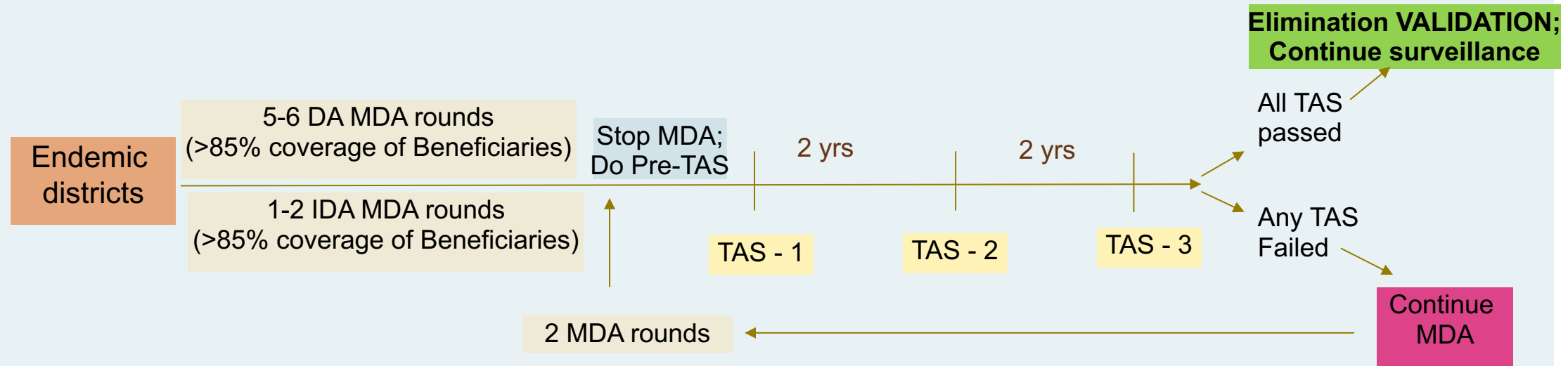
2. Reduce the suffering caused by the disease

Morbidity Management and Disability Prevention (MMDP): Disability prevention and management for those who already have the disease



LF ELIMINATION GUIDELINES

Implementation Unit (Usually administrative Unit)



Old

4 Sentinel + 4 Random sites (Annual Testing Mf slides) per district

Pre TAS – Additional 10 New Sites per district

Evaluation Unit (Up to 2 Million Population; Antigenemia <2%)

TAS – 6 to 7 yrs old school children

Surveillance System

New

1 Sentinel + 1 Random site (Annual Testing Mf slides) per block

Pre TAS – Additional 3 new sites per block

Evaluation Unit (Up to 500,000 Population; Antigenemia <2%)

TAS – 6 to 7 yrs old school children or >20 yrs old in IDA areas

LF ELIMINATION OVERVIEW - INDIA

Lymphatic filariasis (LF) is currently endemic in 328 districts across 20 States and union territories (UTs).

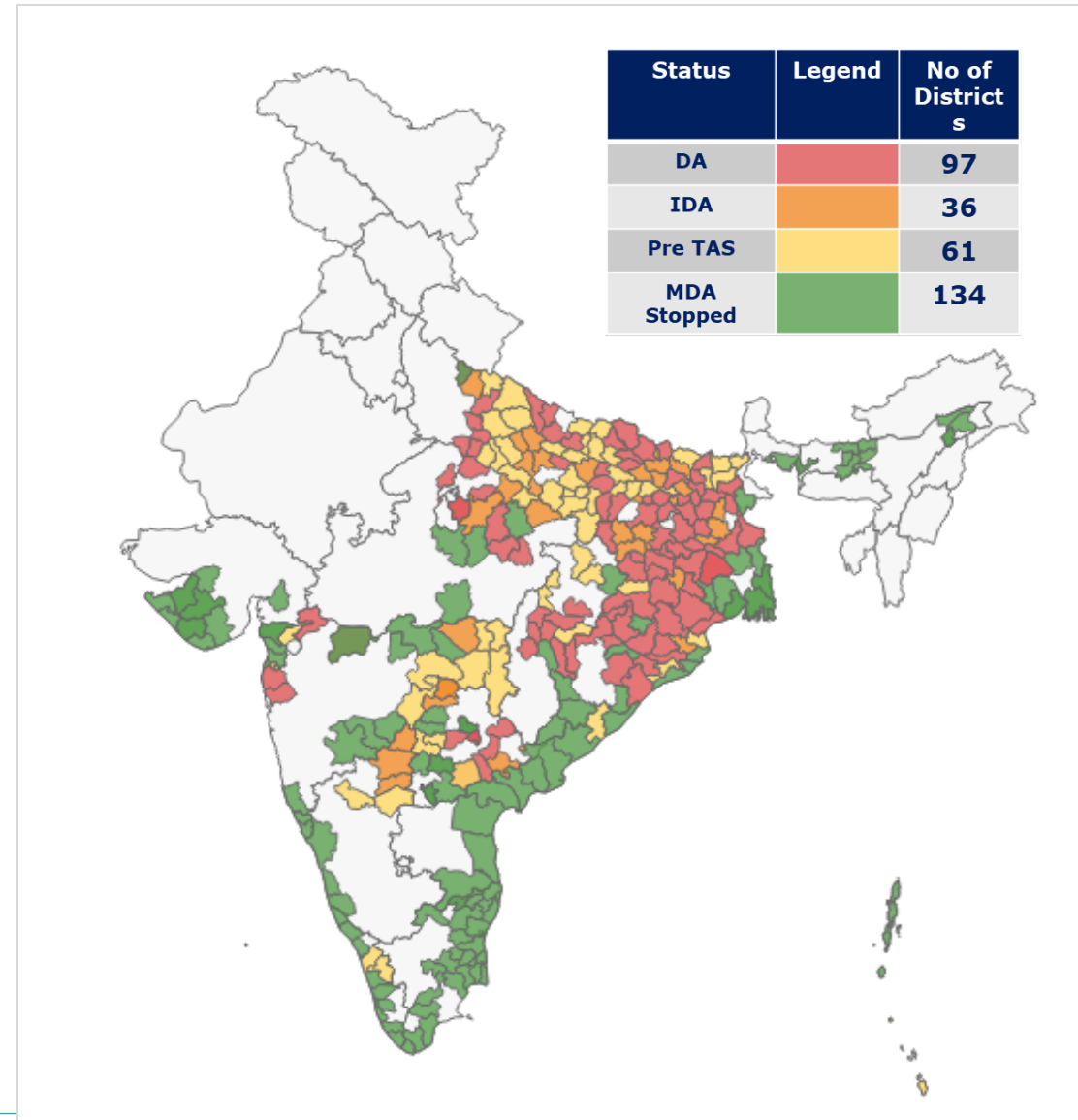
Elimination of Lymphatic Filariasis is a public health priority for the Government of India and is targeted for elimination by 2027

Districts that achieved microfilaria rate <1 % - 134 districts in 2022

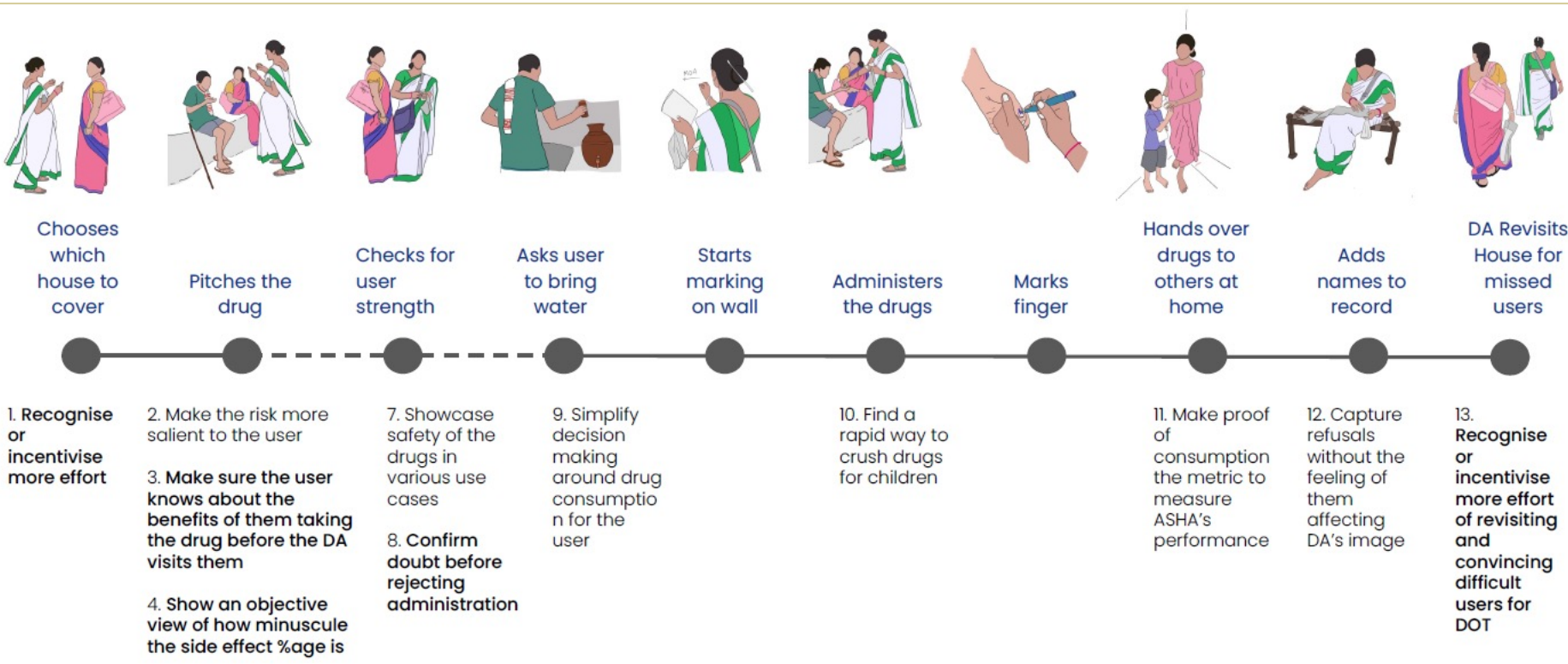
Triple Drug Therapy scaled to 36 districts in 2022 with domestic procurement of Ivermectin

5.28 lakhs Lymphedema cases and 1.78 lakhs Hydrocele cases are reported and 38,382 hydrocelectomies were conducted

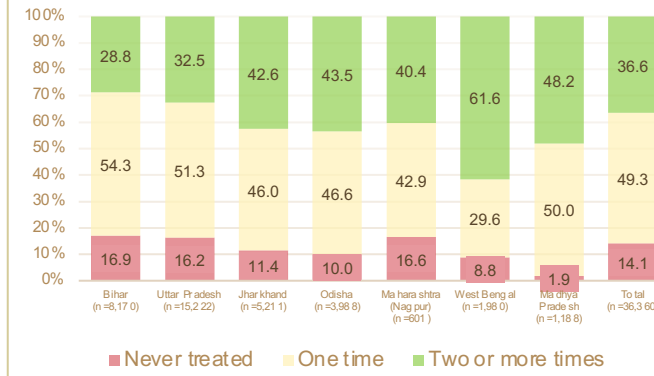
Change in strategy from district to block level to ensure proper implementation and enhanced surveillance.



LF Mass Drug Administration (MDA) campaign

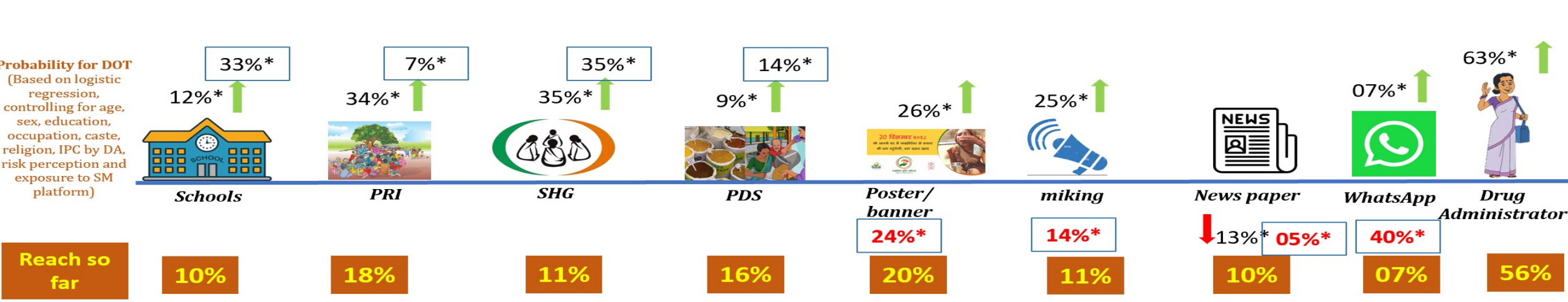


EVER CONSUMPTION OF ANTI-LF DRUGS AMONG 18 OR MORE YEARS (%)

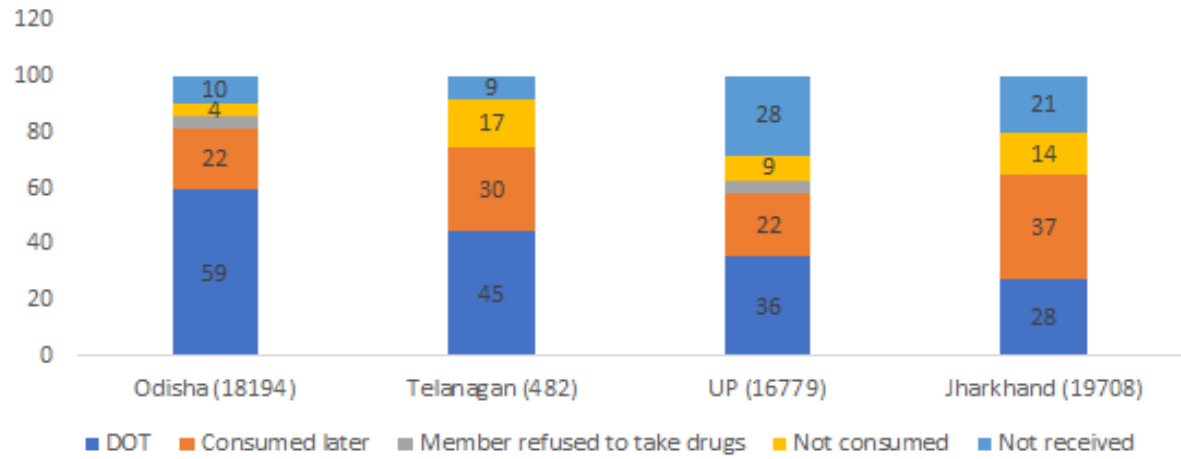


- Low DOT among adult males
- Low coverage and compliance in urban areas
- Low DOT among children of the age group 2-5 years
- Low DOT among underserved communities (Muslim population)
- Existing misconceptions among the Drug Administrators
- Sub optimum reach of social mobilization platforms; Less Pre MDA mobilization period
- Low levels of knowledge on prevention and transmission among the communities leads to more likelihood of never treated

Efficacy of each of the platforms and channels



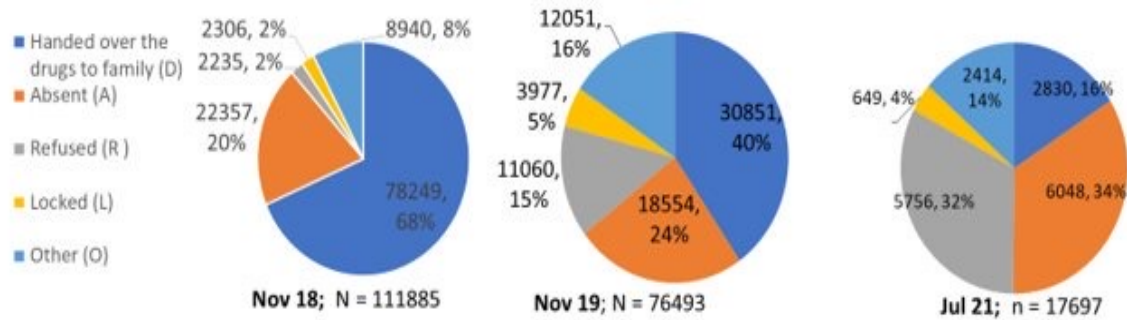
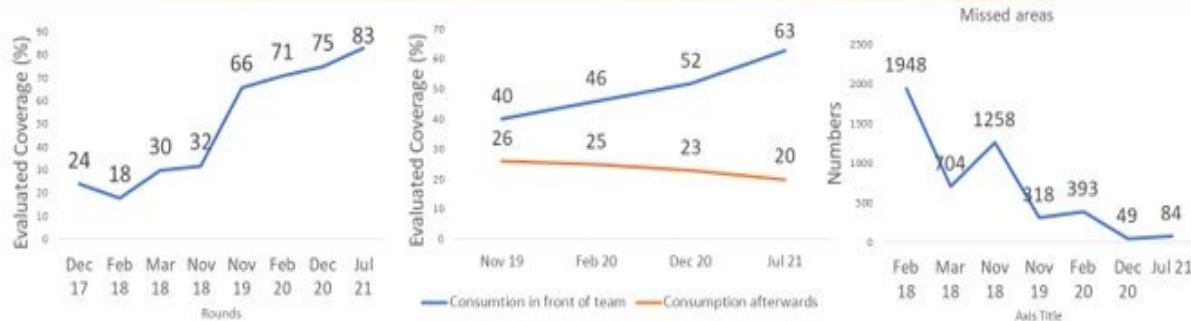
Drug consumption pattern among household members (%) (PCI Monitoring Data July- Sept 2021)



Drug compliance during July 2021 MDA round in State of Maharashtra

District	Type of MDA	Total monitored Population	Number of people eligible for MDA	Number of eligible people consumed drugs	% Eligible people consumed drugs	% Consumption in total monitored Population
Bhandara	IDA	8336	7844	6794	86.61%	81.50%
Chandrapur	IDA	12924	12199	10800	88.53%	83.57%
Gadchiroli	IDA	11685	10815	10202	94.33%	87.31%
Gondia	DA	10766	10014	9019	90.06%	83.77%
Nanded	DA	13681	12603	11466	90.98%	83.81%
Yavatmal	DA	7506	7158	6693	93.50%	89.17%
Maharashtra		64898	60633	54974	90.67%	84.71%

Improvement in consumption since Dec 2017 – Uttar Pradesh



Increase in drug compliance since 2016- Bihar

DISTRICT	2016	2017	2018	2019	2020	DISTRICT	2016	2017	2018	2019	2020
ARARIA	75		47	56		LAKHISARAI		50			83
ARWAL		50		69		MADHEPURA				87	
ALURANGABAD		63				MADHUBANI			30		73
BANKA			47	58		MUNGER	79		72	72	
BEGUSARAI	26		47	61		MUZAFFARPUR	44		66	74	
BHAGALPUR	28		49	61		NALANDA		61			80
BHOJIPUR		56			73	NAWADA		35			81
BUXAR	87		63	74		PATNA	48		44	82	
CHAMPARAN EAST	28		37	63		PURNIA		69			64
CHAMPARAN WEST			65	74		ROHTAS	44				81
DARBHANGA		68			67	SAHARSA			56	62	
GAYA			71	76		SAMASTIPUR		53			75
GOPALGANI	65		48	48		SARAN	71		74	40	
JEHANABAD			51	56		SHEIKHPURA	50		50	77	
JAMUI		73	70	85		SHEOHAR		45			
KAIMUR	65		62	78		SITAMARHI		40	72	68	
KATIHAR				83		SIWAN			56	75	
KHAGARIA	78		82	72		SURPAUL			68	65	
KISHANGANI		34			71	VAISHALI		73			66
Bihar Total	52	56	56	70	74						

MODELLING QUESTIONS



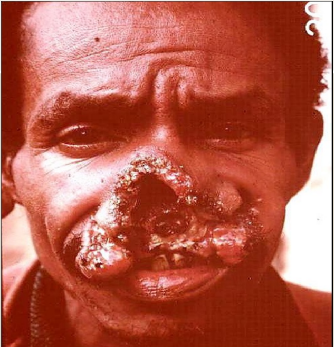
- How many years will an implementation unit take to achieve elimination (MDA coverage with two drugs vs three drugs)
- What is the impact of demographic and environmental factors for reaching elimination
- How does people migration and never treated affect LF transmission
- Vector density and disease transmission
- Risk factors for re-introduction of disease
- Identification of hot spots/pockets of transmission

KALA AZAR



- Caused by protozoan species of the genus *Leishmania donovani* transmitted by bite of female sandfly (*Phlebotomus argentipes*)
- Man is only reservoir and there is only 1 vector
- Sandflies take at least two blood meals to transmit leishmania
- Parasite is mostly confined to reticulo-endothelial system (bone marrow, spleen, and liver).
- Incubation period ranges from 10 days to 2 years,
- Extrinsic incubation period in sandfly varies from 4-25 days
- Main symptoms include prolonged irregular fever(> 2 weeks) , anemia, enlarged spleen, weight loss , loss of appetite and weakness.
- Currently the diagnosis is done by RDT(rK39) or Biopsy(Splenic, Bone Marrow or Lymph Node).
- Single dose effective treatment with LAMB (Liposomal Amphotericin B or Ambisome 10mg/Kg weight

KALA AZAR

Leishmaniasis	Features	Pictures
Visceral leishmaniasis (VL) , also known as kala-azar,	is fatal if left untreated in over 95% of cases. It is characterized by irregular bouts of fever, weight loss, enlargement of the spleen and liver, and anaemia.	 <p>Symptoms of Visceral Leishmaniasis</p> <ul style="list-style-type: none">■ Enlargement of the spleen■ Enlargement of the liver■ Night sweats■ Severe temperature or irregular bouts of fever that can last for weeks■ Bleeding■ Blackening of the skin■ Scaly skin■ Dark and ashen skin■ Cough■ Weakness■ Substantial weight loss <p>For More Information, Visit: www.epainassist.com</p>
Cutaneous leishmaniasis (CL)	is the most common form and causes skin lesions, mainly ulcers, on exposed parts of the body. These can leave life-long scars and cause serious disability or stigma.	
Mucocutaneous leishmaniasis	leads to partial or total destruction of mucous membranes of the nose, mouth and throat.	

KALA AZAR ELIMINATION TARGET

Annual incidence (AI) of kala-azar below one case per 10,000 population at block level in India

$$AI = \frac{\text{(number of new cases + relapse in a single year)}}{\text{(mid-year population of the implementing unit)}} \times 10,000$$

Feasibility of elimination

1. Man is the only reservoir
2. *Phlebotomous argentipes* sandflies, the only known vector
3. Disease is confined to limited geographical area
4. Rapid diagnostic tests and effective treatments are available
5. High political commitment

The main strategies for achieving the target are

1. Early diagnosis and complete treatment;
2. Integrated vector management;
3. Effective disease and vector surveillance;
4. Social mobilization and partnerships;
5. Clinical and operational research

Source: Regional Strategic Framework for Elimination of Kala-azar from the South- East Asia Region (2011–2015) SEA-VBC-85 (Rev.1)

KALA AZAR IN INDIA

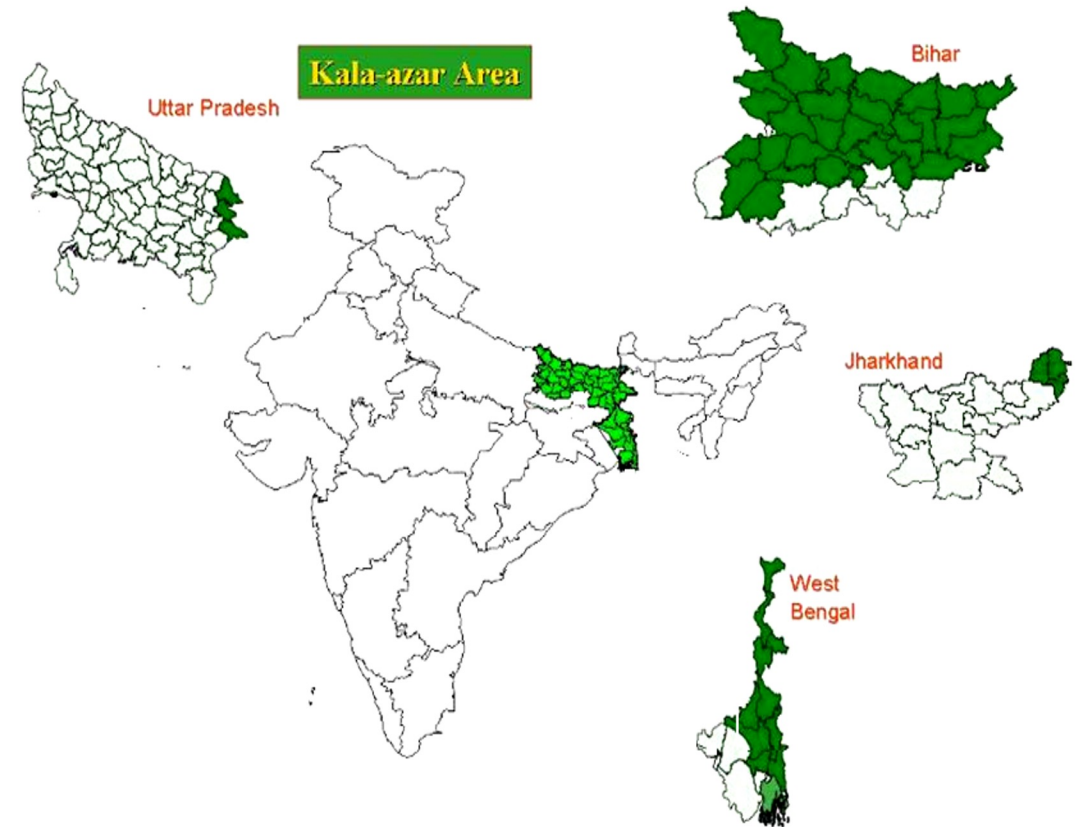
Population at Risk - 165.4 million

States	Endemic Districts (Number)	Endemic Blocks (Number)
Bihar	33	458
Jharkhand	4	33
West Bengal	11	120
Uttar Pradesh	6	22
Total	54	633

Target: Reduce annual KA case incidence to <1/10000 population at block level

All blocks in WB and UP have achieved the elimination target

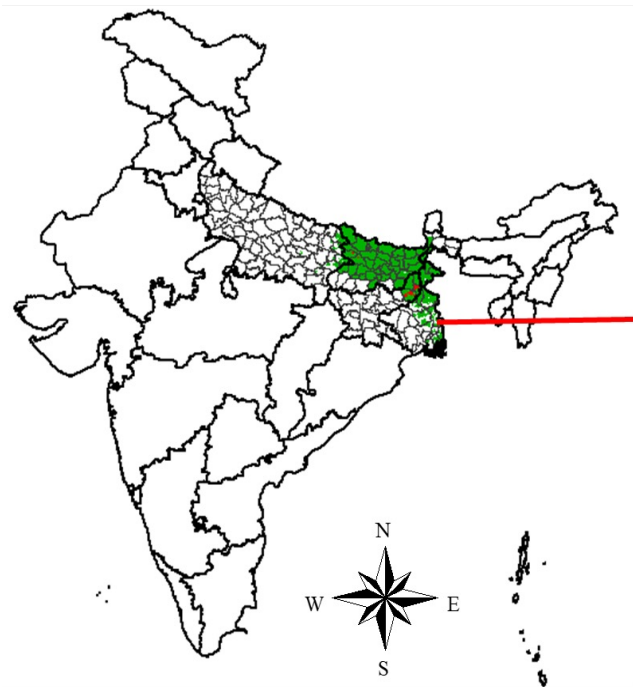
India is very close to achieving its elimination target with the strategic approach of active case search , early diagnosis and complete treatment along with vector Control



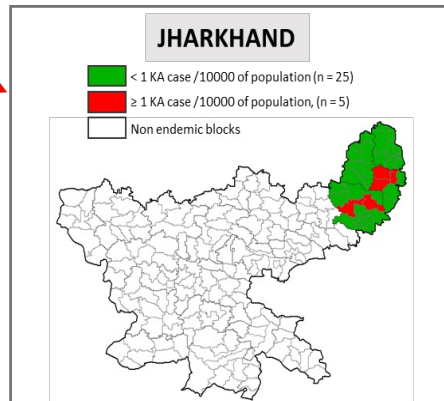
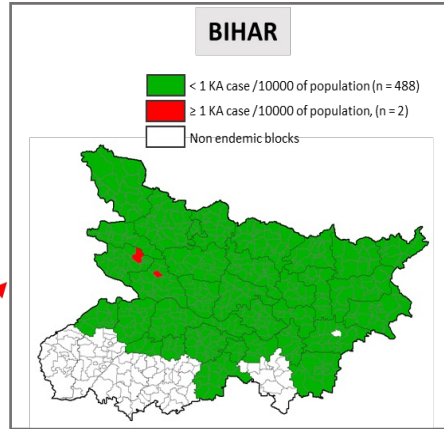
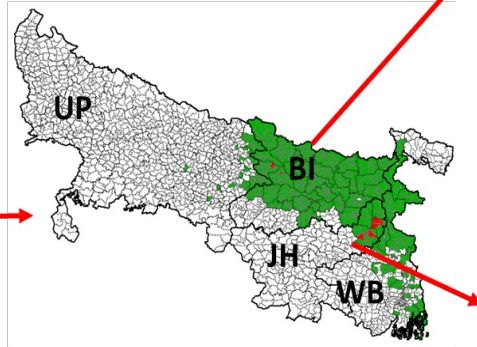
KALA AZAR ELIMINATION PROGRESS

2021

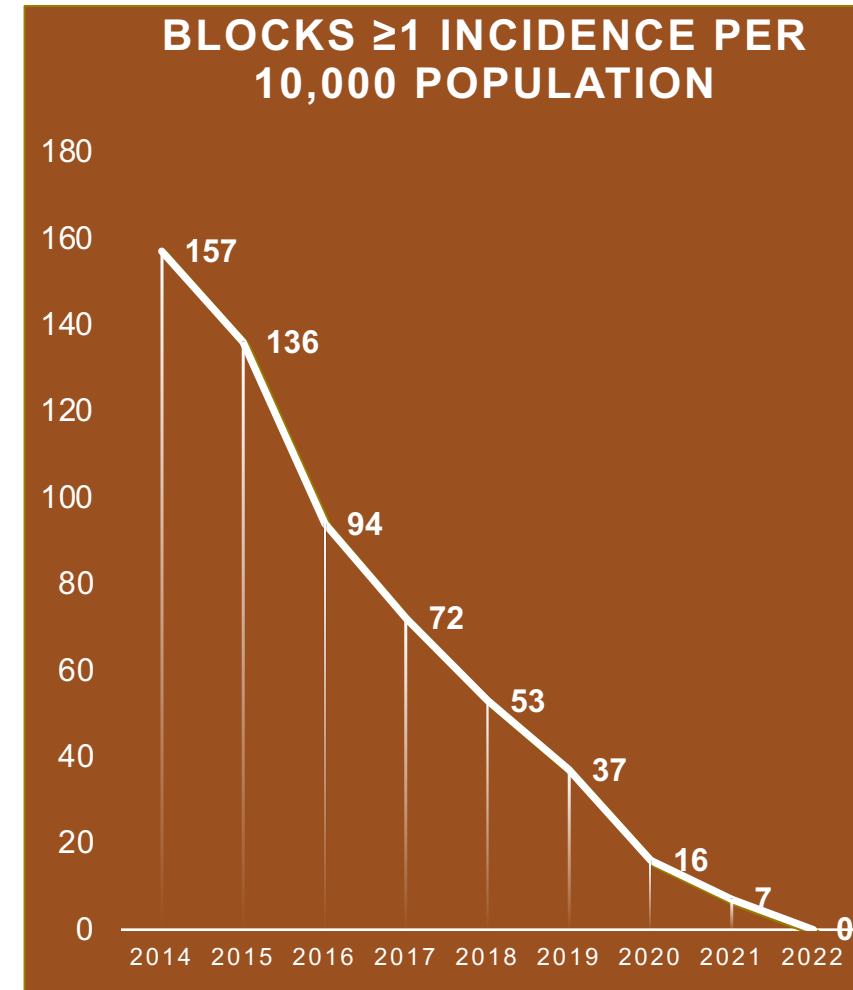
- < 1 KA case /10000 of population (n = 626)
- ≥ 1 KA case /10000 of population, (n = 7)
- Non endemic blocks



Not to scale



2022

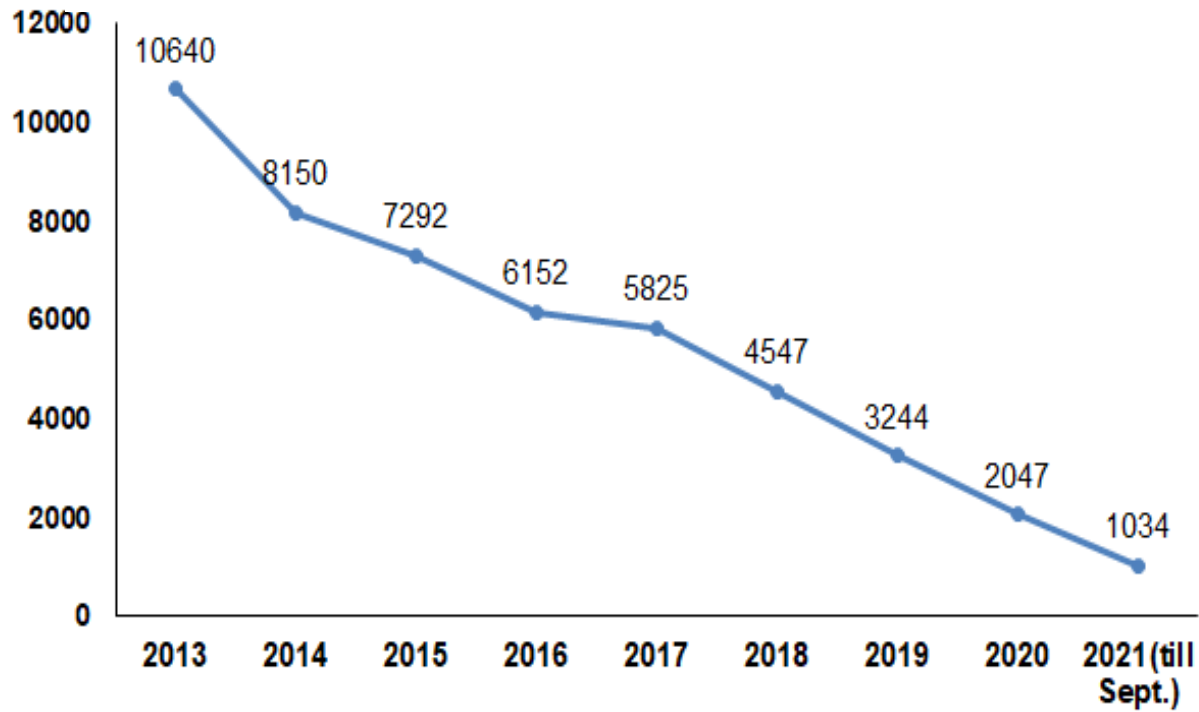


POST KALA-AZAR DERMAL LEISHMANIASIS (PKDL)

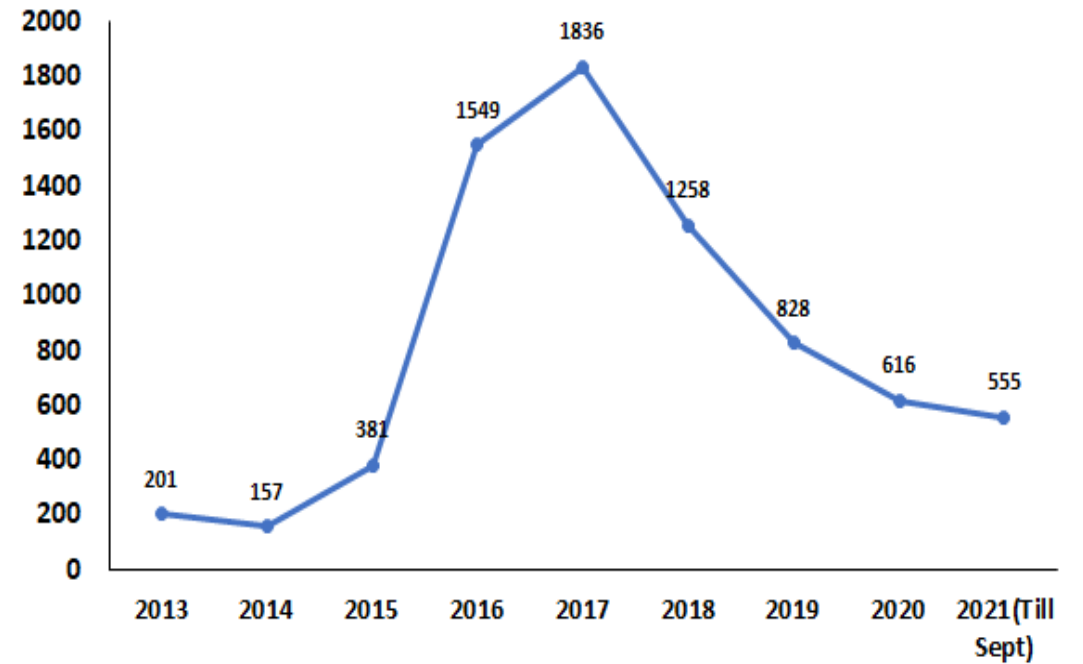
- 6 months - 2 years after cure/ treatment from Kala-azar
- Hypo-pigmented macules (patch), erythema, papulo-nodules. Mixed lesions often seen.
- Face, nose, lips, ears, proximal parts of upper limbs, upper back, inner aspect of thighs with relative sparing of central back & belt area
- Erythematous butterfly rash which may be aggravated by exposure to Sunlight; an early sign of PKDL



VL Case load trends 2013 to 2021(sept)



PKDL Case load trends 2013 to 2021(sept)

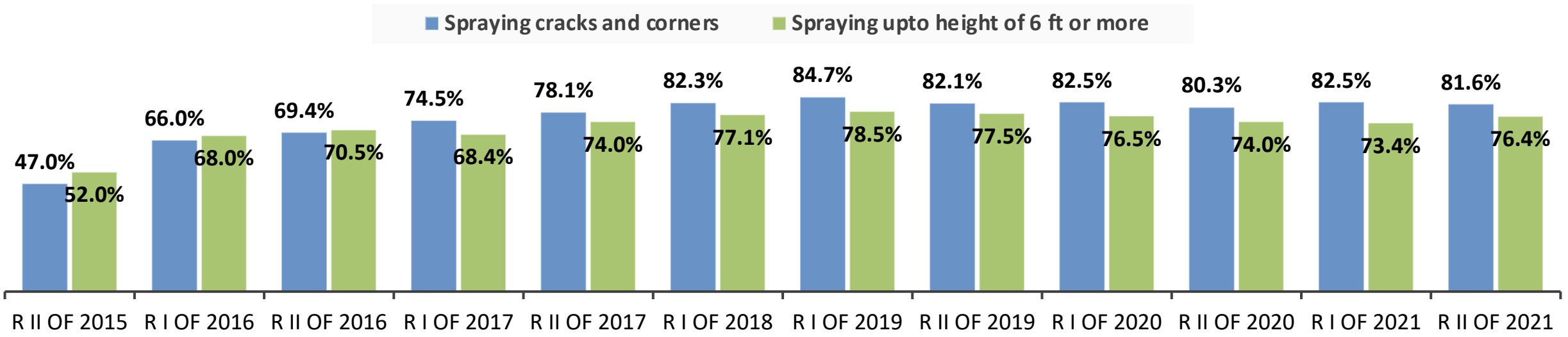


State	2013	2014	2015	2016	2017	2018	2019	2020	2021	Grand Total
Bihar	8367	7279	6108	4887	4352	3590	2525	1504	751	39363
Jharkhand	2271	871	1182	1191	1381	758	542	430	206	8832
Uttar Pradesh	2		1	2	2	117	100	55	39	318
West Bengal			1	72	90	82	77	58	38	418
Grand Total	10640	8150	7292	6152	5825	4547	3244	2047	1034	48931

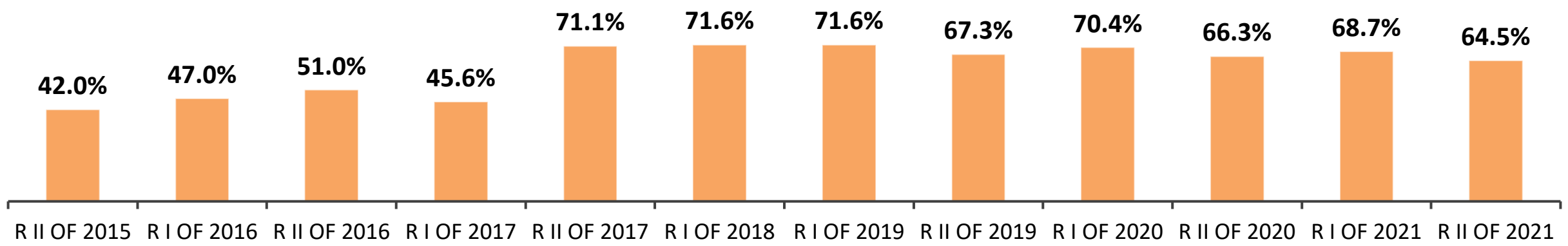
State	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Bihar	34	54	212	487	529	727	444	351	357	3195
Jharkhand	167	102	169	928	1216	366	281	192	116	3537
Uttar Pradesh		1			1	74	51	35	35	197
West Bengal				134	90	91	52	38	47	452
Total	201	157	381	1549	1836	1258	828	616	555	7381

Quality of Spray (R II-2021): *Relatively, the overall quality of spray has apparently reduced as compared to the previous round but spraying upto height of 6ft or more has improved*

Complete wall exposure



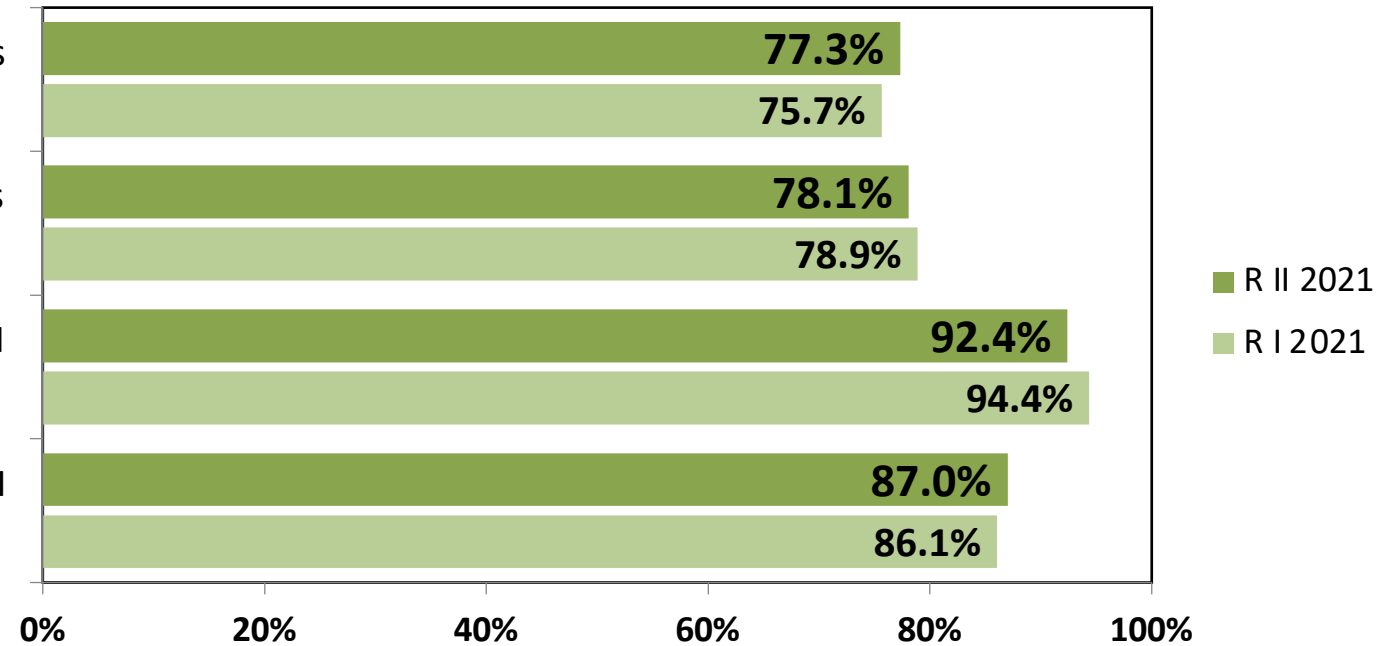
Prevention of contamination of food items/utensils/fodder by covering them before spray



Parts of House Covered

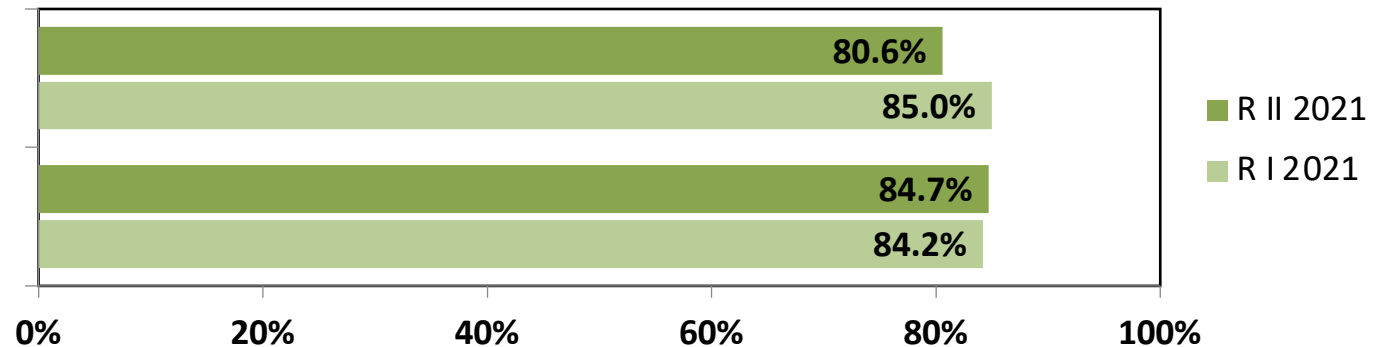
Coverage of House Parts

- % of houses having a separate toilet and that separate toilet was sprayed by IRS team [N (RI 2021)=1080, N (RII 2021)=1147]
- % of houses having separate kitchen and that separate kitchen was sprayed by IRS team [N (RI 2021)=1110, N (RII 2021)=1239]
- % of houses where Varanda was sprayed [N (RI 2021)=1458, N (RII 2021)=1480]
- % of houses where cowshed was sprayed [N (RI 2021)=811, N (RII 2021)=816]



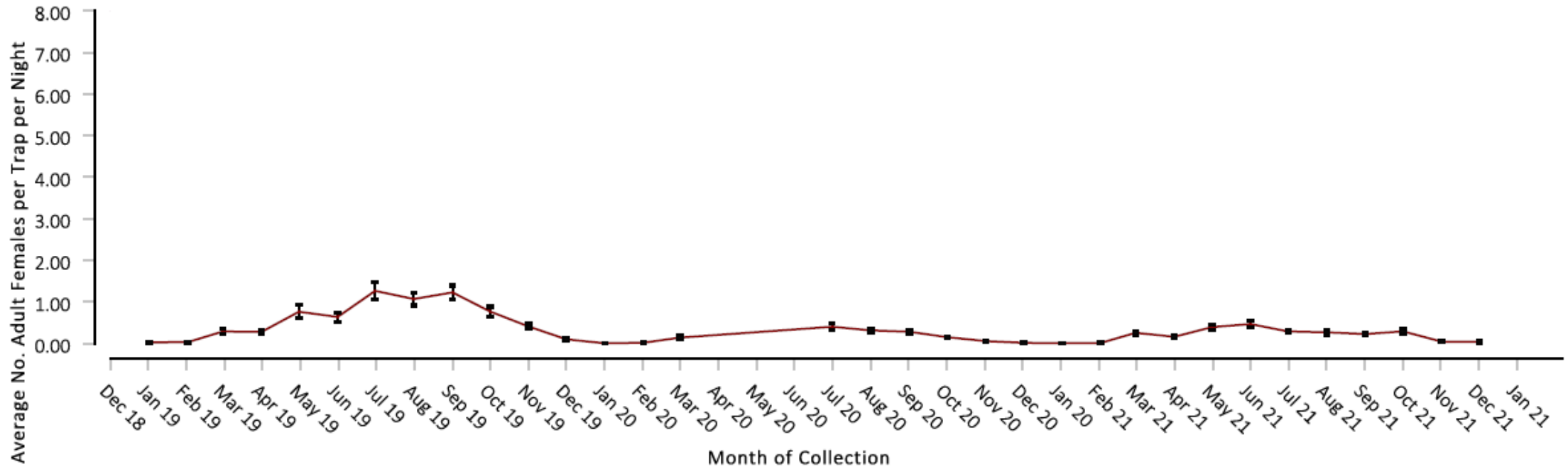
Spray Quality in House Parts

- % of houses where Varanda was sprayed upto 6 ft [N (RI 2021)=1458, N (RII 2021)=1480]
- % of houses where cowshed was sprayed upto 6 ft [N (RI 2021)=811, N (RII 2021)=816]



Vector Occurrence and abundance

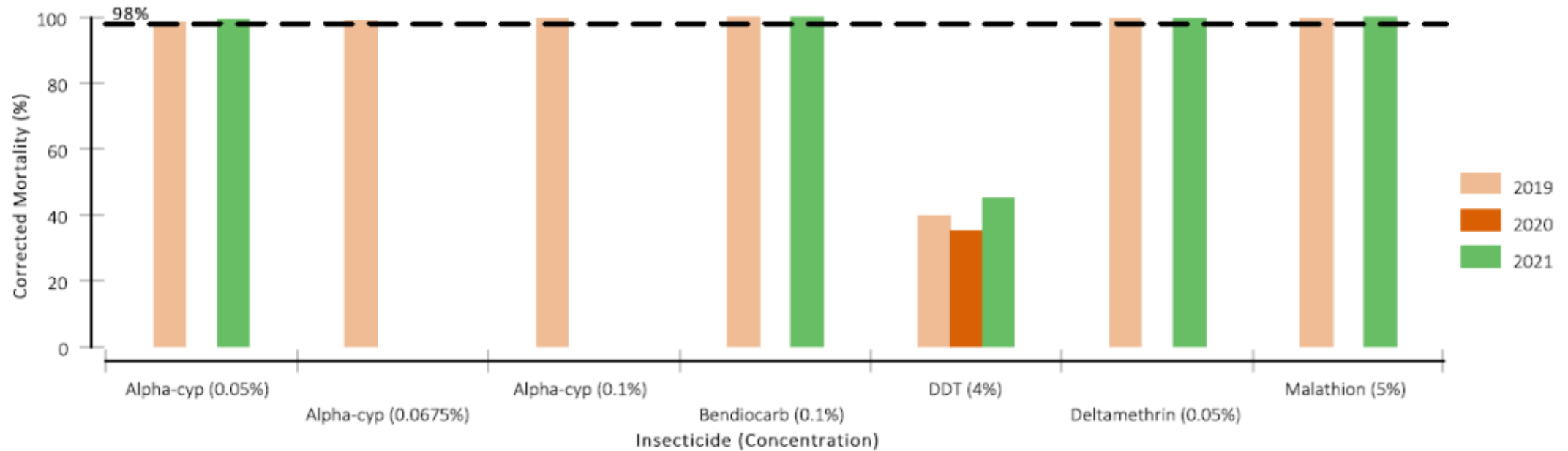
Collection method: CDC Light Traps



- Occurrence: *Phlebotomus argentipes* sand flies are found in Bihar, Jharkhand and West Bengal
- Vector abundance monitoring: Over time the abundance of the vector has decreased

Resistance Monitoring *P. argentipes*

Insecticide resistance in *P. argentipes*



- WHO tube tests are performed on wild caught female *P. argentipes* sand flies annually
- Data shows increasing high levels of resistance to DDT
- High levels of mortality are observed when sand flies are exposed to alpha-cypermethrin
- VL vector remains susceptible to all other classes of insecticide

MODELLING QUESTIONS

- Demographic and environmental factors for disease transmission
 - Why are there persistent pockets with high endemicity
 - What is the risk of VL-HIV and VL-TB co-infection
 - Risk factors for Relapses, PKDL and treatment complications
 - Entomological factors for sporadic cases
 - Reasons for new cases of VL coming from previous non endemic areas
 - Impact of vector density on disease transmission
 - Effect of indoor residual spray on vector density and disease transmission
-

NATIONAL CENTER FOR VECTOR BORNE DISEASES CONTROL

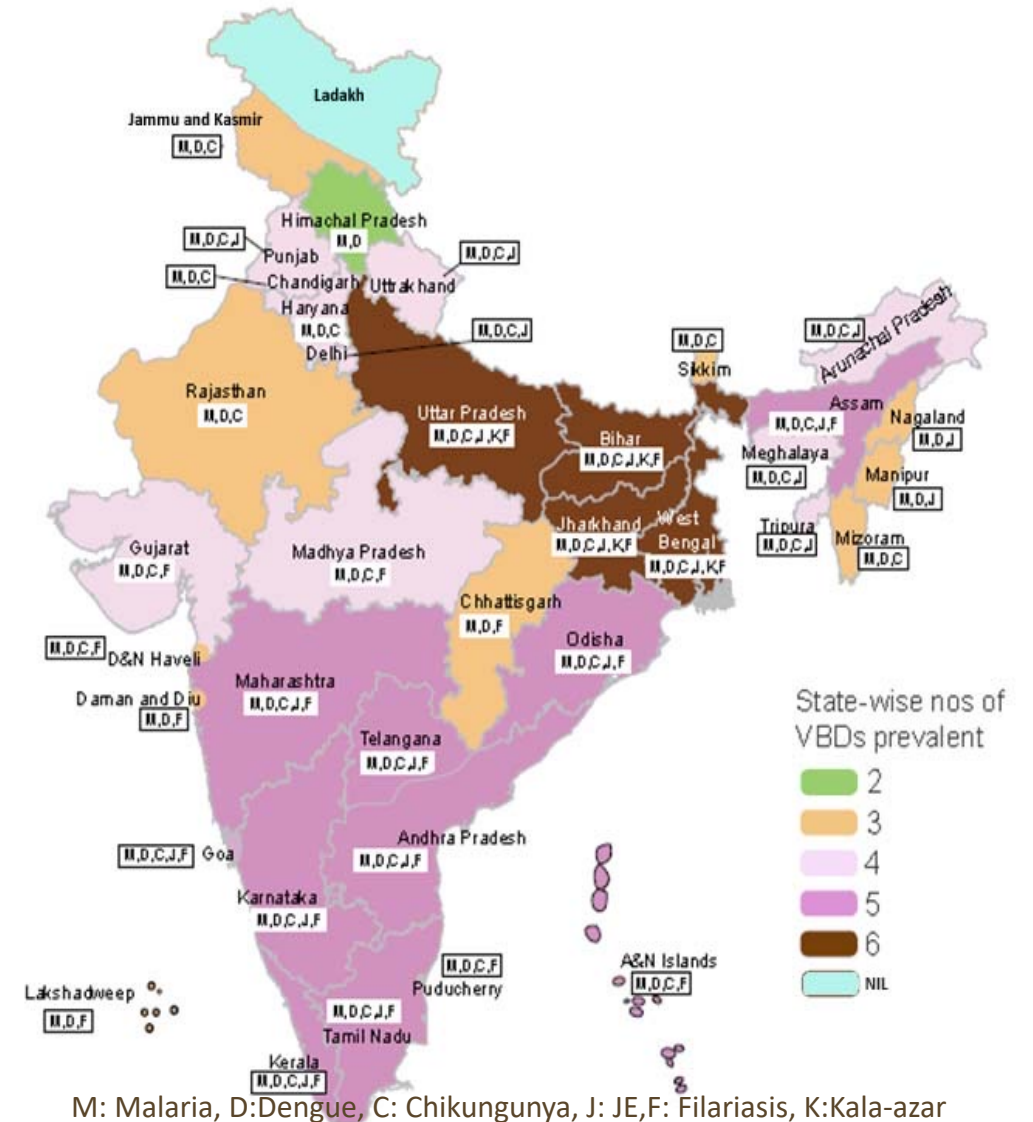
- NCVBDC formulates policies/guidelines, provides technical, financial assistance (NHM norms) to the States/UTs for prevention & control of six VBDs.
- VBDs are seasonal and outbreak prone.
- Diseases under Elimination: Malaria (2030), Lymphatic Filariasis (2027) & Kala-Azar (2023)

Disease

1. Malaria
2. Dengue
3. Chikungunya
4. Japanese Encephalitis
5. Lymphatic Filariasis
6. Kala-azar

Vector


- Anopheles* mosquito
- Aedes* mosquito
- Aedes* mosquito
- Culex* group
- Culex* & *Mansonia* mosquito
- Phlebotomus argentipes* (Sand fly)



NTD PARTNER'S LANDSCAPE

BILL & MELINDA GATES foundation




 **World Health Organization** Provides technical assistance, guidelines, strategic support, independent monitoring for NTDS

 **care** Techno managerial support for KA and LF in Bihar and Jharkhand

 **PATH** Techno managerial support for KA and LF elimination in UP

 **CLINTON HEALTH ACCESS INITIATIVE** Providing technical & secretariat support at National level

 **PCI** Supports Social Mobilization for all endemic states

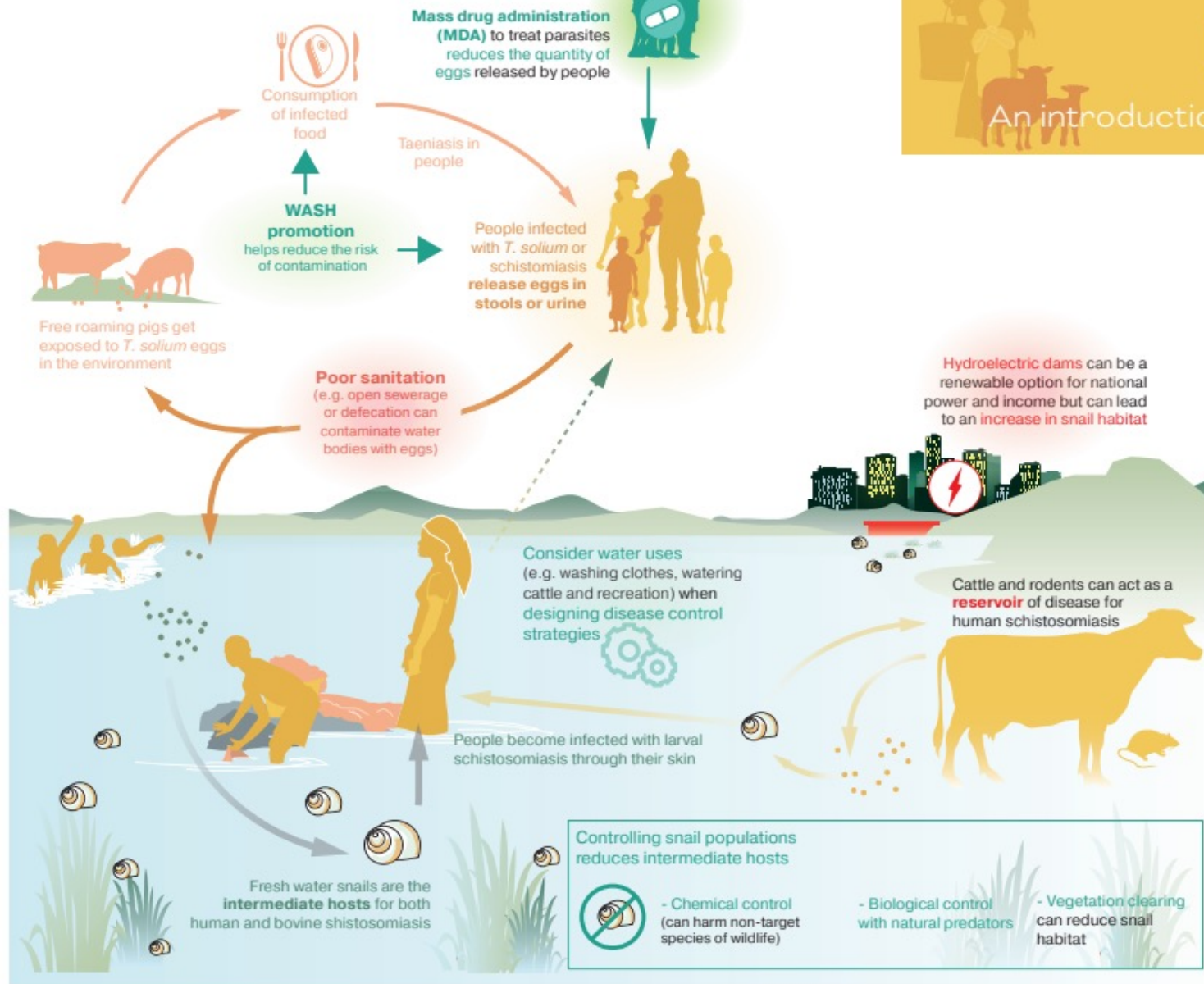
 **Global Health Strategies** Provides advocacy & communication support in UP, Bihar, Jharkhand and West Bengal

 **Centre for Advocacy and Research** Support patients affected and their engagement in programme implementation in UP & Bihar

LSHTM and LSTM - Support in entomological surveillance

 **IAD** - Operational research and IDA Stopping Support for Lymphedema care using Ayurveda and Yoga

ONE HEALTH



◀ Fig. 1. Examples of One Health interfaces for schistosomiasis and taeniasis

 MANY THANKS