Day 2:

Welcome to the Parallel Session

World Health Organization
African Region

ESPEN
EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Annual Meeting of NTD National Programme Managers in the WHO African Region

Human African Trypanosomiasis diagnosis in a changing context

Lejon Veerle

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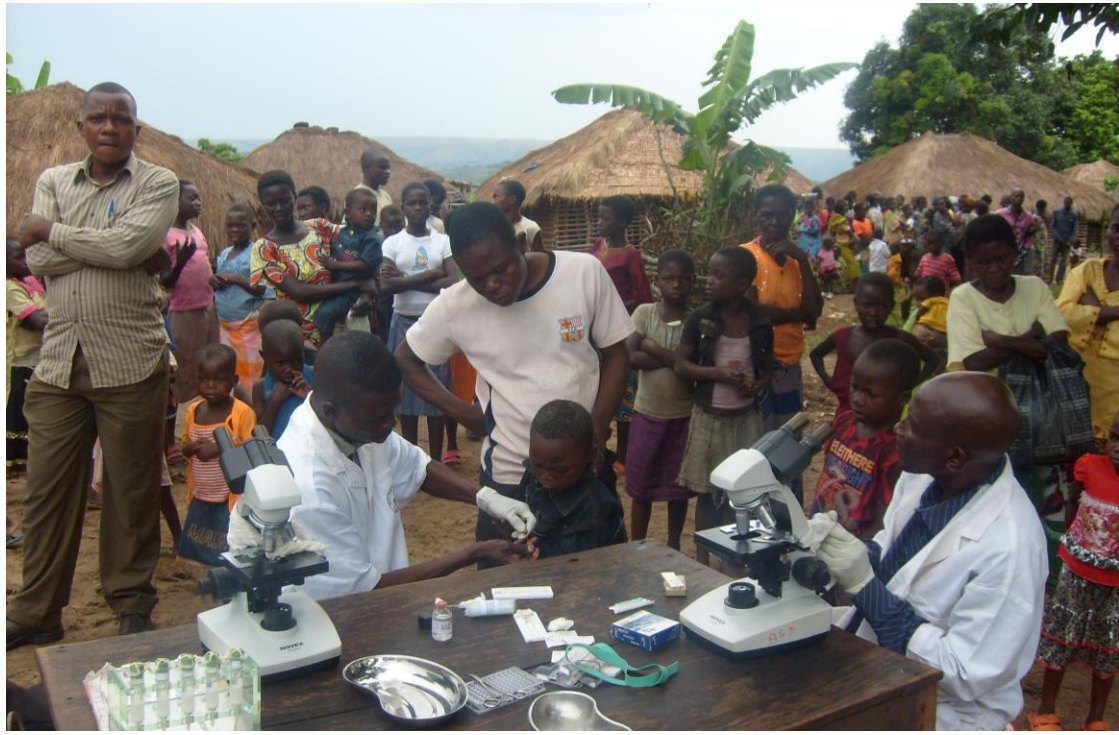
ESPEN EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Annual Meeting of NTD National Programme Managers in the WHO African Region

Human African trypanosomiasis – sleeping sickness

- Human African trypanosomiasis: 2 diseases
  - *T.b. gambiense*: Western & Central Africa, anthroponose, chronic, low parasitemia
  - *T.b. rhodesiense*: Eastern & Southern Africa, zoonose, acute, high parasitemia

- HAT control:
  - Diagnosis & treatment, vector control
  - Strong decline in HAT prevalence in the last 25 years



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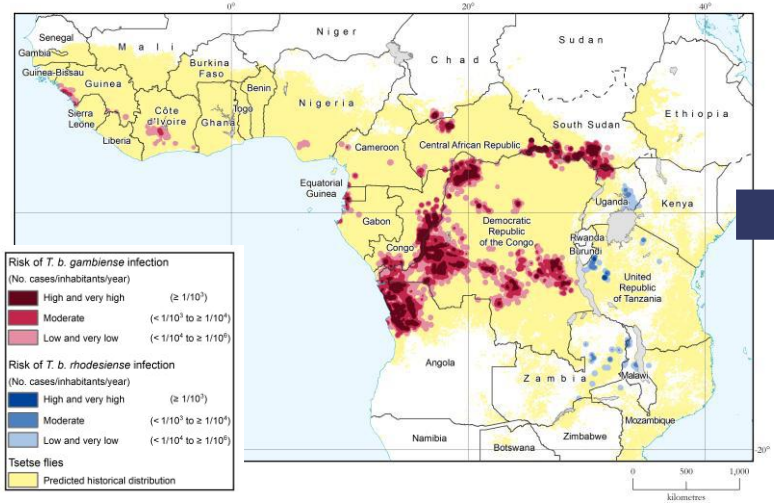
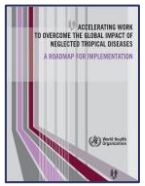
Past

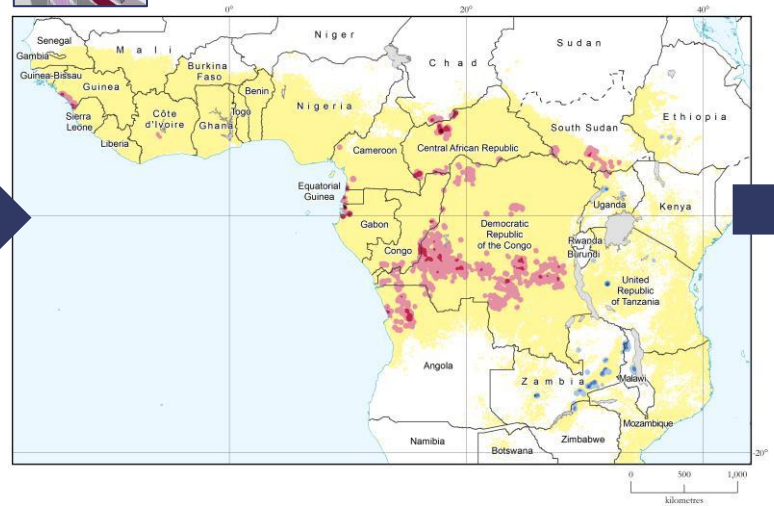
2000-2004: HAT epidemic



Present

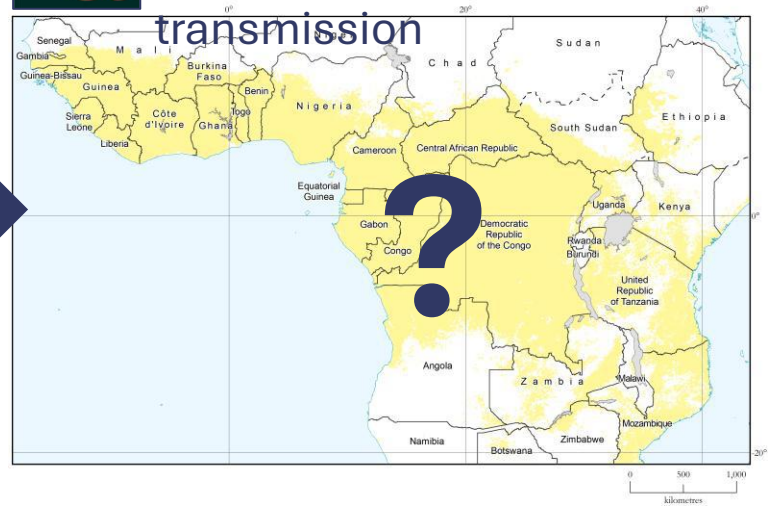


2018-2022: HAT elimination as public health problem



Future

2030: Zero HAT transmission



First line treatment:

Disease stage	*T.b. gambiense*	*T.b. rhodesiense*
Hemo-lymphatic	Pentamidine	Suramin
Meningo encephalitic	Melarsoprol / NECT	Melarsoprol

Since 2018 / Since 2024

Disease stage	*T.b. gambiense*	*T.b. rhodesiense*
Hemo-lymphatic	Fexinidazole	Fexinidazole
Meningo encephalitic	(pentamidine, NECT)	

From 2028 →

Disease stage	*T.b. gambiense*	*T.b. rhodesiense*
Hemo-lymphatic	Acoziborole	Acoziborole ? Fexinidazole
Meningo encephalitic		

Meningo-encephalitic stage treatment

- Toxic, logistic challenge
- LP needed

Fexinidazole:

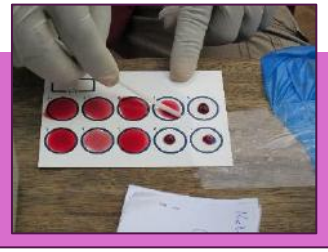
- Oral, safe, 10 days hospitalization
- Not for children, not for severe gHAT
- Complicated treatment algorithms

Acoziborole:

- Oral, safe, 1 dose, all stages & ages

HAT diagnosis should be adapted to the changing prevalence & treatment

Current diagnostic approach gHAT



Screening
Serology

- CATT
- Rapid diagnostic tests (RDT)

Seropositive

+

Confirmation
Microscopy

- gHAT: Low parasite numbers
- Concentration tests
- **Sensitivity maximum 85%**
- Special material & reagents
- Expertise

Parasitologically confirmed

+

Treatment (2028 →)
Acoziborole

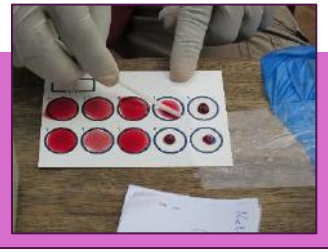
- Oral
- Safe
- 1 dose
- All stages & ages

Undertreatment

Not all cases treated

100% **Drastic decrease in effectiveness (Robays et al. 2004)** **50%**

Future diagnostic approach gHAT



Screening

Serology

- CATT
- Rapid diagnostic tests (RDT)

Seropositive

+

Treatment (2028 →)

Acoziborole

- Oral
- Safe
- 1 dose
- All stages & ages

Were treate cases infected?

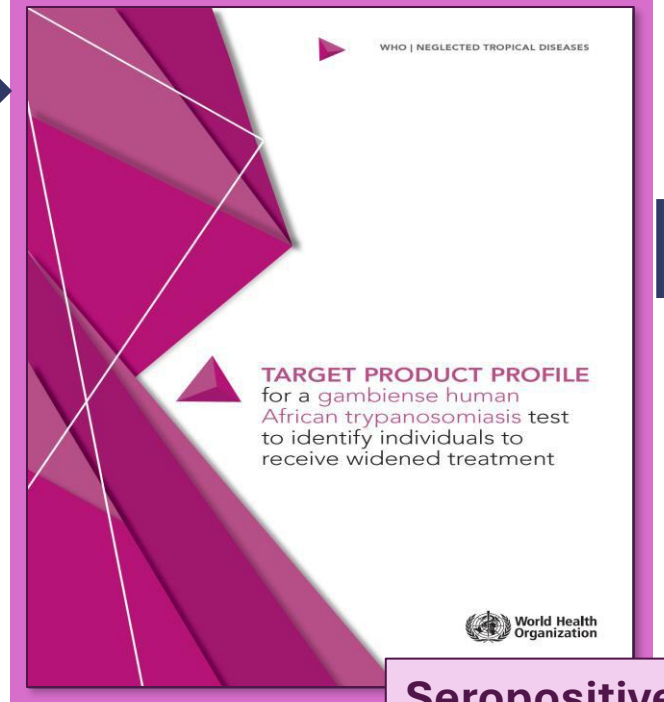
Overtreatment

Treatment (2028 →)

Acoziborole

- Oral
- Safe
- 1 dose
- All stages & ages

Future diagnostic approach gHAT



Seropositive

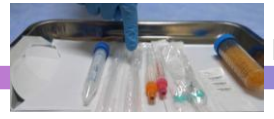
+

Treatment

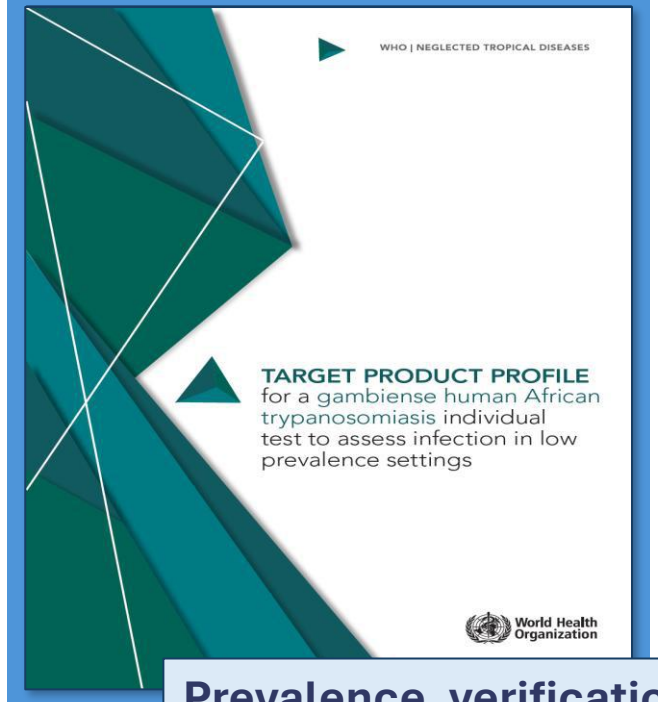
Acoziborole

- Oral
- Safe,
- 1 dose
- All stages & ages

Overtreatment



Kit for blood collection (KPS)



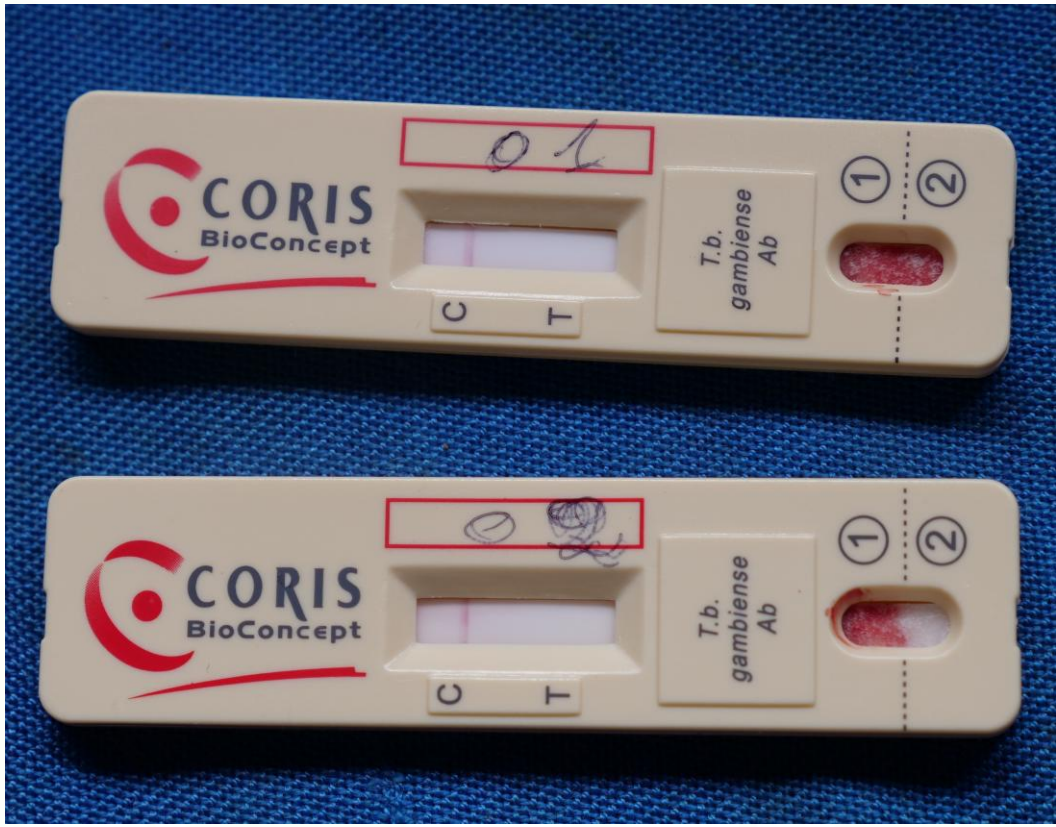
Prevalence, verification, adapt control strategy

What tests do we have?

What tests do we need?

Diagnostics for serological screening

- CATT
- RDT



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CATT: Card Agglutination Test for Trypanosomiasis

- 50 tests/vial: mass screening
- Power source, agitator

- CATT
  - Sensitivity: 90% - 100%
  - Specificity: 88 - 99%

Country	Reference	HAT	Sens	Control	Spec
DRC	Pépin 1986, PMID: 3827349	47/47	100%	3541/4009	88.3%
Rep. Congo	Noireau 1988, doi: 10.1016/0035-9203(88)90430-0	127/154	82.5%	133/144	94.3%
Uganda	Enyaru 1998, doi: 10.1080/00034989858880	40/44	90.9%	-	-
Côte d'Ivoire	Jamonneau 2000, doi: 10.1016/s0001-706x(00)00095-4	11/12	91.7%	393/425	92.5%
Côte d'Ivoire CAR	Truc 2002 , PMID: 12481210	10/10 55/56	100% 98.2%	377/390 455/484	96.7% 94.0%
Uganda, DRC, Eq. GN	Magnus 2002, doi: 10.1016/s0001-706x(01)00184-x	104/115	90.4%	1790/1854	96.5%
Cameroon CAR	Penchenier 2003, doi: 10.1016/s0001-706x(02)00232-2	16/16 58/59	100% 98.3%	4943/5239 1725/2019	94.3% 85.4%
Angola	Inojosa 2006, doi: 10.1136/bmj.38859.531354.7C	-	-	14471/14744	98,1%
DRC	Büscher 2014, doi: 10.1016/S2214-109X(14)70203-7	128/134	95.5%	346/356	97.2%
Angola, DRC, CAR	Bisser 2016, doi: 10.1371/journal.pntd.0004608	140/149	94.0%	13768/14557	95.9%
DRC	Lumbala 2017, doi: 10.1371/journal.pone.0180555	91/131	(69.1%)	13259/13527	98.0%
DRC	Lumbala 2018, 10.1371/journal.pntd.0006386	163/259	(62.9%)	55791/56270	99.1%
Côte d'Ivoire Guinea	N'Djetchi 2024, doi: 10.1186/s40249-024-01220-5	- -	- -	568/577 515/518	98.4% 99.4%
RDC	Tablado ISCTRC 2023 (prospective)	-	-	1503	98.3%

RDTs

- HAT Sero *K*-SeT
  - Sensitivity: 88 - 100%
  - Specificity: 81 – 99%

Country	Reference	HAT	Sens	Control	Spec
DRC	Büscher 2014, doi: 10.1016/S2214-109X(14)70203-7	132/134	98.5%	351/356	98.6%
DRC	Boelaert 2018, doi: 10.1016/j.ebiom.2017.10.032	8/8	100%	258/266	97.0%
Côte d'Ivoire	Koné 2021, doi.org/10.1371/journal.pntd.0009656	2/2	100%	3340/3425	97.8%
Guinea	Camara 2022, doi.org/10.21203/rs.3.rs-2328855/v1	47/47	100%	2240/2297	97.5%
Burkina Faso	Compaoré 2022, doi.org/10.1051/parasite/2022024	-	-	5229/5870	89.1%
Côte d'Ivoire Guinea	N'Djetchi 2024, doi: 10.1186/s40249-024-01220-5	- 1/1	- 100%	503/577 445/518	87.2% 85.9%
Chad, RDC, GN, Ug	Tablado Alonso, 2025, doi.org/10.1111/tmi.14077 (plasma)	149/150	99.3%	113/139	81.3%
DRC	Tablado Alonso (submitted)	-	-		91.0%
DRC	Makabuza (submitted)	42/42	100%	2882/3071	93.9%
Guinea (routine)	Camara 2024, doi.org/10.1371/journal.pntd.0011985.t002	-	-	16320/17340	94.1%
Guinea (plasma)	Camara 2024, doi.org/10.1371/journal.pntd.0011985.t002	59/67	88.1%	120/122	98.4%

- Abbott Bioline HAT 2.0
  - Sensitivity: 94 - 97% (retrospective, plasma only)
  - Specificity: 76 – 96%

Country	Reference	HAT	Sens	control	Spec
Côte d'Ivoire Guinea	N'Djetchi 2024, doi: 10.1186/s40249-024-01220-5	- 1/1	- 100%	446/577 453/518	77.3% 87.5%
Chad, RDC, GN, UG	Tablado Alonso, 2025, doi.org/10.1111/tmi.14077 (plasma)	145/150	96.7%	109/139	78.4%
RDC	Tablado Alonso (submitted)	-	-		76.3%
Guinea (routine)	Camara 2024, doi.org/10.1371/journal.pntd.0011985.t002	-	-	8774/9169	95.7%
Guinea (plasma)	Camara 2024, doi.org/10.1371/journal.pntd.0011985.t002	63/67	94.0%	102/122	83.6%

Diagnostics for serological screening Conclusion

	TPP characteristics	Below minimal	Minimal >95%	Desirable >99%
CATT	Sensitivity Specificity		x	 x
HAT Sero *K*-SeT	Sensitivity Specificity	 Active	x Passive	
Abbott Bioline HAT 2.0	Sensitivity Specificity	 x	x?	

Active screening

Passive screening & combining RDTs (95.1% specificity, N'Djetchi 2024)

- RDTs: Specificity to be improved

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Diagnostics for a posteriori confirmation

- Development of a Blood Collection Kit (KPS)
  - Storage of specimens
    at ambient temperature or colder (4°C, -20°C)
  - Transport to confirmation laboratory
  - Contains all material:
    - Blood collection & transfer
    - DBS preparation (immunological tests)
    - DNA/RNA Shield buffer (molecular tests)
  - Available from INRB

Blood collection kit

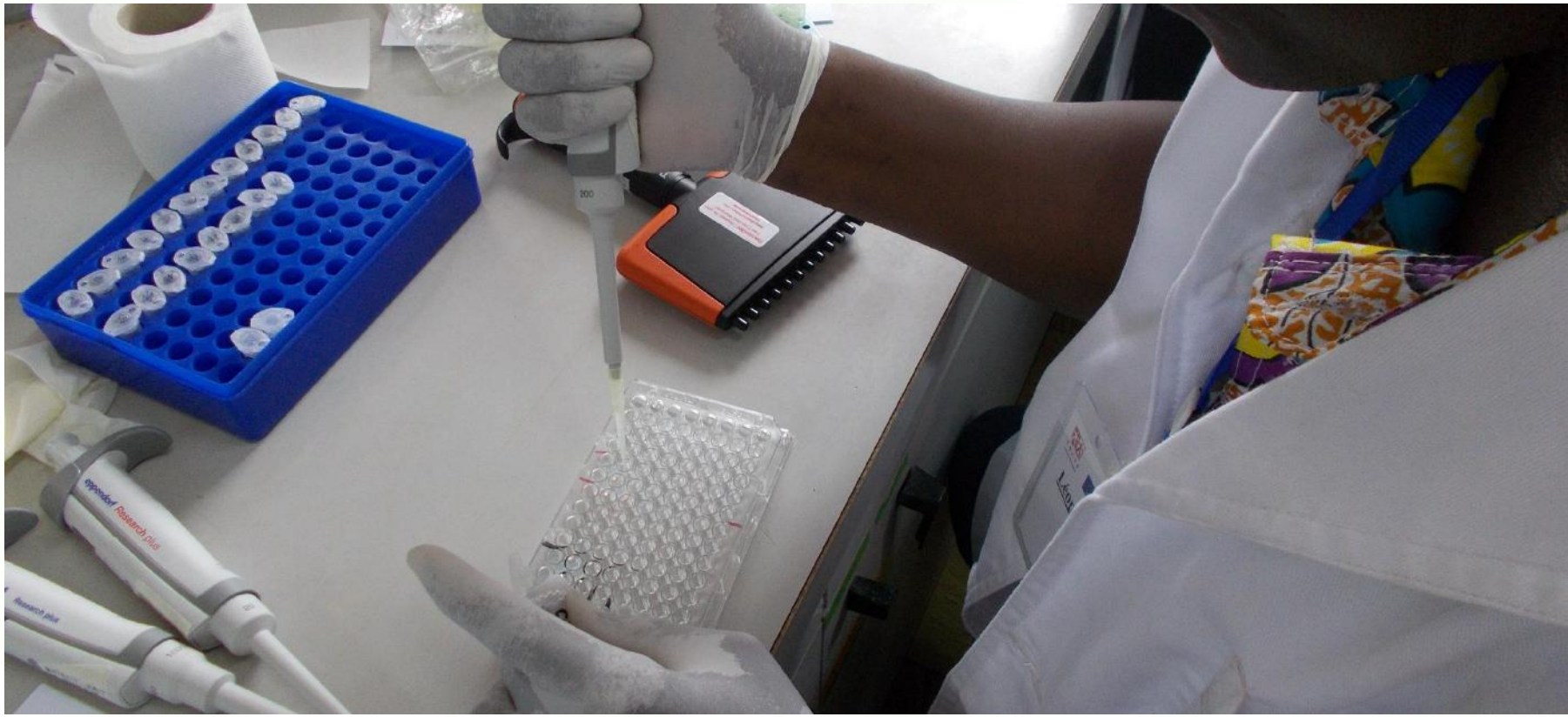
Kit after collection of blood. Dispatch to reference laboratory

Material in the kit

Diagnostics for a posteriori confirmation

Immunological tests:

- Trypanolysis
- ELISA
  - Inhibition
  - Indirect



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Trypanolysis

- Specific antibody detection
  - Serum/DBS + live *T.b. gambiense*
  - Trypanolysis if specific antibodies
- Limited to 4 highly specialised laboratories: ITM, INRB, CIRDES, IPR
  Experimental infections, cryobiology, human infective trypanosome clones, expertise

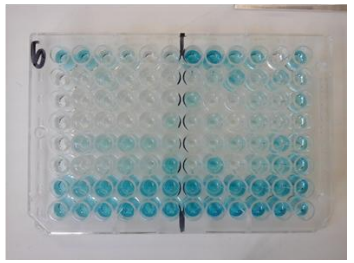
- Sensitivity:
  - Serum/plasma >>> DBS (85%)
- Specificity: 91.6 - 100%

Country	Reference	HAT	Sens	Control	Spec
Guinea, CI, BF (plasma)	Jamonneau 2010, doi: 10.1371/journal.pntd.0000917	73/73	100%	(165/216*	76.4%)
DRC (plasma)	Mumba 2014, doi:10.1371/journal.pntd.0002954	135/143	94.4%	(56/94*	59.6%)
DRC (plasma)	Büscher 2014, doi: 10.1016/S2214-109X(14)70203-7	132/134	98.5%	349/356	98.0%
CI, non endemic BF, non endemic CI, endemic	Dama 2019, doi.org/10.1051/parasite/2019066 (plasma)	-	-	192/192 729/729 616/624	100% 100% 98.7%
Côte d'Ivoire (DBS)	Koné 2021, doi.org/10.1371/journal.pntd.0009656	2/2	100%	82/89*	94.4 %
Burkina Faso (DBS)	Compaoré 2022, doi.org/10.1051/parasite/2022024	-	-	816/816*	100 %
Guinea (DBS)	Camara 2022, doi.org/10.21203/rs.3.rs-2328855/v1	29/34	85.3%	39/42*	92.9%
Côte d'Ivoire (DBS) Guinea (DBS)	N'Djetchi 2024, doi: 10.1186/s40249-024-01220-5	- 1/1	-	253/254* 144/145*	99.6% 99.3%
DRC (DBS)	Makabuza submitted	28/33	84.9%	164/179*	91.6%

* on screening test positives, group may contain HAT patients

Inhibition ELISA

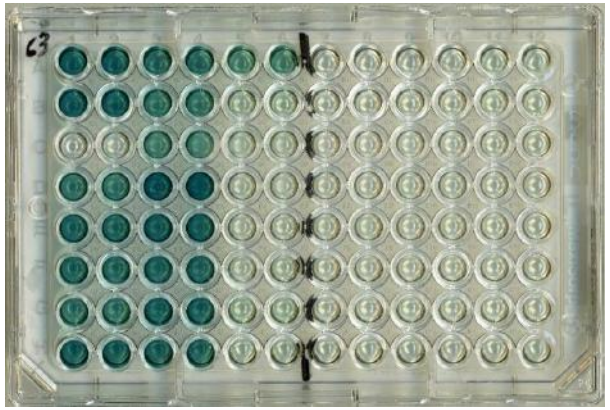
- *"Trypanosoma brucei gambiense*-iELISA"
- Alternative for trypanolysis in non-specialized labs
- Applicable on DBS
- Commercialized by apDia (Belgium)
- Stability issues: Improvement ongoing



Country	Reference (TL as reference standard)	+/HAT	Sens	-/control	Spec
DRC, Guinea, Chad, Uganda (plasma)	Geerts 2021, doi: 10.1093/cid/ciaa1264	724/739	98.0%	616/619	99.5%

Indirect ELISA

- "ELISA/*T.b. gambiense*"
- High throughput, cheap
- Applicable on DBS
- Not commercialized, buy all reagents separately



- Sensitivity: DBS (68-94%)
  - >> Serum/plasma
- Specificity: 94%-100%

Country	Reference	HAT	Sens	Control	Spec
DRC (DBS)	Hasker 2010, doi:10.4269/ajtmh.2010.09-0735		82.2%		99.8%
DRC (DBS)	Inocêncio da Luz 2021, doi.org/10.1371/journal.pntd.0009407	-	-	11438/11535	99.2 %
Côte d'Ivoire (DBS)	Koné 2021, doi.org/10.1371/journal.pntd.0009656	-	-	88/89*	98.9%
Burkina Faso (DBS)	Compaoré 2022, doi.org/10.1051/parasite/2022024	-	-	809/817*	99.1%
Guinea (DBS)	Camara 2022, doi.org/10.21203/rs.3.rs-2328855/v1	23/34	67.6%	41/43*	95.3%
Côte d'Ivoire Guinea (DBS)	N'Djetchi 2024, doi: 10.1186/s40249-024-01220-5	- 0/1	- -	250/254* 144/145	98.4% 99.3%
DRC (DBS)	Makabuza submitted	31/33	93.9%	168/179*	93.9%

* on screening test positives, group may contain HAT patients

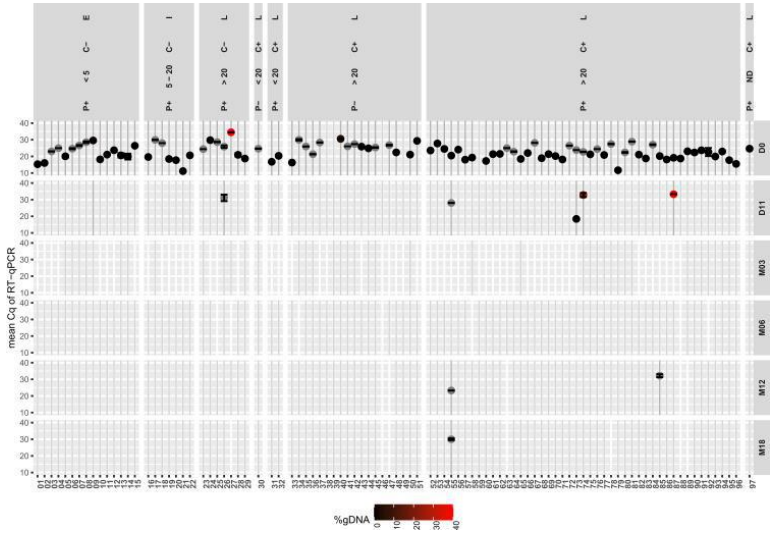
Diagnostics for a posteriori confirmation

Molecular tests:

- RT-qPCR
  - Spliced Leader RNA
  - *Trypanozoon* S2 multiplex
- SHERLOCK4HAT
  - Indirect

Spliced Leader (SL) RNA RT-qPCR

- RNA detection in blood or CSF stabilized in PAXgene Blood RNA tubes
  - Molecular test with most sensitivity data
  - Treatment outcome assessment



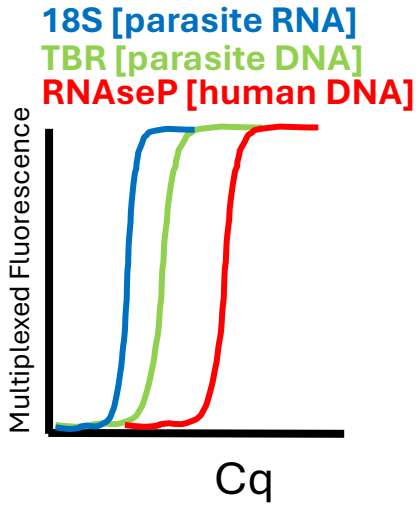
- Sensitivity: 92-95%
- Specificity: 96%-100%

Country	Reference	HAT	Sens	Control	Spec
Guinea	González-Andrade 2014, doi:0.1016/j.jmoldx.2014.02.006	33/36	91.7%	47/49	95.9%
Guinea	Ilboudo 2015, doi : 10.1016/j.jmoldx.2014.04.001	58/61	95.1%	32/32	100%
DRC	Ngay Lukusa 2022, doi: 10.1371/journal.pntd.0009739	92/97	94.8%	-	-

Trypanozoon S2 RT-qPCR multiplex

- Parallel detection of
  - RNA: 18S2 rRNA (Sensitivity > SL)
  - DNA: *Trypanosoma brucei* TBR tandem repeat
    (Van Reet et al 2021, doi: 10.1371/journal.pone.0258711)
  - Human Rnase P DNA: Extraction control

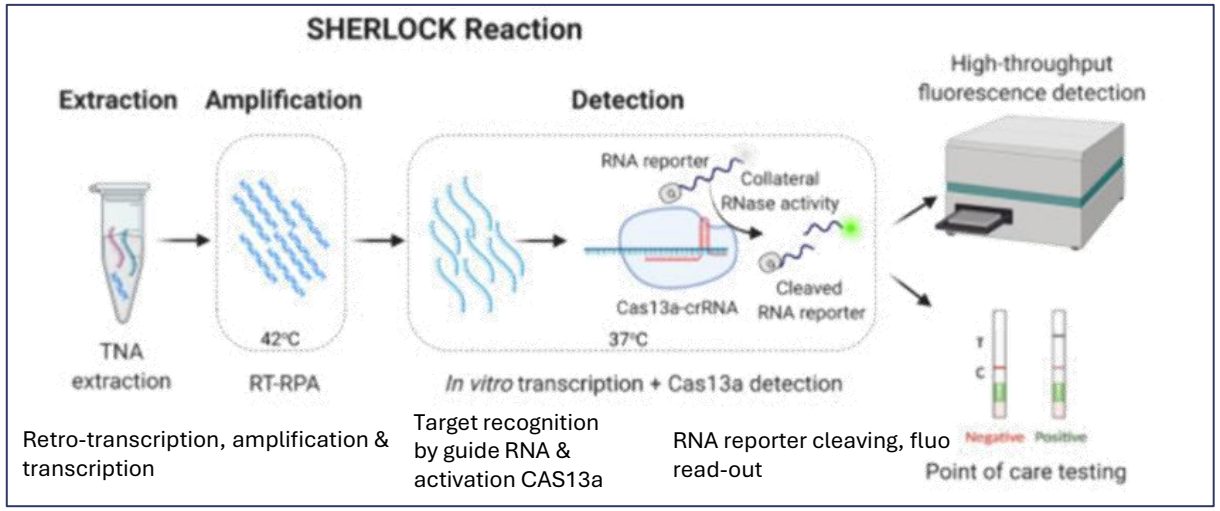
		Samples		
	Target	#1	#2	#3
Trypanozoon-RT-qPCR	18S	23,0	27,0	32,0
	TBR	28,4	31,7	33,1
	RNAseP	27,1	29,7	28,8
SYBR RT-qPCR	SL-RNA	27,5	27,2	34,9



- Sensitivity: no clinical studies
- Specificity: 98%

Country	Reference	HAT	Sens	Control	Spec
CI & GN	N'Djetchi 2024, doi: 10.1186/s40249-024-01220-5	1/1		297/302*	98.3%

SHERLOCK4HAT



- Multiple targets: 18STids, 7SL, 18SZoon, TgsGP, SRA
- Sensitivity: no clinical studies
- Specificity: 93-100%

Country	Reference		HAT	Sens	Control	Spec
Serumbank	Sima 2022 10.1016/j.ebiom.2022.104308	7SL TgSGP	(55/98 (26/98	56.1%) 26.5%)	61/62 55/62	98.4% 88.7%
CI & GN	N'Djetchi 2024, doi: 10.1186/s40249-024-01220-5: 18STids	 7SL TgSGP	1/1 0/1 0/1		281/302 301/302 302/302	93.0% 99.7% 100%

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Diagnostics for a posteriori confirmation Conclusion

	TPP characteristics	Below minimal	Minimal >90%	Desirable >95%
Trypanolysis	Sensitivity	x		
Indirect ELISA	Sensitivity	x		
SL-RNA RT-qPCR	Sensitivity		x	
S2 RT-qPCR	Sensitivity	?		
multiplex	Sensitivity	?		
SHERLOCK4HAT				
	TPP characteristics	**Below minimal**	**Minimal >95%**	**Desirable >99%**
Trypanolysis	Specificity		x	
Indirect ELISA	Specificity		x	
SL-RNA RT-qPCR	Specificity		x	
S2 RT-qPCR	Specificity		x	
multiplex	Specificity	x	x	
SHERLOCK4HAT				

Parallel testing for increased sensitivity?

Rapidly evolving Insufficient data

HAT cases positive after treatment (>24 months)

Prone to contamination

- Need of comparative performance evaluations individual tests + combinations

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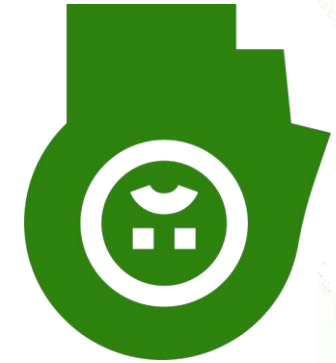
General conclusions



General conclusions

- Although imperfect, for gHAT we have:
  - Screening tests with QC pics
  - Parasitology with QC videos
  - Confirmation tests & reference laboratories

- We can implement diagnostics to
  Screen, confirm & treat
  OR
  Screen, treat & confirm
  to reach gHAT elimination

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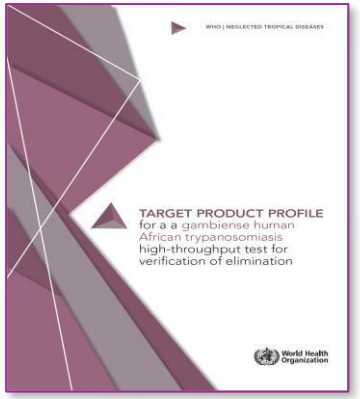
EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Annual Meeting of NTD National Programme Managers in the WHO African Region

General conclusions

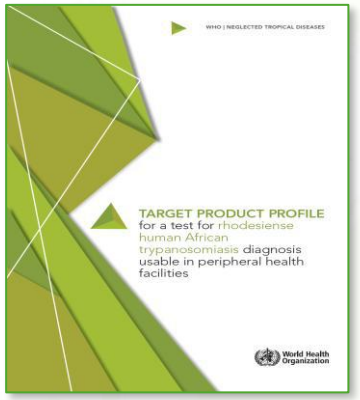
- gHAT high-throughput test for elimination verification
  - Post-elimination monitoring
  - Exploration of "blind spots"
  - Fast results, low cost, high throughput

TPP characteristics	Minimal	Desirable
Sensitivity	>95%	>99%
Specificity	>99%	>99.5%



- Rhodesiense HAT
  - Reliance on smears (& accidental detection)
  - Malaria RDTs replace microscopy
  - No PoC in the pipeline
  - PoC test: TPP highest priority

TPP characteristics	Minimal	Desirable
Sensitivity	>90%	>99%
Specificity	>85%	>99%



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THANK YOU

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THANK YOU

Funding organisms

Research institutions

International organisations

Commercial companies

Control programs

Public Private Partnerships

Gates Foundation

Belgium
partner in development

Horizon 2020
European Union Funding
for Research & Innovation

DNDi
Drugs for Neglected Diseases *initiative*

FIND
Because diagnosis matters

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Driving Change Through Technological Innovation

Professor Delphin Phanzu Mavinga

World Health Organization
African Region

EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Annual Meeting of NTD National Programme Managers in the WHO African Region

Dr Delphin Phanzu Mavinga is

- a Congolese physician with almost 25 years' experience in the field of neglected tropical skin diseases, in particular *Mycobacterium ulcerans* infection or Buruli Ulcer.
- Clinician, Public Health expert (with a focus on tropical disease control) and Researcher, he has made a substantial contribution to the organization of the fight against Buruli ulcer in the Democratic Republic of the Congo, through the decentralization of its management.
- Director of the Department of Scientific Research and Health Development at the Evangelical Medical Institute (IME) of Kimpese.
- Associate Professor at the Faculty of Medicine, University President Joseph Kasa-Vubu, Boma, Province of Kongo central.

Session 9.1: Cutting-Edge Diagnostics: Exploring breakthroughs in diagnostic tools and methods (parallel session) 14:00 – 15:30

BU DIAGNOSTICS

HAT DIAGNOSTICS SESSION

SCH DIAGNOSTICS

Importance of BU Lab confirmation

Microbiological confirmation is essential for several reasons:

1) to **confirm** that the disease is **Buruli ulcer**;

2) to **determine** the precise **prevalence** and **incidence** of Buruli ulcer in a given area;

3) to **confirm new foci**;

4) to **appropriately manage** the disease using antimycobacterial therapy with or without surgery;

5) to **confirm** the **failure of treatment**, or **relapse** or **reinfection** after treatment.

Current BU diagnostics

- Clinical lesions & epidemiological context
- Direct smear examination for acid-fast bacilli (AFB)

(Ziehl-Neelsen, Auramine)

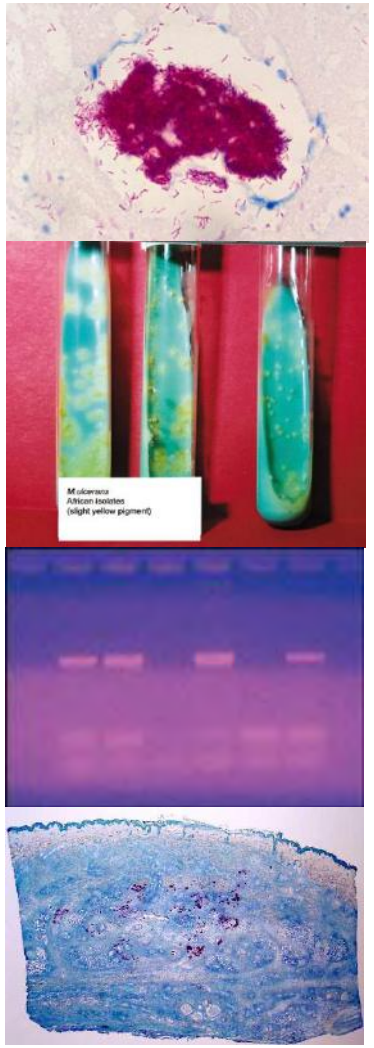
- In vitro Culture

(Löwenstein-Jensen)

- Polymerase Chain reaction (PCR) targeting genomic region IS*2404*
- Histopathological examination

Locally

Reference Laboratory



Need for future (1)

- Among the **four recommended tests for diagnosing BU**, PCR combines high sensitivity, high specificity, and rapidity to obtain results.
- It is well recognized that there are **many diagnostic gaps** in remote and rural communities in low-resource African countries.
- **Technical and logistical difficulties** (e.g., sample transportation, cold chain requirements, stable power supply, suitable laboratory infrastructure, and qualified laboratory staff) limit the use of PCR in BU endemic areas.
- The **absence of a simple and rapid test** that is appropriate for early diagnosis and use in low-resource settings where the disease is most prevalent remains **a major challenge to BU control**.

WHO Research priorities

Among the many potentially important areas of research on Buruli ulcer, **five priority areas** by the Buruli ulcer community.

These are:

1. The mode of transmission
2. **Development of methods for early diagnosis**
3. Drug treatment and new treatment modalities
4. Cultural and socio-economic studies
5. Incidence, prevalence and mapping of Buruli ulcer

Need for future (2)

- Such a test should meet the **WHO recommended criteria** for an ideal diagnostic test suitable for developing countries: **ASSURED**.
- The test should be

✓**A**ffordable,

✓**S**ensitive,

✓**S**pecific,

✓**U**ser-friendly (simple to perform in a few steps with minimal training),

✓**R**obust and rapid (results available in 30 min),

✓**E**quipment-free, and

✓**D**eliverable to the end user.

Innovative Approaches to Diagnose BU at the Point of Care

- Currently, **five potential rapid tests are in development** for deployment in district hospitals and primary healthcare facilities.

These include :

- a **loop- mediated isothermal amplification** (**LAMP**) assay based on the isothermal amplification of *M. ulcerans*-specific insertion sequences
- a **fluorescence thin layer chromatography** (**f-TLC**) assay for the detection of the mycolactone toxin,
- **Immunological tests** for the detection of *M. ulcerans*-specific antigens.
- **Biomeme FranklinTM qPCR System**
- a **volatile organic compound** (**VOC**) detection of BU

Loop- mediated isothermal amplification (LAMP)

- LAMP is a nucleic acid amplification technique that occurs at a constant temperature.
- Four different LAMP tests have been described for the detection of *M. ulcerans* DNA in clinical samples.
- One of the LAMP tests referred to as IS*2404* dry reagent-based (DRB)-LAMP consists of lyophilized reaction reagents (master mix and primers) that can be stored at ambient temperature.
- This portable format represents a step toward the development of a rapid field applicable LAMP test for the diagnosis of BU.
- A prospective evaluation of this IS*2404* DRB-LAMP test (with the BURULI set of primers) is required to assess its performance at district level of healthcare in endemic countries.

M. ulcerans Antigen Detection Tests

- The polyketide toxin, mycolactone, has great potential as target for a specific diag nostic laboratory test for BU.
- Generation of monoclonal antibodies (mAbs) capable of specific binding to mycolactone has allowed developing an ELISA for mycolactone quantification.
- Compared to PCR, the sensitivity of the ELISA for long-term stored swab samples was about 50% and the specificity close to 100%.
- Preliminary data indicate that the sensitivity for fresh samples may be higher.

OPEN ACCESS Freely available online

PLoS NEGLECTED TROPICAL DISEASES

Detection of Mycolactone A/B in *Mycobacterium ulcerans*–Infected Human Tissue

Fred Stephen Sarfo[1], Richard O. Phillips[1,2], Brian Rangers[3], Engy A. Mahrous[3], Richard E. Lee[3], Edward Tarelli[4], Kingsley B. Asiedu[5], Pamela L. Small[3], Mark H. Wansbrough-Jones[4]*

1 Komfo Anokye Teaching Hospital, Kumasi, Ghana, **2** School of Medical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, **3** University of Tennessee Health Science Center, Memphis, Tennessee, United States of America, **4** St. George's, University of London, London, United Kingdom, **5** World Health Organization, Geneva, Switzerland

Published:
July 2, 2009

PLOS | NEGLECTED TROPICAL DISEASES

Published:
November 19, 2015

RESEARCH ARTICLE

Simple, Rapid *Mycobacterium ulcerans* Disease Diagnosis from Clinical Samples by Fluorescence of Mycolactone on Thin Layer Chromatography

Anita Wadagni[1], Michael Frimpong[2], Delphin Mavinga Phanzu[3], Anthony Ablordey[4], Emmanuel Kacou[5], Mirabelle Gbedevi[1], Estelle Marion[6], Yalan Xing[7], Vaddela Sudheer Babu[7], Richard Odame Phillips[2,8]*, Mark Wansbrough-Jones[9], Yoshito Kishi[7], Kingsley Asiedu[10]

f-TLC

- Detection of **mycolactone** in BU lesions using **liquid chromatography and mass spectrometry** formed the basis of the use of this toxin for the diagnosis of BU.
- The f-TLC) method offers **a simple and rapid test for the detection of mycolactone** in clinical samples.
- The test involves extraction of **mycolactone** from clinical samples and separating it from **other lipids** on a chromatographic plate according to their retention factor.
- Wadagni et al. evaluated f-TLC and showed that f-TLC had **a sensitivity of 73.2%** and **specificity of 85.7%** when compared with PCR. **The sensitivity was higher than that of microscopy (66%) or culture (41%)** and **compared favorably with that of histology (82%)**.
- Further improvement in removing background lipids originating from human tissues should improve the sensitivity of the f-TLC technique and facilitate its use as a simple and rapid test for the diagnosis of BU at the district level of healthcare.

PLOS NEGLECTED TROPICAL DISEASES

RESEARCH ARTICLE

Multi-centric evaluation of Biomeme Franklin Mobile qPCR for rapid detection of *Mycobacterium ulcerans* in clinical specimens

Michael Frimpong[1,2]*, Venus Nana Boakyewaa Frimpong[2], Hycenth Numfor[3], Valerie Donkeng Donfack[3], Jennifer Seyram Amedior[4], Danielle Emefa Deegbe[4], Baaba Dadson[4], Anthony Ablordey[4], Sara Eyangoh[3], Richard Odame Phillips[2], Sundeep Chaitanya Vedithi[5]

Published: May 25, 2023

Early Diagnosis of Leprosy and Other Skin Neglected Tropical Diseases including Buruli ulcer

Taking the lab to the people affected before it is too late!!

american leprosy missions

leprosy.org

Need for effective diagnostics for Leprosy & other Skin NTDs

- **Early and accurate diagnosis** is the key to avoid deformities due to skin NTDs that can set in very early in life.
- **Innovative and point-of-care compatible diagnostics** enhances ease of use in resource limited settings.
- **Multiplex platforms** enable integrated diagnosis of various skin NTDs using the same testing platform.

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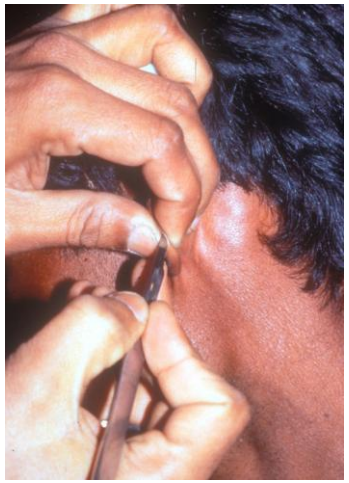
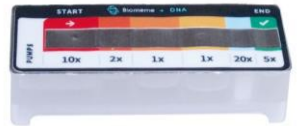
Biomeme Franklin™ qPCR System:



Sample collection
(at the point-of-care)

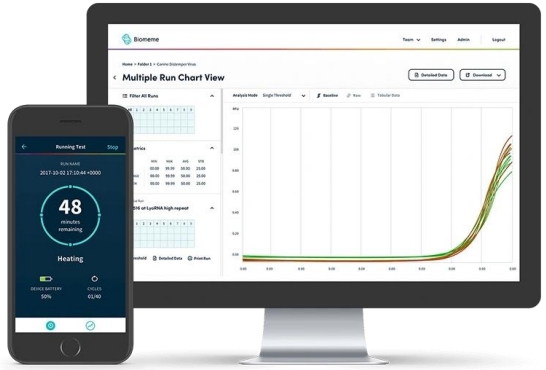


Cartridge for DNA/RNA Extraction

DNA/RNA Extraction in the Field
(2-3 Min)

Biomeme Go-Strip Assays
(premixed with reagents)

Biomeme qPCR –
3plex and 9 wells
(50-60 min to Results)



Biomeme Cloud Portal
(Remote monitoring and access to results)

Evidence: Biomeme qPCR for Leprosy, Buruli Ulcer & COVID19

Bench

People affected by Skin NTDs

Bedside

Community

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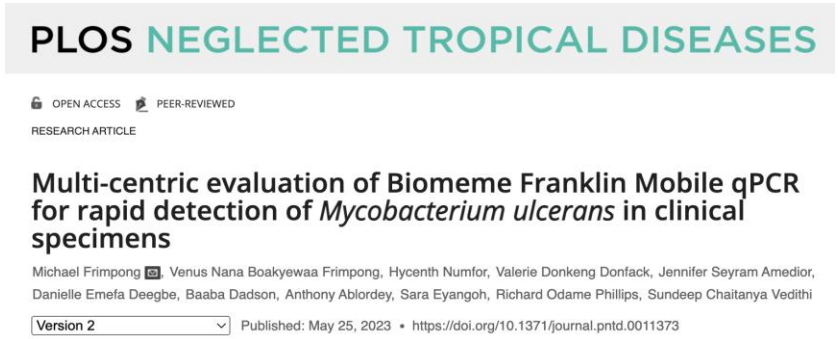
Assay Development and Clinical Validation:

Partner with labs in NTD Endemic Countries in Asia and in Africa (through Skin NTD Labnet) → Optimization and Analytical Validation → Assay development (Biomeme disease specific qPCR Assays) → Clinical evaluation against TPP use cases

Buruli Ulcer - **Sensitivity ≥ 94% Specificity ≥ 97% (KCCR, NMIMR & CPC)**



PLOS NEGLECTED TROPICAL DISEASES

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RESEARCH ARTICLE

Multi-centric evaluation of Biomeme Franklin Mobile qPCR for rapid detection of *Mycobacterium ulcerans* in clinical specimens

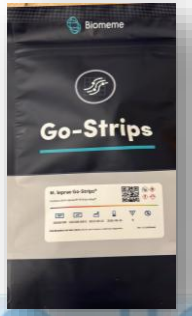
Michael Frimpong, Venus Nana Boakyewaa Frimpong, Hycenth Numfor, Valerie Donkeng Donfack, Jennifer Seyram Amedior, Danielle Emefa Deegbe, Baaba Dadson, Anthony Ablordey, Sara Eyangoh, Richard Odame Phillips, Sundeep Chaitanya Vedithi

Version 2 Published: May 25, 2023 • https://doi.org/10.1371/journal.pntd.0011373

→ Regulatory Approvals

Leprosy - **(SIH-R&LC, Colorado Stat & Nireekshana ACET)**

ALM-developed Go-Strips manufactured under ALM-Biomeme Co-developer Agreement



Partnership and support

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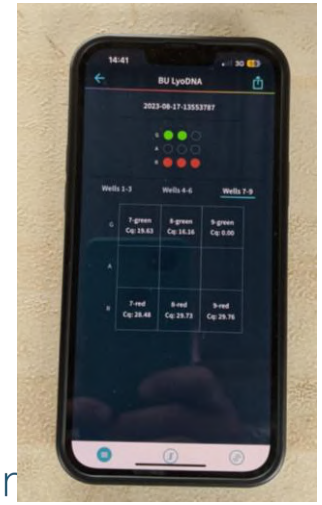
Biomeme BU qPCR testing at Primary Health Facility in DR Congo:

Sample collection

DNA extracted

Biomeme qPCR



qPCR reports a positive result

Later confirmed by culture and standard qPCR

Treatment offered

PLOS NEGLECTED TROPICAL DISEASES

RESEARCH ARTICLE

Volatile organic compound detection of Buruli ulcer disease: Headspace analysis of *Mycobacterium ulcerans* and used gauzes of Buruli-compatible ulcers

Stan F. J. Chudy[1]*, Delphin M. Phanzu[2,3], Arend H. J. Kolk[1], Ghislain E. Sopoh[4], Yves T. Barogui[5], Oren Tzfadia[6], Miriam Eddyani[7], Krista Fissette[6], Bouke C. de Jong[6], Paul Brinkman[1]

Published: September 23, 2024

VOC detection of BU

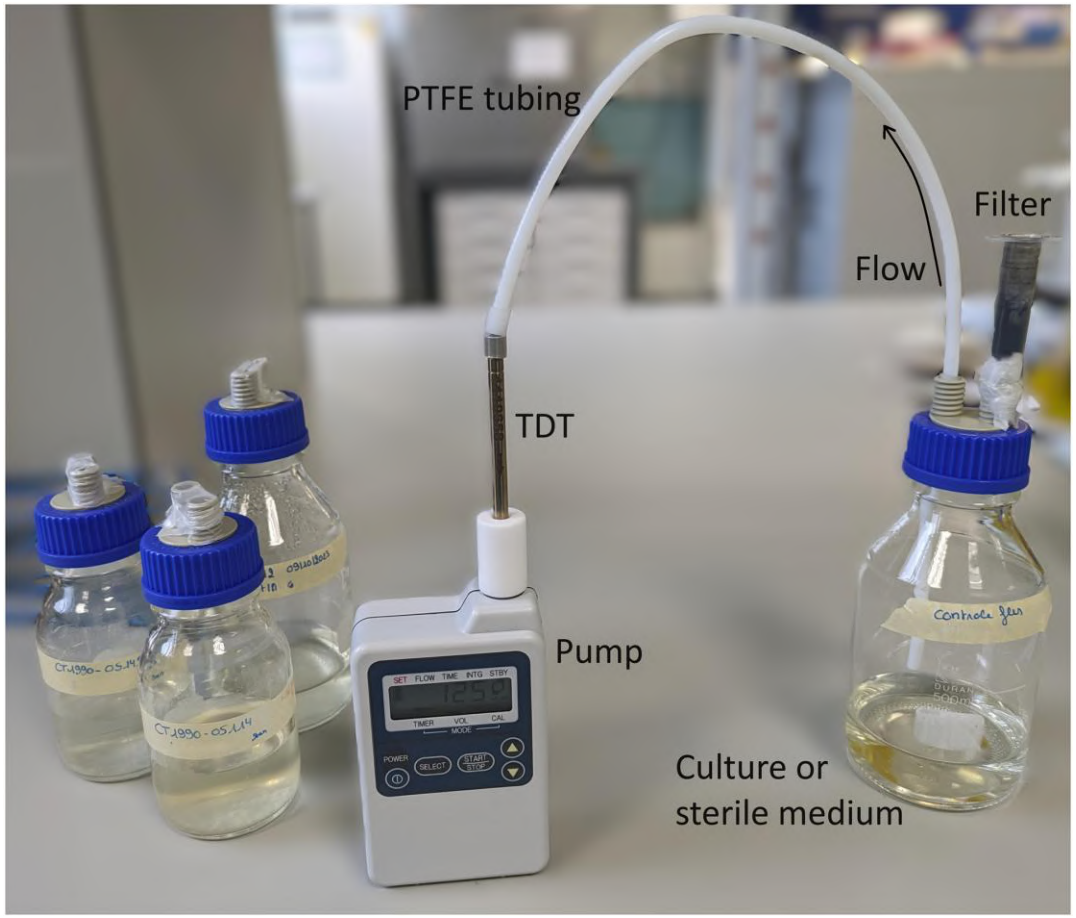
- Volatile organic compounds
- Gas chromatography mass spectrometry (GCMS)
- Two phases:
    1. Discovery: *M. ulcerans* cultures
    2. Validation: gauzes from wounds
- Goal: identify novel biomarkers for BU

Link to article

Amsterdam UMC
University Medical Centers

INSTITUTE OF TROPICAL MEDICINE ANTWERP

Laboratory phase



Results

- In vitro: select distinctive volatiles
- Clinical: validation PCR+ versus PCR-
- **Methylcyclohexane**: AUC 0.740 (95%-CI 0.583–0.897)

- Pilot study: further studies have to confirm the presence of this molecule in BU

Strengths of VOC detection

- GCMS = untargeted
  - Ideal for discovering novel biomarkers
  - Storage of samples
- E-nose = targeted
  - Ideal for detection of volatiles
  - Portable, easy to use

Link to article

Chudy SFJ, Phanzu DM, et al. (2024) Volatile organic compound detection of Buruli ulcer disease: Headspace analysis of *Mycobacterium ulcerans* and used gauzes of Buruli-compatible ulcers. PLOS Neglected Tropical Diseases 18(9): e0012514.

References

- Sarfo FS, Phillips RO, Rangers B, Mahrous EA, Lee RE, et al. (2010)Detection ofMycolactoneA/B in *Mycobacterium ulcerans* Infected Human Tissue. PLoS Negl Trop Dis4(1):e577. doi:10.1371/journal.pntd.0000577
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- Wadagni A, Frimpong M, Phanzu DM, Ablordey A, Kacou E, Gbedevi M, et al. (**2015**) Simple, Rapid *Mycobacterium ulcerans* Disease Diagnosis from Clinical Samples by **Fluorescence of Mycolactone on Thin Layer Chromatography**. PLoS Negl Trop Dis 9(11): e0004247. doi:10.1371/journal. pntd.0004247
- Leprosy and Buruli ulcer. A practical guide. Enrico Nunzi, Cesare Massone, F. Portaels, 2nd Edition, Springer, **2022**.
- Frimpong M, Frimpong VNB, Numfor H, Donkeng Donfack V, Amedior JS, Deegbe DE, et al. (**2023**) Multi-centric evaluation of **Biomeme Franklin Mobile qPCR** for rapid detection of *Mycobacterium ulcerans* in clinical specimens. PLoS Negl Trop Dis 17(5): e0011373. https://doi.org/10.1371/journal.pntd.0011373
- Chudy SFJ, Phanzu DM, Kolk AHJ, Sopoh GE, Barogui YT, Tzfadia O, et al. (**2024**) **Volatile organic compound detection** of Buruli ulcer disease: Headspace analysis of Mycobacterium ulcerans and used gauzes of Buruli-compatible ulcers. PLoS Negl Trop Dis 18(9): e0012514. https://doi.org/10.1371/journal.pntd.0012514

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Department of Biochemistry, University of Cambridge,

Cambridge, United Kingdom

- **Stan F.J. Chudy**

Department of Respiratory Medicine,

Academic Medical Centre,

Amsterdam, The Netherlands,

- **Francoise Portaels**

Professeur Emeritus

ITM Antwerp, Belgium

THANK YOU

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World Health Organization

WHO Skin NTD App

- Supports health workers to diagnose and treat skin NTDs & common skin diseases.
- Soon also with AI photo function!

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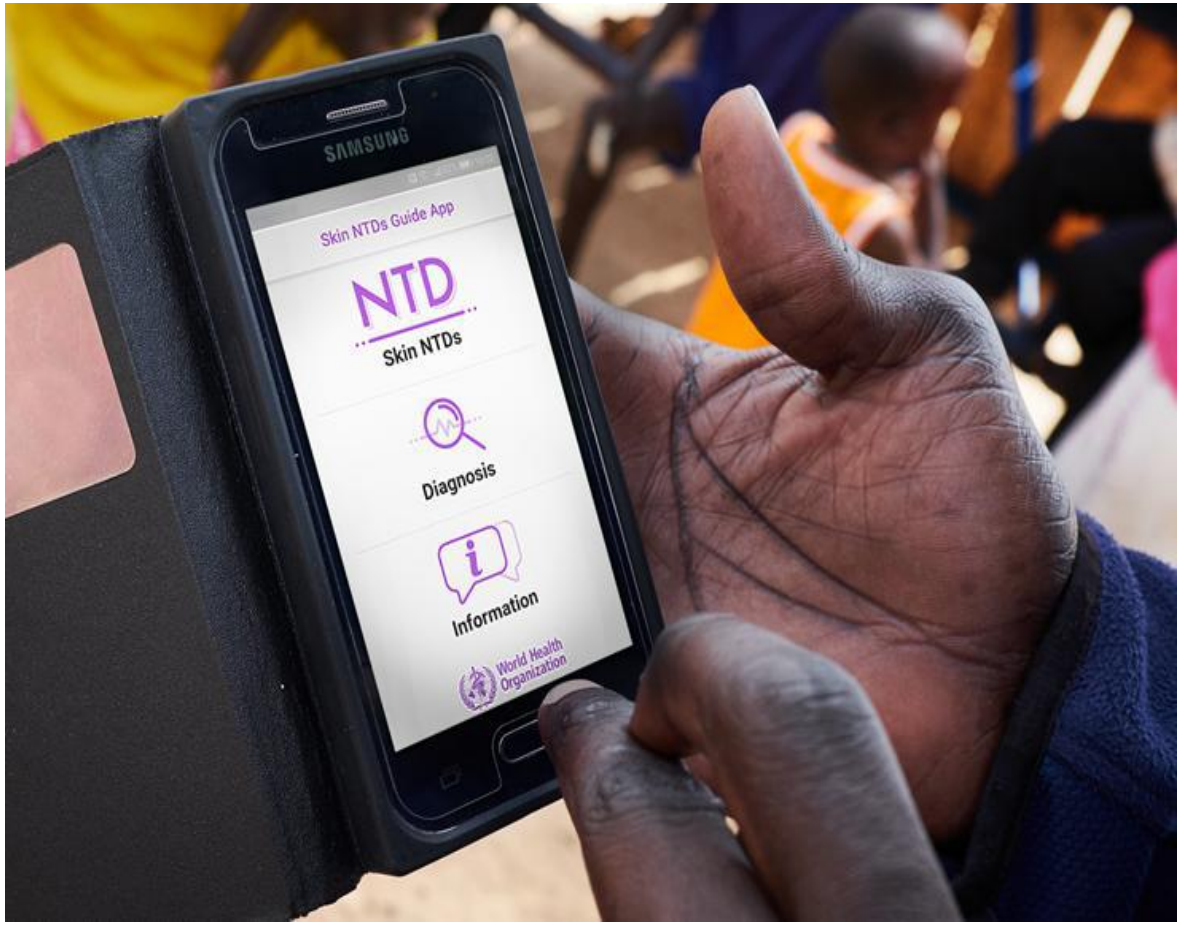

Leprosy/Hansen disease: Contact tracing and post-exposure prophylaxis

Country experiences

Nigeria

Dr. Munirah Abdullahi Onimisi

Leprosy & Buruli ulcer focal person, Federal Ministry of Health, Nigeria

World Health Organization
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Outline

- ❑ Background information
- ❑ Epidemiological situation of leprosy
- ❑ Implementation
- ❑ Activities/methods
- ❑ Geographical location
- ❑ Key Quantitative results
- ❑ Challenges and opportunities
- ❑ Future direction

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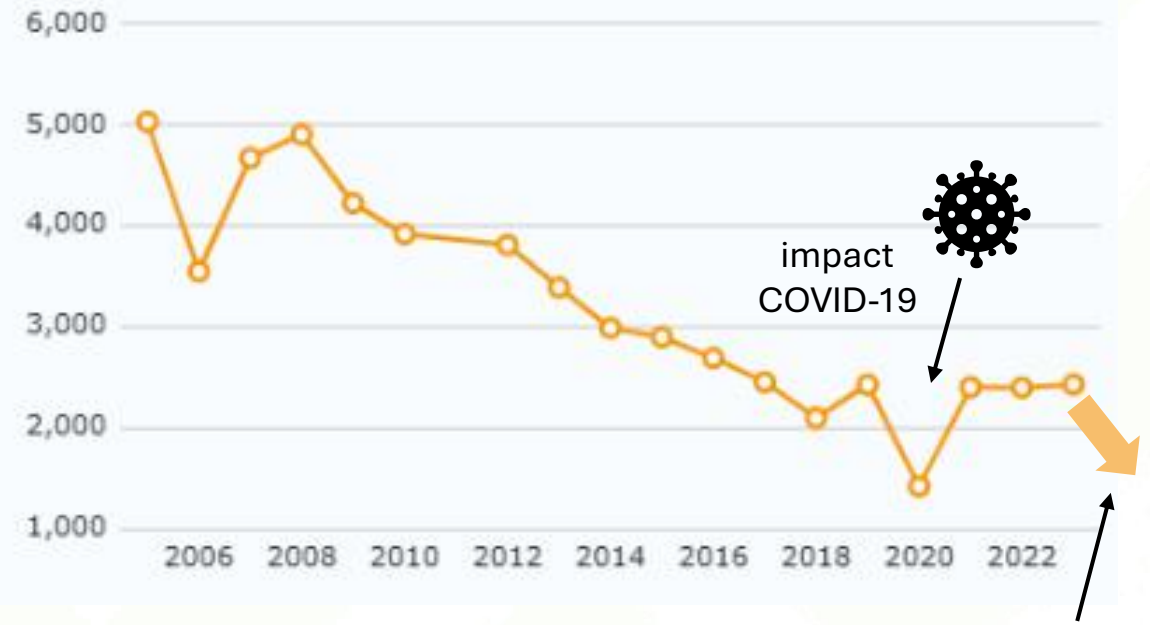
Epidemiological situation of leprosy

Year	2020	2021	2022	2023	2024
New Case	1,541	2,398	2,393	2,425	1,770
New Case (MB)	98%	97%	97%	95%	93%
Child	109 (7%)	212 (9%)	155 (6%)	151 (6%)	130 (7%)
G2D	178 (11%)	270 (11%)	320 (13%)	252 (10%)	204 (12%)



https://apps.who.int/neglected_diseases/ntddata/leprosy/leprosy.html

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EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Implementation: activities carried out

- SDR-PEP was implemented through initial pilot in 12 LGAs and scaled up to additional 14 LGAs in 6 states.
- Notable projects include:
  - Grant through NLR /LTR – 'Ready4PEP Nigeria Project'
  - Sasakawa Health Foundation Grant – 'Strengthening Early Leprosy case finding in Benue and Niger States towards Leprosy Elimination in Nigeria'
- Contact tracing with SDR-PEP is included in the NSP (2023-2030)

LTR NLR Supported by 笹川保健財団 SASAKAWA Health Foundation World Health Organization African Region ESPEN EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Activities and methods

- ❑ Advocacy to relevant stakeholders at all levels
- ❑ Mapping & clustering of leprosy cases
- ❑SOPs and tools development or adoption
- ❑ Capacity strengthening of HC providers
- ❑ Community sensitization
- ❑ Contact tracing and geo-mapping
- ❑ Screening of contacts & implementation of SDR-PEP
- ❑ Combined Self Care Group (CSCG) → integration of multiple diseases (e.g. leprosy, LF, BU, DM)

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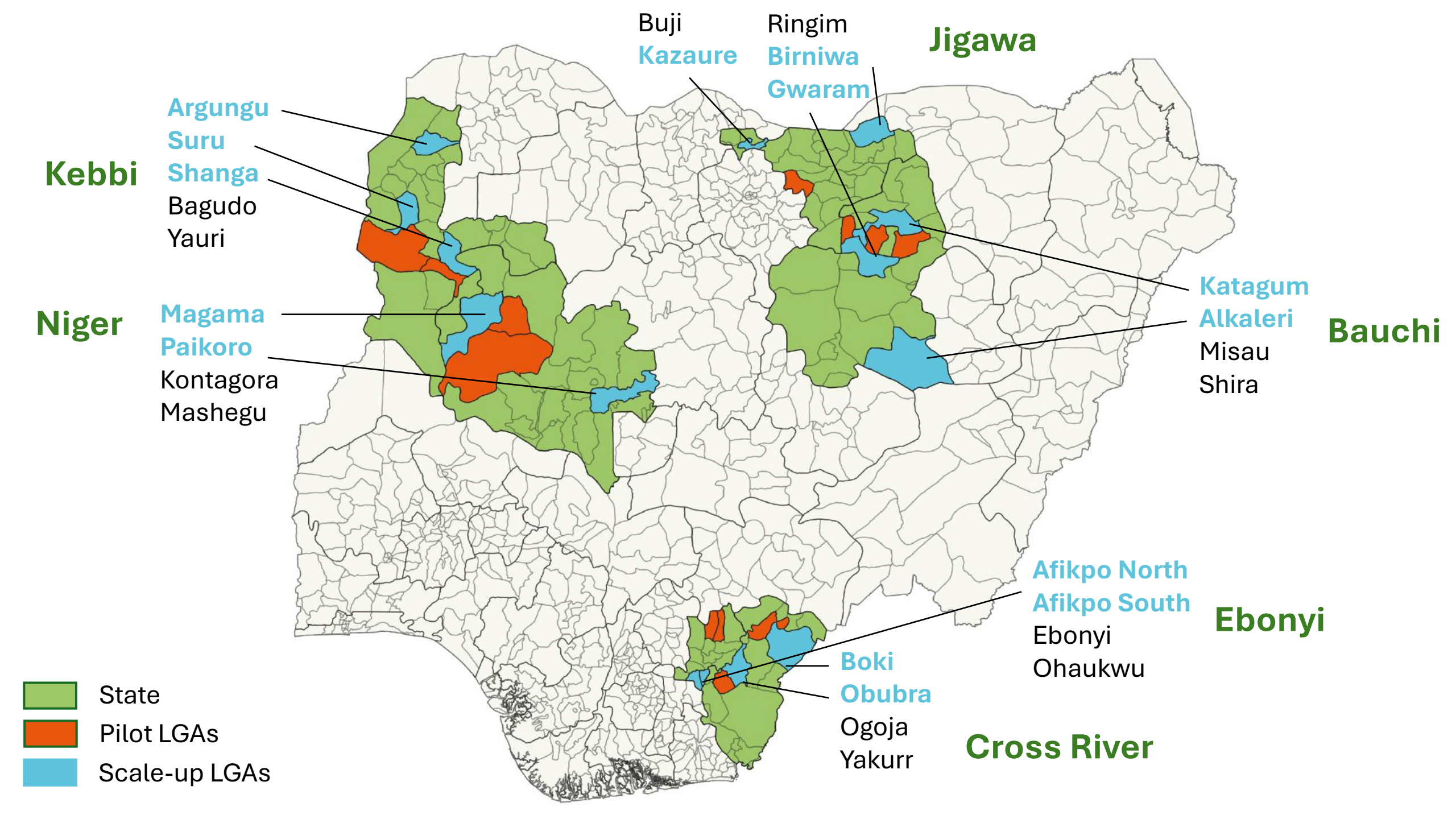
Buji
Kazaure
Ringim
Birniwa
Gwaram
Jigawa
Argungu
Suru
Shanga
Bagudo
Yauri
Kebbi
Niger
Magama
Paikoro
Kontagora
Mashegu
Katagum
Alkaleri
Misau
Shira
Bauchi
Afikpo North
Afikpo South
Ebonyi
Ebonyi
Ohaukwu
Boki
Obubra
Ogoja
Yakurr
Cross River
State
Pilot LGAs
Scale-up LGAs

Key quantitative results

Country area (national / provincial / districts)	Nigeria
Number of index cases included for contact tracing & SDR-PEP intervention	2,297 index cases (Ready4PEP Project)
Number of contacts list to be screen	29,895
Number of contacts screened	29,658 contacts (99% of all contacts screened)
Average number of contacts per index case	29,895 / 2,297 = 13 contacts per index case
Number of contacts who have received SDR-PEP	23,254 contacts (78% of contacts were eligible to receive SDR-PEP)
Number of leprosy cases detected among contacts screened	1,863 (6%)

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Challenges

- ❑ Geographical Coverage Constraints
- ❑ Health Workforce Limitations
- ❑ Logistics and Supply Chain Issues
- ❑ Security challenges
- ❑ MDT stock-out

Opportunities

- ❑ Fostering community ownership
- ❑ Scaling up implementation to other states
- ❑ Training opportunities for HCWs
- ❑ SDR-PEP is a tool to fight stigma

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Future directions

- ❑Contact tracing has been included in the National Strategic Plan (2023-2030)
- ❑Contact tracing and SDR-PEP will be included in the national guideline in the next review (2026)
- ❑Technical and funding support needed & inclusion of Nigeria in WHO rifampicin donation programme
- ❑Integration of AI for mapping & WHO leprosy elimination monitoring tool (LEMT) to target focus areas
- ❑Further training & promoting the WHO Skin NTD App, which will also include AI, amongst health workers working on **integrated detection of NTDs** and common skin diseases

A GIS-map from Nigeria with clusters of leprosy patients

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STBLCP

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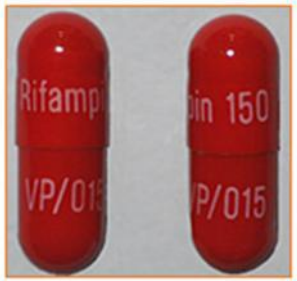
Leprosy/Hansen disease: Contact tracing and post-exposure prophylaxis



ETHIOPIA

Country Experience

Name of presenter: Tigist Betseha, Leprosy FP, MoH

Dr Zeyede Kebede, NTDs coordinator

Dr. Henock Bekele,NPO CM NTDs, WCO

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Epidemiological situation of leprosy in Ethiopia

- **High-Burden Status:** Ethiopia is one of the 22 high-burden leprosy countries worldwide

- **Historical Prevalence:**
  - 1983: 19.8 cases per 10,000 population
  - 1999: Less than 1 case per 10,000 population
  - Achievement: Met Global Leprosy objective as having eliminated Leprosy as a PHP

- **Current Situation (2024):**
  - 44 hot spot districts reported 1 or more leprosy cases per 10,000 population (Range: 1 to 4.5 per 10,000 population)

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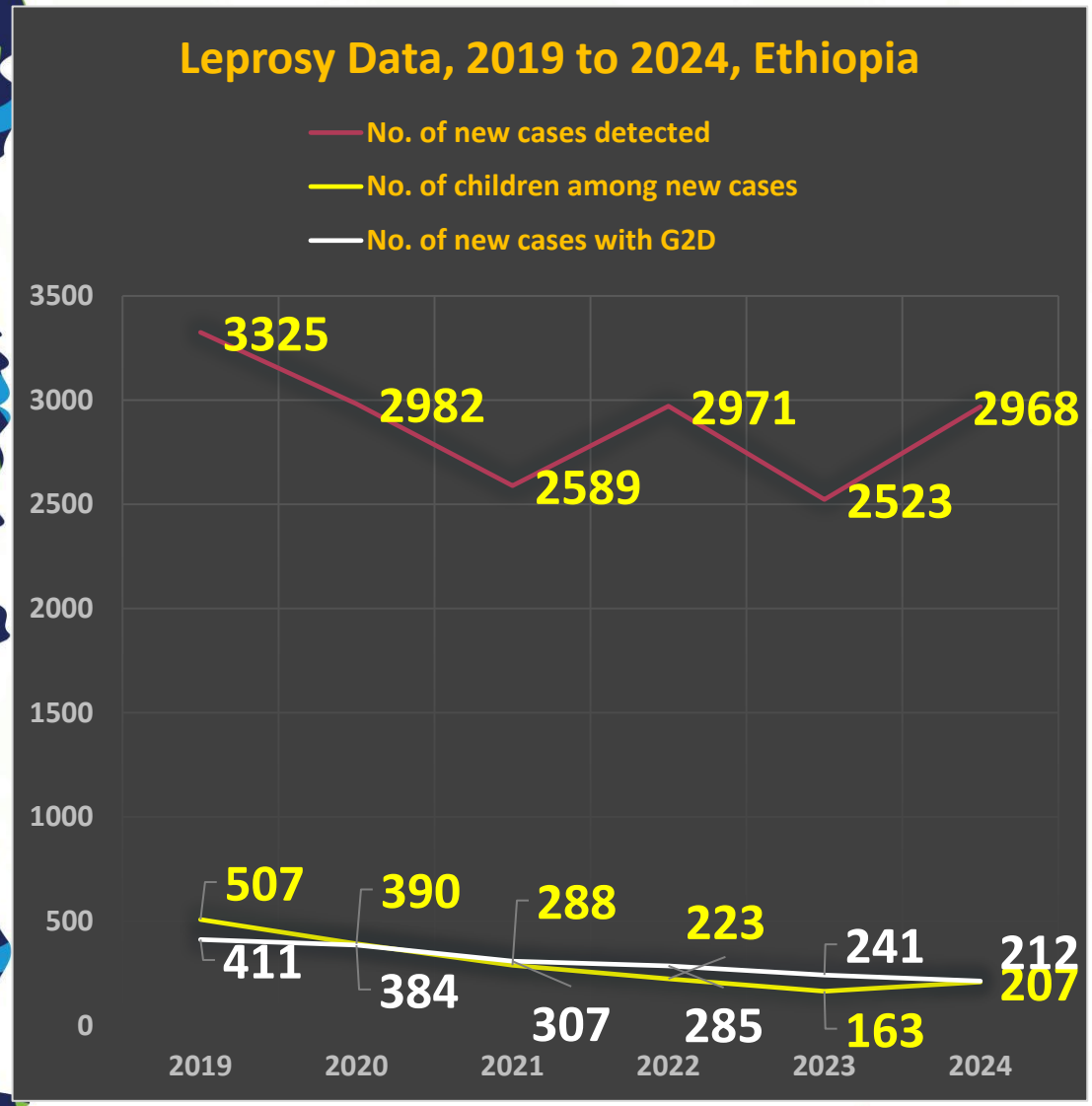
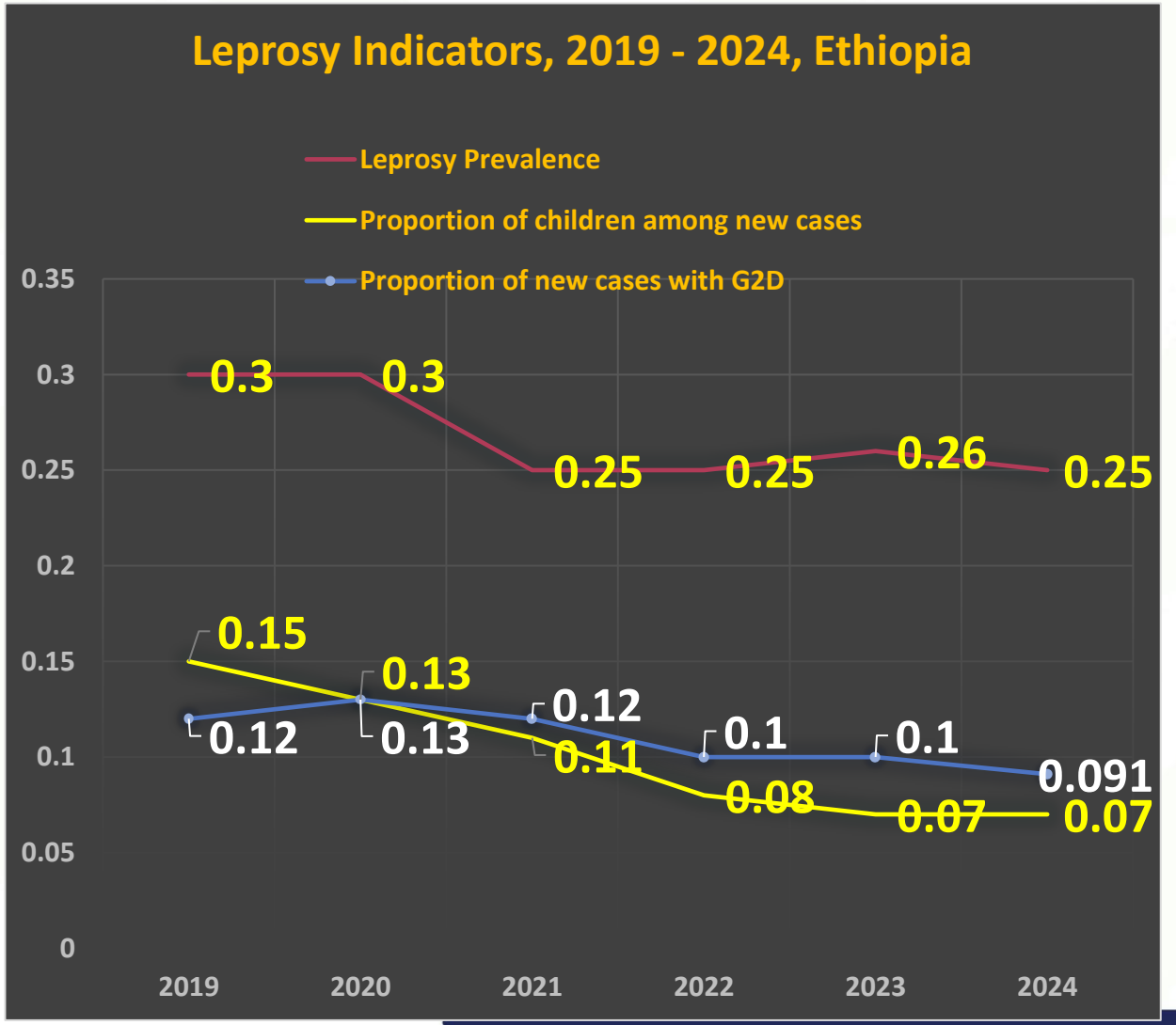
Epidemiological situation of leprosy in Ethiopia .....





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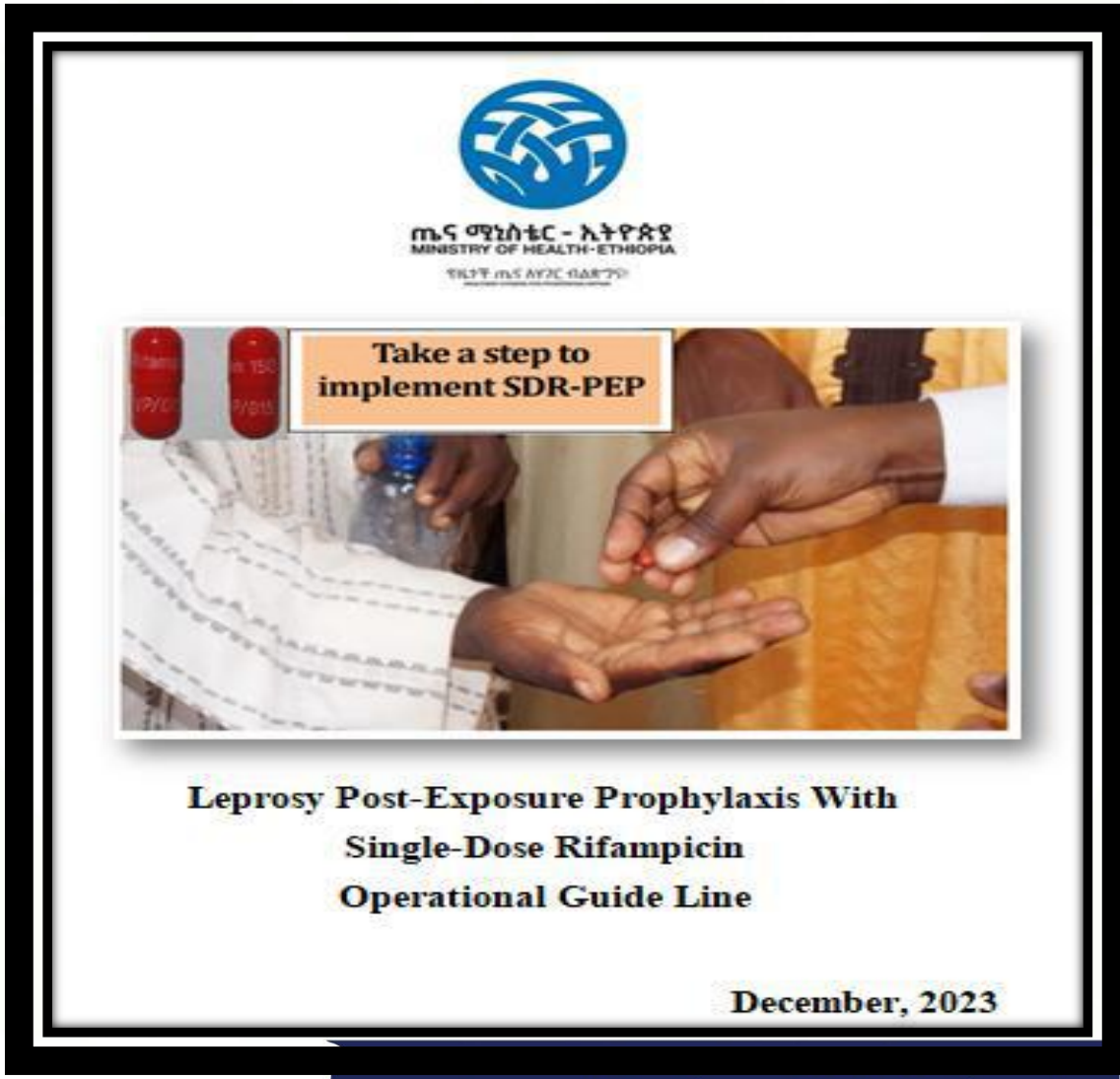
Implementation of Leprosy PEP with SDR in Ethiopia

- **Guideline Development and Printing:** Adoption and adaptation of WHO guidelines, development of national operational guidelines, and distribution

- **Financial Grant Secured:** USD 45,000 donated by the Sasakawa Health Foundation (SHF)

- **Rifampicin Donation Received:** WHO donated 100,000 adult capsules and 20,000 pediatric capsules



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Implementation of Leprosy PEP with SDR in Ethiopia…

- **Training of General Health Workers:** Based on national operational guidelines
- **Community Health Extension Workers Orientation:** On tracing contacts and providing SDR PEP
- **Active Case-Finding and PEP with SDR Campaign:** Launched in high-burden districts

Picture: Training of health workers on SDR PEP in Amhara Region

Picture credit: Ministry of Health of Ethiopia

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Implementation of Leprosy PEP with SDR in Ethiopia....

- **Tracing Household Contacts:** In 1,000 health facilities based on previous leprosy case reports
- **Screening and Provision of PEP:**
  1. At health facilities closest to villages
  2. At skin camps in remote villages
  3. House-to-house visits
- **Joint Supportive Supervision:** By MoH, WHO, and other stakeholders
- **Review Meeting:** National-level review meeting in Addis Ababa

Picture: A health worker providing SDR PEP in Oromia Region

Picture credit: Ministry of Health of Ethiopia

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Key activities of SDR-PEP in Ethiopia

Index patien
- Leprosy patient taking MDT since at least 1month
- Available contacts in catchmen t area

Contact tracing
- Identify contacts and arrange meeting/ visit them

Contact screenin
- Privacy, gender senitivity
- Sufficient daylight/ portable LED daylight lamp
- Screen entire body
- Refer suspected for

Eligibility for SDR
- None of the exclusion criteria is met
- Willingn ess to participat e

SDR administr ation
- Dose accordin g to age and weight
- Use adequate formulati on for children (sirup, tablets as available

Recording & reporting
- Paper based recording
- Possibly electroni c reporting

Picture: A health worker recording SDR PEP activity in Oromia Region

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Key results

Indicators	Number / Proportion
Number of index cases [A]	3041
Number of contacts listed [B]	12194
Average number of contacts per index case: [C] = [B]/[A]	4
Number of contacts screened [D]	12,963
Proportion of contacts screened: [E] = [D] / [B]	1.06
Number of contacts who have received SDR [F]	10442
Proportion of contacts who have received SDR: [G] = [F] / [B]	0.86
Number of leprosy cases detected among contact screened: [H]	880
Proportion of leprosy cases detected among contacts = [H] / [B]	0.07

Key results.....

Table 1: Leprosy household contact screening and provision of PEP with SDR 2024

REGION	Total leprosy cases for whom contact screening was done	Total number of household contacts of leprosy cases registered on the leprosy contact screening register at the leprosy clinic*	Total number of household contacts of leprosy patients found during contact screening activity and screened for leprosy **	Total number of household contacts of leprosy cases diagnosed to have leprosy	Total number of eligible household contacts of leprosy cases provided with SDR - PEP	Number of household contacts of leprosy cases needed to be screened to get one leprosy case
OROMIA	1820	9845	9598	487	7835	20
AMHARA	784	1509	2752**	324	2112	8
OTHER REGIONS	437	840	613	69	495	9
TOTAL	**3041**	**12194***	**12963****	**880**	**10442**	**15**

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Challenges

1. Stigma and Consent: Occasionally, there was difficulty in obtaining consent from index cases and contacts due to stigma. Convincing by explaining the benefits of SDR PEP done by trained health workers and members of ENAPAL

2. Logistical Issues: Remote districts with no road access; use of motorcycles, donkeys, horses, and mules for transporting supplies and SDR PEP providers

3. Training and Supervision: off-site training was not feasible for all, and national supervisors couldn't reach all villages. Supplemented by on-site training and supervision by trained lower-level health officials

4. Monitoring and Reporting: Challenges in data collection and tracking activities; efforts to integrate electronic data are currently underway

Opportunities

Reduction of Leprosy Transmission in Ethiopia: The SDR-PEP is expected to reduce the risk of developing leprosy, thereby decreasing transmission rates

Early Detection: Contact screening facilitated the early detection of new leprosy cases and timely treatment, and is expected to result in good treatment outcomes

Cost-Effectiveness: Implementing SDR-PEP in Ethiopia was a cost-effective strategy for leprosy control, as it helped prevent the development of disabilities

Strengthening Health Systems: Implementing SDR-PEP strengthened health systems by improving the skills of HCWs and enhancing the overall capacity for disease surveillance and response

Community Engagement: Increased community awareness and engagement in leprosy control efforts

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Lessons learned

1. **Feasibility**: Implementing SDR-PEP is feasible within existing health systems

2. **Cost**: Integration into screening contacts with relatively low additional costs

3. **Acceptance**: Generally accepted by patients, contacts, HCWs, and government officials

4. **Operationalization**: Effective under routine program conditions

5. **Guidelines**: National SDR-PEP guidelines as a reference for health workers

Future directions

Scaling Up: Expanding SDR-PEP to all districts with reported leprosy cases, contributing to the national goal of achieving zero leprosy

Training and Capacity Building: Enhancing the skills of HCWs through training programs

Community Engagement: Increasing awareness and acceptance through health education campaigns

Monitoring and Evaluation: Establishing robust systems for tracking implementation and outcomes

Policy Support: Ensuring policy support for sustainable implementation, inclusion of SDR-PEP in national health policies, and securing funding for its widespread adoption

Acknowledgment

Sassakawa Health Foundation

WHO

ENAPAL

GLRA

TLIMI

Picture: A health worker providing SDR PEP to the eligible household contact of a leprosy patient in Oromia Region

Picture credit: Ministry of Health of Ethiopia

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Leprosy/Hansen disease: Contact tracing and post-exposure prophylaxis

Country experience

Country: Ghana

Name of presenter: Dr. Benedict Okoe Quao, PM

10 min

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Presentation Outline

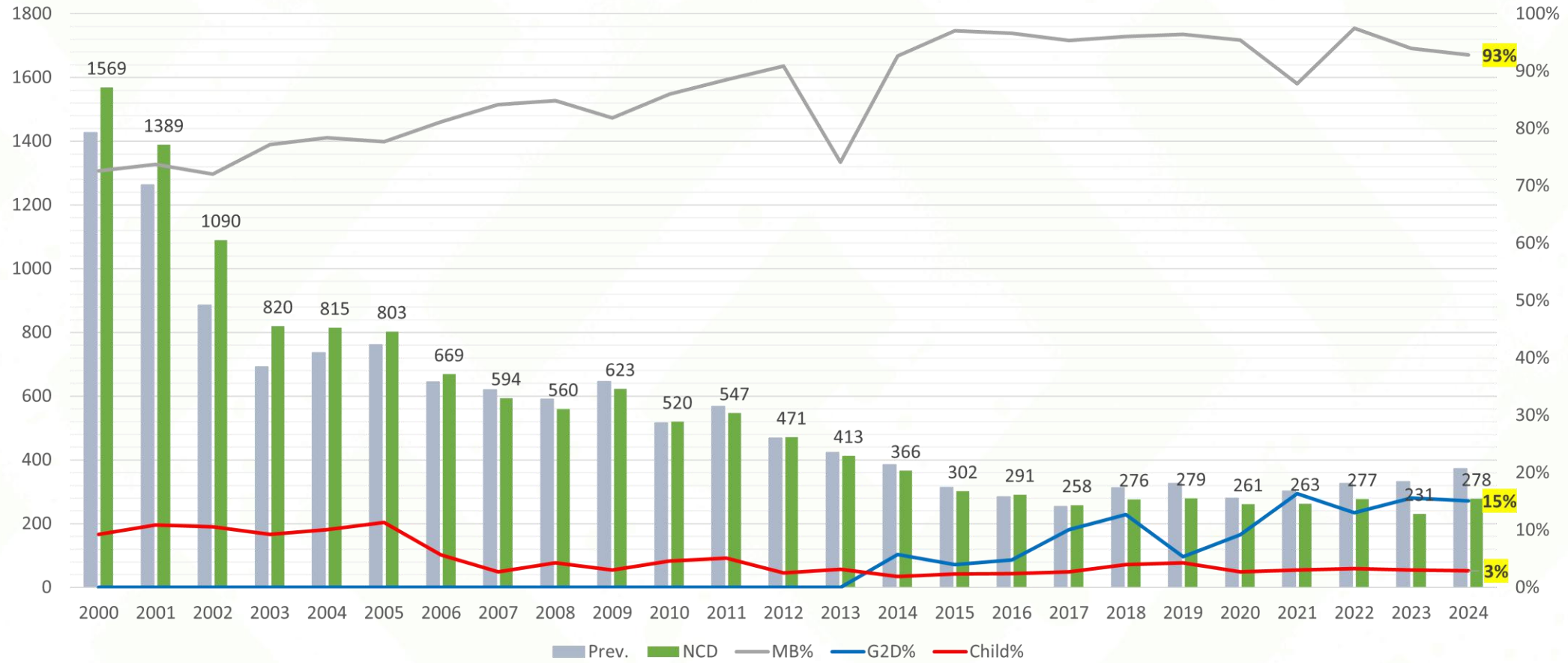
- Epidemiological situation
- Implementation (activities carried out)
- Key results
- Challenges and opportunities
- Lessons learnt
- Future directions
- Acknowledgements

Epidemiological situation of leprosy in Ghana

- Threshold for eliminating leprosy as a public health problem (i.e., prevalence <1 per 10,000 population) reached in 1998.
- Generally steady decline in annually detected new cases over last decade with generally a high MB proportion
- Majority of 261 districts in phase 2 or phase 3 of elimination
- Child proportion has declined from around 10% around the turn of the century, to less than 3% (relatively stable) over last 7 years
- Increasing trend of G2D-proportion reflecting low awareness and capacity for diagnosis

MB: Multibacillary leprosy; **G2D:** Grade-2 Disability

Epidemiological situation of leprosy (Trends)



Prev: Prevalence; **NCD:** New Cases Detected; **MB%:** MB Proportions; **G2D%:** Grade-2 Disability Proportion; **Child%:** Child Proportion

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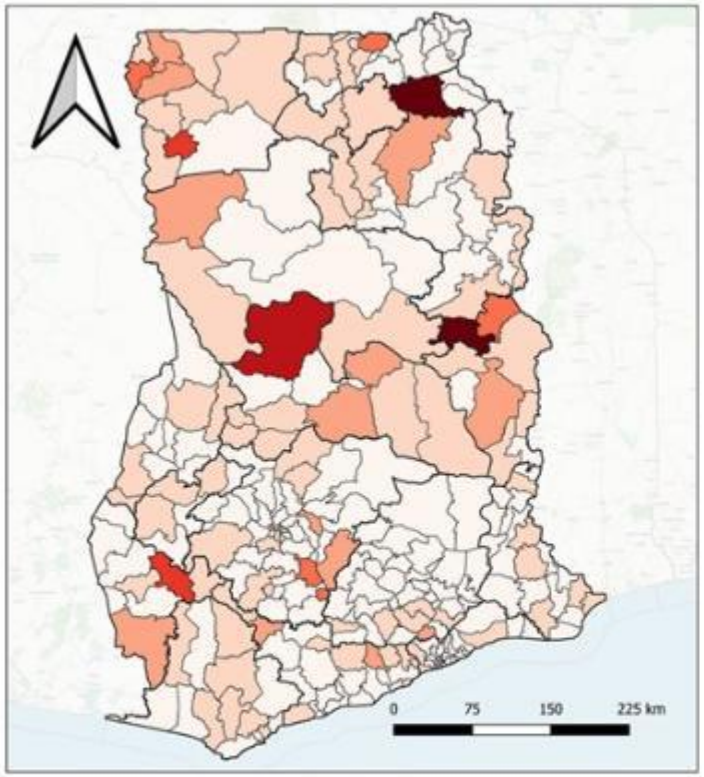
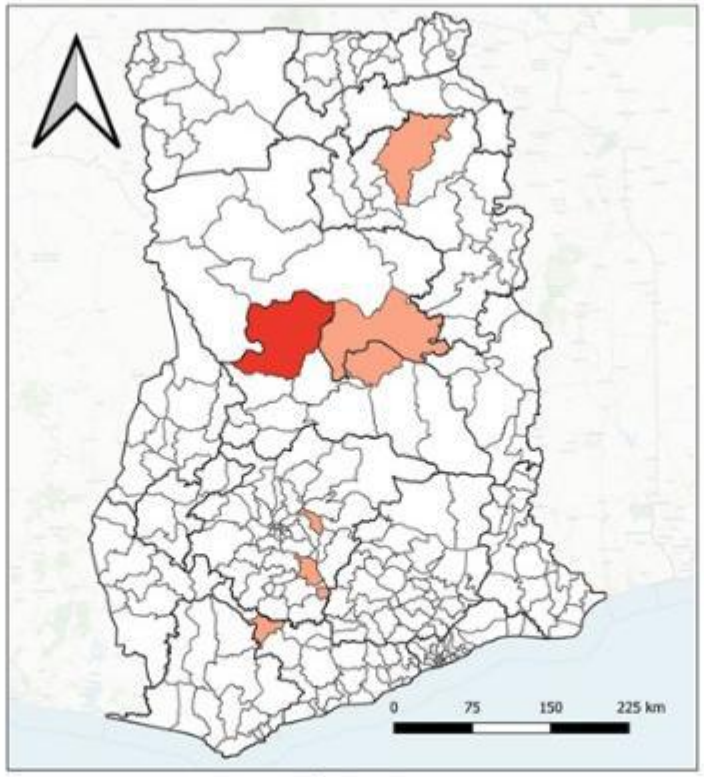
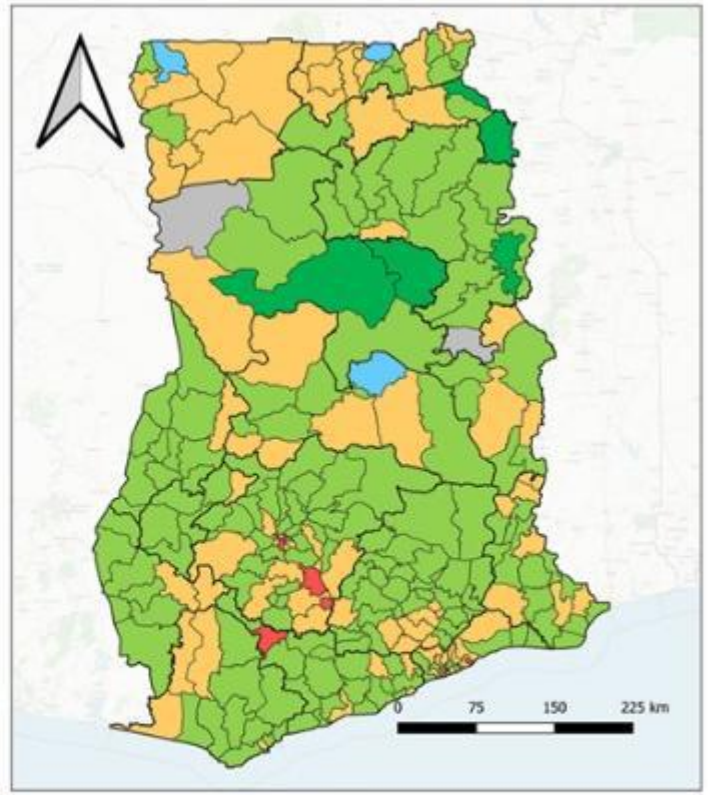
Epidemiological situation of leprosy (Maps)







NLCP: National Leprosy Control Program

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Implementation: Activities carried out (1/3)

Jun. 2018

- **WHO finalizes first guideline for diagnosis, treatment & prevention of leprosy**
- *Includes recommendation for Single Dose Rifampicin as post-exposure prophylaxis (SDR-PEP) for contacts*

Jan. 2019

- **Annual Review and Planning Meeting for Regional Technical Officers, Ankaful, Ghana - 2019**
- *RTOs impressed upon to implement established contact tracing strategy*

Jan. 2020

- **Annual Review and Planning Meeting for Regional Technical Officers, Ankaful, Ghana – 2020**
- *Introduction of New tools – Register with contacts traced field; Contact Tracing Forms; Update of DHIMS-2 leprosy form including information on contact tracing*

Nov 2020

- **Start of GPZL Country Model Implementation in Ghana – 2020**
- *Review revealed unsystematic contact tracing; Experts recommended increased ownership and funds for regions to lead; Piloting SDR-PEP by the end of 2022 identified as a roadmap milestone*

Dec 2021

- **Finalization of the Development of the Ghana Zero-Leprosy Action Plan – 2022 – 2030**
- *Included scaling up leprosy chemoprophylaxis as a major strategy; basis for GPZL Seed-funding Request*

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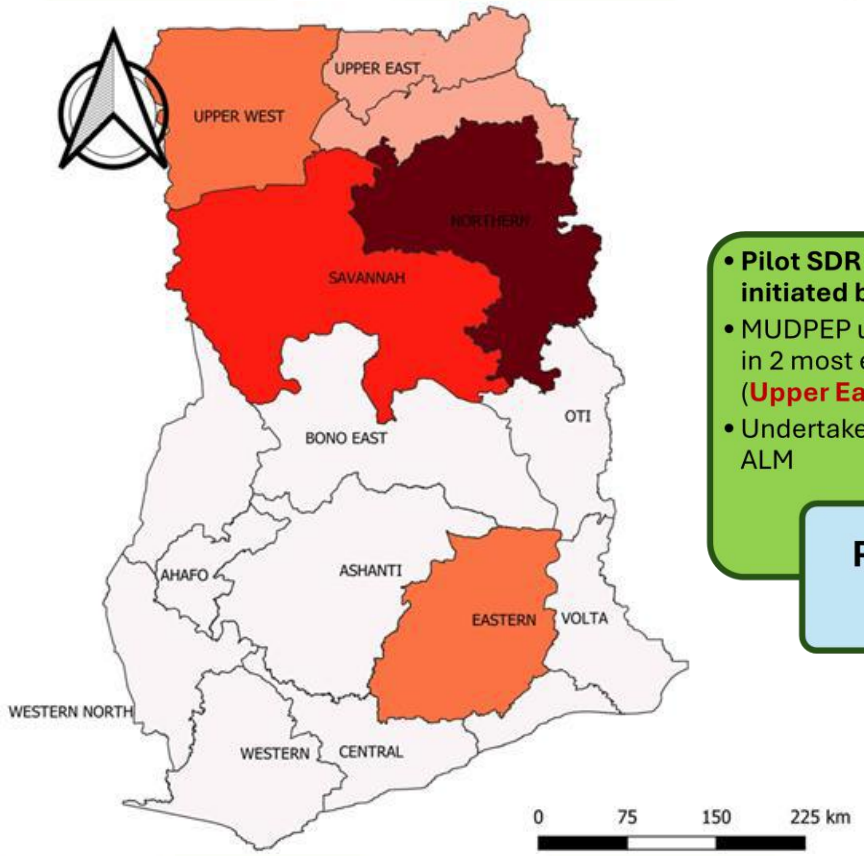
Implementation: SDR-PEP phase rollout (2/3)



- **Pilot SDR PEP Project initiated by end of 2022**
- MUDPEP using RACF method in 2 most endemic regions (**Upper East** and **Upper West**)
- Undertaken with support from ALM

Phase #1: Initial Pilot

Phase #2: Limited Scale-up

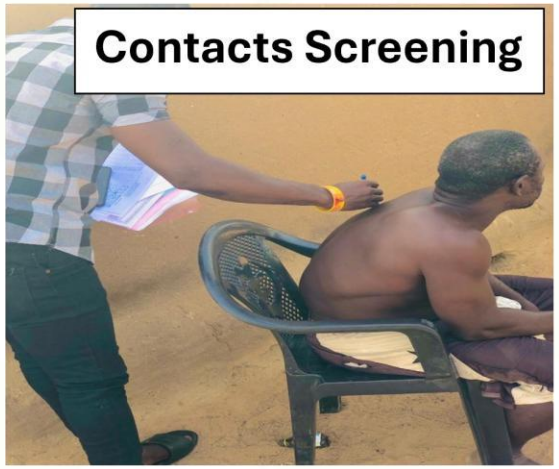
- **Scale-up Pilot project incorporating integration in more systematic manner**
- GPZL Seed-funding PASS-PEP-LEPS project in **Eastern**, **North-East**, **Northern**, and **Savannah** regions

- **National-level Implementation**
- 50% and 90% % Persons-at-risk receiving SDR-PEP by 2025 and 2030 respectively
- Ongoing GH-PEPLEPCON in same 6 regions

Phase #3: Implementation to scale

MUDPEP: Mop-Up Drive for Post-Exposure Prophylaxis; **RACF:** Retro-Active Case Finding; **ALM:** American Leprosy Missions; **PASS-PEP-LEPS:** Passive to Active Search Switch & Post-Exposure Prophylaxis for Leprosy and other Skin-NTDs; **GHPEPLEPCON:** Ghana Post-Exposure Prophylaxis for Leprosy Contacts (Routine)

Implementation: Specific activities carried out (3/3)



SDR: Single Dose Rifampicin; **M&E:** Monitoring & Evaluation

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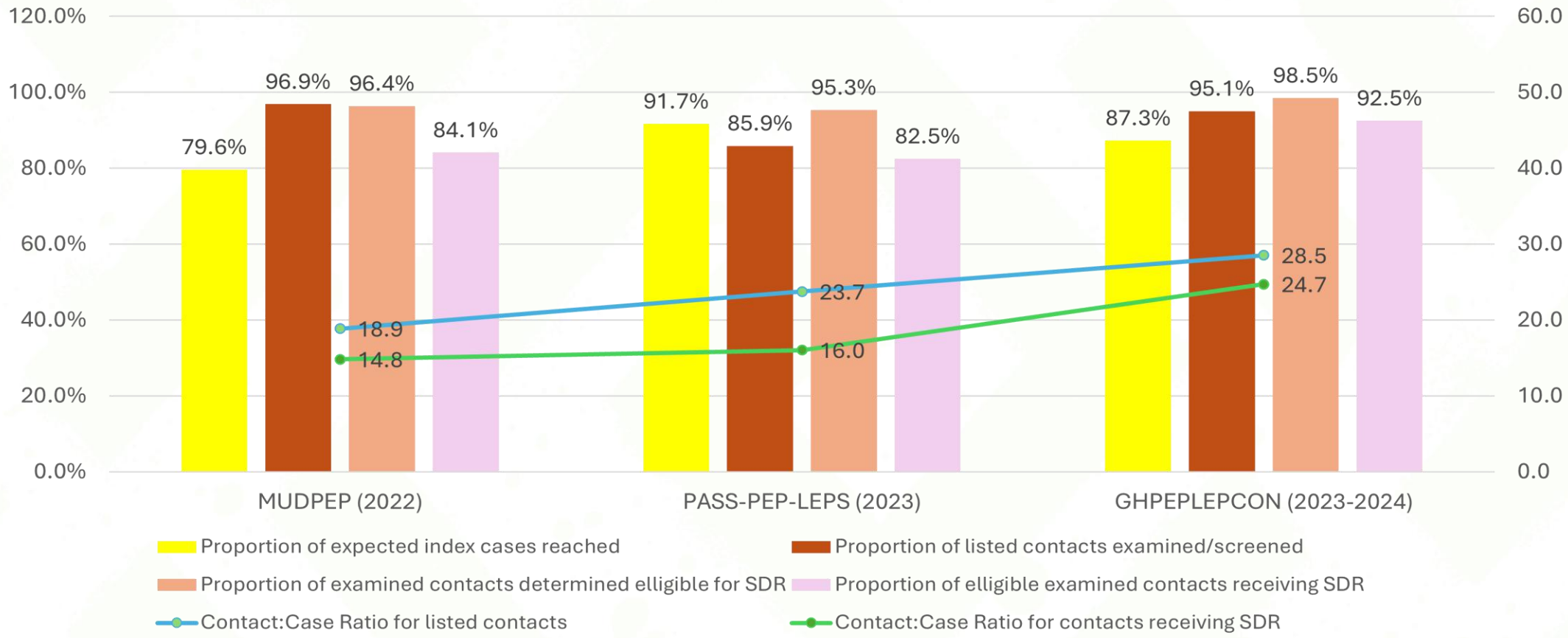
Key results

Indicators	MUDPEP	PASS-PEP-LEPS	GH-PEP-LEP-CON	TOTAL
Number of index cases [A]	258	276	144	678
Number of contacts listed [B]	4,866	6,551	4,108	15,525
Average number of contacts per index case: [C] = [B]/[A]	19	24	29	23
Number of contacts screened [D]	4,714	5,627	3,905	14,246
Proportion of contacts screened: [E] = [D] / [B]	0.97	0.86	0.95	0.92
Number of contacts who have received SDR [F]	3,822	4,426	3,559	11,807
Proportion of contacts who received SDR: [G] = [F]/[B]	0.79	0.68	0.87	0.76
Number of cases detected among contact screened: [H]	7	4	4	15
Proportion of cases detected among contacts = [H]/[B]	0.0014	0.0006	0.0010	0.0010

SDR: Single Dose Rifampicin

Key results (SDR-PEP Cascade)



SDR: Single Dose Rifampicin

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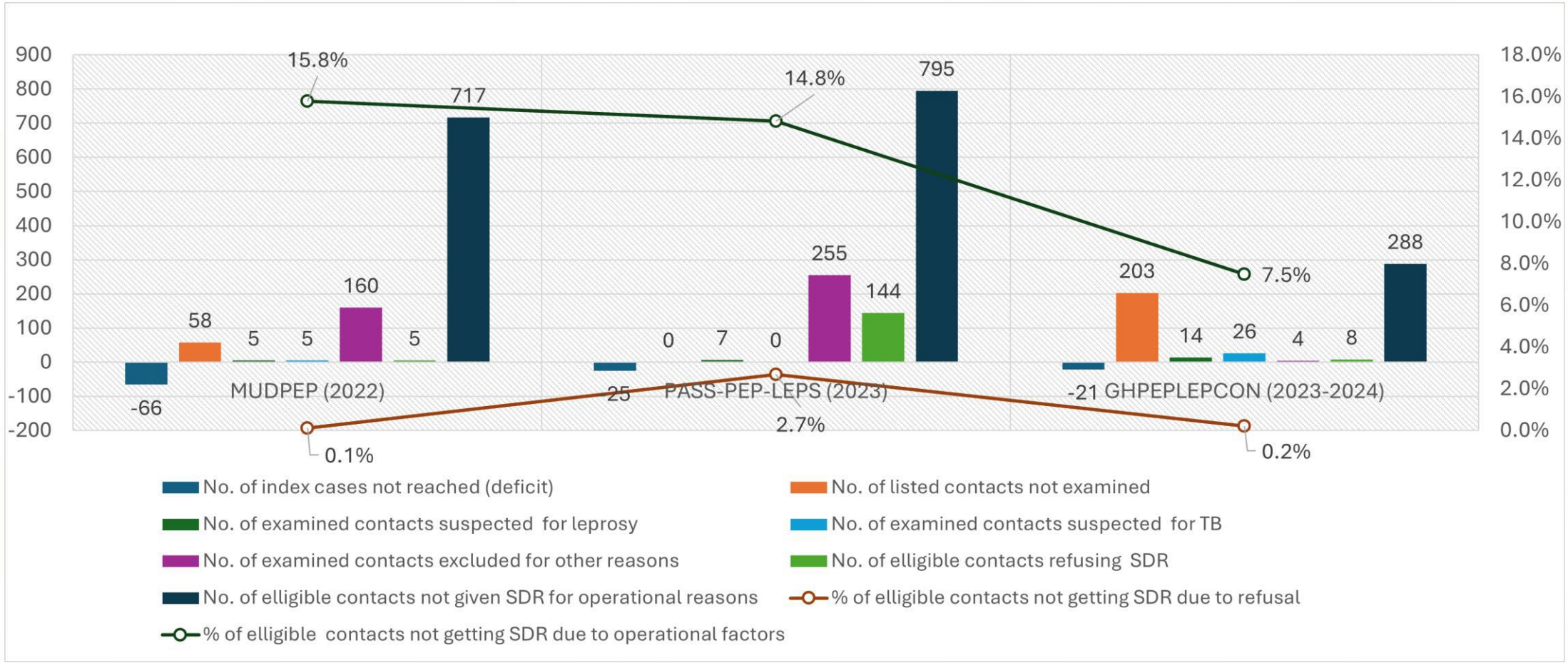
Key results (Losses along cascade)



SDR: Single Dose Rifampicin

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Challenges and Opportunities (1/2)

Challenges:

- Having steady availability of all forms of rifampicin (sourcing; long lag between request and supply, difficulty in accessing pediatric formulations)
- Logistical challenges in reaching remote, dispersed communities and infrastructural constraints – resource intensive!
- Issues of stigma
- Great variability in quality of data collection and reporting systems

Challenges and Opportunities (2/2)

Opportunities:

- Collaboration with TB Program to source rifampicin from Global Drug facility (*prior to donation through WHO*)
- Screening contacts for TB prior to SDR-PEP provided a platform for integrating leprosy control with TB contact tracing and other public health interventions.
- Opportunity for screening for other skin diseases including skin-NTDs.

TB: Tuberculosis; **WHO:** World Health Organization; **SDR-PEP:** Single-Dose Rifampicin as Post-Exposure Prophylaxis; **skin-NTDs:** Skin-related Neglected Tropical Diseases

Lessons learnt

- SDR-PEP is safe; no serious ADRs or deaths reported
- Important to narrow gap between contact line-listing CCR and SDR CCR
  - largely arises from operational factors
- RACF associated with greater losses right from outset
  - Factors may be outside our control
  - We need to reduce time between diagnosis and/or treatment and when contact tracing/SDR-PEP is applied
  - Quarterly frequency appears effective

SDR-PEP: Single Dose Rifampicin as Post-Exposure Prophylaxis; **ADR:** Adverse Drug Reaction; **CCR:** Contact: Case Ratio; **RACF:** Retro-Active Case Finding;

Future directions

- Formalizing expected targets along the contact tracing cascade
  - Proportion of index patients who have contacts listed
  - Proportion of listed contacts examined/screened
  - Proportion of examined contacts determined to be eligible for SDR
  - Proportion of eligible contacts dose with SDR
  - Proportion of contacts who complete follow-up (2-yr for PB, 5-yr for MB)
- Strengthened data systems required to follow-up cases, better target interventions, and evaluate impact
- Using LEMT to target intervention priority areas

SDR: Single Dose Rifampicin; **PB:** Paucibacillary leprosy; **MB:** Multibacillary leprosy; **LEMT:** Leprosy Elimination Monitoring Tool

THANK YOU

Acknowledgements:

- Leadership & staff of Ghana Health Service
- World Health Organization (GLP / WHO-AFRO, WCO)
- Hope Rises International (*Formerly American Leprosy Missions*)
- Global Partnership for Zero Leprosy
- Kumasi Centre for Collaborative Research (KCCR)

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Moxidectin: a promising tool to help accelerate elimination of onchocerciasis

Sally Kinrade

Onchocerciasis and LF project leader
Medicines Development for Global Health

16 April 2025

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Moxidectin is the first new treatment for onchocerciasis in >30 years

The data The impact Recent updates Defining how moxidectin may be used

Moxidectin, a new tool for onchocerciasis

Key characteristics

Moxidectin has exceptional efficacy in onchocerciasis and LF

- Complete OV mf clearance in more people and for much longer compared with IVM (Opoku et al 2018)
- Moxidectin + albendazole shown superior to IA and comparable to IDA in LF (NCT04410406%)
- Efficacy in other NTDs –STH*, strongyloidiasis**

Excellent safety profile

- Well tolerated in all studies to date
- No SAEs related to treatment, similar profile to IVM
- Approximately 80,000 people treated to date
  - >10,000 participants (4+yrs) in blinded safety study (oncho+/-LF endemic populations)
  - >65,000 in the 1stmoxidectinMDA in Ghana

% Accepted for publication * Welsche et al 2023, Sprecher et al 2023 ** Sprecher et al 2024

Greater and longer lasting reduction in skin microfilariae after moxidectin compared with ivermectin

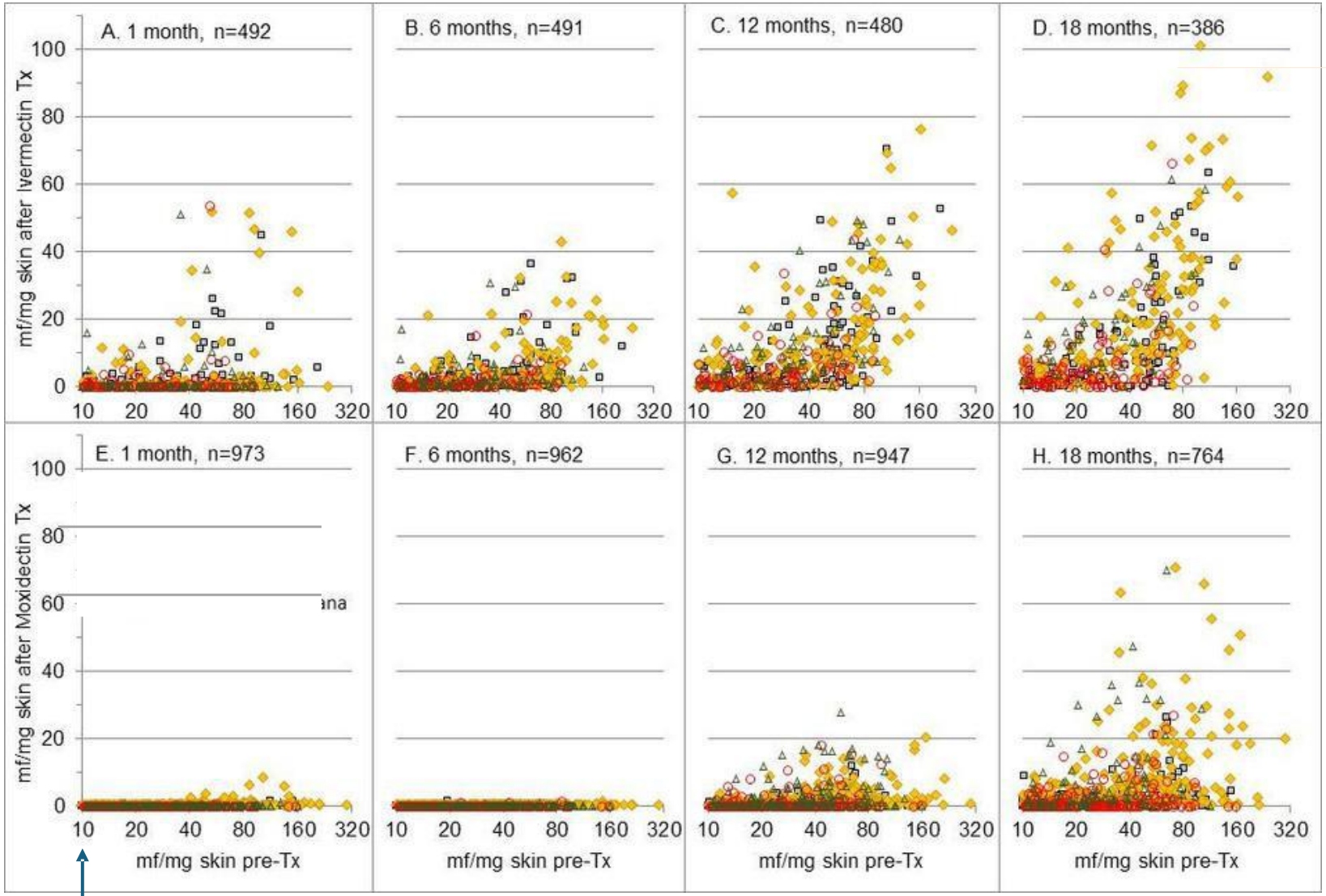
IVM

Ivermectin
150mcg/kg

X-axis: Pre-treatment mf level

MO

Moxidectin
8mg



Y-axis: Post-treatment mf levels

- Nord-Kivu, DRC
- Nord-Ituri, DRC
- Lofa County, Liberia
- Nkwanta District, Ghana

Opoku et al 2018

Greater and longer lasting reduction in skin microfilariae after moxidectin compared with ivermectin

IVM

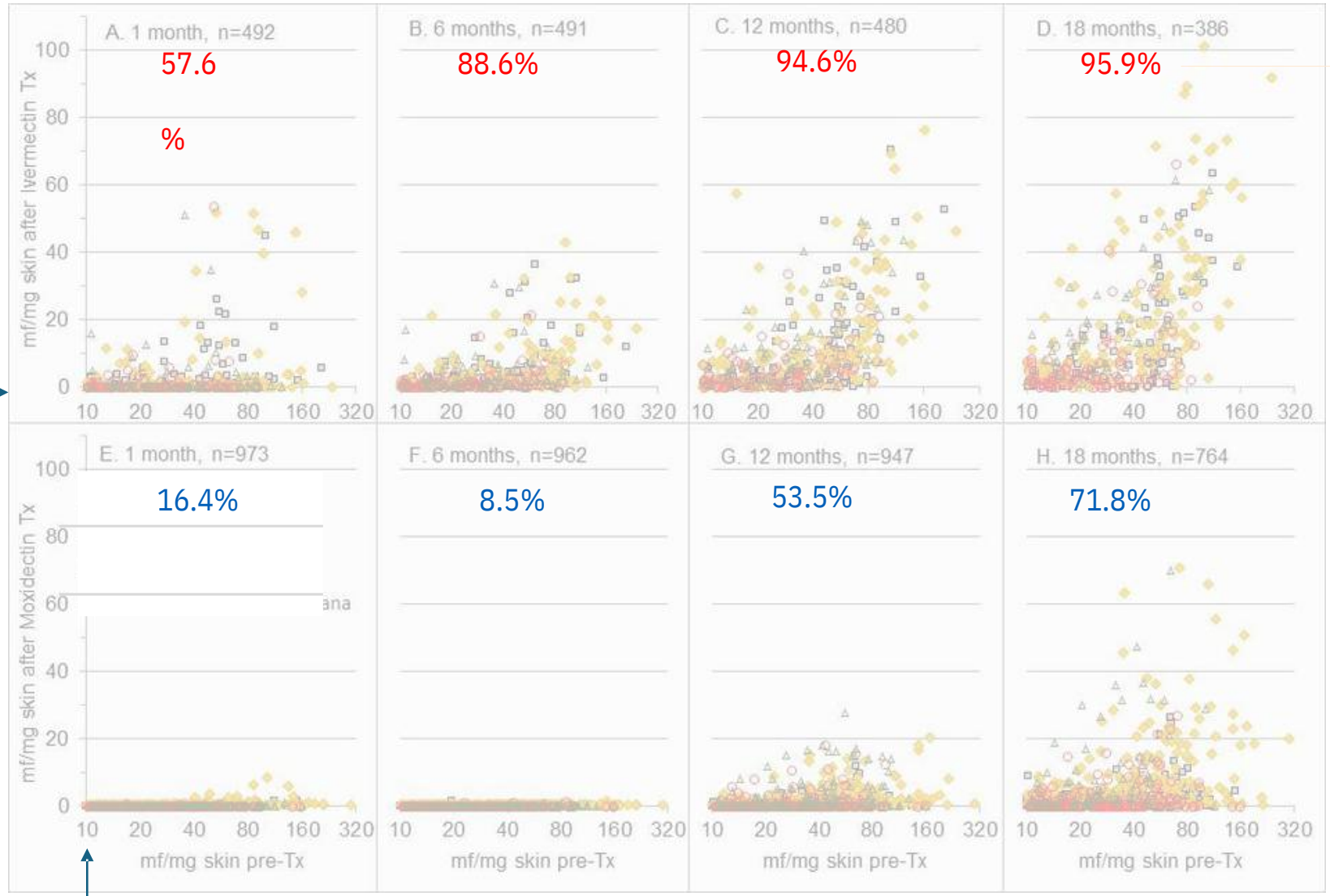
Ivermectin 150mcg/kg

MOX

Moxidectin 8mg

X-axis: Pre-treatment mf level

Y-axis: Post-treatment mf levels



Proportion of participants with detectable skin mf

Proportion of participants with detectable skin mf

- Nord-Kivu, DRC
- Nord-Ituri, DRC
- Lofa County, Liberia
- Nkwanta District, Ghana

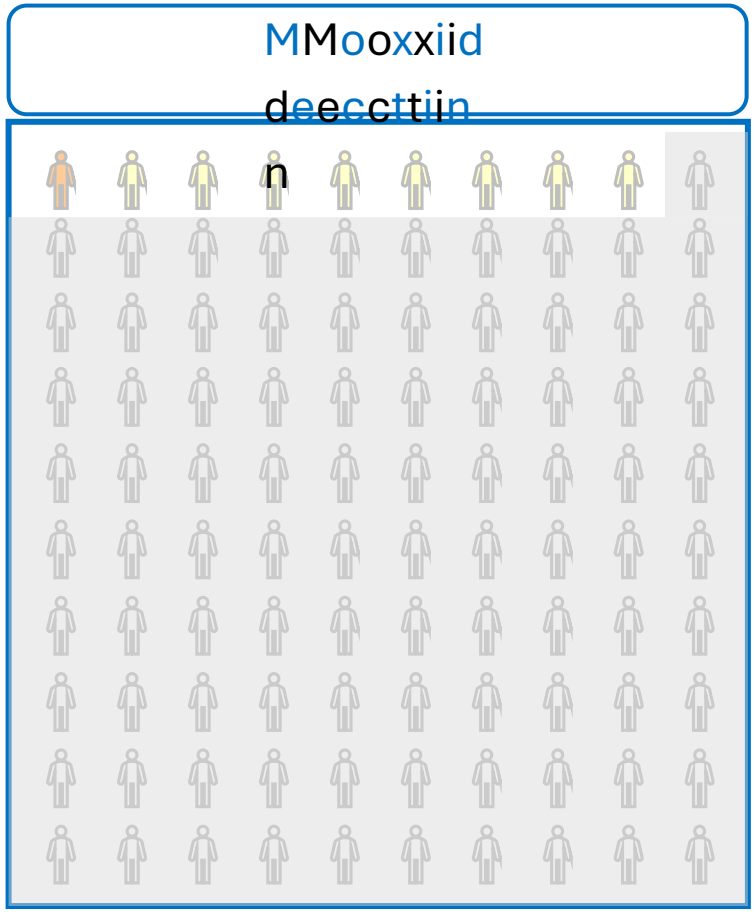
Opoku et al 2018

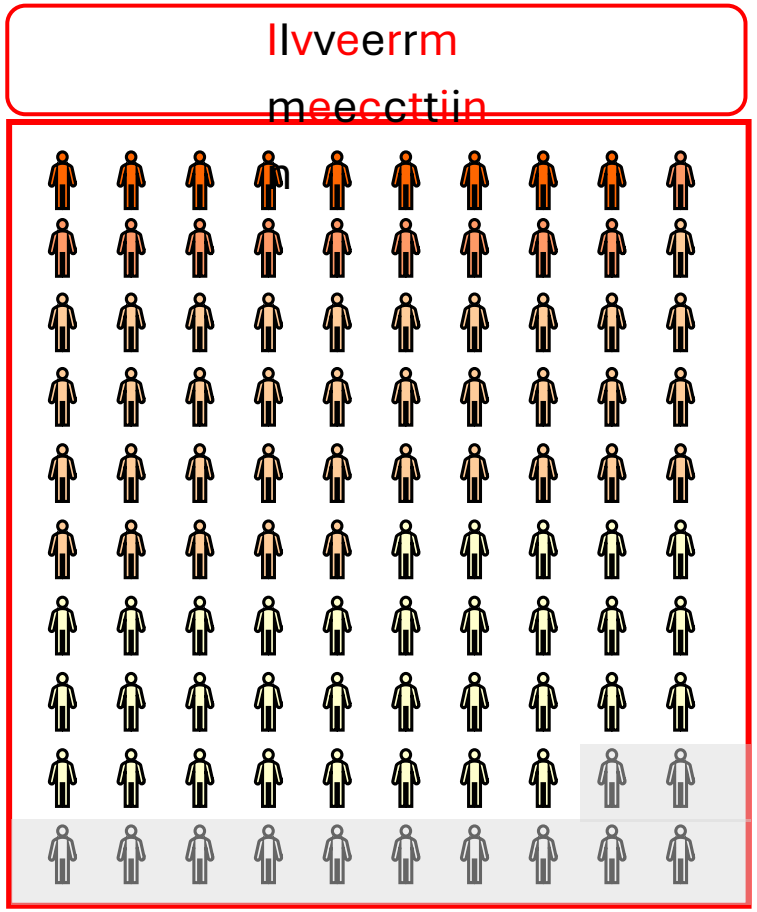
Low or no skin microfilariae will reduce (prevent) transmissionand establishment of new infections

In 100 people with ≥ 10 mf/mg skin

At Month 6

NegativeSkin mf count	
PositiveSkin mf count	
0 to 1 mf/mg skin	
1-5 mf/mg skin	
5-10 mf/mg skin	
>10 mf/mg skin	





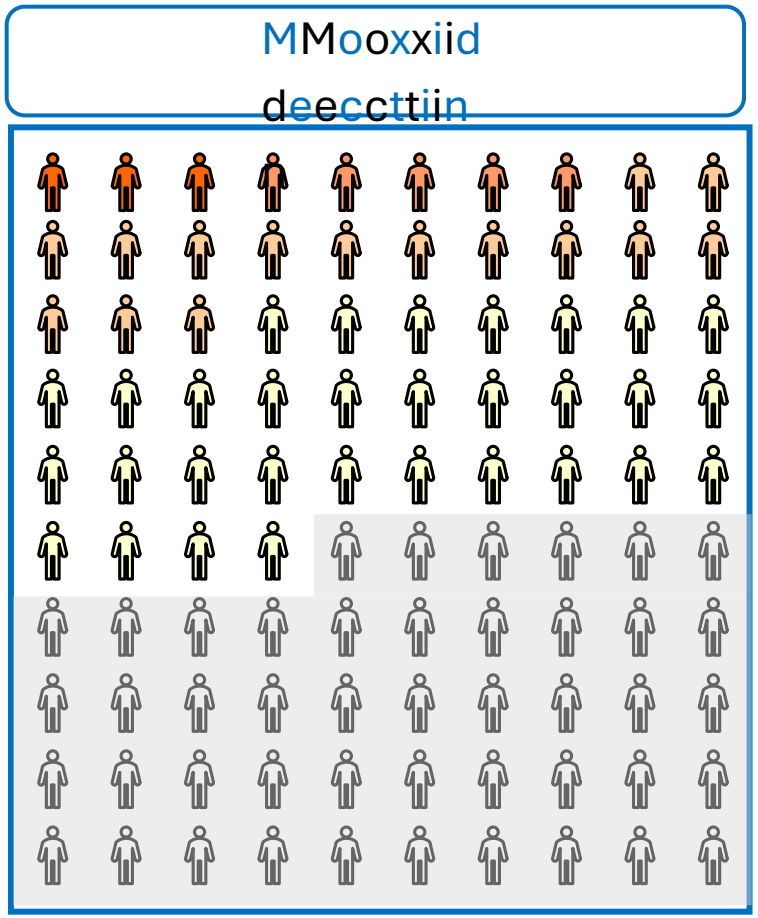
Opoku et al 2018

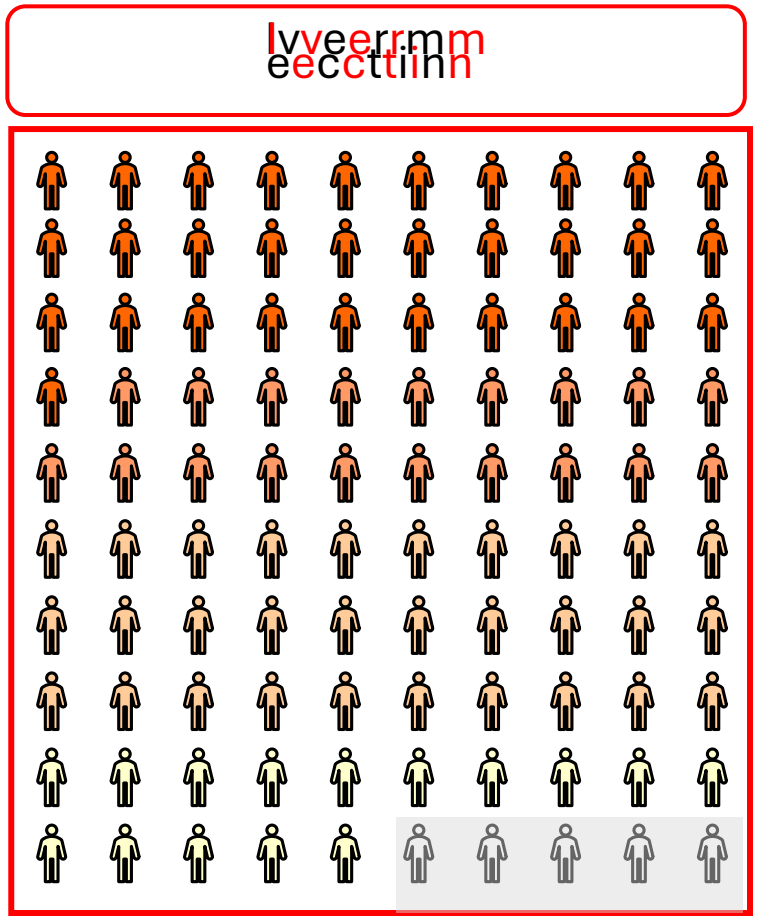
Low or no skin microfilariae will reduce (prevent) transmissionand establishment of new infections

In 100 people with>10 mf/mg skin

At Month 12

NegativeSkin mf count	
PositiveSkin mf count	
0 to 1 mf/mg skin	
1-5 mf/mg skin	
5-10 mf/mg skin	
>10 mf/mg skin	





Opoku et al 2018

Moxidectin is well tolerated

Data extracted from the submission to the Ghana FDA in Jul 2024

(blinded data, unblinded report pending)

Table 18 Overview of Treatment-Emergent Adverse Events by Age Group in MDGH-MOX-3002 Study (DRC site)

Age group	Total number of participants N	Number of participants n (%)			
		Without TEAEs	With at least one TEAE	With at least one TEAE starting Day 0 to Day 5*	With at least one TEAE starting Day > 5 to Month 3*
Children ≥ 4 to < 12 years	187	184 (98)	3 (1.6)	2 (1.1)	2 (1.1)**
Adolescents ≥ 12 to < 18 years	2290	2236 (98)	54 (2.4)	37 (1.6)	19 (0.8)
Adults ≥ 18 years	5549	5184 (93)	365 (6.6)	279 (5.0)	101 (1.8)
Total	**8026**	**7604 (95)**	**422 (5.3)**	**318 (4.0)**	**122 (1.5)**

Abbreviations: TEAE = treatment-emergent adverse events, NA = not available

*After administration of study drug

**As at the data cutoff date of December 16, 2023, all enrolled and treated children 4 to 11 years of age had completed the study through to Month-3 post-administration of study drug.

Source: DSMB report from safety study MDGH-MOX-3002 in Democratic Republic of the Congo

Moxidectin has the potential to accelerate time to elimination

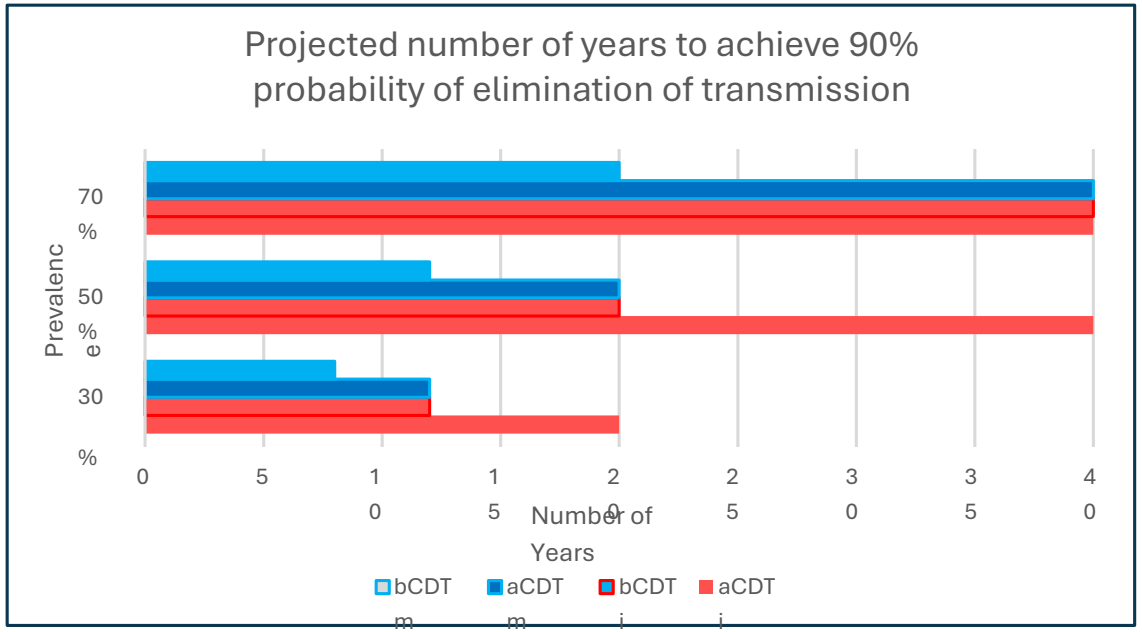
NTD-MC Consensus statement "Moxidectin Will Accelerate Onchocerciasis Elimination"

WHO Onchocerciasis Technical Subgroup (OTS) meeting Dec 2022

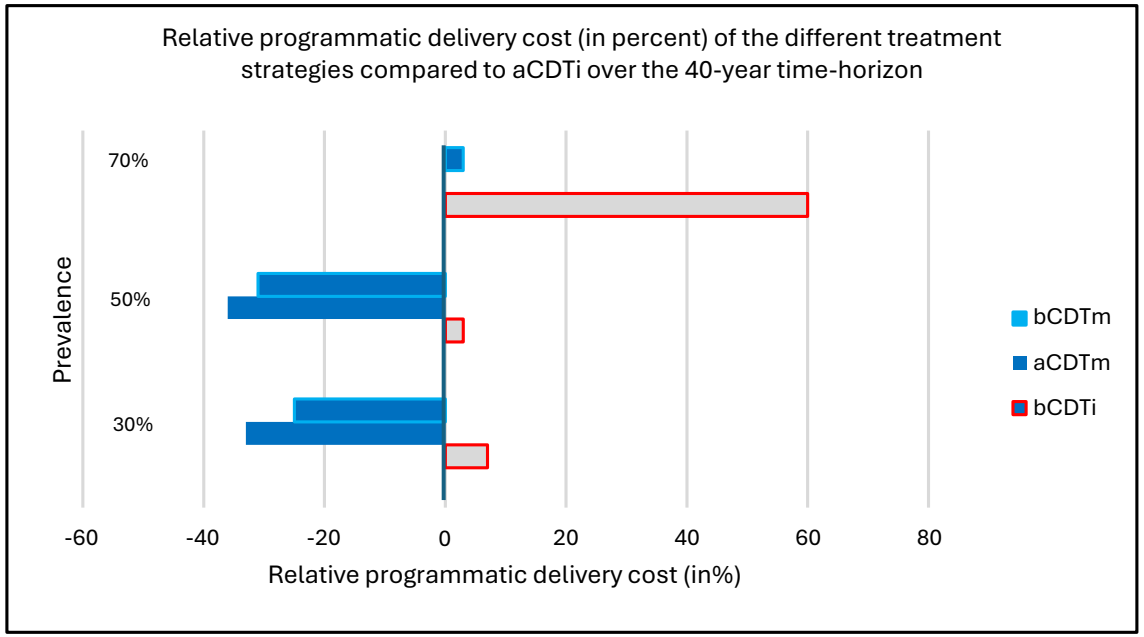
NTD MODELLING CONSORTIUM

7. Moxidectin will accelerate elimination in all settings. The greatest value of moxidectin is in higher endemic settings.
    a. There is uncertainty about whether moxidectin is strictly necessary to achieve elimination in settings with high baseline endemicity.
    b. There is consensus that the higher the endemicity the more useful moxidectin is in achieving elimination and reducing duration of intervention required.
    c. In treatment-naive settings with moderate baseline endemicity, the introduction of moxidectin will likely reduce the duration to elimination of transmission by ⅓-½ compared to ivermectin.
    d. In settings where ivermectin is being used but elimination is not yet achieved, moxidectin will likely reduce the remaining time to elimination of transmission by ¼-½ (where it can be achieved).

Faster elimination and lower programmatic cost



Turner et al. 2024



Adapted from Turner et al. 2024

Used at the same treatment frequency,

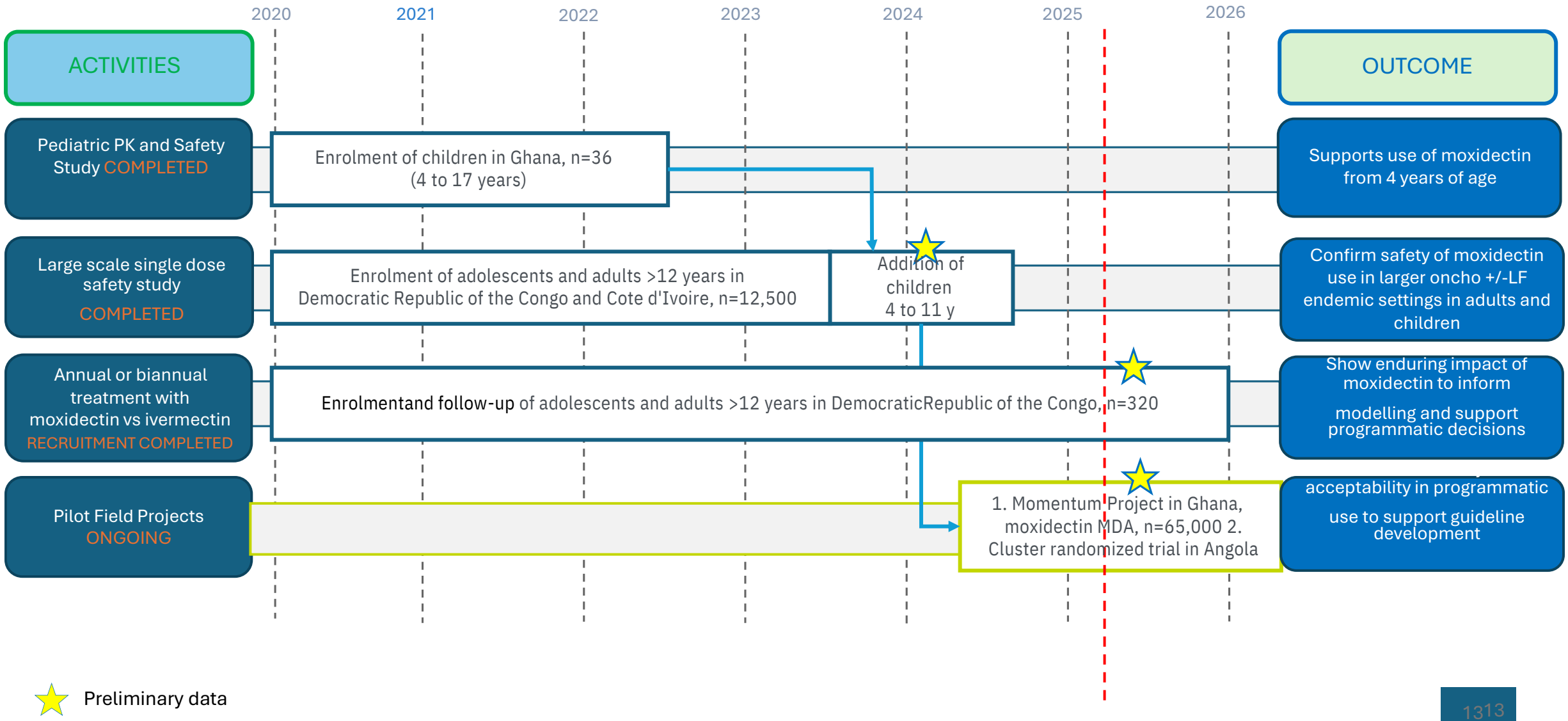
- MOX will enable faster elimination….including where IVM cannot
- The greater the endemicity, the greater the impact

Epidemiological models also show that annual MDA with MOX has a similar impact to biannual MDA with IVM which could have some programmatic benefit.

Epidemiological models shows that moxidectin systematically ↓ program costs compared with ivermectin

Informing programmatic use and enabling access to moxidectin

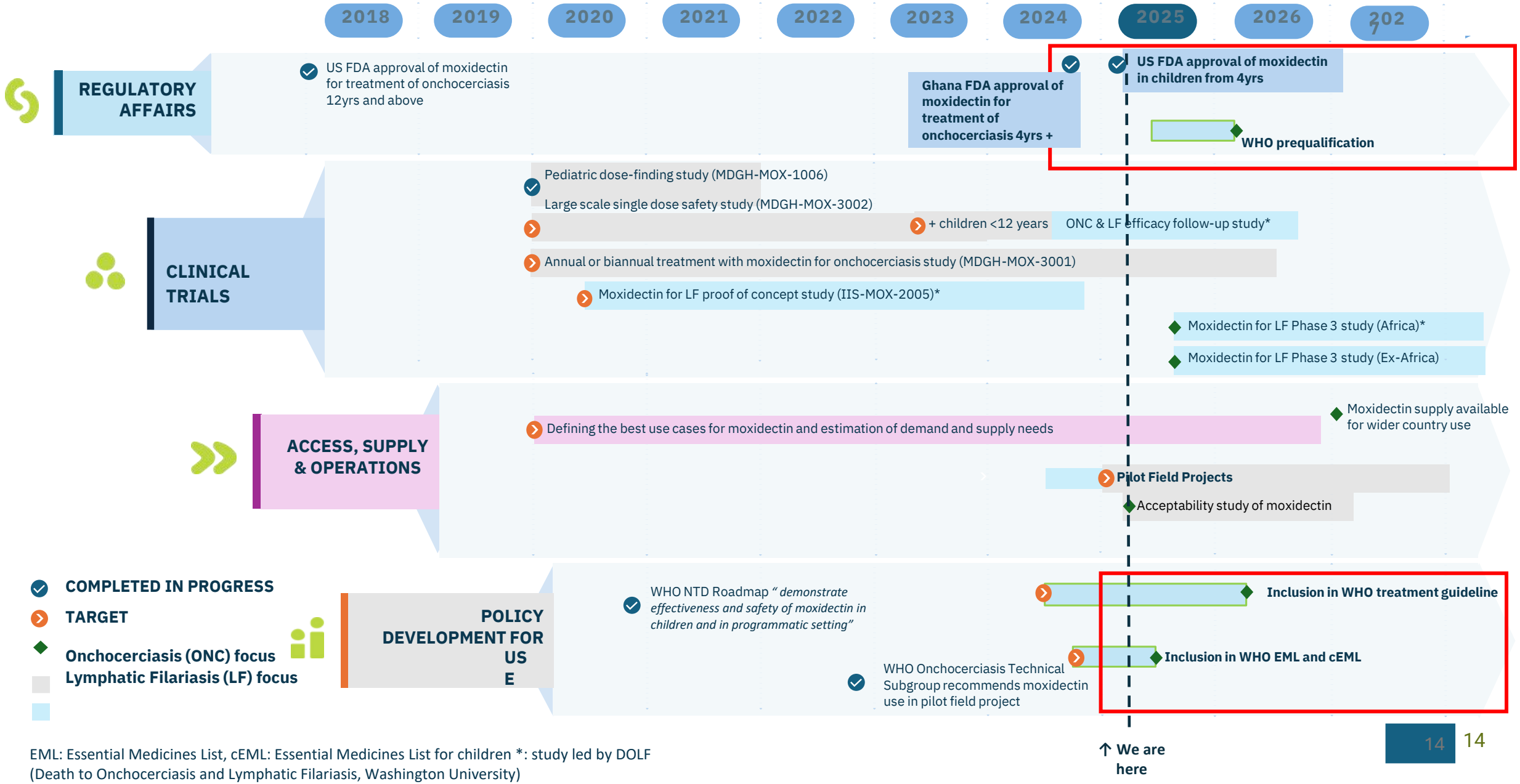
On-going data generation to support programmatic use



Preliminary data

Progressing Moxidectin for Onchocerciasis and Lymphatic Filariasis

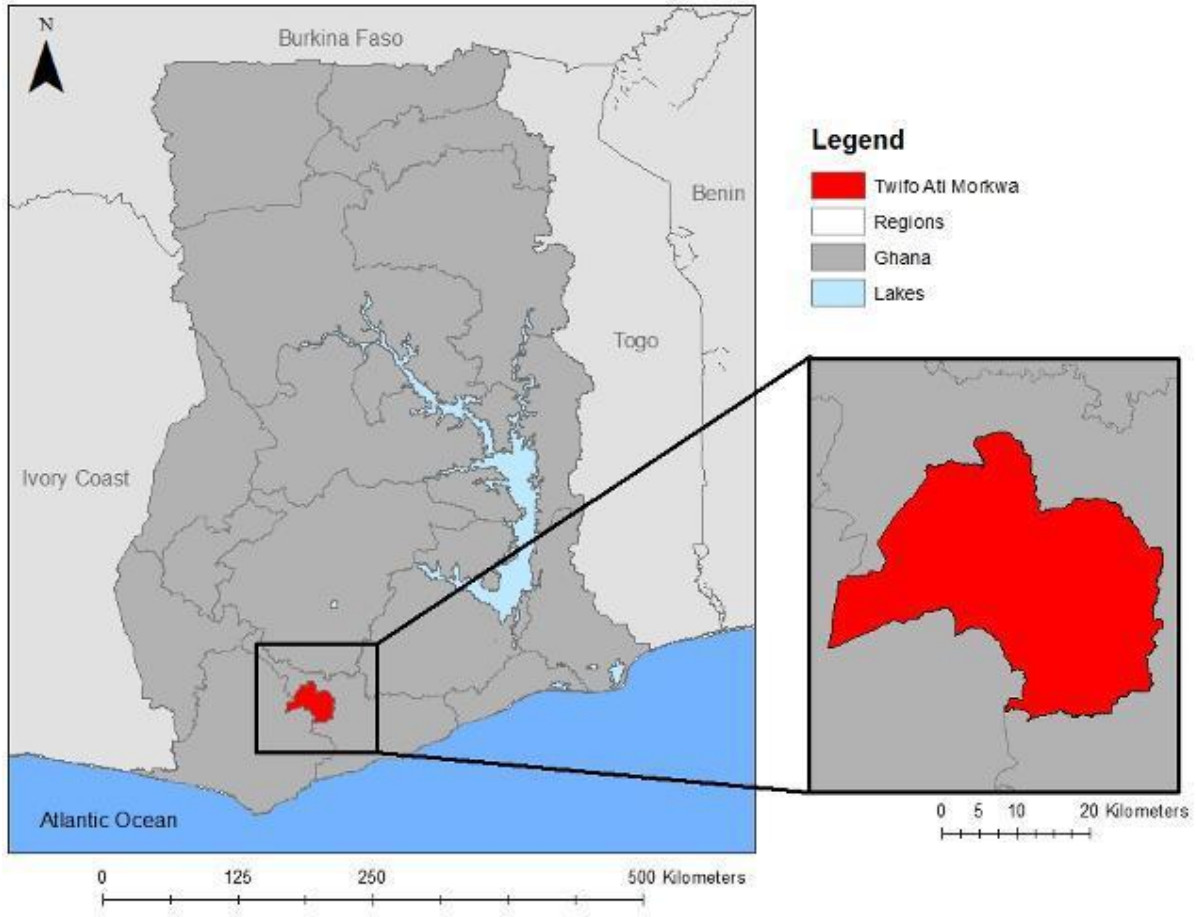
(version 02/2025)



EML: Essential Medicines List, cEML: Essential Medicines List for children *: study led by DOLF (Death to Onchocerciasis and Lymphatic Filariasis, Washington University)

Spotlight on the Ghana Momentum Project

Onchocerciasis MDA in Twifo Atti Morkwa District



Background •Daboase High Risk Focus (HRF) in the Pra-Offin Transmission Zone

•Stop MDA survey 2019

•Mapping 2022

- •mean seroprevalence 6.3%

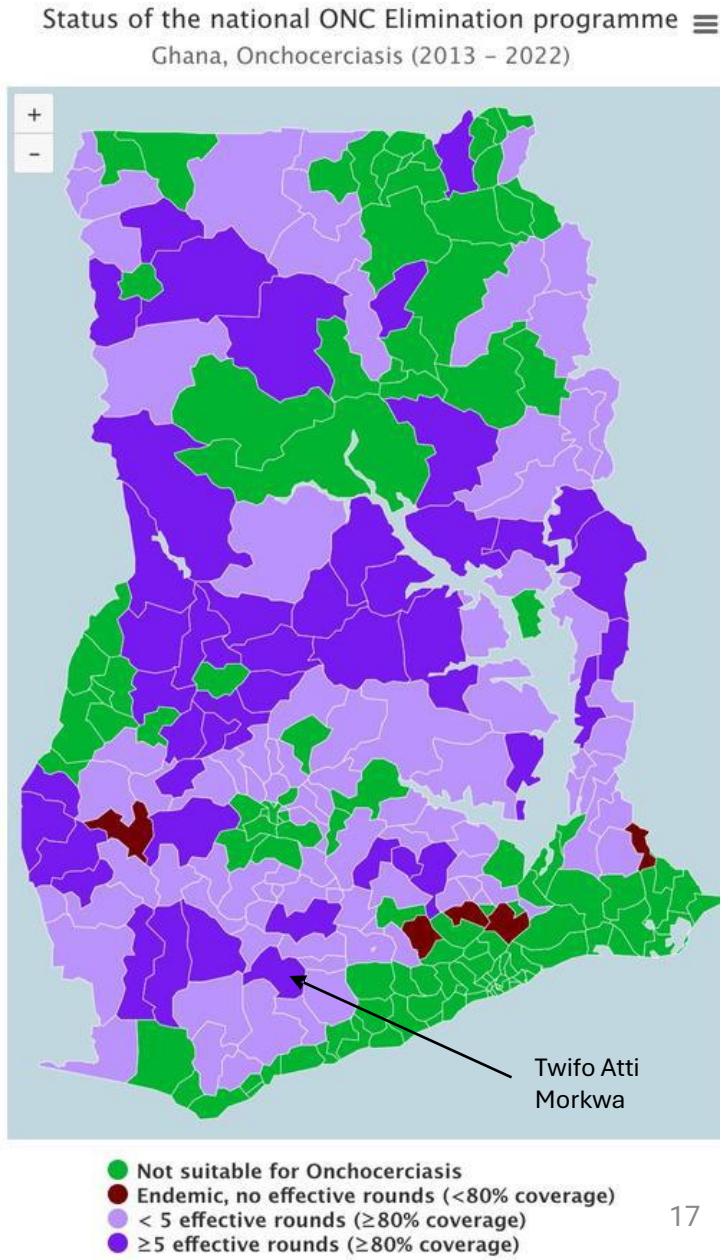
• PLAN

- •Re-start MDA in the 3 affected districts in 2024
- •Twifo Atti Morkwa district
  - IVM - 1 round in July 2024
  - MOX - 6 rounds biannually from Jan 2025

Key Objectives for Momentum Project

To generate relevant data and experience to support the introduction and use of moxidectin in onchocerciasis elimination programmes

1. Enable field experience using moxidectin to treat people 4 years and older living in onchocerciasis endemic communities. [Pilot MDA]
2. Confirm feasibility of introducing moxidectin as an alternative treatment for onchocerciasis and its acceptability to the local population and stakeholders [Social Research]
3. Develop and test training/educational materials (including safety reporting process) to ensure effective communication with stakeholders



Momentum Ghana is a significant achievement

First African Regulatory Authority registration of moxidectin for the treatment of onchocerciasis

Registration inclusive of children4 yrs and older

First country-led implementation of moxidectin in a mass drug administration (MDA) program.

Outcomes of Momentum Project

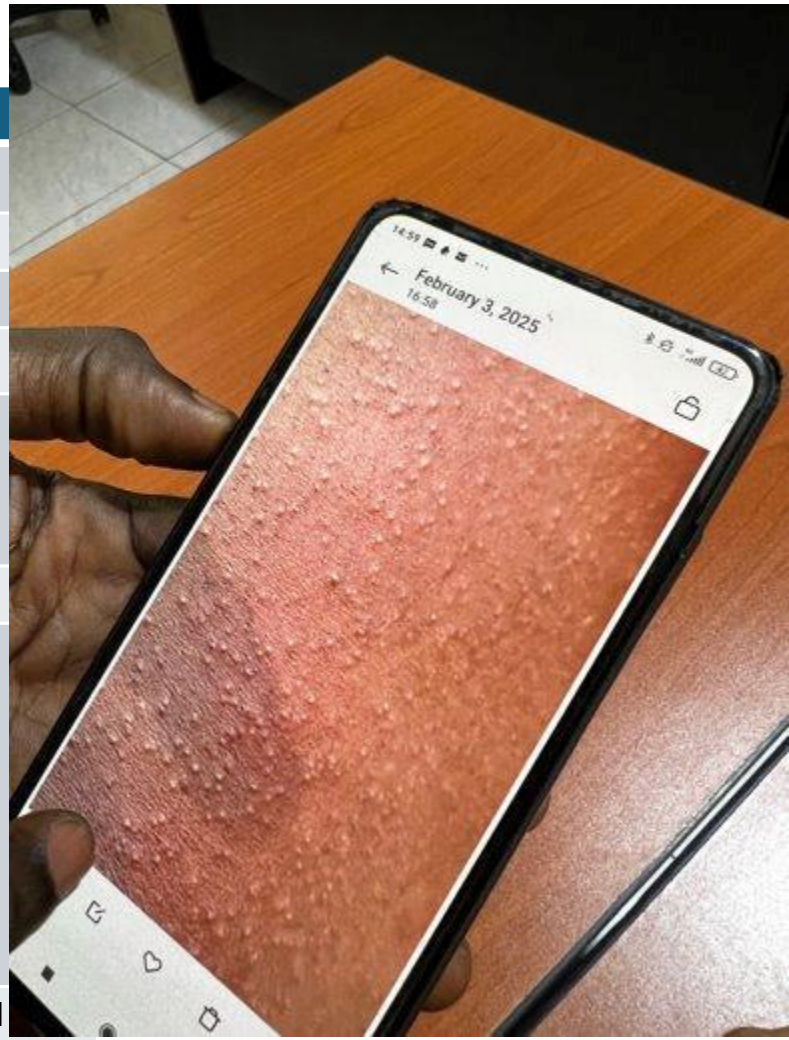
- Preliminary datashows 65 000 people reached in Twifo Atti-Morkwa. Average
- Coverage:~ 80% Training outcomes:
- Enhanced capacity of CDDs and health workers.
- Age-based dosage (no height stick):

4 to <8 years	4mg (2 tablets of moxidectin 2mg)
≥ 8 years	8mg (4 tablets of moxidectin 2mg)

- Safety reports aligned with known safety profile of moxidectin

Spontaneous Adverse Event Reports (AEs)

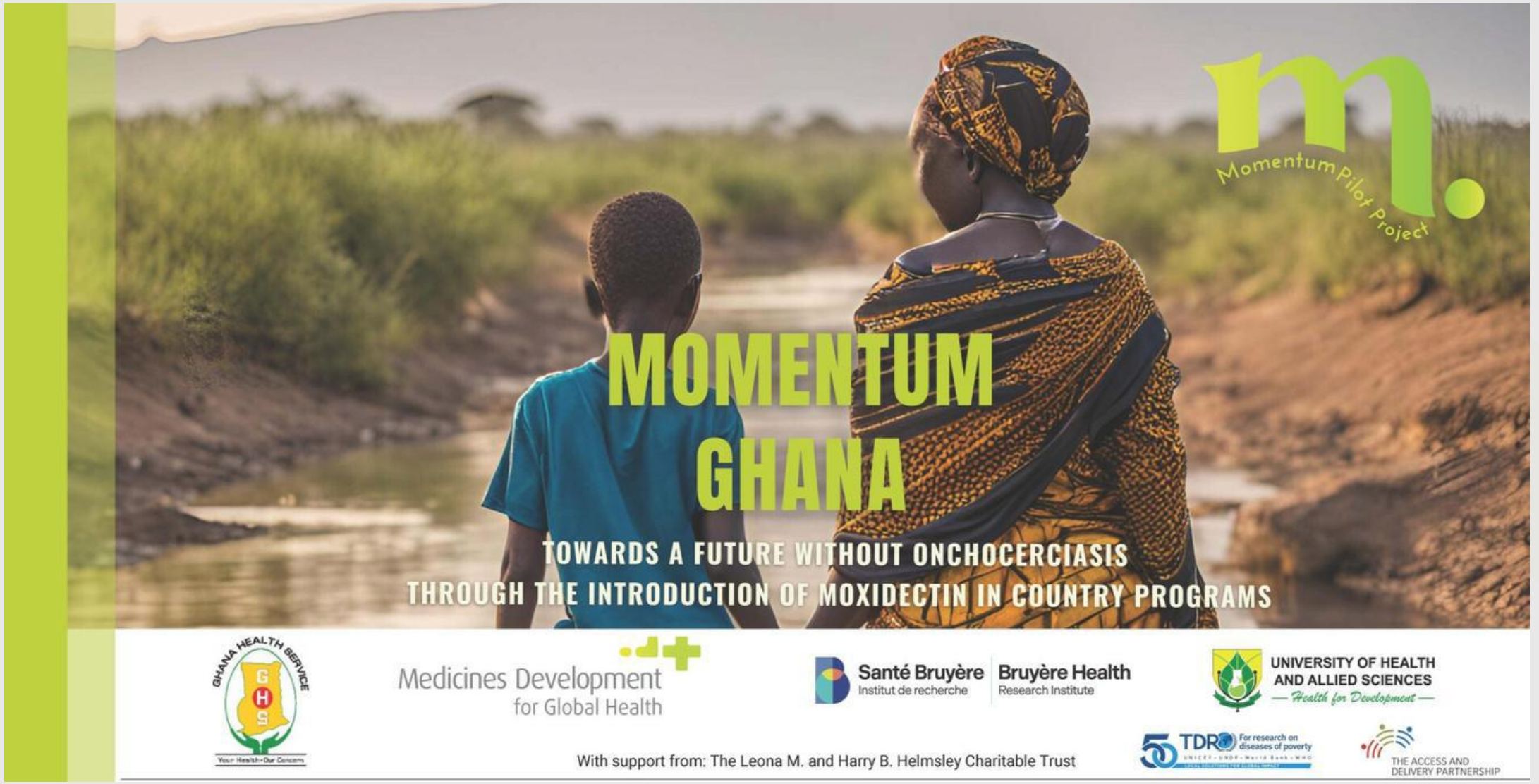
Category Total Adverse	Details 31 0
Event Reports Serious	1–5 days post-administration
Adverse Events	18 females, 13 males Adults:
Timeframe of Events	18 cases
Gender Distribution	Paediatric: 13 cases
Age Distribution	-8 children aged 4–11 -5 adolescents >12
Most Common AE	Itching and/or skin rash (17 cases)
Other Reported AEs	- Dizziness (4 cases) - Diarrhea (3 cases) - Swollen feet (3 cases) - Stomach pain/vomiting (3 cases) - Headache (2 cases) - Muscle pain (1 case) - Difficulty breathing (1 case) - Fever (1 case) - Cough (1 case)
Conclusion	Events consistent with the known adverse event profile from clinical studies and product characteristics.



Next Steps

1. Acceptability and Feasibility data collection
   - Commenced 9 April 2025.
2. Surveillance and Monitoring
   - Reporting Adverse Events to GFDA and international authorities
3. Community Collaboration:
   - Strengthen educational materials.
   - Continue sensitization campaigns.
4. Explore expansion opportunities to Twifo Hemang Lower Denkyra district

-> The Momentum Project will run through 2028 and will include three rounds of biannual moxidectin MDA.


Momentum Pilot Project
MOMENTUM
GHANA
TOWARDS A FUTURE WITHOUT ONCHOCERCIASIS
THROUGH THE INTRODUCTION OF MOXIDECTIN IN COUNTRY PROGRAMS
GHANA HEALTH SERVICE
Your Health • Our Concern
Medicines Development
for Global Health
Santé Bruyère
Institut de recherche
Bruyère Health
Research Institute
UNIVERSITY OF HEALTH
AND ALLIED SCIENCES
Health for Development
TDR
For research on
diseases of poverty
THE ACCESS AND
DELIVERY PARTNERSHIP
With support from: The Leona M. and Harry B. Helmsley Charitable Trust

Implementing moxidectin where it is needed for the biggest impact

Sustaining the MOMENTUM to support countries to reach their elimination targets

Dissemination to other endemic areas in need of an alternative

Expansion in Ghana
+ one or more countries

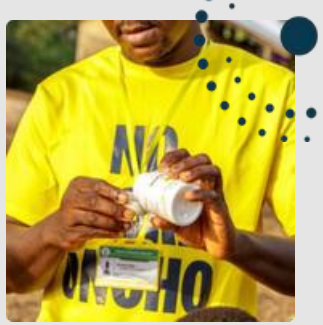
Normative guidance

Regulatory

Priority use cases

Supply

Ghana



Wider Adoption

Early Implementation

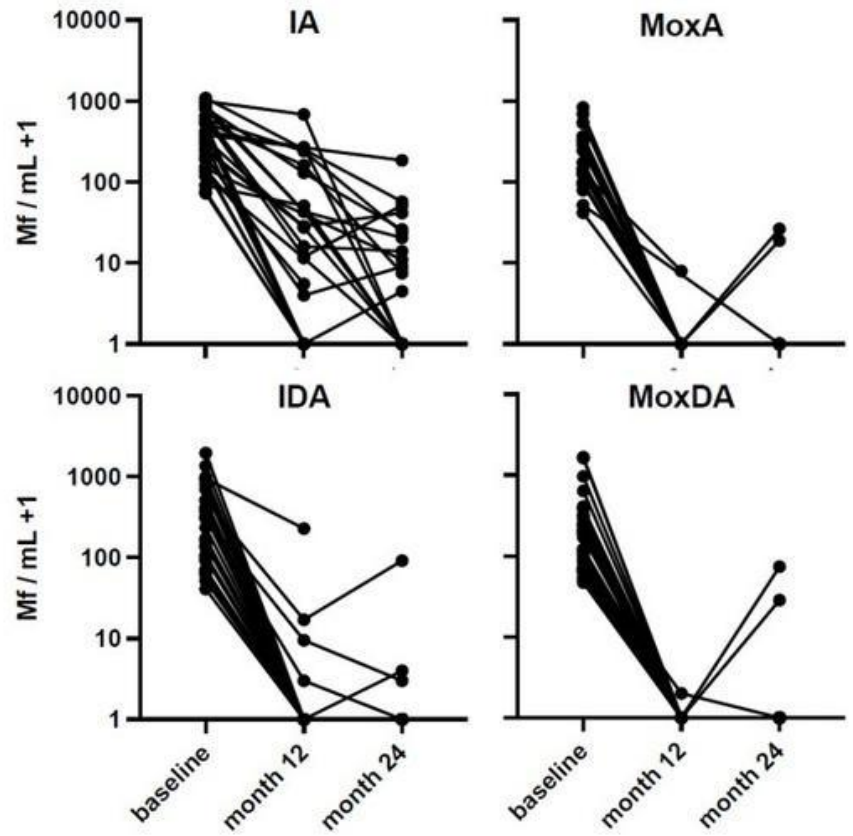
Pilot Field Project – 1 district

2024 2025 2026 2027 2028 2029 2030 2031

Moxidectin scale up plan developed based on estimated demand
MDGH will supply at cost+ ; price per dose will decrease with increased volume

Preliminary data suggests that moxidectin in combination treatment may accelerate elimination of LF

Proof of Concept Study (NCT04410406) Preliminary Findings



IA vs MoxA (Fisher's exact) P = 0.000, 0.010

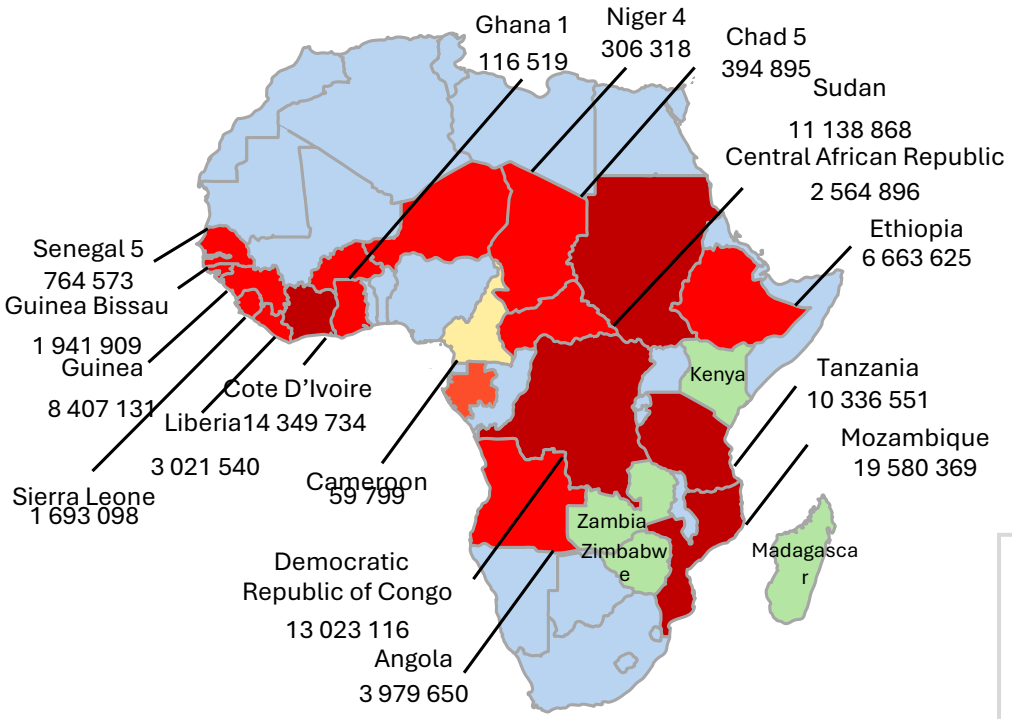
- MoxA (once) is superior to IA (annually) for *W. bancrofti* mf clearance at 12-and 24-months post-treatment and appears equivalent to IDA and MoxDA for that endpoint.
- There was greater Filariasis Test Strip (FTS) score reduction in DEC-containing groups; MoxDA had the highest antigen clearance
- Worm nest clearance suggests that MoxA, MoxDA, and IDA may be more effective than IA for killing adult worms
- Adverse events immediately following treatment were similar in all arms

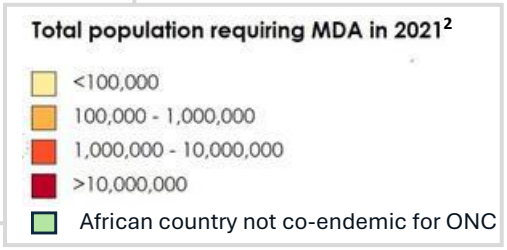
IA: Ivermectin and albendazole; MoxA: Moxidectin and albendazole; MoxDA: moxidectin, diethylcarbamazine, and albendazole; IDA: ivermectin, diethylcarbamazine, and albendazole

Abstract presentation #6418 DOLF ASTMH, 21 Oct 2023

Moxidectin potential for oncho/LF co-endemic areas

An estimated **58.7M** people living in LF/onchocerciasis co-endemic areas in Africa received treatment with **ivermectin 200 µg/kg and albendazole 400 mg (IA)** in MDA programs in 20221.





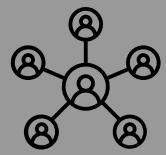
Potential synergies for onchocerciasis and LF elimination programs

Same product

Same age-based dosages*

4 to <8 years	4mg (2 tablets of moxidectin 2mg)
≥ 8 years	8mg(4 tablets of moxidectin 2mg)

Same delivery (MDA)



*under investigation

Source: 1. WHO GPELF Progress Report, 2022; 2. WHO GPELF Progress Report, 2021 Note: Maps show the population requiring MDA; the number receiving MDA is substantially lower.

Clinical evidence and use of a diagnostic will inform potential deployment of moxidectin in certain Loa loa–endemic settings

CRFilMT & IRD 	Safety and short-term efficacy of single dose of 2mg moxidectin in Loa loa-infected individuals: a double-blind, randomized ivermectin-controlled trial with ascending microfilarial densities COMPLETED
CERMEL, BNITM & IRD 	LoloMox, a clinical phase IIA randomized, ascending dose, placebo-controlled, assessor blind, safety, tolerability and efficacy study of orally administered moxidectin in subjects with microfilaraemic loa loa infection ONGOING
CRFilMT & IRD 	Eminence 1) a Phase IIIb community trial of annual or biannual moxidectin compared to annual ivermectin in Bafia and Monatele, Cameroon, renowned for their high transmission intensity, 2) a Phase II adaptive trial of ascending moxidectin doses on increasing L. loa microfilarial densities, and 3) a social sciences study to assess the acceptability of and adherence to moxidectin IN PLANNING

Wafeu et al., Apr 2024

- Similar safety profile for 2mg moxidectin and 150µg/kg IVM -

Significantly slower L loa MFD decrease in the MOX arm compared to the IVM arm

LoaScope

BNITM: Bernhard-Nocht-Institute for Tropical Medicine, IRD: Institut for la Recherche et le Developpement, CRFilMT: Filariasis and other Tropical Diseases Research Center, CERMEL: Centre Recherches Medicales de Lambarene

MDGH is working with partners to define the best use of moxidectin to support countries' efforts towards the elimination of onchocerciasis and lymphatic filariasis

Clinical partners

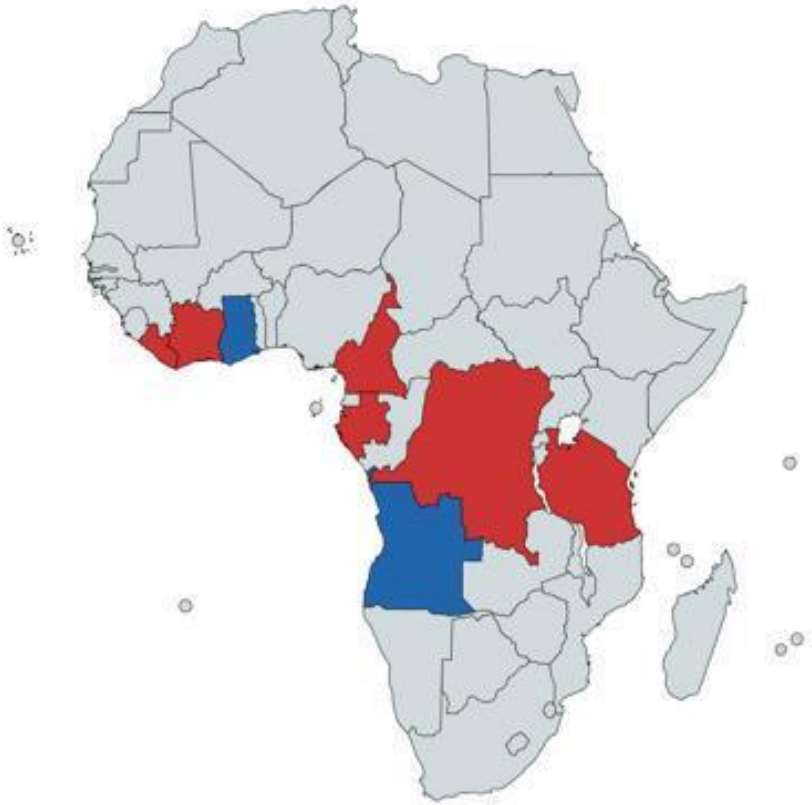
DOLF

Swiss TPH
Swiss Tropical and Public Health Institute

CRFIIMT
Centre for Research on Filariasis & other Tropical Diseases

UNIVERSITÄT BONN

CSRS
Depuis 1951



clinical studies
Implementation

Implementation partners

GHANA HEALTH SERVICE

UNIVERSITY OF HEALTH AND ALLIED SCIENCES
Health for Development

THE ACCESS AND DELIVERY PARTNERSHIP

Bruyère

uOttawa

UNSW Kirby Institute

Modelling

Erasmus MC

Imperial College London

Technical advice

Funding partners

EDCTP

HELMSLEY CHARITABLE TRUST

BILL & MELINDA GATES foundation

THANK YOU

Any

questions?

» https://www.medicinesdevelopment.com/

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African Region

ESPEN EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Annual Meeting of NTD National Programme Managers in the WHO African Region

Session 9.3
Strengthening Last-Mile Supply Chains:

Lessons from Last-Mile Assessments
&
Enhancing Inventory Reporting

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EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Annual Meeting of NTD National Programme Managers in the WHO African Region

Annual Meeting of NTD National Programme Managers in the WHO African Region

“Innovating for acceleration: Pathway to NTD Elimination”

Day 2: Parallel Session Registration

Jour 2 : Inscription aux sessions parallèles

Dia 2: Inscrição para as Sessões Paralelas

World Health Organization African Region

ESPEN Expanded Special Project for Elimination of Neglected Tropical Diseases

Kuwait Fund For Arab Economic Development

THE END FUND

Strengthening Inventory Tracking

Namuchile Kaonga

ESPEN Supply chain management officer

World Health Organization
African Region

EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

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Inventory

Key Objective:
Improve inventory tracking and reduce discrepancies in reported medicine levels.

How It Was Achieved:

- Strengthened follow-up with countries on inventory reporting
- Enhanced data validation during submission processes
- More accurate visibility of medicine stock

Time for Countries to Finalize Inventory:

- **Average:** 3–4 months
- **Longest duration:** Nearly 7 months

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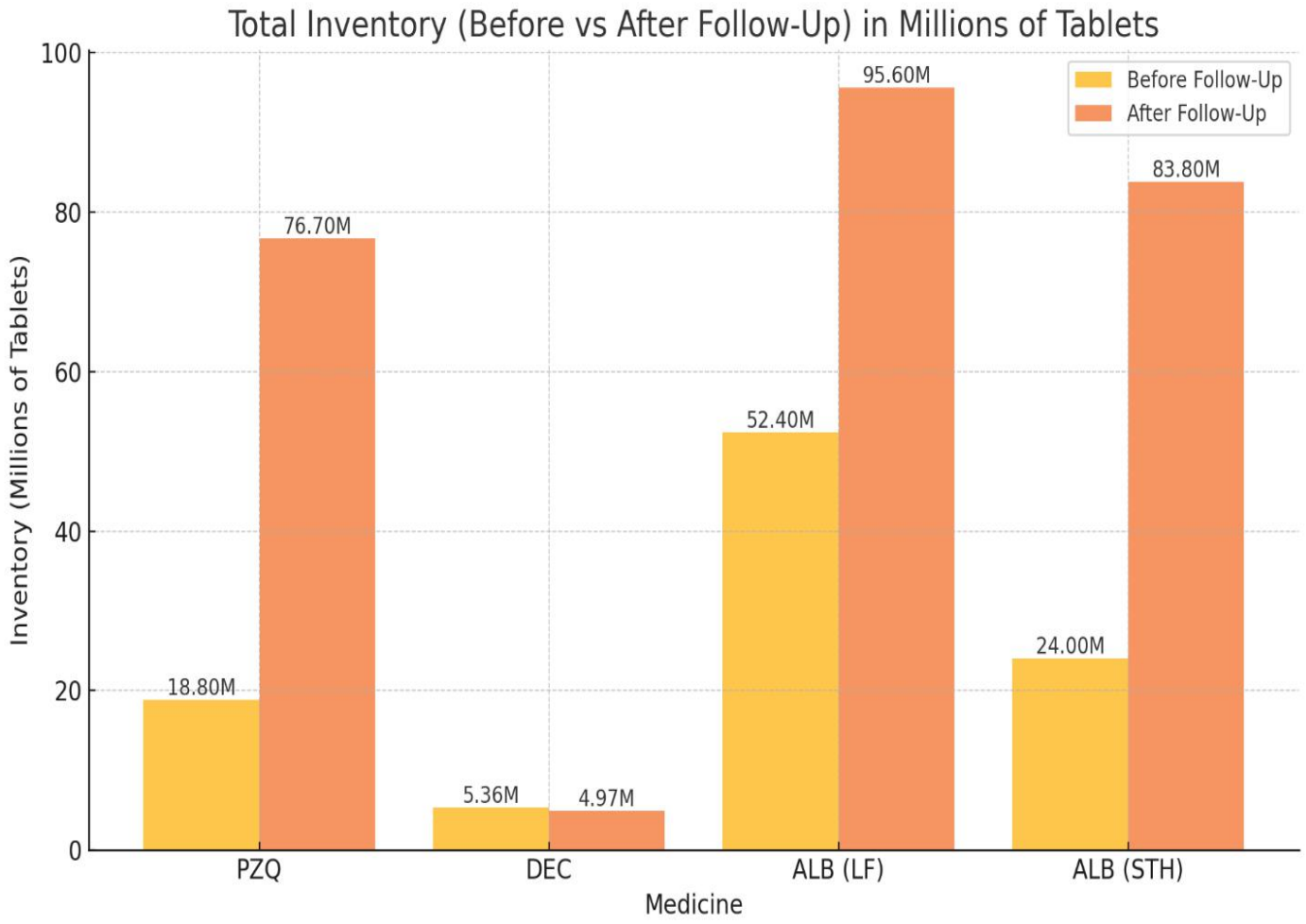
Analysis

Scope:
Analysis based on country-reported inventory in initial 2023 JRFs and 2025 JRSM submissions.*

How many countries?
36 countries reviewed as of 31st Dec 2024

Key Inventory Changes (in tablets):

- **PZQ:** ↑ 57.9 million
- **DEC:** ↓ 0.39 million
- **ALB (LF):** ↑ 43.2 million
- **ALB (STH):** ↑ 59.8 million



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How can we improve accurate inventory data tracking and reporting

WHO/ ESPEN is working in collaboration with countries and partners, including the **Supply Chain Technical Support Mechanism (SCTSM) project**, across eight countries to build on lessons learned and support the development of practical solutions.

- *Up next, the presenters will provide insights on:*
- Supply chain scoping missions conducted
- Approaches used to strengthen inventory tracking at country level
- How inventory gaps were addressed

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THANK YOU

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Overall Presentation of Key lessons and lessons learnt from scoping mission

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The Supply Chain Technical Support Mechanism (SCTSM), in collaboration with WHO and other stakeholders, aims to strengthen NTD supply chains to ensure timely availability and reduced wastage of PC-NTD medicines.

Co-designed by **WHO Geneva, ESPEN (WHO-AFRO), USAID, the Gates Foundation,** and pharmaceutical partners, to help strengthen core supply chains at country and global levels for donated medicines for preventive chemotherapy (PC) targeting onchocerciasis, lymphatic filariasis, schistosomiasis, and soil-transmitted helminthiases.

Strengthen NTD supply chains in 8 African countries by improving quality and timeliness of logistics data and how data is used, strengthening coordination of program and supply chain staff, and increasing SC capacity of NTD programs.

Optimize allocation of donated PC medicines for the 4 targeted NTDs through improved commodity visibility and data confidence for medicine donors and funders and reduced wastage for NTD programs and supply chains.

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First activity was to conduct collaborative country level scoping to understand the context, build local consensus on priority challenges and co-create an NTD supply chain roadmap

Supply Chain Functional Area	Cross Country Challenges
Strategic Planning & Performance Management	The NTD supply chain for PC-medicines are partially or not integrated with other health supply chains Limited coordination among Supply Chain stakeholders on supply chain activities: MOH, WHO, IPS, clearing agents Few countries had supply chain SOPs or NTD PC medicines were not included in national SOPs Lack of NTD Supply Chain KPIs to monitor performance
Logistics Management Information Systems	Data inaccurate, inconsistent, poor data visibility, use of manual forms, outdated data esp for population Unavailability or limited use of NTD logistic management tools Weak reporting mechanisms, very few digital tools in use
Human Resources	Limited capacity for supply chain management in NTD programs Limited knowledge among logistics staff in MOH on unique needs of NTD supplies No designated focal person for supply chain management in NTD programs

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General Challenges from Scoping

Supply Chain Functional Area	Cross Country Challenges
Forecasting and Supply Planning	Limited multi year forecasts, not integrated with national quantification processes Uncertainty/inaccuracy of demand due to population movement and funding insecurity No routine monitoring of supply plans Delayed submission of JAPs, delayed deliveries, deliveries with varying quantities to original request
Procurement and Importation	Policies that favour local manufacturing resulting in disruptions to importation Some countries have high clearing fees that the governments can not afford Delayed clearance of NTD commodities due to bureaucratic processes
Warehousing and storage	Low warehousing capacity especially at sub-national levels Poor storage practices
Inventory Management	Reverse logistics is a major challenge due to the lack of defined processes, funding and proper documentation Lack of funds for inventory operations
Distribution	Fully or partially dependent on partners to distribute the last mile by the government In some countries lack of planning leads to challenges aligning distribution with routine deliveries of essential medicines

Key Priorities Identified by Countries

Strengthen logistics management information systems

- collecting the data needed for tracking inventory and conducting inventory reconciliation, especially post MDA to enable triangulation of treatment data and inventory data. Integration with existing digital systems where possible.

Practice of multi year forecasting with routine review and adjustment

- where possible integrating in national processes on forecasting, updating of supply plans and stock status or commodity security meetings

Define clear Standard Operating Procedures

- clear job aids - person responsible, timelines for activity, step by step instructions on how to complete task.
- clear procedures for reverse logistics - processes, tools and logistics - especially designing specific workflows in eLMIS tools
- Integrating where possible with national supply chain SOPs

Improve Coordination and Planning

- coordination among different implementing partners and government departments is required especially when utilizing nationals systems for distribution and warehousing and for customs clearance

Establish specific KPIs for NTD commodity tracking

- some SC KPIs used on eLMIS dashboards for routine supplies are based on monthly averages of consumption or stockouts, this does not apply for campaigns medicines and KPIs for campaign medicines need to be adapted

Thank you

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Strengthening Last-Mile Supply Chains: Lessons from Last-Mile Assessments & Enhancing Inventory Reporting

Dr Clarer Jones,
Tanzania

World Health Organization
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EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

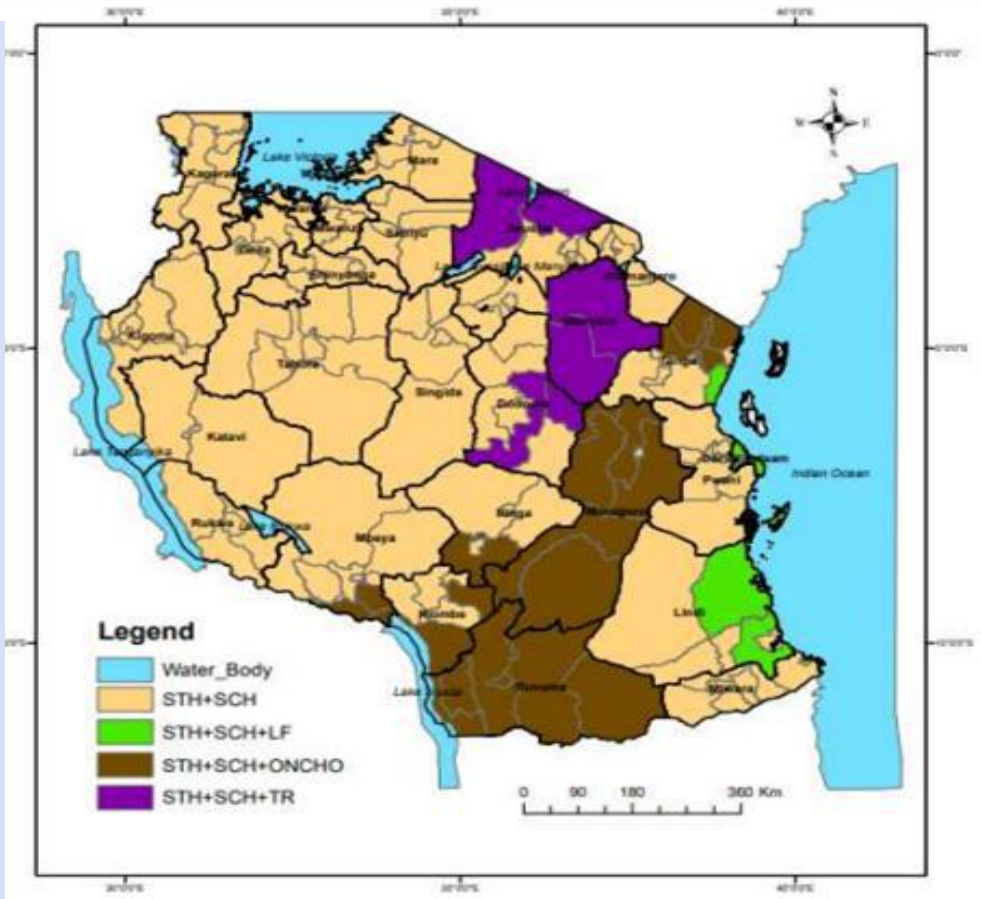
Annual Meeting of NTD National Programme Managers in the WHO African Region

Presentation Outline

1. Country Program Overview
2. Strategic goal
3. Integration of NTD PC commodities into primary health care
4. eLMIS challenges
5. Journey to improving inventory data for capturing NTDs**)**

Tanzania NTD Program Overview

- NTDs are prevalent in Tanzania with all 184 councils have at least 5 PC NTD mapped.
- A large part of the population is at risk of co-infection with two or more of these diseases
- Initially, interventions to control NTDs were implemented as vertical program for each individual disease
- 2009 integrated NTD control program launched targeting the PC NTDS



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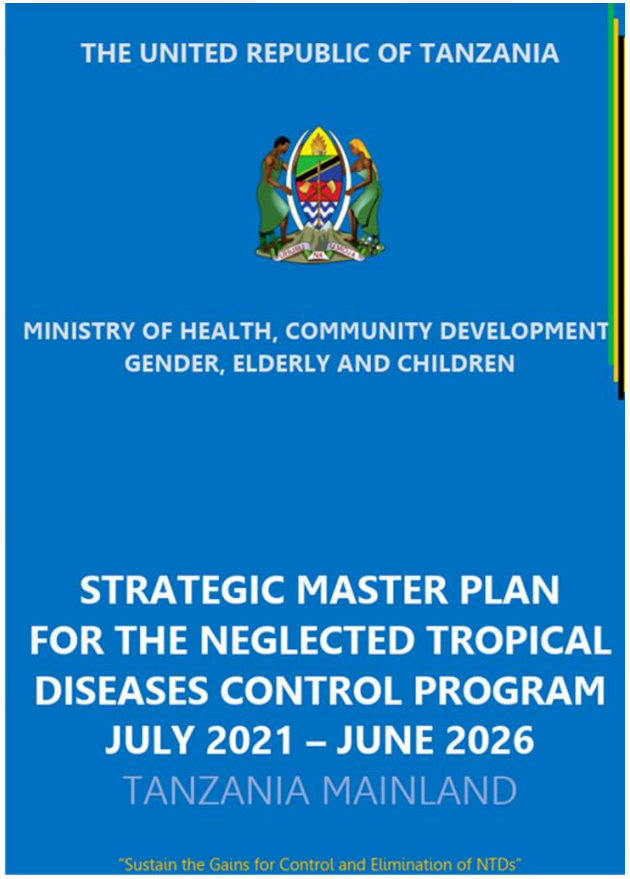
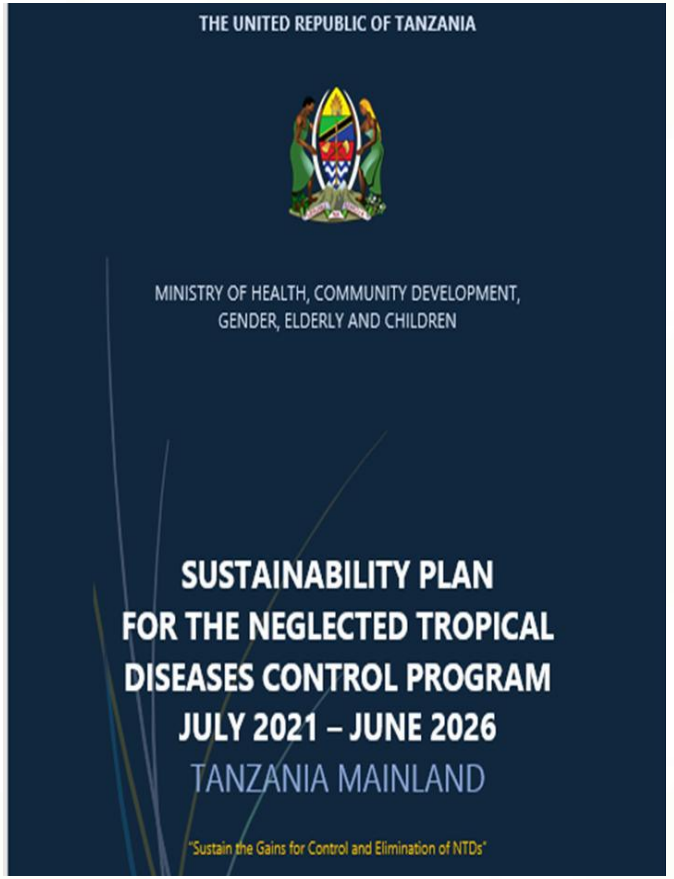
Strategic Goal

To accelerate the reduction of 5 PCTs NTDs burden and sustain the gains of integrated NTD elimination measures in all endemic councils in Tanzania through multi-sectoral approach.





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Mainstreaming NTD Commodities into existing systems

Factors pushed towards integrating NTDs into mainstream systems and processes ..

- *The need for efficiency*
- *Strengthening of health systems*
- *Data integration*
- *Political-economic considerations.*

Mainstreaming NTDs into existing systems

- *Secure dedicated budget lines for NTDs within the National health budget*
- *Integrate NTD Commodities in eLMIS*
- *Integrate NTD indicators into national health information systems (DHIS2)*

Key players and stakeholders

- *Users (Region Administrative & Local Government Autorities)*
- *Ministry of Health (Pharmaceutical services unit, Directorate of Preventive services).*
- *Tanzania Medicines & Medical Devices Authority,*
- *Medical stores department,*
- *Implementing partners*

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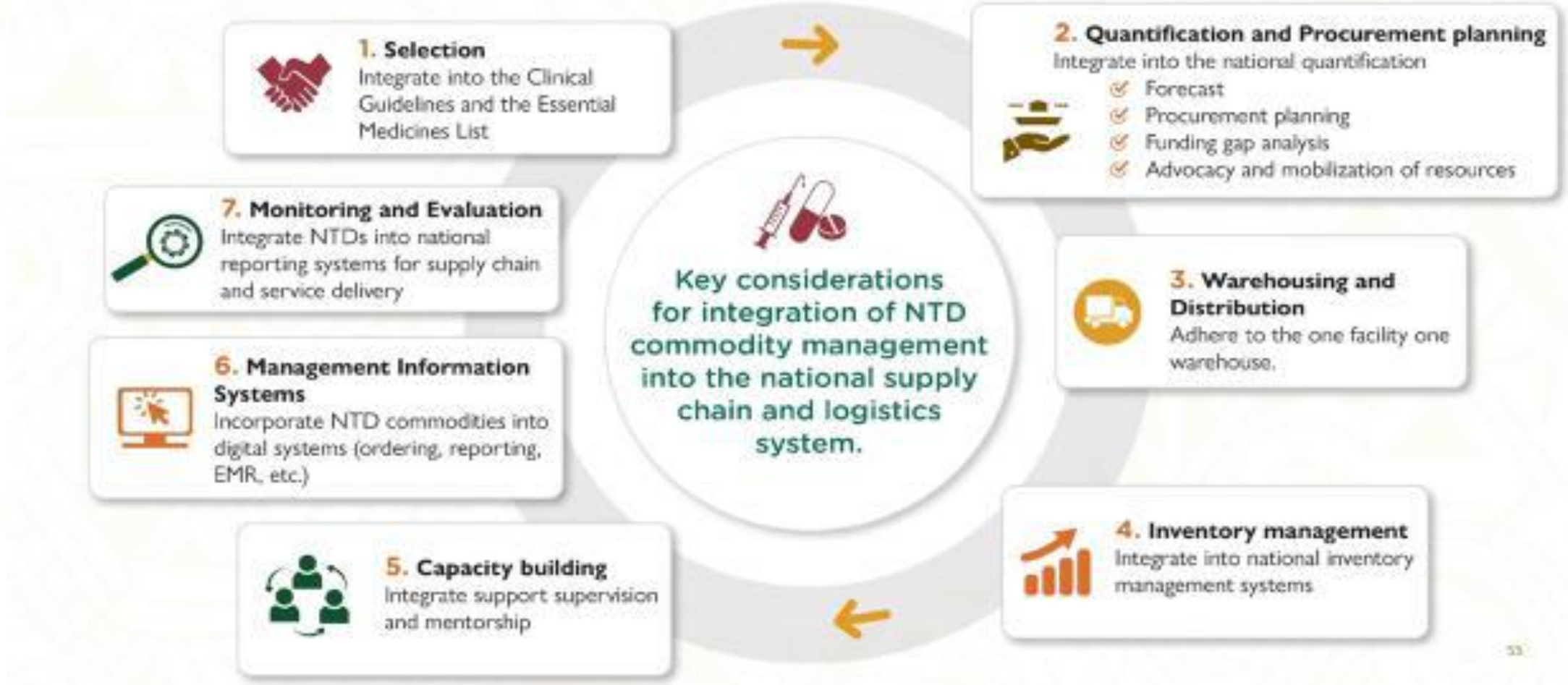
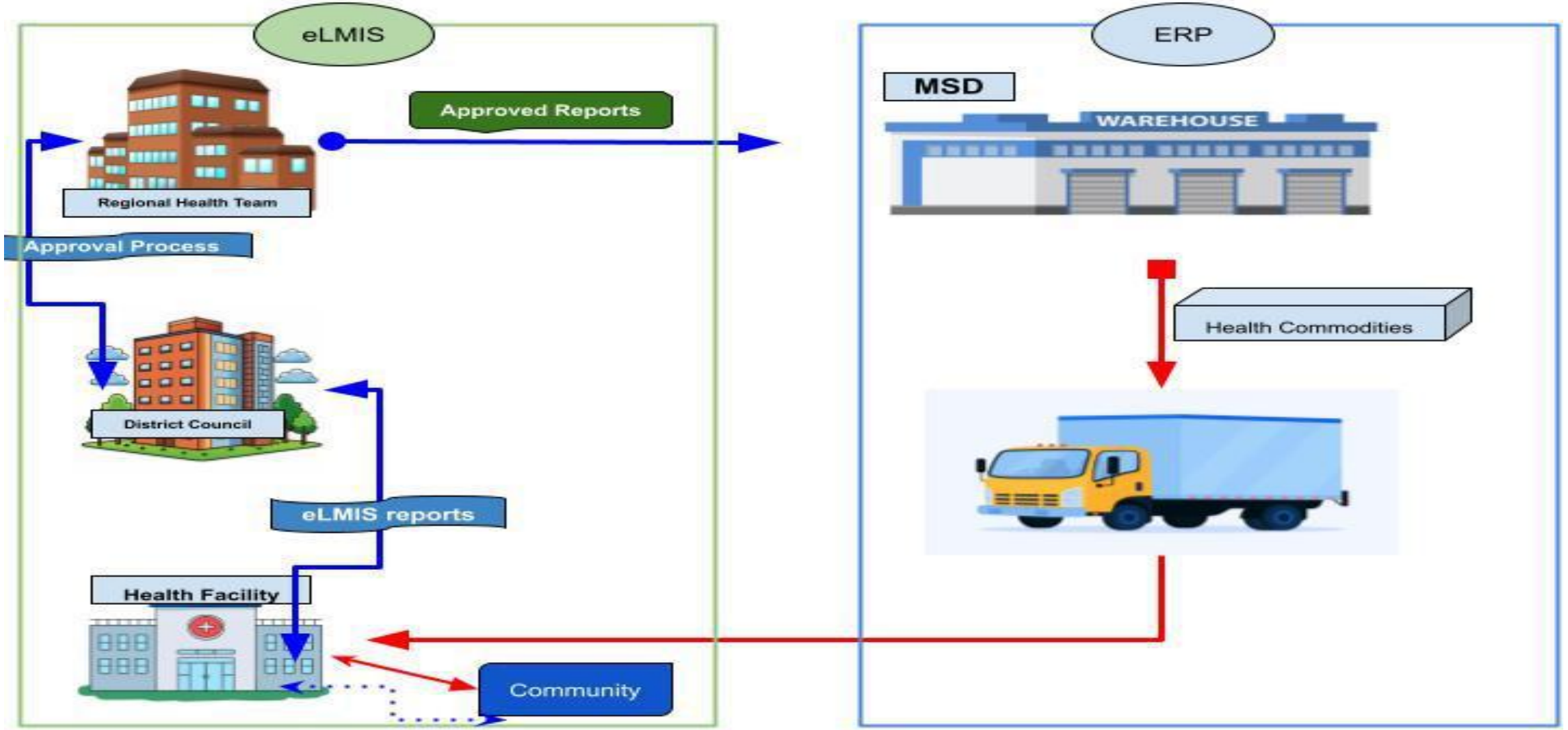
Integration of commodities into Primary Health Care



Integration of NTD commodities into Integrated Logistics System (ILS)

- From **Health Facilities**, eLMIS reports and requests for all essential items are prepared and submitted to MSD via higher levels **every two months** using the ILS
- Facilities report SOH on monthly basis using eLMIS
- **NTD Health Commodities** are among the items ordered through ILS using eLMIS
- Designated facilities order NTD medicines in the ordering cycle prior to the NTD
- NTD medicines are distributed along with other commodities to facilities by MSD

eLMIS - Flow of information



eLMIS challenges and journey to improve inventory data capturing

eLMIS Challenges	Mitigation initiatives
The ordering system is structured to support bimonthly supplies of essential commodities using data sets that are different from those used to order medicines for MDA PC	We have initiated internal processes to implement the necessary changes. The proposed adjustments will enable easier ordering of NTD commodities by integrating ordering formulas directly into the system. Also, an SOP has developed to guide users
NTD commodities are accessible by all facilities, including those with low or no endemicity, which poses a risk of distributing supplies to areas without actual demand."	Enhancing monitoring mechanisms. Developing NTD Health Commodities SOP. (Roles of council and regional teams in reviewing orders, with an emphasis on closely following up on the quantities requested by facilities
There is limited visibility of stock on hand following MDAs, as facilities often do not report commodities that are not part of regular orders. This gap in reporting reduces monthly stock visibility and impacts future planning	Initiatives are underway to collect monthly stock-on-hand data from these facilities. Additionally, efforts are ongoing to capture post-MDA data through eLMIS and other existing electronic systems such as DHIS2

Where do we want to be in the next 1, 3 years?

- NTD commodities to be forecasted using bottom-up quantification (eLMIS), whose data will be used for JAP and TEMF
- Build capacity plans (short and long terms) on forecasting
- Improved data visibility and easily accessing reports from the e-LMIS

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Ethiopia experience on Reviewing treatment data with inventory using adapted excel tool

Tesfahun Bishaw

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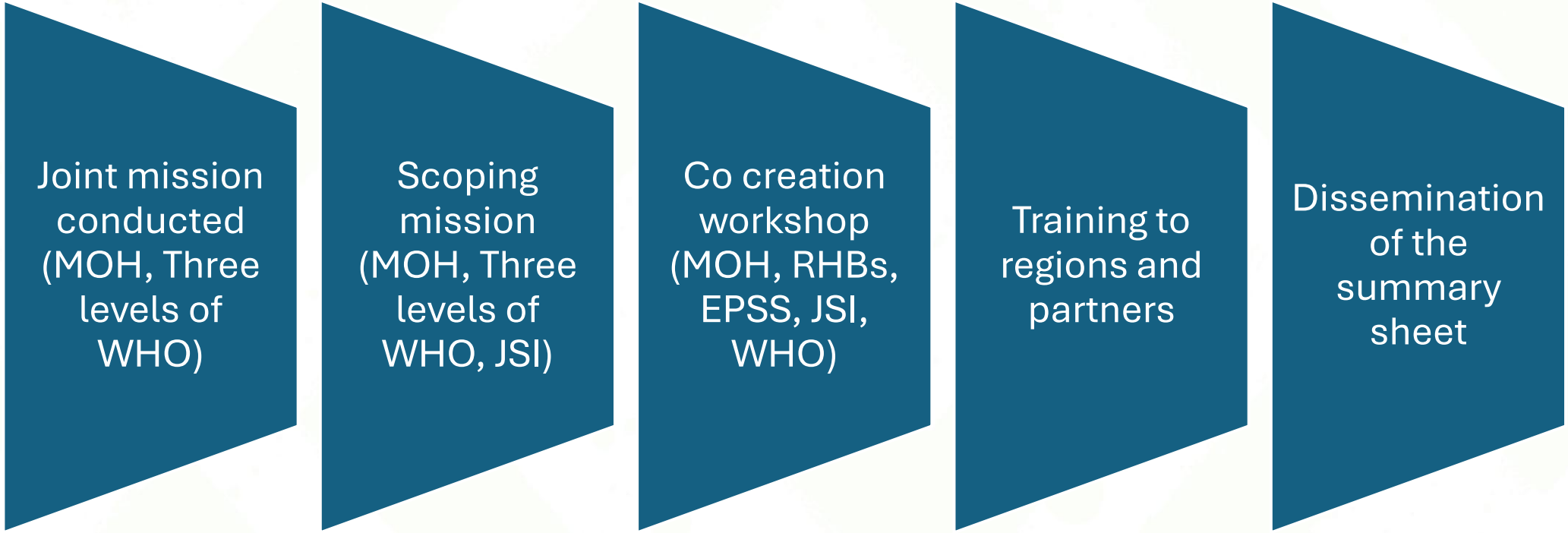
How was the summary sheet/excel adapted?



Previous versus current reporting templates

Target Population							Treatment Result							Treatment Coverage				Drug Distribution Management							MDA Participants Data																			
5-14 years (SAC)			15-19 years (Adolescents)			WRA (20-49) years	5-14 years			15-19 years			WRA(20-49)	5-14 yrs (%)	15-19 yrs (%)	20-49 years(%)	Comulative 5-49yrs (%)	Mebendazole (5-14 yrs, 15-19yrs & WRA (20-49))						#No. of People participated on Woreda Training	# No. of People participated on regional ToT	No. of Kebeles reached in that district	# No. of Supervisors participated		# No. of HEWs participated			# No. of Teachers & Volunterss participated			All Participants													
M	F	T	M	F	T	WRA	M	F	T	M	F	T	Treated					Issued	Used	Wasted	Lost	Remaining	Expiring Date					F	T	M	F	T	M	F	T										

Remaining Stock from Previous Years		Received Qty		Total Stock for the current MDA		Nearest Expiry Date		No of Treated People for PZQ	No of Treated People for MEB	Current MDA month	Distributed Qty		Qty transferred to another regions		Expired/Lost Qty		Theorectical Balance		Actual Balance		GAPs	
PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB				PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB

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Adapted excel tool…

- Pilot testing of the tool (Sidam and former SNNP)
- Official communication to all regions
- Since sept 2023, all regions started to report treatment and drugs data using summary sheet
- The report should be reviewed by IPs, WHO and MoH

Feedback to regions

Zone	Woredas	Remaining Stock from Previous Years		Received Qty		Total Stock for the current MDA		Nearest Expiry Date		No of Treated People for PZQ	No of Treated People for MEB		Current MDA month	Distributed Qty		Qty transferred to used treatment for adolescent		Expired/Lost Qty		Theoretical Balance		Actual Balance		GAPs		Comment	Meb used for Adolescent
		PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB					PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB		Used MEB for adole	Gap
Afdher	Bare	0	0	84771.00	63096.00	84,771	63,096	2024	2025	37367	37367		May-2024	84,771	63,096	0	15,848	34	81	84771	44404	84771.00	47,248	0	2844		15,848	0
	Dobbay	0	0	90897.00	67656.00	90,897	67,656	2024	2025	40756	40756		May-2025	90,897	67,656	0	20,351	68	117	90897	43284	90897.00	47,305	0	4021		19,450	901
	Hkan	0	30,067	59204	10423	59,204	40,490	2024	2025	28490	28490		May-2025	59,204	0	0	0	56	0	59204	32803	59204	32,803	0	0		11,839	-11,839
	Hargele	0	5459	82120	34230	82,120	34,230	2024	2025	39604	40733.11264		May-2025	82,120	34,230	0	0	30	85	82120	39604	82120	34,145	0	-5459		16,647	-16,647
	West-enay	0	0	46123.257	0	46,123	0	2024		24423	0		May-2025	46,123	0	0	0	41	0	46,123	0	46123	0	0	0		0	
	Cheen	0	0	0	73789	0	73,789	2024		0	45991		May-2024	0	73,789	0	25,000	0	145	0	47208	0	48,644	0	1436		19,450	5,550

For example Bare woreda of Afdher zone

Woreda	Total Stock for the current MDA		Distributed quantity		Quantity transferred		Expired/lost		Theoretical balance		Actual balance		Gaps	
	PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB	PZQ	MEB	0	2844
Bare	84,771	63,096	84,771	63,096	0	15,848	34	81	84,771	63,096	84,771	47,248		

1. Theoretical balance=[Total stock for the current MDA-(quantity distributed + quantity transferred+ expired/lost)]
   PZQ = [84,771-(84,771+0+34)]= **-34tabs**
   MEB = [63096- (63,096+15,848+81)= **-15,929 tabs**
2. Actual balance is the number of tablets left after MDA campaign and the stock on hand for the next MDA (PZQ 84,771, MEB 47248 which is **wrong**)
3. Gaps= Theoretical balance-actual balance
   In addition is it possible to use the mebendazole for adolescents treatment?

   I hope this will clarifies your doubt.

Summary sheet 2024

Population treated				Quantity Received				Quantity Issued				Quantity Used				Quantity wasted			
SCH	STH (SAC)	Onch	LF	PZQ	MEB	IVM	ALB	PZQ	MEB	IVM	ALB	PZQ	MEB	IVM	ALB	PZQ	MEB	IVM	ALB
17,708	62,798			37,187	99,589			37,187	99,589			37,153	62,495			28	166		
2,326,700	4,179,310			8,659,110	6,822,556			8,659,110	6,619,345			8,659,110	6,006,000			7,735	10,609		
152,016	19,023			397,845	51,773			397,845	51,773			316,403	30,564			1,253	227		
11,309	203,860		89,539	45,000	241,400		92,012	45,000	241,400		89,539	43,905	232,121		89,539	18	55		5
52,090				193,000				193,000				83,887				275			
21,270	41,464			46,369	105,869			46,077	105,869			43,202	92,166			-	-		
	72,108																		
4,228,804	8,499,423	15,076,889		10,309,802	9,306,124	37,973,894		10,309,802	9,306,124	36,608,157		9,979,772	8,304,037	36,608,157		7,679	84,442	9,219	
33,775	1,605,552			70,927	1,766,107			70,927	1,766,107			70,927	1,766,107						
798,163	1,443,571			1,433,709	1,839,116			1,433,709	1,839,116			1,192,663	1,443,571			13,637	847		
135,160	1,571,336	898,987	159,447	362,600	1,649,947	2,249,210	160,000	362,600	1,649,947	2,188,045	159,447	330,440	1,571,336	2,188,045	159,447	217	1,594		
45,080	877,994	2,032,314	125,917	112,757	1,175,664	5,790,235	120,791	112,757	1,175,664	5,676,489	117,358	106,366	1,106,384	5,676,489	117,358	6,391	217	1,045	
659,106	265,871			1,607,885	385,714			1,607,885	385,714			1,174,154	235,915			5,173	584		
8,481,181.46	18,842,310.26	18,008,189.90	374,903.00	23,276,190.85	23,443,859.20	46,013,338.76	372,803.00	23,275,898.85	23,240,648.20	44,472,691.50	366,344.00	22,037,979.51	20,850,695.54	44,472,691.50	366,344.00	42,405.28	98,740.98	10,264.00	5.00

Quantity Lost				Quantity remain (LOM)				Expiry date				Used updated LOM report templet	
PZQ	MEB	IVM	ALB	PZQ	MEB	IVM	ALB	PZQ	MEB	IVM	ALB		
6	-			-	36,928							No	
-	79			298,595	807,609			24-Apr-25	NR	NR		Yes	NR: Not reported
				81,024	11,209			24-Apr-25	24-Apr-25			No	
-	-			1,078	9,263		4,807		NR	NR		No	
77				99,970	-				Dec-24			No	
-	-			3,167	13,703			Jun-25	Jan-27			Yes	
												No leftover medicne report included	
428	6,780			341,799	987,566	1,363,087		Sep 24, Jun 25	NR			No	
												No leftover medicne report included	
8,963	1,119			218,447	389,321			Jun-25	Oct-27			No	
22	608			31,921	76,803		553	Jun-25	Oct-27			Yes	
14	19			-	65,746	122,220	3,433	24-Apr-25	Sep-24			Yes	
595	29			166,732	87,155			24-Apr-25	Feb-25			No	
10,105.00	8,634.00	-	-	1,242,731.52	2,485,303.00	1,485,307.43	8,793.00						

Theoretical balance				Gap			
PZQ	MEB	IVM	ALB	PZQ	MEB	IVM	ALB
-	-	-	-				
(0)	36,928	-	-	(0)	-	-	-
(7,735)	805,868	-	-	(306,330)	(1,741)	-	-
80,190	20,982	-	-	(834)	9,773	-	-
1,078	9,224	-	2,468	-	(39)	-	(2,339)
108,762	-	-	-	8,792	-	-	-
3,167	13,703	-	-	-	-	-	-
-	-	-	-	-	-	-	-
321,924	910,866	1,356,517	-	(19,875)	(76,700)	(6,570)	-
-	-	-	-	-	-	-	-
218,447	393,579	-	-	-	4,258	-	-
31,921	76,409	61,165	553	-	(394)	61,165	-
(14)	69,044	112,701	3,433	(14)	3,298	(9,519)	-
427,964	149,186	-	-	261,232	62,031	-	-
				(1,242,732)	(2,485,303)	(1,485,307)	(8,793)

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Data review and 2026 quantification conducted.

NTD Data review and quantification

- **Participants**: EPSS, RHBs, IPs, and stakeholders
- **Data Presented**: National NTD reporting rates, completeness, and accuracy through triangul
- **Tools Used**: WHO-adapted inventory summary Excel tool
- **Triangulated Data**: MDA reports vs. drug distribution & leftover stock

Key Objectives

- Verify data accuracy
- Ensure accountability
- Assess program efficiency
- Improve forecasting & reduce wastage
- Forecast 2026 medicines using JAP

Key Discussions

- Unaccounted distributed drugs
- Forecasting & next drug distribution
- Data gaps: duplicate/misspelled districts
- Incomplete & inconsistent reports
- Tracking issues: unclear drug distribution records
- Delayed reporting & manual data entry errors
- Gaps in knowledge, skills, and commitment

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The outcome of data review and quantification

JRF 2024 was prepared, reviewed and submitted to WHO

Accuracy, timeliness and completeness of treatment and inventory repot importance was emphasized

Participants were equipped with data review process to review and validate reports received from lower levels

It was a good lesson for RHBs to do the same when they are receiving reports from the lower level

JRSM 2026 is ready for submission

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Required Action and Next Step

Data Validation	• Conduct routine cross-checks between reported numbers and physical stock.
Capacity Building	• Train personnel on accurate treatment and inventory data entry and validation.
Standard Reporting Tool (Integrated NTD Database, mBirana)	• Use digital tracking system for drug management and decision making
Regular Audits	• Conduct periodic field audits to verify reported figures.
Refine Forecasting (JRSM)	• Adjust drug request and distribution based on triangulated data.

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Progrès dans la gestion des medicaments : Logistique inverse

Une stratégie gagnante pour Madagascar

Presentée par Dr Patricia MARTIN

Chargée du programme MTN OMS Madagascar

Entrepôt de l'OMS M/car

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1. Contexte

MADAGASCAR :

- ✓ Île avec une superficie de **587,041 km²**
- ✓ Population: **30 626 890 million**
- ✓ Mortalité maternelle 335/100 000 naissances vivantes
- ✓ Taux de mortalité néonatale 24/1000 naissances vivantes
- ✓ Accessibilité géographique aux services de santé 58% (<5km)
- ✓ 114 DS /23 regions

- Les MTN restent un enjeu majeur de santé publique à Madagascar
- **Co-endémicité** : FL & SCH/STH & Teaniose/NCC
- Grace à **l'integration de AMM FL avec AVS Polio** :
  - →100% de couverture géographique (83 DS nécessitant la CPP)
  - → atteinte des objectifs en taux de couverture thérapeutique (>65%)
- AMM Bilharziose-Géohélminthiase : 107 DS
- Médicaments utilisés :
  - FL (IDA&DA) : Albendazole, Ivermectine, Diethylcarbamazine
  - SCH : Praziquantel
  - STH : Mébendazole
- Existence de reliquats de médicaments non-utilisés pendant les campagnes d'AMM ➔ **pertes importantes de médicaments** liées à un problème de gestion

2. Principe de la logistique inverse

- **Objectif** : réduire les pertes et le gaspillage de medicaments et réutiliser les stocks existants pour combler les gaps dans 15 districts cibles d' AMM en mai 2024.

Qu'est-ce que la logistique inverse ?

• Processus de retour des médicaments non utilisés depuis les centres de santé vers le niveau central.

• Coordination entre le ministère de la santé, l'OMS, les sous-bureaux et les districts.
• Vise à renforcer l'efficacité logistique et éviter les expirations.

3. Mise en oeuvre de la logistique inverse (avril 2024)

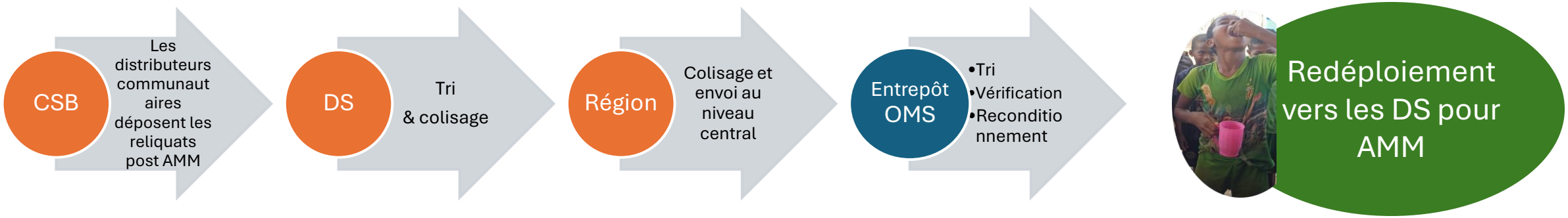
- **Circuit de la logistique inverse :**

Obligation de retour des reliquats au niveau des districts sanitaires au plus tard 15 jours après la fin de la campagne (note ministérielle du 26 août 2024 par Le Secrétariat Général)

Outils de collecte des données:

- Avant campagne : Kobocollect
- Pendant campagne : masque de saisie
- Après campagne : Fiche de suivi des intrants

→ Suivi par des appels téléphoniques



Logistique inverse en avril 2024

Médicaments	Qté reçue (boîtes)	Qté périmée	Qté utilisable	Observations
Diéthylcarbamazine	4 912	492	4 420	Périmés détruits par DPLMT
Albendazole	2 443	2 443	0	Tous périmés
Ivermectine	2 975	31	2 944	Quelques pertes

📈 Impact sur la campagne, mai 2024

- ✓ 6 DS ont pu maintenir l' AMM grâce à la logistique inverse.
- ✓ Besoin : 3,66M comprimés DEC / Stocks récupérés : 4,42M.
- ✓ 1 134 019 personnes traitées

📊 4- Résultats des inventaires de stock de la logistique inverse

- DEC : 4 912 boîtes
- ALB: 2 443 boîtes
- IVM : 2 975 boîtes

➔ Recuperation de **4 127 902 doses** de medicaments réutilisables

5- Estimation du coût des médicaments récupérés :

analyse coût-bénéfice

Hypothèse :

Coût unitaire estimé par boîte :

DEC : 16,50 USD/boîte

Ivermectine : 115,5 USD/boîte

Médicament	Présentation	Prix par boîte (USD)	Qtté récupérée	Qtté utilisable (Bte)	**Valeur totale (USD)**	**Valeur médicament utilisables (USD)**
Ivermectine	Bte de 200	115,5	2975	2944	343612,5	340032
DEC	Bte de 1000	16,5	4912	4420	81048	72930
Albendazole	Bte de 1000	4,4	2443	0	10749,2	0
			TOTAL		**$ 435409,7**	**$ 412 962**

« Avec seulement 4 000 USD de coûts logistiques, l'opération a permis de récupérer l'équivalent de **412 962 USD de médicaments utilisables**, soit un retour sur investissement plus de **400 fois**. »

6. Problèmes rencontrés

1-Fiabilité des informations sur les reliquats declarés par les DS

2-Temps de collecte des informations au niveau périphérque trop long

3-Ecart entre les stocks théoriques et les stock physiques declarés par le niveau périphérique

4-Transports des reliquats de medicaments des formations sanitaires enclavées vers les DS

5-Transports des reliquats de medicament des DS vers le niveau central

6-Gestion des boîtes de médicaments entamées

7-Reconditionnement des reliquats de medicaments

Situation des reliquats au niveau périphérique après AMM 2024 au 07 avril 2025	PZQ	BILTRICIDE	IVM	DEC	ALB
Stock théorique déclaré par le niveau périphérique	1 073 668	17 708	1 630 260	3 723 196	1 402 301
Stock physique déclaré par le niveau périphérique	885 834	16 198	1 514 214	2 918 403	1 146 923
Ecart entre stock théorique et stock physique	17%	9%	7%	22%	18%
Médicaments retournés au niveau central au 31/03/2025	735 721		668 946	684 270	264 733
Reliquat restant au niveau des districts	150 113	16 198	845 268	2 234 133	882 190
Ecart de logistique inverse au niveau central	83%	0%	44%	23%	23%

7. Progrès réalisés 2025

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🚀 8.Conclusion & Perspectives / Initiatives visant à améliorer l'exactitude des inventaires, et à réduire les lacunes dans les données

- Opérationnaliser le système d'information de gestion logistique (SIGL) : DHIS2 programme et OpenLMIS
- Mettre en place des outils de gestion permettant de soutenir le SIGL et d'assurer la traçabilité de la logistique inverse du dernier kilomètre jusqu'au niveau central
- Procéder à l'évaluation périodique de la qualité des données
- Diffuser et suivre l'application de la note du MoH sur la logistique inverse

➡

- ✓ La logistique inverse est une stratégie efficace et économiquement avantageuse
- ✓ Recommandation : l'intégrer systématiquement après chaque AMM
- ✓ Renforcement nécessaire de la chaîne logistique et des outils de suivi des médicaments.
- ✓ Valeur des médicaments récupérés largement supérieure.
- ✓ Réduction des pertes → économie pour le programme

THANK YOU

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Accountability in Action: Kenya's Inventory Reconciliation Experience for NTD's Commodities

Wyckliff Omondi

Assistant Director of Medical Parasitology & Head, Vector Borne & Neglected Tropical Diseases-MoH

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Assessing Capacity for Optimized NTD Commodity Management

Functional Area	Score	Status
Strategic Planning & Performance Management	46%	Partially Organized
Management Information Systems	47%	Partially Organized
Human Resources	33%	Partially Organized
Forecasting and Supply Planning	36%	Partially Organized
Storage and Warehousing	54%	Organized
Inventory Management	47%	Partially Organized
Distribution	42%	Partially Organized

Most supply chain pillars are functional but under-optimized—requiring targeted investment, digitization, and better integration with national systems

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Lessons from Inventory Management – Part I

Challenges Hindering Efficient Inventory Management

1. **Financial Constraints**

   Short timelines during MDA limit ability to conduct reverse logistics or consolidate unused stocks.

2. **Fragmented Storage**

   Medicines stored across multiple locations at national level make it difficult to track and manage inventory.

3. **Gaps in Documentation**

   Prior to rollout of MOH 660 and 759 tools, NTD commodities were not routinely tracked at facility level.

   Current tools present an opportunity to strengthen monthly inventory visibility.

4. **Inadequate Storage Conditions**

   Some commodities stored in PHO offices and non-standard facilities, risking product quality and accountability.

Lessons from Inventory Management – Part I

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Lessons from Inventory Management – Part II

Operational and Packaging Issues

4. **Limited Pharmacist Engagement**

   Pharmacists were not consistently involved in MDA logistics, especially at sub-county/facility level.

5. **Large Pack Sizes**

   Difficult to manage and share among CDDs, leading to handling issues and wastage (e.g., splitting tins into nylon bags).

6. **Restrictions on Leftover Medicines**

   Current policies on opened tins hinder timely use or redistribution, contributing to wastage.

7. **Poor Inventory Practices**

   Lack of bin cards, no stock counts, and expired medicines often not recorded or removed

Sub county Pharmacist conducting physical count of PC medicines at the sub county stores

Next Steps for Strengthening Supply Chain

Empower Pharmacists	• Involve them throughout the MDA lifecycle for improved accountability and supervision.
Capacity Building	• Train pharmacists and NTD coordinators at all levels on SC practices for both PC and case management medicines.
Digitize Logistics Tools	• Strengthen tablet accountability and treatment forms through digital platforms. • Ensure integration with KHIS, eLMIS, and eCHIS for real-time data visibility.
Optimize Medicine Use Post-MDA	• Develop clear guidance on handling opened tins, factoring expiry, timing of next MDA, and cascade completion.
Improve Packaging	• Engage with manufacturers for packaging innovations tailored to field realities.
Enhance Supervision	• Use a standardized SC checklist during and post-MDA for consistent follow-up.

Future Considerations & Innovations

Conducting physical count of dosing poles and household registers stored at a sub county public health offices

Contextualize SC Indicators for NTDs

- Integrate with existing tools (MOH 660, 759, IDB) to monitor stock, consumption, and wastage across the cascade.

Simplify Inventory Management

- Embed forward/reverse logistics functions into an integrated NTD dashboard.
- Leverage existing tools like the PZQ tool and IDB tablet accountability module (piloted in Dec 2024 MDA).

Leverage Allocation Tools

- Explore adapting inSupply Health's prioritization tool for MDA logistics planning—including drug, tool, and IEC material distribution at county/sub-county/ward levels.

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Joint Application Package Tools Survey

Enquête de rétroaction sur les outils du dossier de demande conjointe

Pesquisa de Feedback sobre as Ferramentas do Pacote de Solicitação Conjunta

NTD Supply Chain Forum

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Annual Meeting of NTD National Programme Managers in the WHO African Region

“Innovating for acceleration: Pathway to NTD Elimination”

Day 2: Parallel Session Registration

Jour 2 : Inscription aux sessions parallèles

Dia 2: Inscrição para as Sessões Paralelas

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Kuwait Fund For Arab Economic Development

THE END FUND ENDING NEGLECTED DISEASES

Supply Chain Technical Support Mechanism for Neglected Tropical Disease Programs -

Year 1 Progress and Year 2 Priorities

Sarah Andersson, Vicent Mungilizu

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Join at menti.com | use code 8932 9733

Mentimeter

Welcome to the SCTSM survey.

This survey is about the Supply Chain Technical Support Mechanism for NTD Programs Project. SCTSM for short.

The purpose of this survey is to gather your feedback so we can improve the project.

Thank you for taking the time to complete it.

Showing examples

65

Menti Survey Results

What is the *Nimble* Supply Chain Technical Support Mechanism?

Co-designed by WHO Geneva, ESPEN (WHO-AFRO), USAID, the Bill & Melinda Gates Foundation, and pharmaceutical partners, to help strengthen core supply chain functions at country and global levels for **donated medicines** for **preventive chemotherapy** (PC) targeting onchocerciasis, lymphatic filariasis, schistosomiasis, and soil-transmitted helminthiases.

JSI

inSupplyHealth
CO-CREATING INNOVATIONS FOR HEALTH

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Why the *Nimble* Supply Chain Technical Support Mechanism?

Country Level Challenges	Global Level Challenges
• Delayed and incomplete submissions of medicine requests (through the Joint Application Package) • Weak systems and processes for NTD stock management and reverse logistics • NTD program not included in the national logistics management information systems (eLMIS) • Not receiving medicines on time or in the quantities requested • Delayed customs clearances	• Inaccurate short-term forecasts and lack of long-term forecasts • Lack of end-to-end visibility of inventories • Lack of information on funding availability for mass drug administration (MDA) to ensure that donated medicines are distributed to targeted populations • Unrealistic timelines from order date to country-level MDA implementation date

Resulting in delays, wastage, expiries and inefficiencies in medicine donation program, putting the program at risk

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To address these challenges the project has country and regional/global objectives

Strengthen NTD supply chains in 8 African countries by improving quality and timeliness of logistics data and how data is used, strengthening coordination of program and supply chain staff, and increasing SC capacity of NTD programs.

Optimize allocation of donated PC medicines for the 4 targeted NTDs through improved commodity visibility and data confidence for medicine donors and funders and reduced wastage for NTD programs and supply chains.

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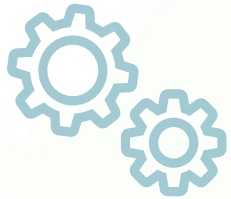
To achieve these objectives the project takes the following approach

- Strengthen **end-to-end** supply chains to achieve results that benefit the global (first mile) and country (last mile) levels.
- Build the capacity of **people** in the system, improve supply chain **processes,** and enhance visibility, quality and use of country-level logistics **data**.
- Work in an **integrated** and collaborative way with national NTD programs and other key stakeholders to **prevent duplication** of existing efforts and avoid causing confusion at the country level.
- Support **cross-country** and **global learning exchanges** to share challenges and solutions from the 8 focus countries.



Types of activities for the project include:

- **Collaborative country level scoping** to understand the context and build local consensus on priority challenges and co-design of an agreed NTD supply chain roadmap.
- **Standardization & improved quality of NTD logistics data** by strengthening the logistics management information system for NTD medicines to ensure timely and accurate reporting.
- **Implementation of NTD logistics data review meetings** to strengthen the use of data through a continuous improvement process to support adaptive supply chain management.
- **Development of a long-term medicine forecasting methodology** and capacity building in short- and long-term forecasting for PC NTD medicines.
- **Integration of NTD medicines into the national health supply chain**, where feasible, and strengthened relationships between NTD program and MOH supply chain staff.

Project Structure and Governance

Steering Committee (weekly)

WHO / Geneva, WHO / ESPEN, Johnson & Johnson, Esai, Merck group, Glaxosmithkline (GSK), Bill & Melinda Gates Foundation, USAID, Global Health Taskforce, StandardCo

Role - oversight, coordination

Advisory Group (quarterly)

Steering Committee, 8 Country NTD Programs, Kikundi Community of Practice, International Trachoma Initiative, Mectizan Donation Program, WHO Disease Leads, END Fund, Implementing Partners, Global Health Taskforce (SC Forum)

Role - advice, alignment with other initiatives

Project Staff

JSI - US Based

Project Director
Senior Advisor, Global Forecasting
Senior Advisor, Country Programs
Program Officer

InSupply Health - Ke and Tz based

Team Lead
Senior Advisor
2 Regional Advisors
Capacity Building Advisor
M&E Advisor

8 Country Supply Chain Advisors - 8 countries

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Relationship to Global Coordination and Stewardship Committee (GCSC)

Global Coordination and Stewardship Committee (GCSC)

Strategic Oversight: GCSC sits at the top as the strategic body responsible for oversight and coordination across all donation-related activities. Its focus is high-level strategic alignment with the WHO roadmap and ensuring that stakeholder actions contribute to measurable impact on NTD elimination.

Supply Chain Technical Support Mechanism (SCTSM)

Operational Support: SCTSM functions as the key technical support arm, implementing the supply chain strategy on the ground. It bridges the gap between policy set by GCSC and the operational realities faced by countries. It supports operational planning, forecasting, and supply chain optimisation for NTD medicines.

NTD –Supply Chain Forum (SCF)

Supply Chain Technical Advice: The NTD-SCF operates as the technical forum handling supply chain issues, such as coordinating stakeholders, resolving shipment delays, and ensuring efficient medicine distribution. It acts as a technical body feeding insights into SCTSM and GCSC.

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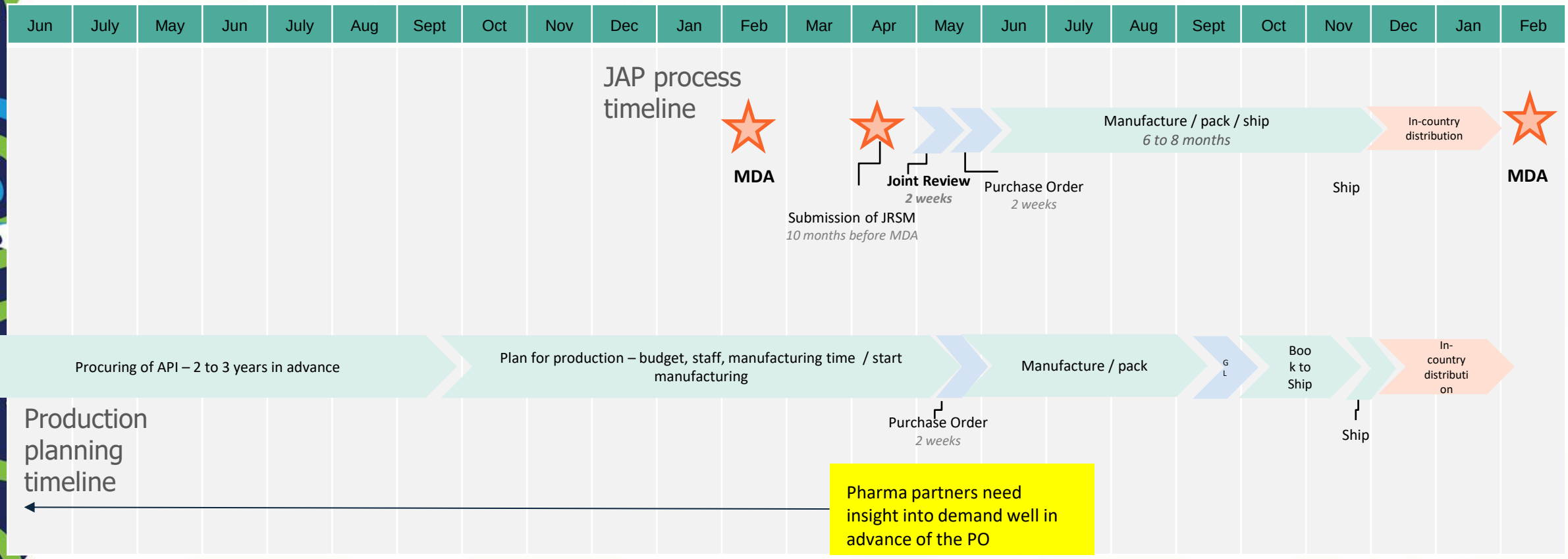
SCTSM Year One focused on understanding the context, establishing trust and buy-in of the project by national NTD programs and partners

Country Support	• Conducted **Scoping activities** across 8 countries to understand context and local priorities and developing implementation plans with MOH and partners • **Built relationships and trust** in project countries with NTD programs and implementing partners, including coordinating on activities with partners • Hired dedicated **project staff in each country**, supply chain generalists, local hires • **Supported ongoing activities** such as revising SOPs, integration and digitization of data - the project has been pulled in as another resource • **Supported MDAs** in second half of 2024 with inventory tracking and supervising MDA activities • Developed tool and supported **3-year (2025-2027) country forecasts** for SCTSM countries
Cross Country Support	• In collaboration with ESPEN, conducted **routine monthly calls** with country programs since September 2024, to problem solve on barriers to orders and shipments • Developed **supply outlooks** to provide visibility into future inventory and potential disruptions
Regional & Global Support	• **Weekly calls** with supply chain partners, WHO Geneva, ESPEN (WHO-AFRO), USAID, the Bill & Melinda Gates Foundation, and pharmaceutical partners • Participation in working groups and Supply Chain Forum

Learning: Misalignment of supply (production planning) and demand (request) process causes inefficiencies and unnecessary costs



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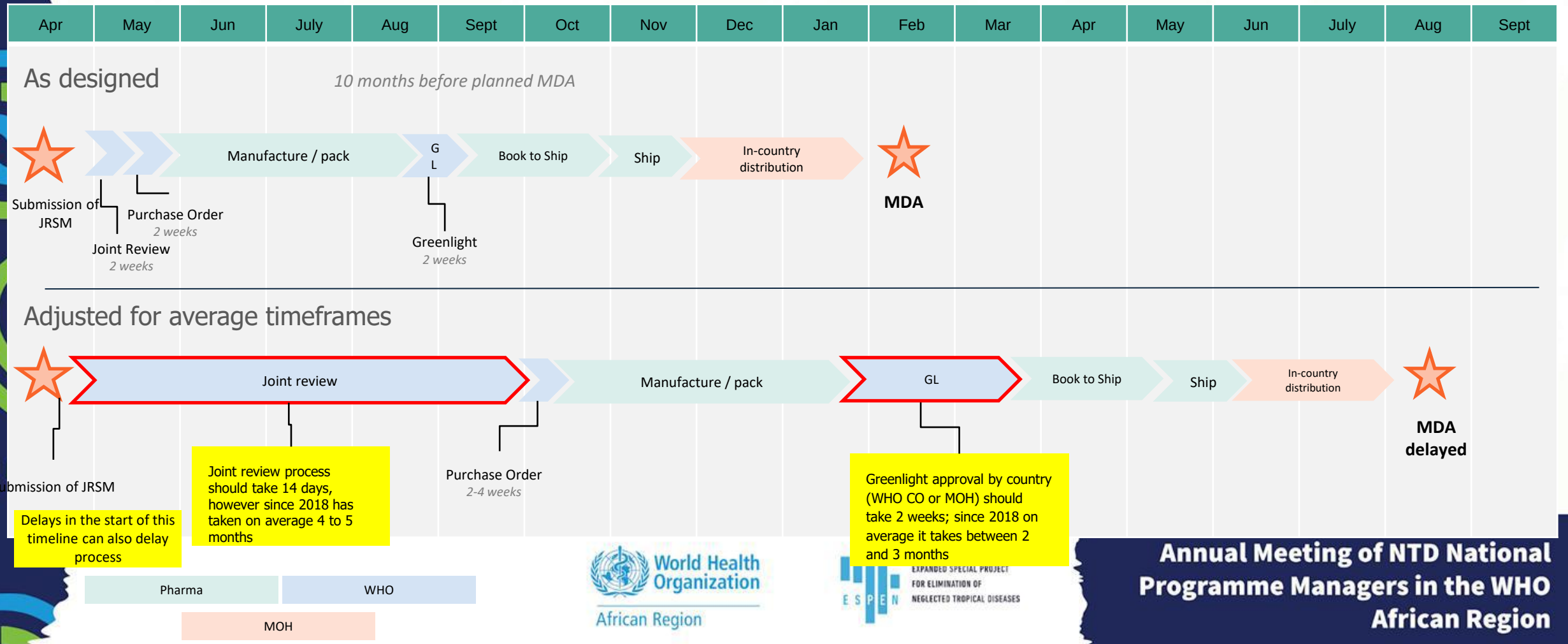
Learning: Delays in purchase orders were the most critical issue in 2024, causing concern for pharma partners and risking country 2025 plans

The actual lead time was much longer than accounted for: Inaccurate lead times have downstream and upstream consequences for both countries and pharma partners.



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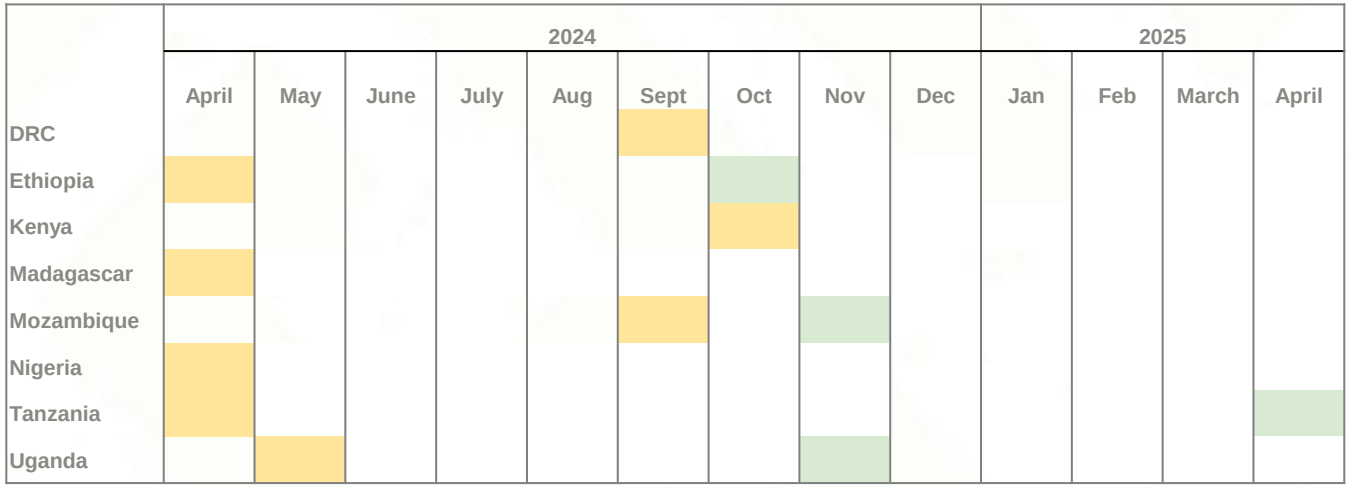
Key Learning from Year 1

Delays in purchase orders were the most critical issue in 2024, causing concern for pharma partners and risking country 2025 plans.

Number of days taken for approval of requests per year (based on SOPs this should be 21 days)

- Ethiopia: **6 months** from submission to approval
- Uganda: **6 months** from submission to approval
- Tanzania: almost **12 months**
- Four countries still **not approved**



Delayed orders result in stock sitting in warehouses increasing manufacturers storage costs, staffing costs and costs related to manufacturing.

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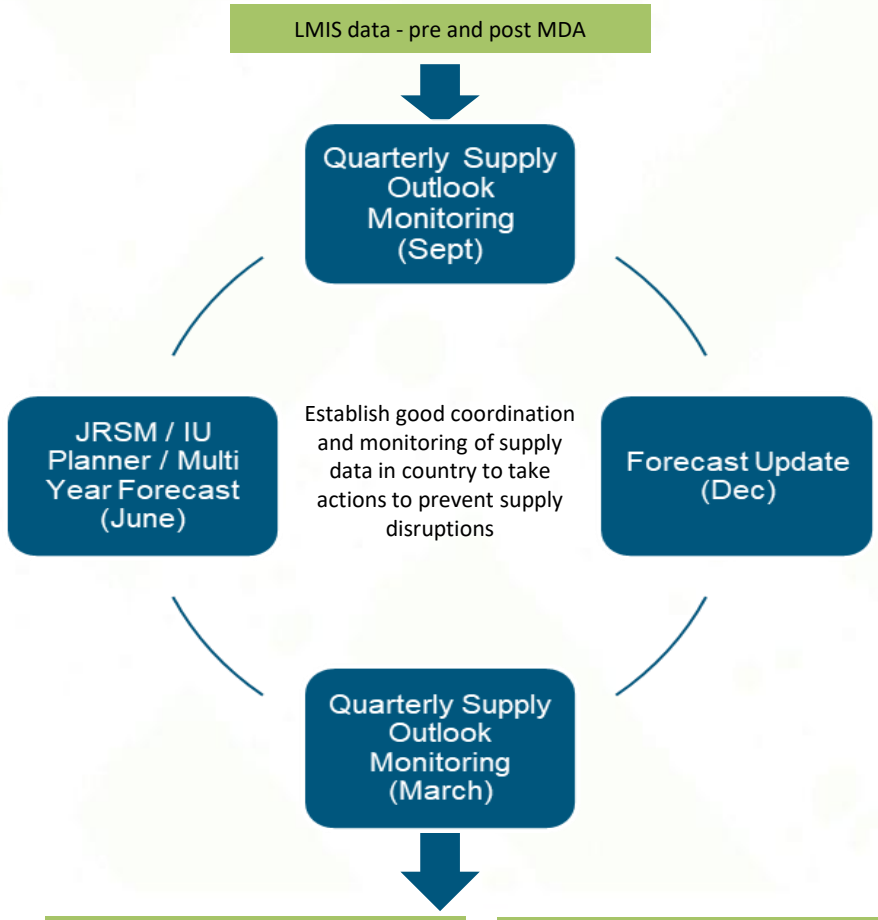
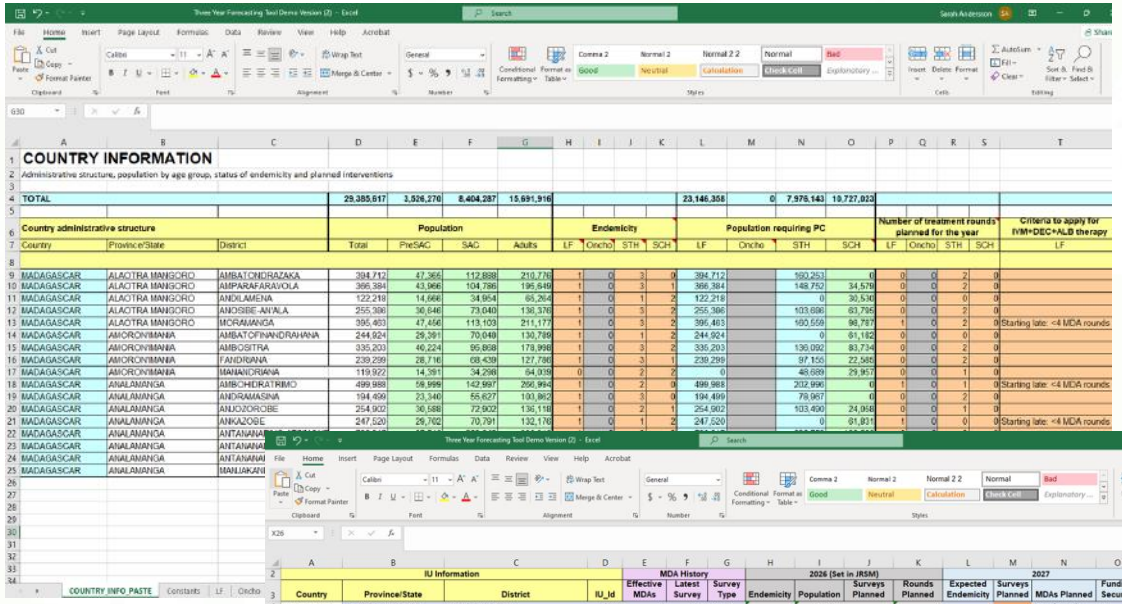
Year 2 Priorities: support quality and timely **requests** and **greenlight** and provide better visibility for pharma partners

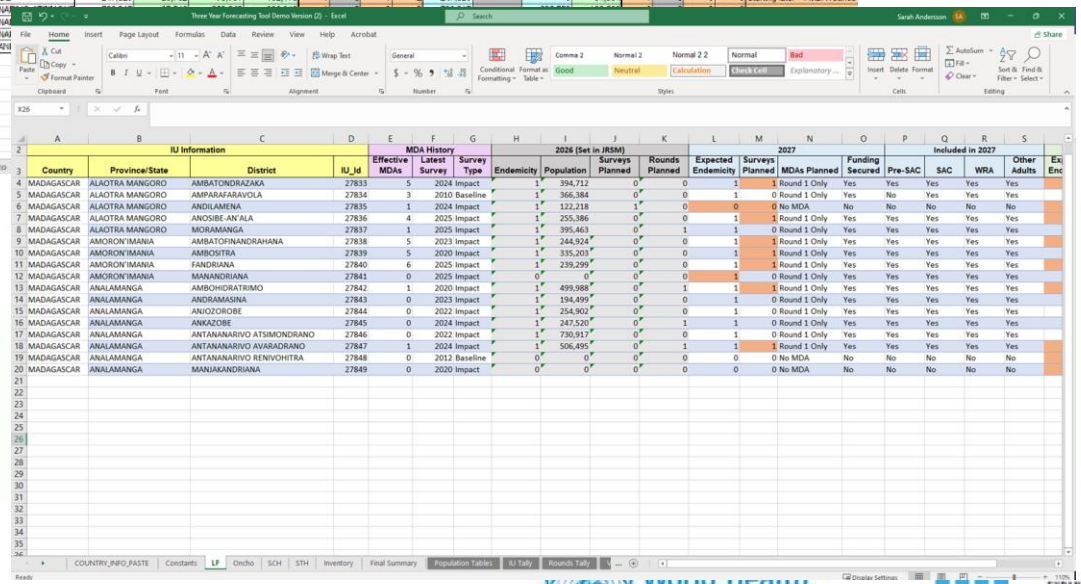


The project is working with WHO to better define our role in supporting the request process:

- **Coordination:** Convene multi-stakeholder TWGs to prepare good quality JRF and JRSM and complete IU Planner, support timely responses to queries and clarifications.
- **Three-year forecasts:** Forecasts to enable early identification of issues related to program implementation (surveys, lack of funding) potentially shortening the JRSM review process and provide pharmaceutical partners with visibility into demand to plan their manufacturing.
- **Monthly meetings:** Update critical information and quickly and proactively resolve issues related to requests and greenlight approvals.
- **LMIS/Data Use:** Support strengthening logistics reporting of stock balance data to central level and quarterly monitoring of **supply outlook,** to respond to queries on inventory reconciliation**.**

Multi Year Forecast (MYF)





Provide longer term visibility for pharma partners to plan production.

SCTSM developing a MYF tool with WHO and once finalized this will be rolled out to other countries.

Create a timeframe for the MYF -

- Create 3 year forecast at time of JRSM
- Update forecast every 6 months

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Annual Meeting of NTD National Programme Managers in the WHO African Region

Monthly Meetings

Purpose

1. To improve visibility of up-to-date country and global level supply chain information
2. Speed up resolution of problems that hold up approval of JRSM and greenlight
3. Identify potential expiries and wastage of products so timely action can be taken

Data to be reviewed, validated, updated and discussed during the meeting:

- Updates from WHO ESPEN
- JAP status with comments
- Shipment / greenlight / customs status
- MDA dates
- Funding availability for MDA
- Stock levels, consumption levels (post MDA), potential expiries

Monthly Meetings Supply Outlook

Update inventory data, MDA dates, shipment dates to align supply with demand

ALB LF	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA			2,029,335						2,800,000				
Shipments (active POs)		7,031,000											
Adjustments (+/-)													
Inventory	2,400	7,033,400	5,004,065	7,033,400	5,004,065	7,033,400	5,004,065	7,033,400	5,004,065	7,033,400	5,004,065	7,033,400	5,004,065

MEB STH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA				13,195,498					8,759,999				
Shipments (active POs)		19,328,000											
Adjustments (+/-)													
Inventory	5,175,103	24,503,103	24,503,103	11,307,605	11,307,605	11,307,605	11,307,605	11,307,605	2,547,606	2,547,606	2,547,606	2,547,606	2,547,606

PZQ SCH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA				9,374,835									
Shipments (active POs)		7,317,000											
Adjustments (+/-)													
Inventory	3,616,070	10,933,070	10,933,070	1,558,235	1,558,235	1,558,235	1,558,235	1,558,235	1,558,235	1,558,235	1,558,235	1,558,235	1,558,235

IVM*	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA			5,682,138						7,840,000				
Shipments (active POs)													
Adjustments (+/-)													
Inventory	17,695,500	17,695,500	12,013,362	17,695,500	12,013,362	17,695,500	12,013,362	17,695,500	12,013,362	17,695,500	12,013,362	17,695,500	12,013,362

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Monthly Meetings Supply Outlook

February: the plan is in place

MEB STH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA				13,195,498					8,759,999				
Shipments (active POs)		19,328,000											
Adjustments (+/-)													
Inventory	5,175,103	24,503,103	24,503,103	11,307,605	11,307,605	11,307,605	11,307,605	11,307,605	2,547,606	2,547,606	2,547,606	2,547,606	2,547,606

March: Shipment of MEB delayed due to delayed approval of JRSM, therefore there is insufficient stock for the MDA

MEB STH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA				13,195,498					8,759,999				
Shipments (active POs)						19,328,000							
Adjustments (+/-)													
Inventory	5,175,103	5,175,103	5,175,103	0	0	19,328,000	19,328,000	19,328,000	10,568,001	10,568,001	10,568,001	10,568,001	10,568,001

April: MDA needs to be delayed, means our inventory at the end of year will be increased

MEB STH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA								13,195,498					8,759,999
Shipments (active POs)						19,328,000							
Adjustments (+/-)													
Inventory	5,175,103	5,175,103	5,175,103	5,175,103	5,175,103	24,503,103	24,503,103	11,307,605	11,307,605	11,307,605	11,307,605	11,307,605	2,547,606

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Monthly Meetings Supply Outlook

February: the plan is in place

MEB STH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)													
Forecast Planned MDA				13,195,498					8,759,999				
Shipments (active POs)		19,328,000											
Adjustments (+/-)													
Inventory	5,175,103	24,503,103	24,503,103	11,307,605	11,307,605	11,307,605	11,307,605	11,307,605	2,547,606	2,547,606	2,547,606	2,547,606	2,547,606

October: MDA only reaches about 7 million people, now the amount remaining at the end of the year is increased

MEB STH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)									7,543,678				
Forecast Planned MDA													8,759,999
Shipments (active POs)						19,328,000							
Adjustments (+/-)													
Inventory	5,175,103	5,175,103	5,175,103	5,175,103	5,175,103	24,503,103	24,503,103	24,503,103	16,959,425	16,959,425	16,959,425	16,959,425	8,199,426

November: Final inventory reports after the MDA shows about 3 million tablets are missing which needs to be investigated

MEB STH	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025	October 2025	November 2025	December 2025	January 2026	February 2026
Consumption (Historical)									7,543,678				
Forecast Planned MDA													8,759,999
Shipments (active POs)						19,328,000							
Adjustments (+/-)													
Inventory	5,175,103	5,175,103	5,175,103	5,175,103	5,175,103	24,503,103	24,503,103	24,503,103	16,959,425	13,897,000	13,897,000	13,897,000	5,137,001

Conclusion

SCTSM works closely with WHO, Pharma Partners, other donors and is specifically focused on improving the end to end supply chain for the **donated PC medicines** that are requested through the JRSM

As the operational partner under the GCSC it is expected that SCTSM will implement the strategies identified by partners to **address current bottlenecks**

Experiences from this project will be used to **document lessons learned** and best practices to then scale up to other countries

Need to improve the **visibility of supply and demand data** for the pharma partners so they can plan and prepare their manufacturing to ensure countries receive supplies in full and on time

- regular updates to inventory and forecasting data through the monthly meetings and supply outlooks

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Annual Meeting of NTD National Programme Managers in the WHO African Region

Roles and Responsibilities for the Joint Application Package

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Objectives of Session

1. To agree on the roles and responsibilities of stakeholders, including SCTSM, in strengthening the JAP

Some reasons for delays in approvals of JRSM

- Poor quality, incomplete submission
- Poor quality, incomplete responses to queries from WHO
- Poor accounting for previously donated medicines - misalignment with what has been supplied with the number of people treated
- New treatment guidelines not being followed in request applications
- Survey results not reflected in request applications
- Insecure funding for program operations at country level

Poor quality JAP submissions lead to delays in the joint review process which delay approval

Delays in the approval of medicine requests often occur because the review process cycle outlined above is repeated and delayed due to poor quality and incomplete initial applications and insufficient responses to WHO's queries or feedback.

Areas of focus to improve timeliness of JRSM approval and medicine delivery

- **Improving the Timeliness of JRSM Submissions:** Submit quality JRSM 10 months before **first MDA of calendar year**
- **Improving the Quality of JRSM Submissions:** **Convening JAP review meetings** that include all stakeholders, M&E, supply chain, disease focal persons, implementing partners to get consensus on plans for the following year before the JAP is submitted to WHO
- **Improving the Timeliness of JRSM Response:** Responding to queries from WHO on application **within 14 days** of receiving feedback, coordinating with all stakeholders on preparing the response
- **Submission of the latest inventory report:** Complete related sections in JRF and JRSM.
- **Submission of Green Light Checklist:** fill and sign the checklist by authorized personnel **within 14 days** and send it to the shipment forwarder in this case DHL. The template is on WHO website.
- **Submission of latest Epidemiological Impact or Mapping Surveys data:** latest epidemiological impact or any new mapping surveys updated in the EPIRF to determine the endemicity and / or determine stopping of treatments as soon as data is available.
- **Submission of a multi year forecast:** at time of completing JRSM also **complete a 3 year forecast** to assist pharmaceutical patterns to plan manufacturing of the medicine.

Roles and Responsibilities - Group Activity

	Preparation of JAP	Submission of JAP	Review/revision of JAP forms	Greenlight / Shipment	Multi-Year Forecasting
MOH					
WHO Country Office					
SCTSM					
Other IPs					
WHO ESPEN					
WHO Geneva					

Each group has **30 mins** to discuss and complete one worksheet.
List the roles and responsibilities of each stakeholders in area listed here, please consider some of the areas of focused mentioned in the previous slides.

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Roles and Responsibilities - MOH

1. **Coordination of NTD Interventions:**

- Establish a National Steering Committee (NSC) to guide and oversee national strategies for NTD control, elimination, and eradication.
- Create a Technical Working Group (TWG-JAP-SCM) on JAP and SCM to manage the planning, implementation, and reporting of NTD health products, including supply chain management and the Joint Application Package (JAP).
- Include SCTSM representatives and implementing partners in the TWG to provide technical assistance and strengthen supply chain planning and operations.

1. **Secretariat Role of the TWG:**

- The National Steering Committee (NSC) serves as the secretariat for the TWG, responsible for:
  - Organizing and convening TWG meetings.
  - Facilitating discussions and coordinating inputs from TWG members.
  - Ensuring comprehensive collaboration in development and completion of the JAP
  - Ensuring implementation of decisions and follow-up actions.
  - Maintaining records and documentation for TWG activities.

1. **Accountability and Reporting:**

- Report to WHO on NTD medicine accountability and supply chain progress via JAP application and Gap Assessment Tool (GAT).
- Ensure systems are in place for tracking and managing health products from the national level to community.
- Communicate with partners and other WHO offices for any changes of rules, regulations or procedures of the country which will have an impact on NTD Health products donation.

Roles and Responsibilities - WHO CO

1. **The WHO Country Office provides technical guidance, fosters stakeholder collaboration, and supports the Ministry of Health in aligning national NTD programs with global standards and the 2030 NTD Roadmap.**

    - Participate and assist countries in establishing and supporting the TWG.
    - Provide technical advice for completing all forms of JAP submissions applicable, including JRSM and JRF.
    - Facilitate the communication between RO and NTD Programmes particularly related to provision of timely feedback to RO/HQ reviews.
    - Facilitate advocacy and resource mobilization for supply chain improvements.
    - Ensure WHO standards and policies, including guidance updates, are disseminated in a timely manner and applied to national NTD interventions as soon as is practicable.
    - Facilitate the greenlight provision when consignee to the NTD Health Product donation.
    - Facilitate the tax exemption and customs clearance before the arrival of the NTD medicine and health product into the port of entry.
    - Advocate with MoH for removal or waiver to some of the country's regulations such as import permit, taxes, special payments at the port of entry etc, on NTD medicine and health products when applicable.
    - Ensure countries utilize the different technical materials and tools developed by WHO and partners on JAP and SCM including online training modules, mobile application, DHIS2 module etc and report back to WHO/RO and HQ.

Roles and Responsibilities - WHO AFRO / Geneva

- Joint Review of JAP
  - Review all joint application packages to ensure accuracy and completeness of the data within one week of receiving the submission
  - Review applications to ensure WHO treatment guidelines are followed in preparing the application
  - Review applications to ensure endemicity codes for IUs are aligned to the most recent survey data
  - Compare data submitted across the application forms to ensure population data is consistent and inventory data is reconciled with treatment numbers
  - Provide a compiled list of comments to countries on any discrepancies within 1 to 2 weeks of submission to ensure timely correction of applications can be made.
  - Continue to communicate and support countries to quickly resolve issues related to the medicine requests.

- Technical Support for NTD Programs
  - Provide feedback and technical support on JAP submissions and supply chain practices.
  - Host capacity-building workshops for supply chain management and JAP processes.
  - Facilitate guidance dissemination, knowledge sharing and alignment across countries and regions.
  - Encourage countries to involve relevant partners—such as implementing partners and STSCM—in communications with WHO on JAP.
  - Provide technical support supervision in those countries chronically challenged on JAP process and SCM.
  - Document best practices in the countries where they have best practices and share with challenged countries to facilitate peer to peer learning.
  - Conduct online surveys to assess countries' progress and get feedback.

Roles and Responsibilities - SCTSM

1. **Collaborate with the NTDPs, WHO offices and implementing partners to support accurate and complete JAP submissions.**

    - Support and participate in ensuring the TWG-JAP-SCM is established and meets regularly.
    - Set a quantification and JAP submission calendar that is to be adhered to.
    - In collaboration support completion of JRSM, JRF and EPIRF (when available) according to the timeframes in standard operating procedures.
    - Support collection and cleaning of data (treatment and inventory data) for the JRSM and JRF application.
    - Support MOH programs to respond to review queries raised by WHO Regional Office **as soon as possible.** Facilitate coordination between TWG-JAP-SCM members to clarify and respond to issues raised through the JRSM review such as funding confirmation or survey results as required.

1. **Provide expertise on supply chain management and to address operational challenges, including multi-year need forecasting and inventory management at multiple levels.**

    - Support countries to:
        - Conduct **multi-year forecasting** (36 months and beyond) each year based on up-to-date JRSM and update the forecasts biannually.
        - Prepare for and actively participate in, **routine monthly virtual meetings** with WHO to discuss supply issues.
        - Strengthen **logistics information systems** to collect data during and post MDA implementation e.g. number of people treated, wastage rates, medicines consumed, remaining usable inventory
        - **Monitor supply chain data and key indicators**
            - update supply outlooks to enable proactive identify overstocking, potential expiries or understocking
            - monitor the expiry status of medicine supplied to the country.
            - routinely compare treatment and inventory data to understand their theoretical balance vs. actual balance and track discrepancies.
    - Communicate regularly with the WHO Country NPO, RO and HQ to ensure alignment and collaborate in identifying areas where challenges/additional support may be needed.

Roles and Responsibilities - IPs

- Collaborate with the NTDPs, WHO offices, other implementing partners and SCTSM (where applicable) to support accurate and complete JAP submissions
  - Support the Ministry of Health and partners to submit JAP applications at least 10 months ahead of the planned MDA date.
  - Support countries to respond promptly to JAP review queries.
- Confirming domestic or external funding for MDA
- Support the country to prepare for smooth receipt of donated medicines, including:
  - Green lighting shipments and ensuring the greenlight is communicated to the medicine forwarding agent on time
  - Obtaining import permits
  - Advocacy for and Preparation of duty waivers
  - Facilitating in-country clearing and warehouse transfers and storage of NTD medicines, including payments as required for local clearing agents.
  - ensure all other requirements for receiving the donated shipment have been met
- Provide operational support on supply chain management and address operational challenges alongside SCTSM where applicable, including
  - Support for transport and storage of donated medicines at regional, district and distribution point levels pre- and post-MDA
  - Support for reverse logistics and data reconciliation post-MDA
  - Support for routine collection of data on inventory and reporting to WHO
  - Advocacy for adherence to documented waste management policies at all levels

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Joint Application Package Tools Survey

Enquête de rétroaction sur les outils du dossier de demande conjointe

Pesquisa de Feedback sobre as Ferramentas do Pacote de Solicitação Conjunta

NTD Supply Chain Forum

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Progress in FGS Control Introduction in Countries

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Coordination of urogenital schistosomiasis and FGS in the African region

Dr. Elizabeth Juma
ESPEN Team Lead

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OUTLINE

- The FGS burden
- What needs to be done
- What is available in terms of tools and resources
- What is the gap
- ESPEN FGS Strategy

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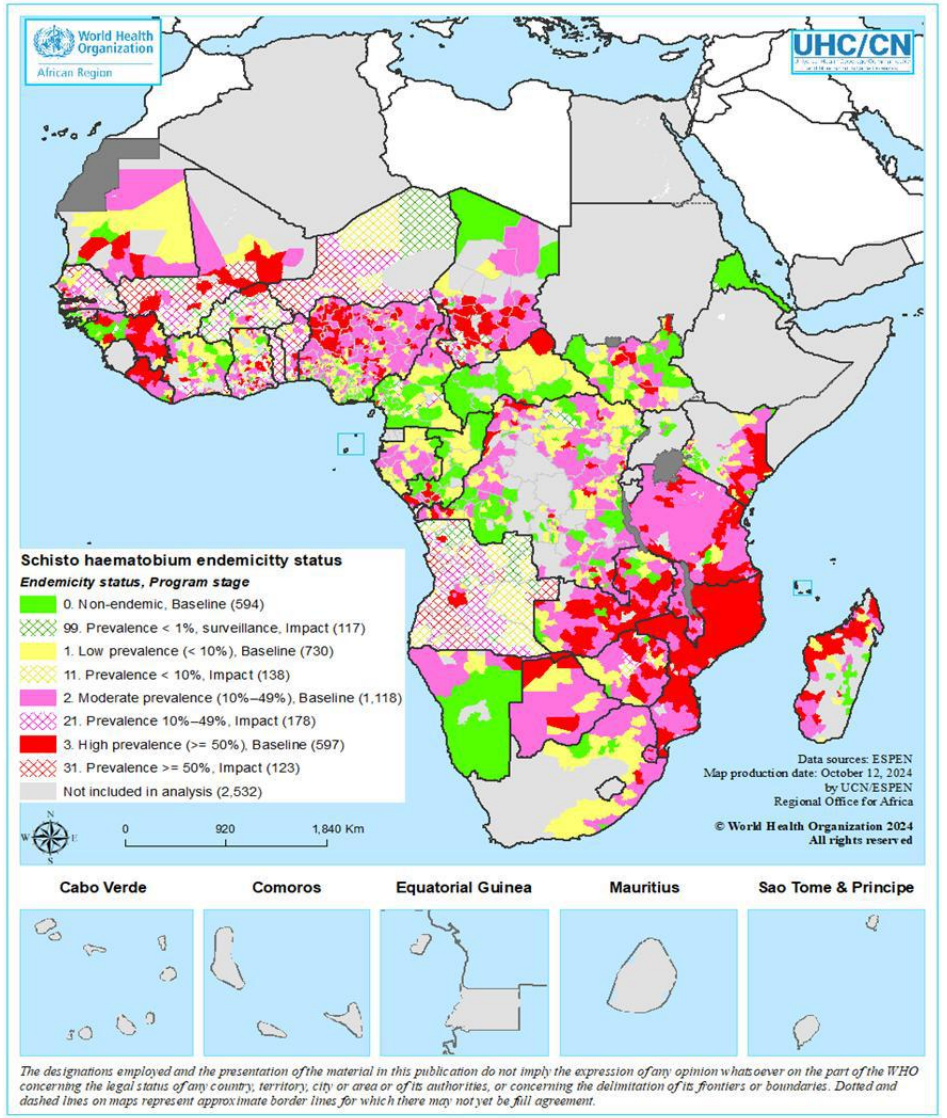
The Burden

- High prevalence of FGS in *Schisosoma haematobium* endemic areas
- Affects over 56 million women (data refinement needed)
- Severe reproductive health impact
- Stigma and socio-economic consequences
- Links to cervical cancer and increased HIV transmission



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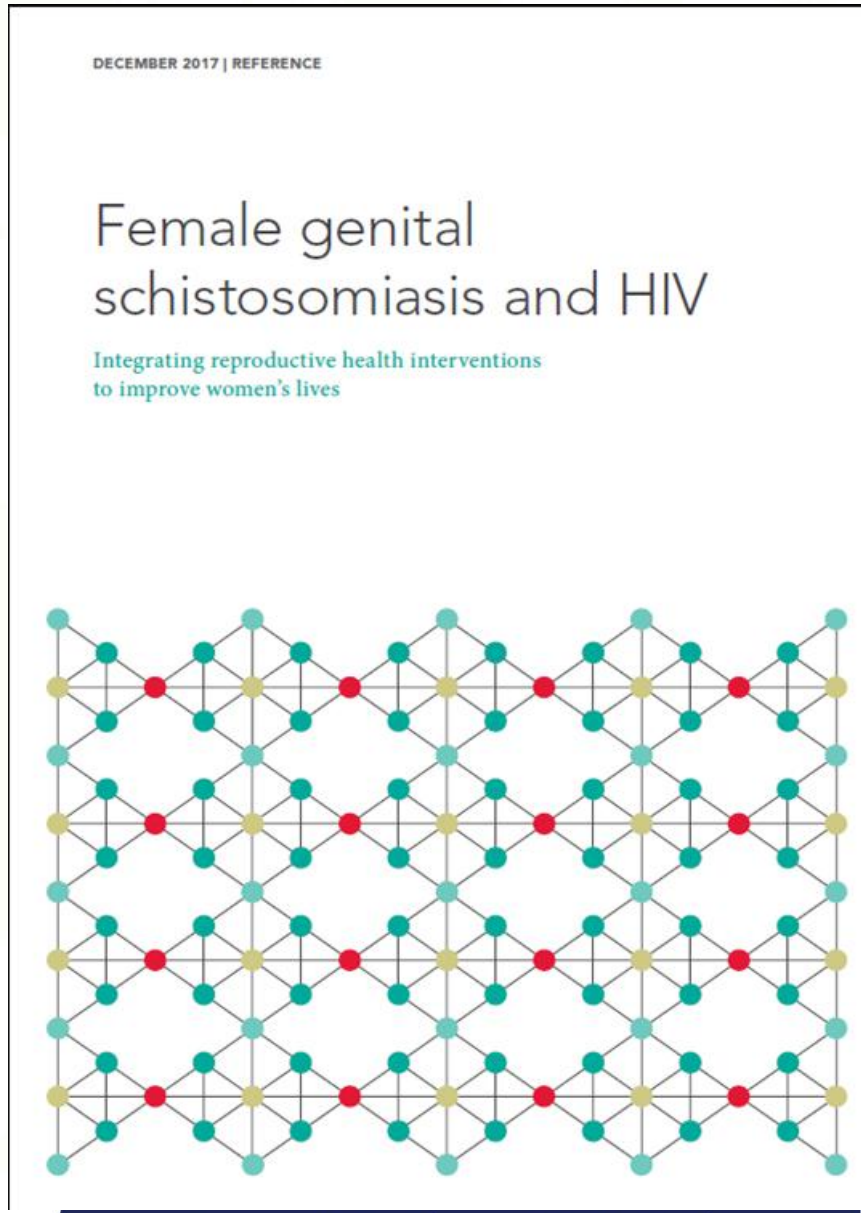
What needs to be done

- **Mapping**
  - Clear definition of populations living in areas of risk
- **Preventative interventions**
  - Community education and health promotion
  - Mass treatment of women 15-49 at community level
  - Treatments at health facility levels
- **Case Management** (at primary health care, maternal health, sexual and reproductive health clinics)
  - Capacity building for health workers
  - Referral for treatment of cases
  - Access to treatment for FGS, Destigmatization of FGS, and Follow-up care
- **Routine reporting, monitoring and evaluation**
  - Include FGS in appropriate routine reporting of national health information systems



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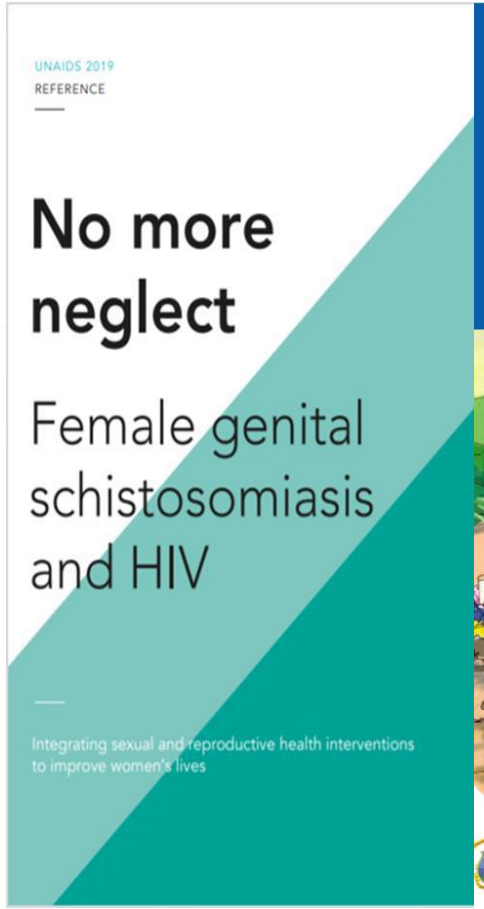
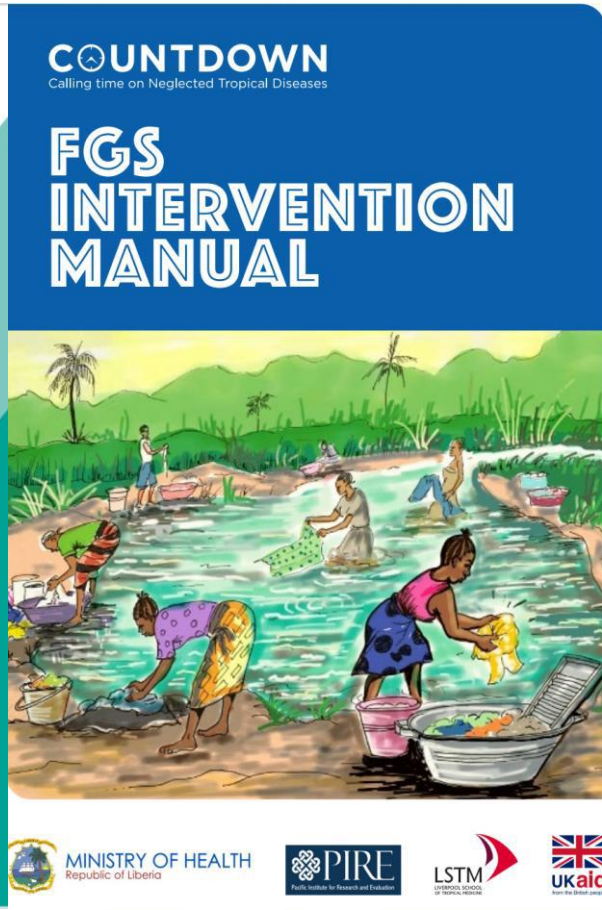
Tools and Resources Available

- Praziquantel for mass treatment
- WHO FGS guidelines
- Diagnostic tools (+ novel tools in research settings)
- WHO Training manuals
- WHO Education materials
- WHO/AFRO aligned programmes
- Community engagement models
- Existing health system structures
- Supportive partners and a regional network of engaged scientists
- Ongoing pilot projects in several countries e.g. GIZ-funded FGS project in Malawi

Several WHO guidance



Several partner/MoH tools



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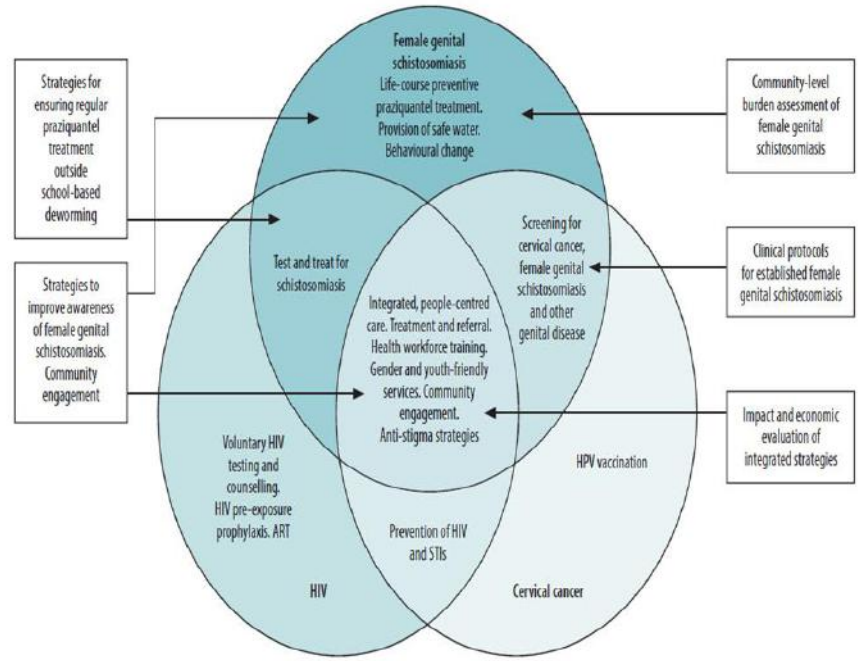
Gap analysis

- Regional level FGS risk maps, updated disease estimated burden and data refinement at regional level
- Country level mapping and mapping protocol
- Availability of diagnostic tools and manuals at sub-national levels
- Training manual in diagnostics and community engagement (Job Aids)
- Limited national strategies for integration and cross-sector collaboration
- Inconsistent data reporting across countries
- Minimal engagement in destigmatization efforts
- Funding gaps for MDA and Sexual and Reproductive Health Programmes

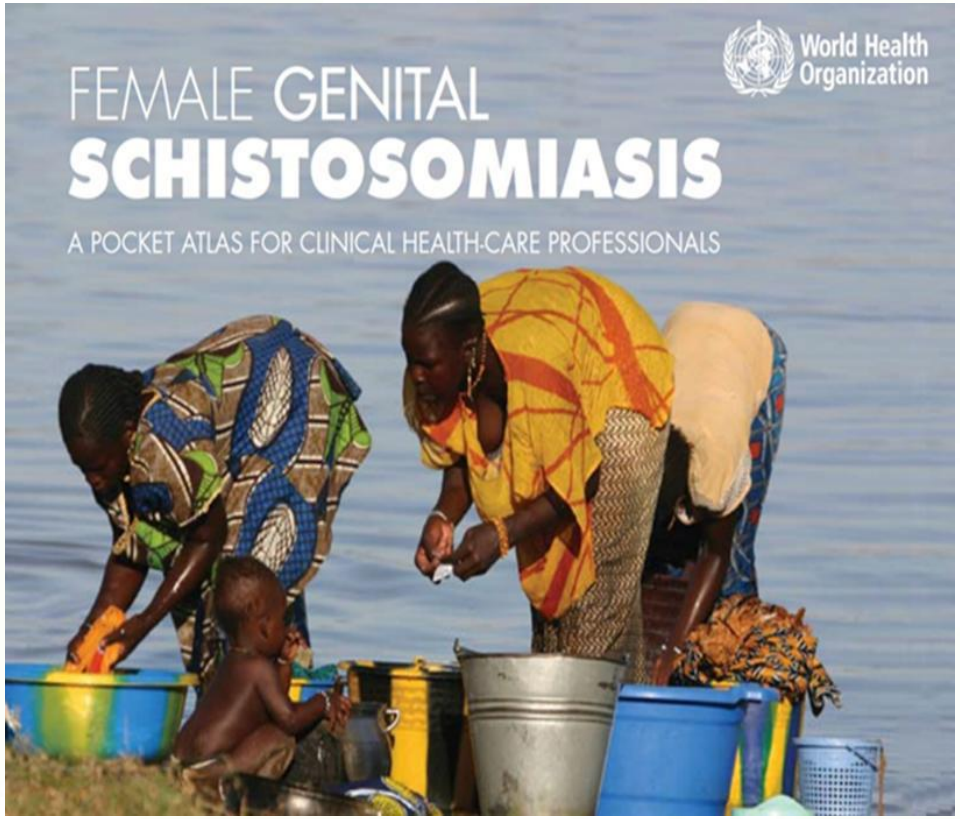
Conceptual framework for the integrated programmatic implementation of female genital schistosomiasis, HIV and HPV/cervical cancer



ART: antiretroviral therapy; HIV: human immunodeficiency virus; HPV: human papilloma virus; STIs: sexually transmitted infections.

ESPEN's Approach

- Coordinate regional approach for integration of FGS into health systems
- Mapping:
  - Clarify burden data and refine endemic zones
- Consolidation of tools and manuals:
  - Establish and convene consultative group of regional experts
  - Create frameworks for national committee setup
- Capacity building and monitoring:
  - Consolidate training manuals for healthcare workers, job aids and guide committee setup



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Progress in FGS Control: Global Updates

Dr. Amadou Garba, WHO/HQ

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Progress in FGS Control: Remarks

Dr. Anouk Gouvras

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[FIG] TOGETHER TO END FEMALE GENITAL SCHISTOSOMIASIS

The **FGS Integration Group (FIG)** is a global coalition of organisations galvanising collective action across sectors including HIV, cervical cancer, sexual and reproductive health (SRH), NTDs, WASH and others, to address FGS through the integration of key actions/interventions into programmes and services.

Mission: Contribute to strengthening health systems by improving the delivery of equitable and holistic health services for people, improving women's health outcomes, and ultimately contributing to social and economic equity.

Purpose: Create an enabling environment to support implementation of cross-sector action for comprehensive inclusion of FGS into health policies, programmes, and services to strengthen the FGS public health response and meet women and girls' HIV/SRH needs.

FIG can provide information, resources and technical support services in the design of integrated FGS/SRHR programming and welcome opportunities to partner in delivery and research.

https://bit.ly/FIG-schisto

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FIG UPDATE -2024-2025

- Chairs Leora Pillay, Frontline AIDS and Yael Velleman, Unlimit Health. Strong advocacy activity:
- UK Parliament International Development Committee recommended the integration of FGS in Sexual and Reproductive Health and Rights programming, to the UK Foreign, Commonwealth and Development Office (FCDO).
- Malawi working to include Genital Schistosomiasis in its National Guidelines for Syndromic Management of Sexually Transmitted Infections, to reduce misdiagnosis and mismanagement.
- FIG Policy brief launched at WHO chaired side event at AIDS 2024 The Time is NOW - Addressing the unmet needs of women and girls in Africa through FGS integration).
- FIG is coordinating closely with German Federal Ministry for Economic Cooperation and Development launched a new initiative 'From Neglect to Action: Invest in Women, Invest in Health' at the World Health Summit in Berlin, Germany.
- Working with the media: The Guardian on the impact of FGS and the work being done to tackle FGS in Kenya.
- Webinars include:
    - WHO IBP Network (family planning and sexual and reproductive health) for International Women's Day webinar "Agents of Change: Your role in addressing Female Genital Schistosomiasis".
    - Eastern Africa National Networks of AIDS and Health Service Organisations (EANNASO) and Women For Global Fund on "Ending the Neglect - Unlocking the potential of including FGS in Global Fund HIV prevention programmes".
    - Women for Global Fund webinar with country-based HIV advocates
    - Canadian Network for NTDs on "Integrating FGS to Optimize Women and Girls' Health in Africa."
- FIG partners fed into development of an FGS Minimum Service Package (MSP) for governments, public health practitioners.
- Frequently Asked Questions (FAQs) document bit.ly/FGS_FAQs
- Collaborations with ESPEN, WHO, UNAIDS and more

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Perspectives of FGS-SRH integration in Kenya

Dr. Victoria Gamba- Obstetrician Gynaecologist/FGS-SRH Integration Kenya

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Perspectives vs Perceptions

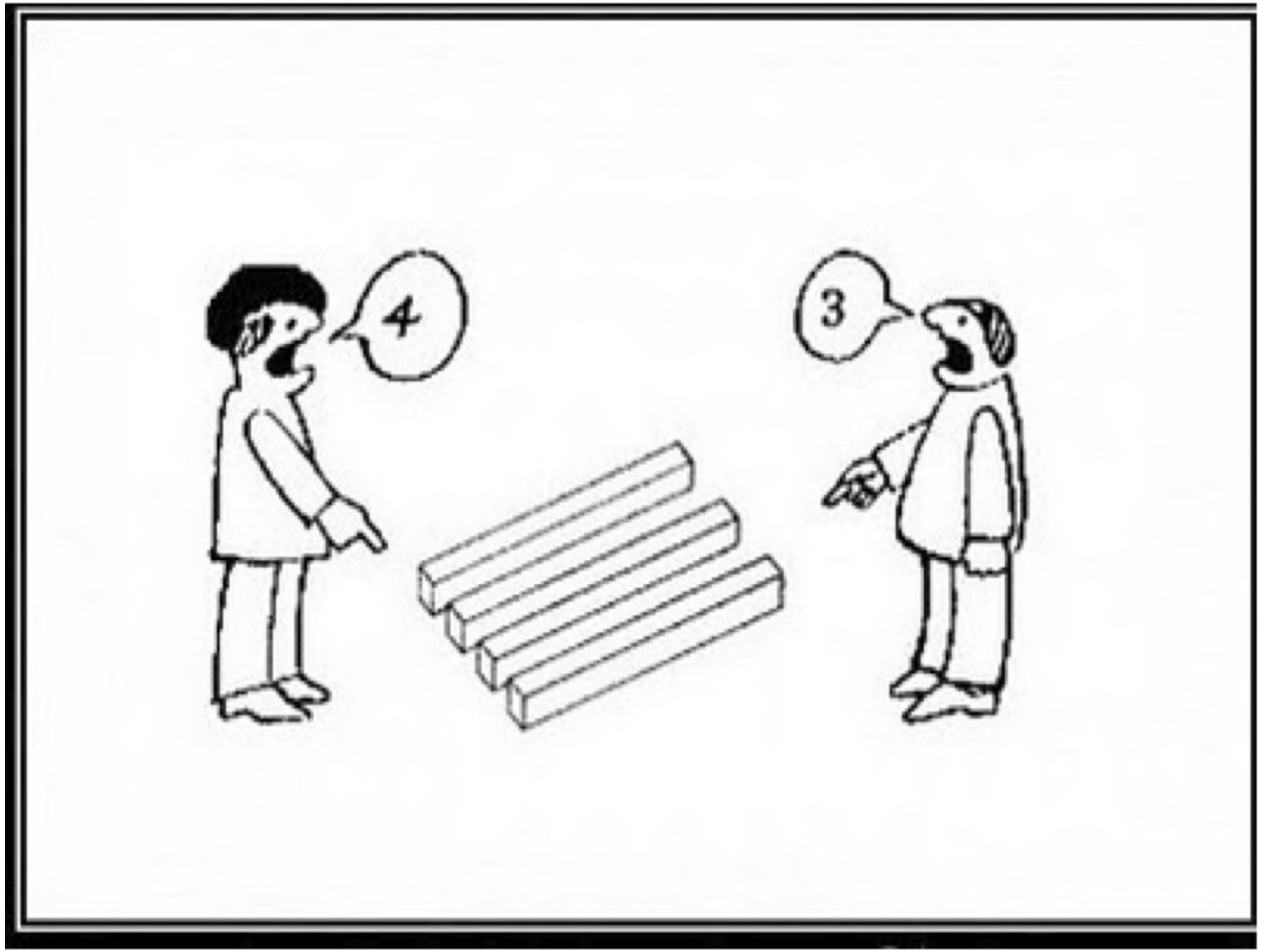


Image source:**The social mission of perceptual research**

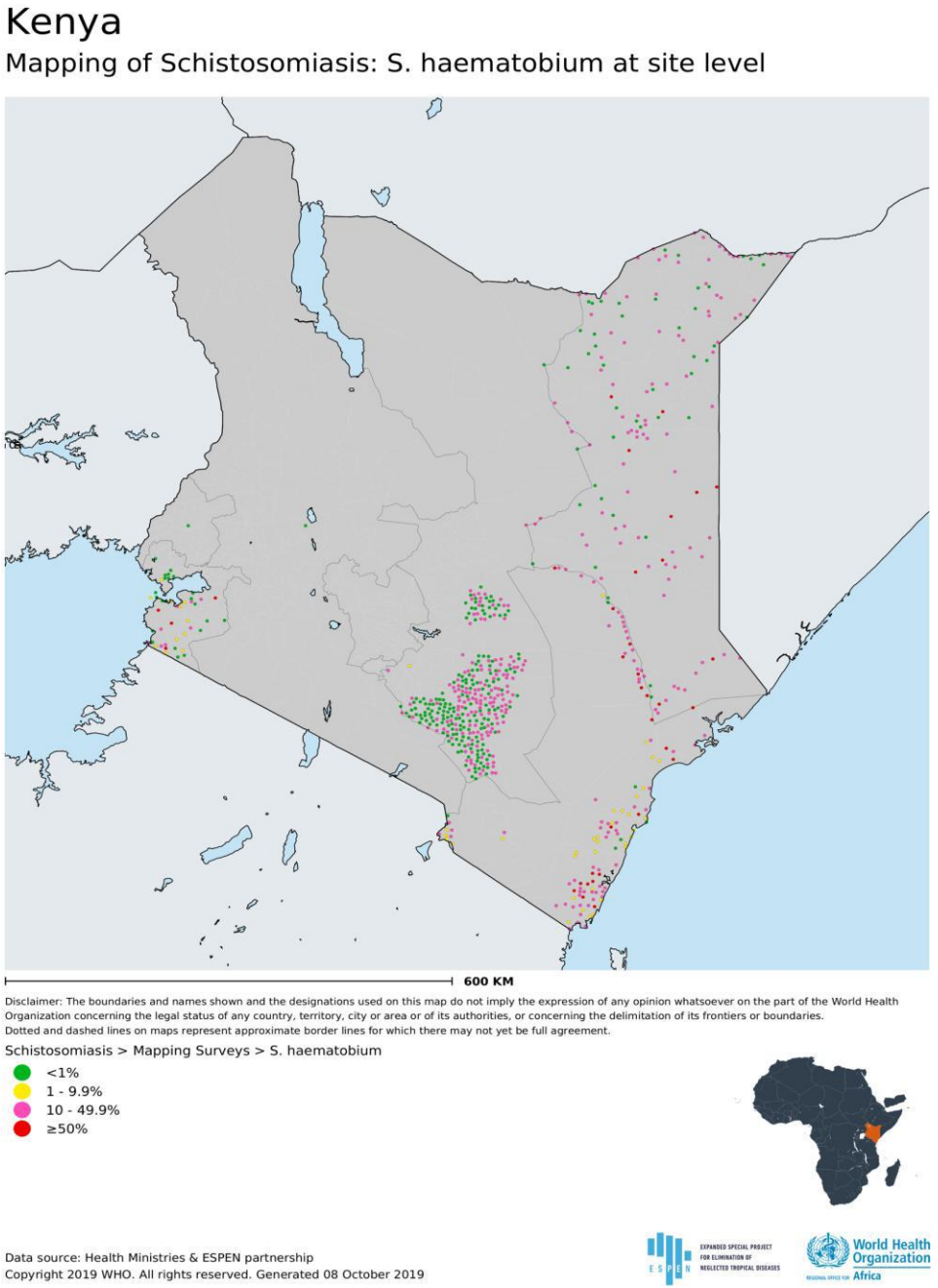
Background

FGS is a neglected tropical disease that affects the reproductive tract.

FGS is caused by a parasite known as Schistosoma hematobium.

Schistosoma hematobium distribution in Kenya as shown-coastal, eastern central, parts of western.

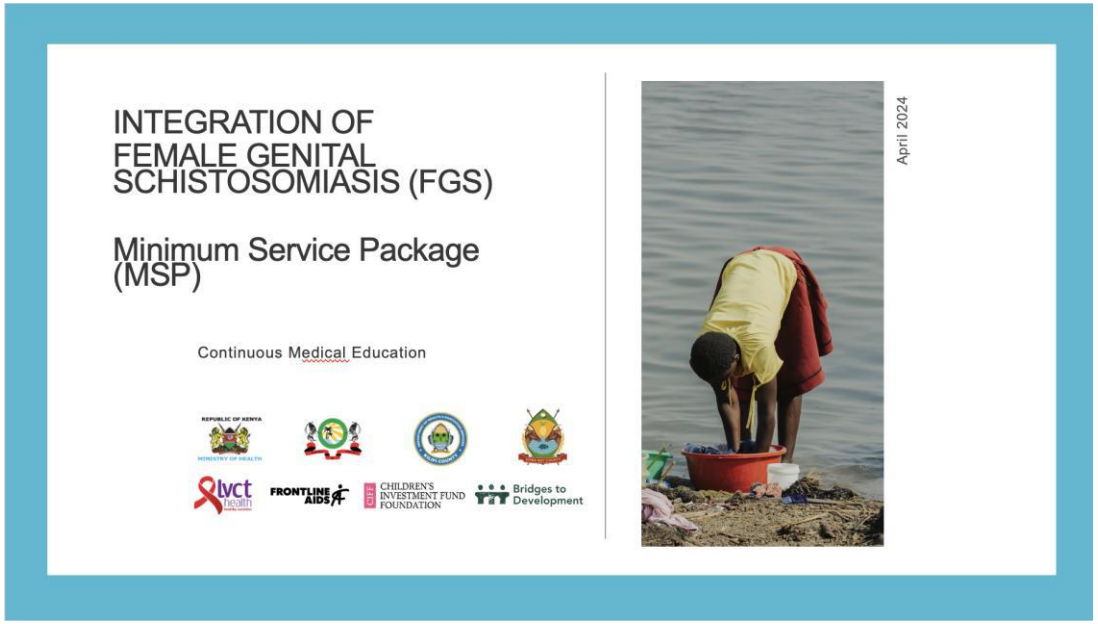
Clinical presentation- non distinct from other Reproductive tract infections. Presenting a diagnostic /treatment challenge.



FGS Integrated interventions in Kenya

2020-2021 in 1 County

2023-2025 in 3 Counties



FGS Integrated interventions in Kenya

2020-2021 in 1 County

Reach

- **23** safe spaces-**1700** AGYW
- **TOT- 9** HCW and **4** Health decision makers
- **61** CHP/DREAMS mentors

Challenges

- Covid-19 pandemic
- Fewer women screened
- Transfer of health personnel/staff turn over
- Lack of clear FGS reporting tools

Opportunities

- FGS-SRH Integration is possible

2023-2025 in 3 Counties

Reach

- **TOT- 75** healthcare workers trained
- **521** facility staff sensitized
- **491-** CHPS/CHAs trained
- **8856** Women screened for both FGS and Cervical cancer

Challenges

- Lack of FGS Reporting tools
- Availability of Consumables
- Client transport costs
- Availability of Praziquantel
- **Opportunities**
- Integrated Screening done in OPD
- PZQ procured in some counties
- Outreaches approach to reach the un marginalised

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Multi-Country Assessment of Prevalence of FGS (MAP-FGS)

Elizabeth Long

Public Health Advisor

World Health Organization
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Bilharziose génitale feminine à Madagascar

ACTIVITES DE L'ASSOCIATION K'OLO VANONA

Dr Patricia MARTIN

OMS Madagascar

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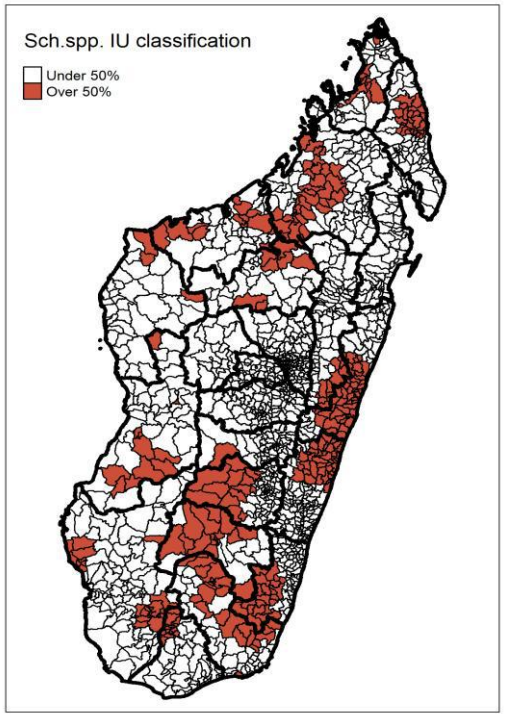
MADAGASCAR :

- ✓ Île avec une superficie de **587,041 km²**
- ✓ Population: **30 626 890 million**
- ✓ Mortalité maternelle 335/100 000 naissances vivantes
- ✓ Taux de mortalité néonatale 24/1000 naissances vivantes
- ✓ Accessibilité géographique aux services de santé 58% (<5km)
- ✓ Nombre d'unités d'évaluation (districts) : 114

SCHISTOSOMIASE

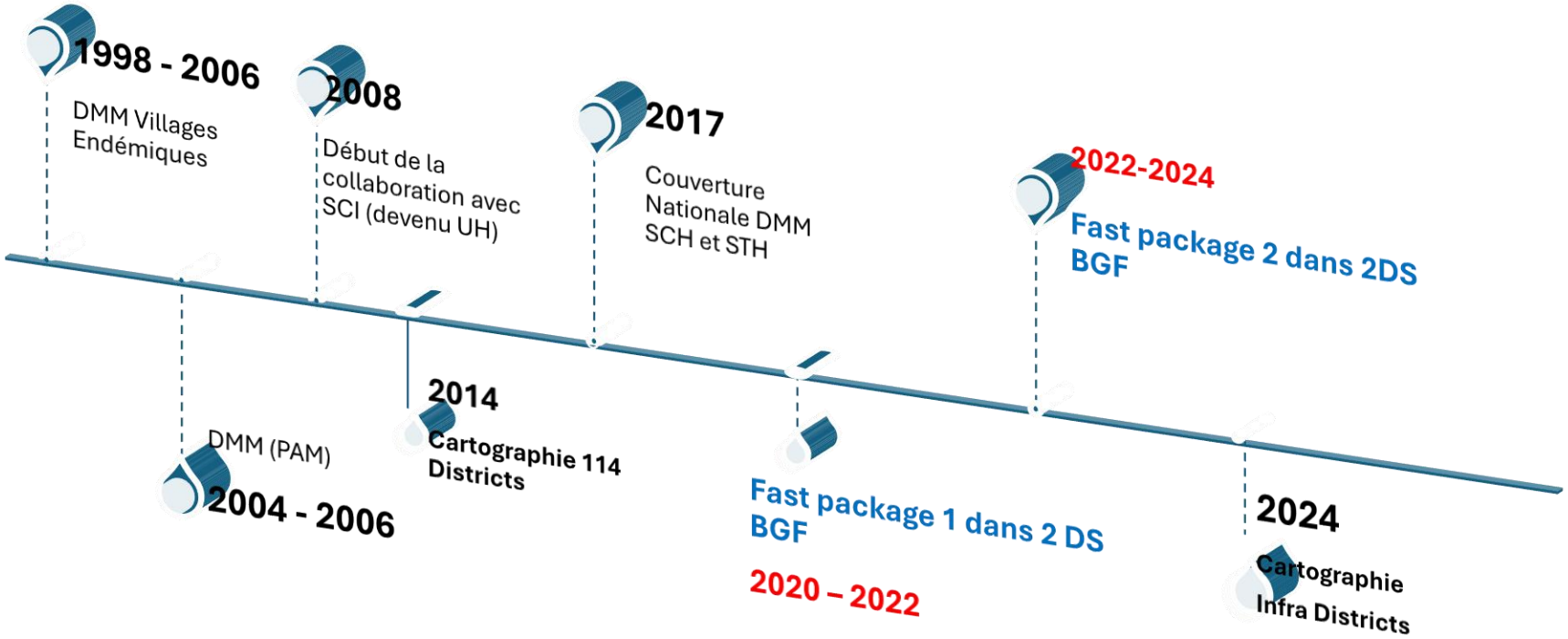


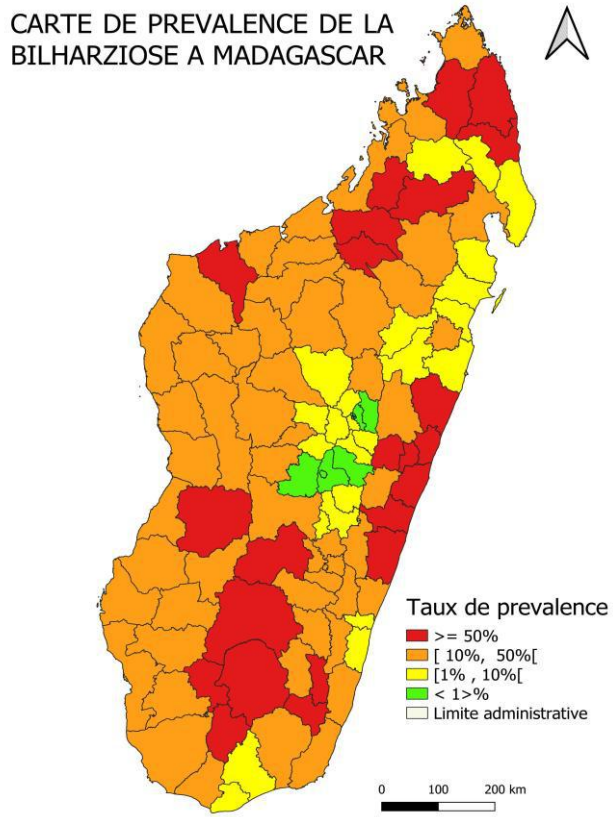
- ✓ Prévalence combinée des communes (urogénitale & intestinale)

  ≥50% : 21%
  ≥10% - <50% : 46%
  ≥1 - <10% : 26%
  <1% :7%

- ✓ Co-endémicité : filariose lymphatique, teaniose/NCC

Chronologie de la lutte contre la schistosomiase à Madagascar





BGF est inclus dans l'ordinogramme de soins de santé de base (DSSB)

FGS Accelerated Scale Together

2020 - 2022

FAST PACKAGE 1 dans 2DS : Morondava et Sakaraha

2022 - 2024

FAST PACKAGE 2 dans 2DS : Maevatanana & Port Bergé

4 en 1

- formation des AS pour une approche syndromique
- Formation des AC pour assurer la sensibilisation au niveau communautaire
- Développement et distribution des outils de sensibilisation/livret éducateur

Essai clinique

Dépistage de la bilharziose urinaire basé sur questionnaire et bandelette.

1- Etude de validation d'un nouveau schéma thérapeutique ». Ambanja 2019-2021

→Traitement de SCH urogénitale chez les femmes par PZQ

- Formation AC des Fokontany
- Sensibilisation femmes au niveau communautaire sur la bilharziose + BGF
- Dépistage clinique de BGF, recrutement des patientes éligibles pour l'étude
- Analyses biologiques au niveau: laboratoire de CHD Ambanja, laboratoires collaborateurs à l'étranger
- Suivi des femmes à 5, 10, 15, 51 et 75 semaines après traitement
- Enquête qualitative sur la Bilharziose en général et la BGF

2- Etude de prospection pour identifier les communautés dans les zones endémiques à S. haematobium dans le Sud et Nord de Mcar (étude clinico-épidémiologique chez les enfants d'age pré-scolaire et d'âge scolaire Amboasary Sud dans et Ambanja 2022)

- Formation de 2 AS du CSB Urbain Amboasary Sud et du CSB Antsakoamanondro Ambanja
- Sensibilisation des parents
- Dépistage de la bilharziose urinaire basé sur questionnaire et bandelette
- Traitement des cas positifs

3- Etude pilote pour la mise en œuvre d'une application mobile comme moyen de diagnostic de la Bilharziose Génitale chez la Femme. Ambanja Mars-Mai 2023

- Formation théorique sur la BGF de 22 AS dans 6 CSB et de 3 cliniques privés
- Dépistage clinique de la BGF et recrutement des patientes éligibles pour l'étude
- Traitement des cas positifs

Défis :

- Implication effective du Min. de l'éducation nationale
  - → toutefois l'équipe a une bonne collaboration au niveau périphérique
- Notification de SCH/BGF / RMA
- Etendue géographique

PERSPECTIVES

Elaboration de curriculum de formation sur la BGF pour les prestataires en soin de santé primaire

Intégration de BGF dans le cursus de formation en médecine et les paramédicaux

Renforcement de la lutte contre la bilharziose et la BGF par le biais de la recherche

Mise à l'échele du projet dans tous les DS

Recherche sur d'autres domaines de la santé

Merci

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FGS Country Case Studies - Ghana

Dr Joseph Opare, PM, NTDP, GHS

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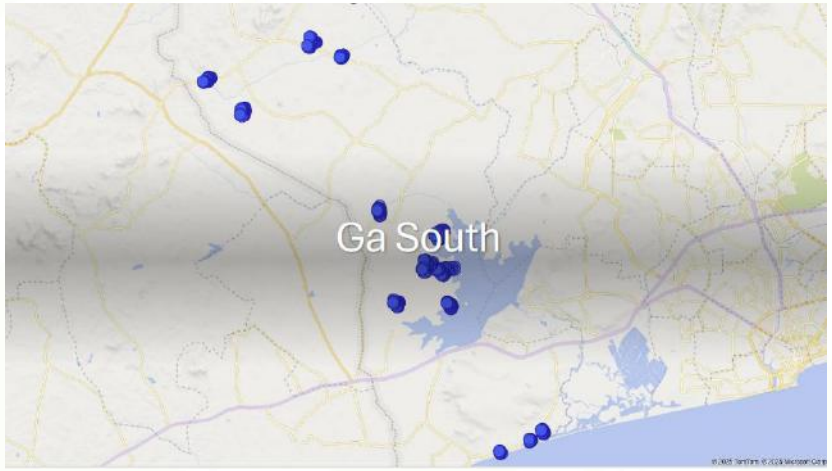
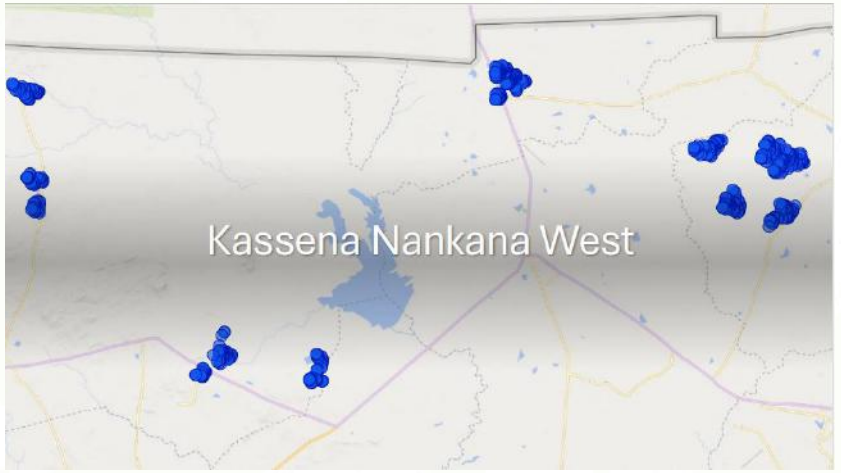
Introduction

- Female genital schistosomiasis (FGS) is a gynaecological condition caused Schistosoma haematobium (Sh)
- An estimated 56 million women and girls across Africa
- Symptoms-vaginal itching and discharge, post-coital bleeding, genital lesions, ectopic pregnancy, spontaneous abortion or infertility
- Diagnosed through inspection of the cervix and vaginal wall using a colposcope
- Clinical findings : grainy sandy patches, homogenous yellow sandy patches, abnormal blood vessels and rubbery papules

MAP-FGS in Ghana

- Two areas selected for inclusion in study: Ga South and Kassena Nankana West
- Protocol development, contracting, and preparations between April 2024-December 2024
- Training in February 2025
- Data collection complete in Ga South on 13 March 2025 and Kassena Nankana West on 30 March 2025
- Samples are being tested in the laboratory (PCR for STIs/HPV and ELISA for *S.haematobium*
- External Image Review Underway
- Data cleaning and analysis ongoing





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MAP-FGS in Ghana

Kassena Nankana West

- 958 women (18-60) were visited at the household
- 798 women (18-60) were eligible and invited to participate

Age Group	Consent	Colposcopy	All Study Activities
10-17	146	N/A	145
18-31	328	320	316
32-60	322	317	314
Total	796	637	775

Ga South

- 1,077 women (18-60) were visited at the household
- 895 women (18-60) were eligible and invited to participate

Age Group	Consent	Colposcopy	All Study Activities
10-17	146	N/A	133
18-31	325	313	290
32-60	314	304	281
Total	785	617	704

FGS Accelerated Scale Together (FAST) package

- February, 2021 SCH/STH Committee was inaugurated
- The NTDP embrace the idea of FAST PACKAGE which was initially supported by ESPEN
- **Components**
    - Diagnosis and treatment
    - Training of medical personnel
    - Awareness
    - Prevention of new cases
- **FGS National Committee** seeks to Push the agenda of the FAST package

FGS National Committee

Aim: To increase communication and collaboration about Female Genital Schistosomiasis, with the longer term goal of integrating Female Genital Schistosomiasis management into existing clinical training and care

- Membership:
  - Public Health Division including the NTDP
  - Clinical care Division
  - Family Health Division
  - Ministry of Health and Ministry of Education
  - **WHO**

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Regional Level Sensitisation Meetings

Meeting at RHD, GA

Meeting at RHD VR

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District Level Capacity Building

District training session

FGS Committee meetings

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Achievements

- Launch and committee meetings
- Oriented Four Regional health Directorates (Volta, Greater Accra, Central and Western regions): 100 officers
- Reviewed and adopted the “Schistosomiasis and Female Genital Schistosomiasis (FGS) booklet for educators”
- Subcommittee meeting to review committee’s programme of work
- Oriented all District Directors of Health Services and Physician Assistants group in the Eastern Region of Ghana on FGS (120)

Challenges/Lessons Learnt/Way Forward

- **Challenge**
  - Funding programme meeting
- **Lessons learnt**
  - Unmet need for FGS capacity building and management at the sub-national level
  - Riding on the back of other programme activities to continue the crusade
- **Way forward**
  - District level training
  - Integration into other programme activities
  - Local resource mobilization for programme meetings

Acknowledgements

- ESPEN, WHO
- MAP-FGS / COR-NTD
- FAST PACKAGE
- GHS
- RHDs DHD

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THANK YOU

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FGS Initiatives in Malawi

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- Schistosomiasis a significant public health concern in Malawi (40-50% Prev.)
- FGS an emerging public health problem for women in schistosomiasis endemic areas
- Common in places where women use unsafe water for various household use.
- Recent study on FGS in Chikwawa and Nsanje districts = prev of 21.5% by clinical colposcopy

FGS ON THE MOVE!

On the 14th of October, Germany's Development Minister, Svenja Schulze, launched a new initiative ‘From Neglect to Action: Invest in Women, Invest in Health’ together with Khumbize Chiponda, Malawian Minister of Health, Dr Tedros Ghebreyesus, Director-General of the World Health Organization, and Dr Natalia Kanem, Executive Director of the UN Population Fund, at the World Health Summit in Berlin.

- MOH,GIZ, WHO and other Partners supporting an FGS initiative in Salima and Dedza districts.
- Goal: increase awareness & understanding of FGS among health care workers to improve treatment, management, care and support for FGS among vulnerable communities.

Progress:

1. Draft training Mannual Developed.
2. Trainings planned, to commence soon

Objectives:

1. Improve diagnostic & mgt skills of FGS in exposed women & girls.
2. Strengthen prevention & control strategies of STH including FGS
3. Increase awareness & knowledge of FGS in women & girls to improve health seeking behaviour
4. To monitor, evaluate and report progress on FGS interventions

Call for Action:

More support through donors and partner collaboration needed to expand the initiative to more high Schistosomiasis burden districts where such initiative is not happening

Thank you!

THE NTD PROGRAMME MANAGERS MEETING

"Innovating for acceleration: Pathways to NTD Elimination"

#2025NTDPMM #EndingNTDs
#EndingDiseasesInAfrica

Bilharziose génitale feminine en Côte d'Ivoire

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Session 10.3: Visceral Leishmaniasis Elimination Efforts - VL Active case finding and VL Theory of Change

Goal:

1. To share experiences on NTD innovation efforts to enhance visceral leishmaniasis (VL) elimination through implementation of active case finding in remote location in Uganda.

2. To present the theory of change (TOC) for VL elimination; share requirements and discuss the synergies, linkages, challenges and the way forward to meet the **VL elimination** goals.

Presentations:

- **Dr Ivan Ankunda (PM, Uganda):** VL active case finding - The Mobile Mentor Team Approach.
- **Dr Duncan Ochol (END Fund)**: Operationalization of VL Elimination Framework/VL Elimination TOC.

Presenters

Dr Ivan Ankunda is Senior Medical officer, Division of Vector Borne and Neglected Tropical Diseases, Ministry of Health, Uganda. His Current roles are Leishmaniasis and Skin NTD Focal point, NTD M&E Focal point. Prior to this, he worked in NTD program and responsible for overseeing and coordinating National leishmaniasis and Skin NTD program, directly coordinating and supporting Vector Borne and NTD M&E activities.
He holds Bachelors of Medicine and surgery, Masters of Public health, Post graduate diplomas (M&E and Project planning and Management).

Duncan Ochol holds PhD in epidemiology and Masters of Public Health. Hei is currently the **Senior Director, Programs for VL initiative in East Africa** at the END Fund. Prior to joining the END Fund, he served as **Program Director** for the Interchurches Medical Assistance World Health (IMA) in South Sudan and **Country Lead** for ASCEND Project in Kenya for VL, and also contributed for the **primary health care, reproductive health and HIV/AIDS programs**, and also served as **NTD focal point for the WCO-South Sudan**. Duncan played leading roles in control and management of NTDs: VL, HAT, LF and schistosomiasis.

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VL ACTIVE CASE FINDING:THE MOBILE TEAM APPROACH

DR IVAN ANKUNDA

LEISHMANIASIS AND SKIN NTDs FP, NTD M&E FP

DVBNTDs, MOH UGANDA

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Typical homesteads in Karamoja

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Map showing VL endemic districts/ implementation units

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Summary……1

- Karamoja sub-region in North-Eastern Uganda is highly endemic for Visceral leishmaniasis (09 districts) with likely ongoing transmission along neighboring districts
- 1.4 million people at risk with about 70% residing in remote rural areas.
- Largely nomadic community, semi-arid with one peak rainy season, insecure, marginalized population with highest poverty index in the country
- Poor health seeking behaviors , illiteracy and cultural norms have negatively impacted health status of communities in this region.

Summary……2

- 136 peripheral Health facilities across the 09 endemic districts and currently 04 treatment centres(Amudat, Moroto, Matany and recently Kaabong Hospitals) provide both VL diagnostic and treatment services.
- Currently 70 health facilities get support from END FUND project on VL diagnosis and referral services but there are plans to scale up to all facilities to achieve integration of VL services into routine health care.
- There is inadequate information on the prevalence, burden and spatial distribution of the disease- No baseline mapping has been done
- Average distance from the nearest health facility is 20-30kms and > 100kms for referral /treatment centres.
- Malaria endemic localities do overlap with VL endemic areas.(At National level, Karamoja subregion has one of the highest prevalence of malaria at 34% and one of the highest case fatality rates in children under 5 years)

Summary……3

- Coordination mechanism for Leishmaniasis response
  - National leishmaniasis technical working group
  - Leishmaniasis East African Platform(LEAP)

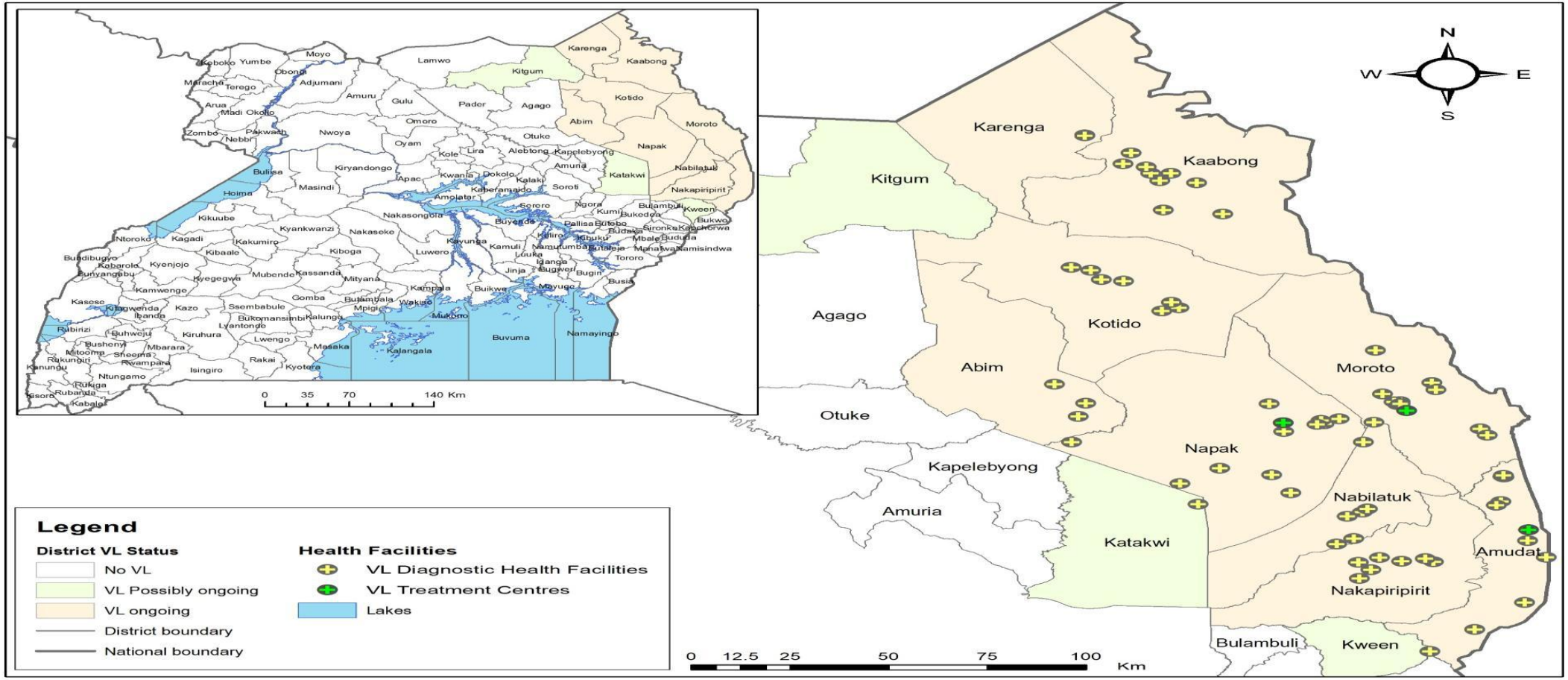
- Existence of leishmaniasis national strategy:
  - Not specifically but VL is included in the Uganda NTD Master Plan (2023-2027),NTD Strategic Plan
  - Guidelines for the diagnosis, treatment and prevention of Visceral Leishmaniasis 2019 (PDF format, not yet in URL link)
  - VL is also included in the following:
    - Uganda NTD M&E plan (2021-2025)
    - Uganda Sustainability plan for NTD control program (2020-2025)

  - Mentioned in other strategic documents:
    - Health Sector Strategic Plan III (2020/21 – 2024/25)
    - National Development Plan III (2020/21 – 2024/25)
    - Cabinet Information Paper CT … (2022): Neglected Tropical Diseases Situation and Recommendations to Manage Neglected Tropical Diseases by the Hon. Health Minister **(Advocacy for increased political commitment and domestic resources to NTDs)**

Summary……3

District	Subcounties	Parish	Villages	Estimated population	Number of Households	Average household size
Moroto	09	42	252	228,800	25,991	3.9
Amudat	11	44	428	157,800	42,009	4.8
Kotido	19	77	519	223,900	44,716	4.9
Kaabong	19	85	455	137,100	33,326	6.5
Napak	14	57	346	168,700	41,036	5.1
Nabilatuk	06	26	112	107,100	26,992	4.9
Nakapiripirit	09	36	209	133,200	26,003	4.2
Abim	16	72	568	193,600	38,921	3.7
Karenga	10	37	228	124,800	19,116	5.5
	113	476	3,117	1,475,000		

Map showing VL diagnostic and treatment centers



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VL ACTIVE SURVEILLANCE STRATEGY

Previously it was thought most cases in Uganda were imported from Kenya into Amudat and Moroto districts and that other district had no VL.

- A blanket approach strategy was applied to prove the allegation as follows:
  i. Advocacy and training of trainers was done in each district
  ii. Some health workers at least 02 in some of the facilities trained on VL signs, diagnosis, treatment, prevention and referral
  iii. At least 2 VHTs per parish trained on signs, sensitization of communities, case identification and referral to nearest health facility
  iv. It was expected that any existing cases would be identified by VHTs, referred to HF, confirmed, others identified from outpatients, and all referred to treatment center
  v. The case would be treated but technical team would visit home of the case and do index case search

  The approach did not improve number of cases identified leading us to introduce reward system earlier successful in Guinea worm elimination, but this too did not work

MOBILE MENTOR TEAM APPROACH FOR ACF

- VL historical data analyzed, endemic villages linked to respective districts identified.
  - Notably all 09 districts had presented VL cases in Amudat treatment centre.
- Mobile mentor team case identification from endemic villages and nomadic groups was added to the strategy
- Each mobile team is armed with a list with names of endemic villages to be visited, health facilities, Nomads map, etc) but also cases have been identified in new villages (ongoing transmission)
- Community sensitization by trained local VHT and on radio talk shows and jingles, done before actual case screening conducted by mobile mentor teams
- Questionnaire: electronic mobile app to record demographic information, history of travel in the last 6 months, signs and symptoms and risk factors.
- GPS coordinates of each VL cases identified are captured
- Index case testing immediately done to obtain other cases within the same homestead or village
- Established Referral system between endemic areas and the treatment centre

MOBILE MENTOR TEAM APPROACH FOR ACF

- To ensure effectiveness of this model, a holistic approach should be utilized through synergizing efforts from other relevant activities i.e.
  - ➢ Intensified community sensitization and mobilization
  - ➢ Integration of VL activities with other NTD activities e.g. MDA
  - ➢ Prompt coordination and support supervision by district health team
  - ➢ Regional data quality and performance review meetings
  - ➢ Capacity building of health workers, village health teams , Biostaticians and HIAs

- Active surveillance conducted with support from the EndFund reported a three-fold increase of total number of cases reported in 2021 and 2022. With limited epidemiological information it is not known whether this increase is a result of improved case detection or they are an outbreak of the disease.

Mobile teams:

each team composed of Medical doctor/clinical officer (Clinical training) and Lab tech/assistance (Laboratory training) or Community health workers

Mobile Team 1: Provision of supplies and on-the-job training to health facilities plus active case search

Ambulance will transfer any positive case to nearby VL centre.

Self-referral and reimbursement for patients in remote area

Mobile team 2: Operating in Nomad camps (LNOB) to assess, test and refer any suspected cases to nearby treatment centres.

Immediate transfer of any positive/suspected cases to nearby centre

All teams will provide health education for health facility staff, community in the villages and Nomad community

All identified VL cases are immediately assessed and started on treatment

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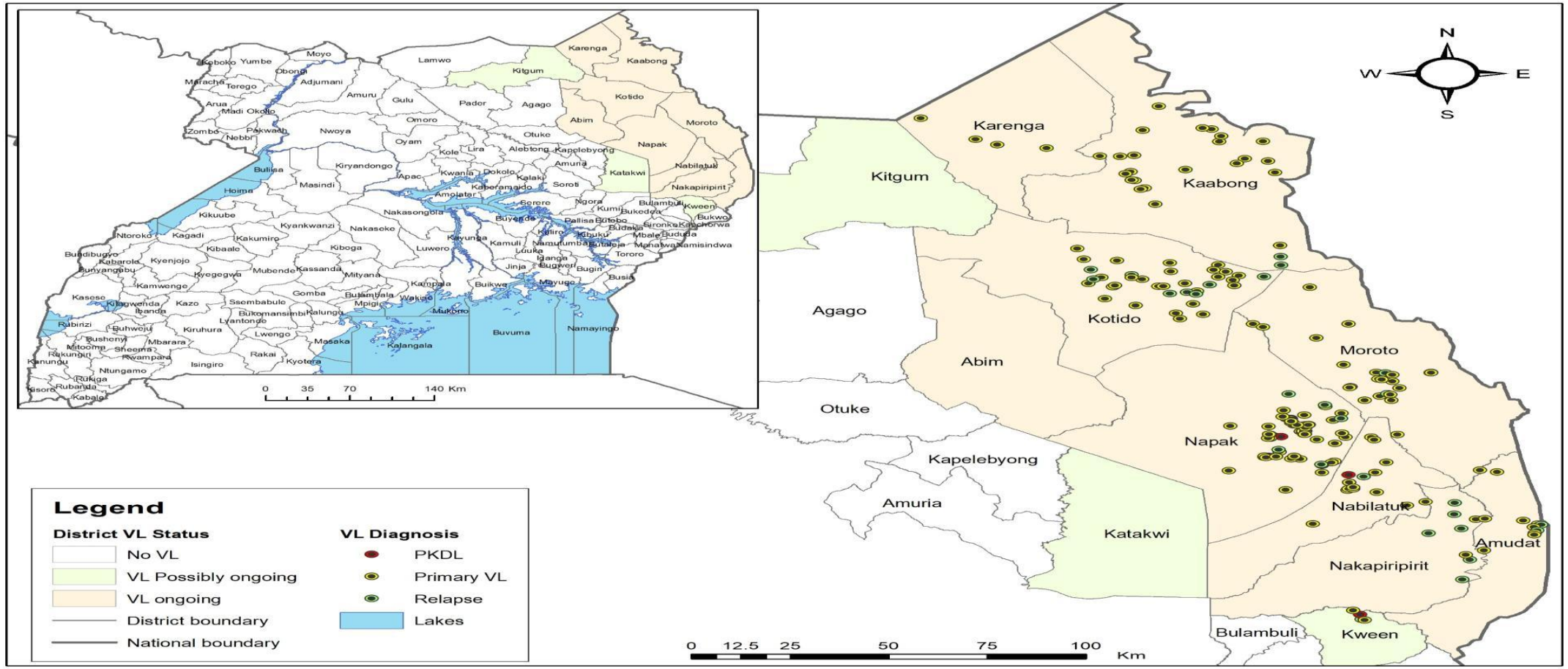
Map showing VL Case distribution



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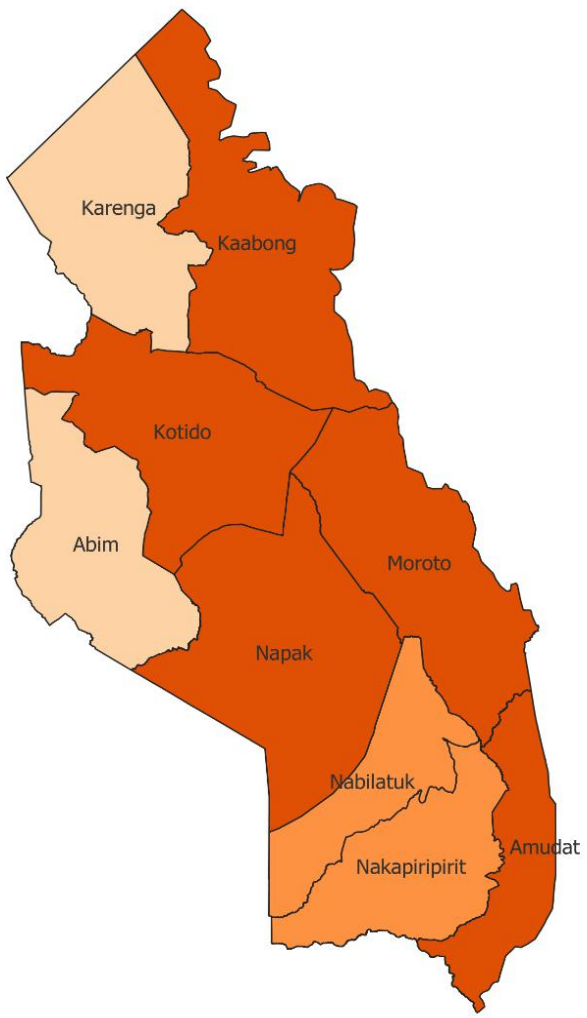
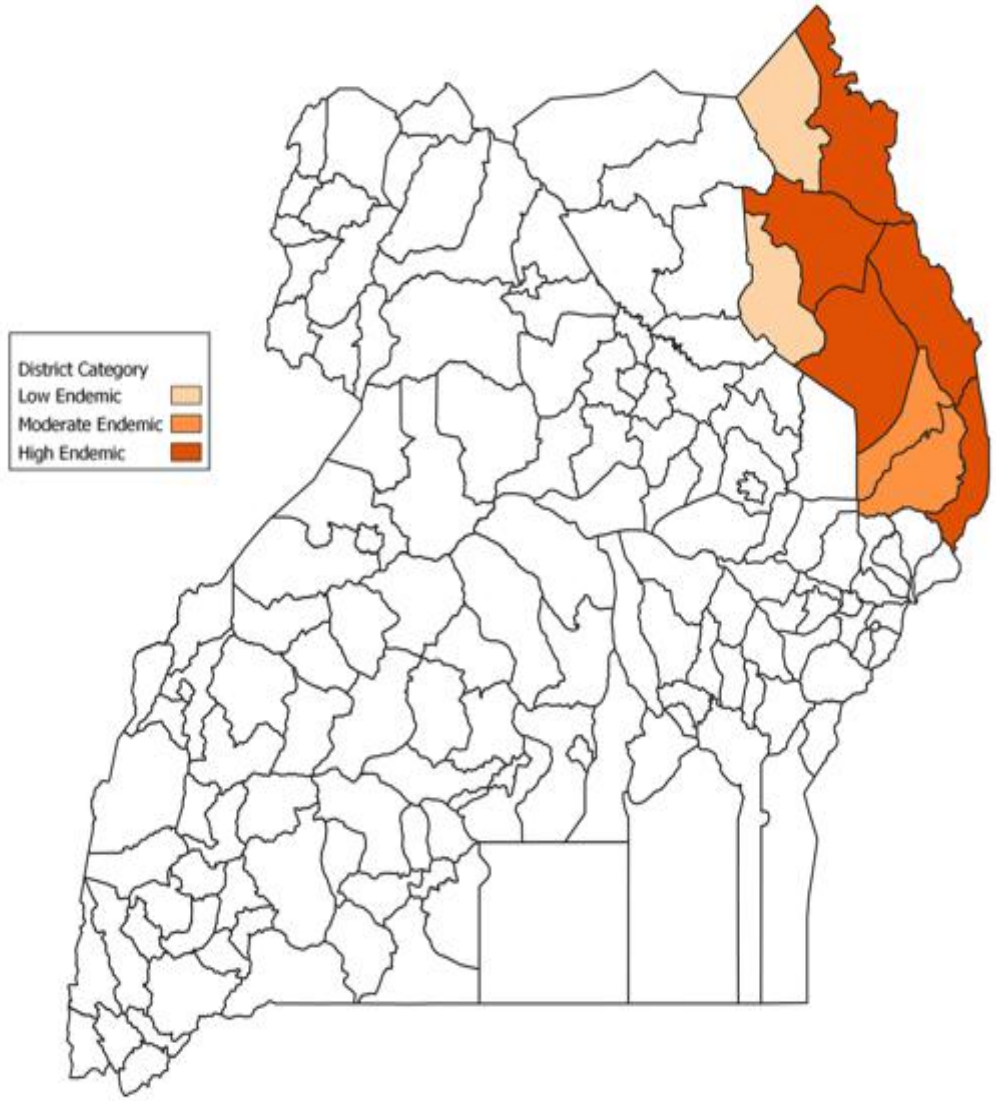
VL Endemic Districts in Karamoja



District Category
Low Endemic
Moderate Endemic
High Endemic



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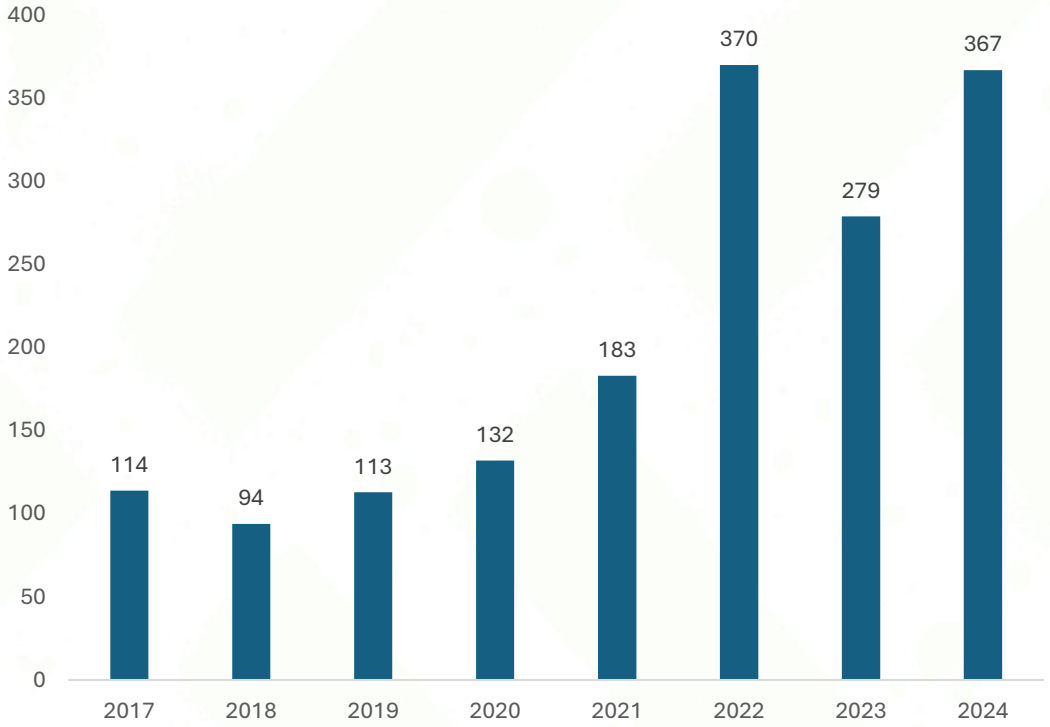
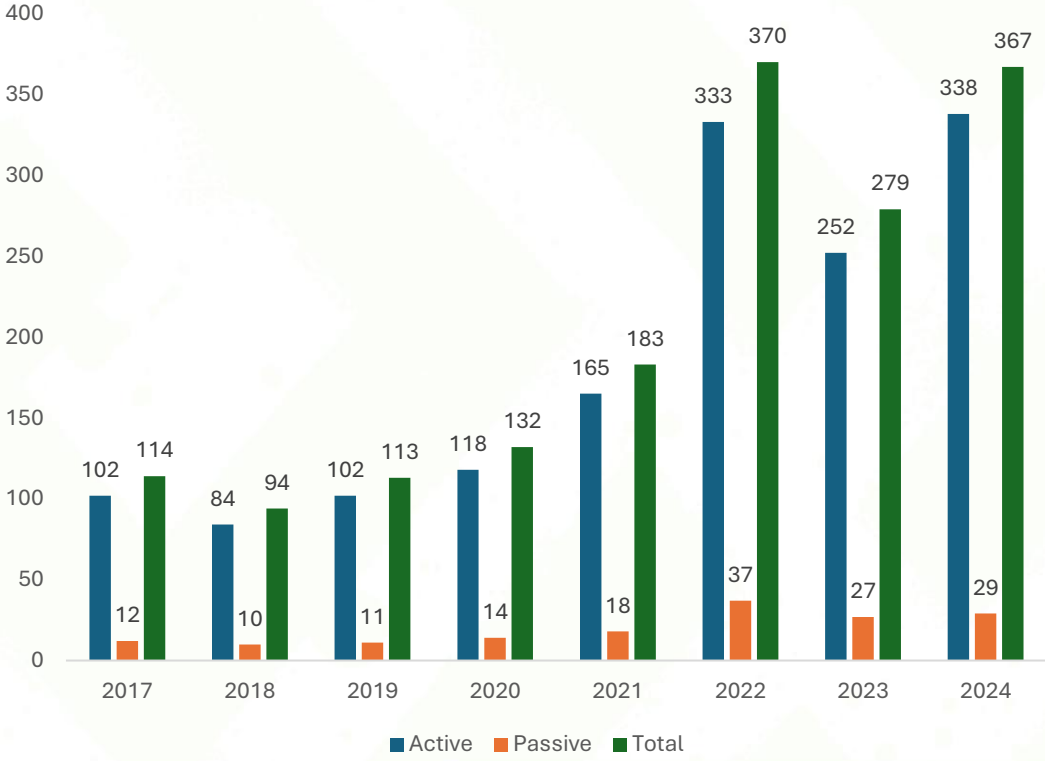
VL DATA

Annual VL Caseload(2017-2024)



Total VL Cases Vs Active/Passive Surveillance(2017-2024)



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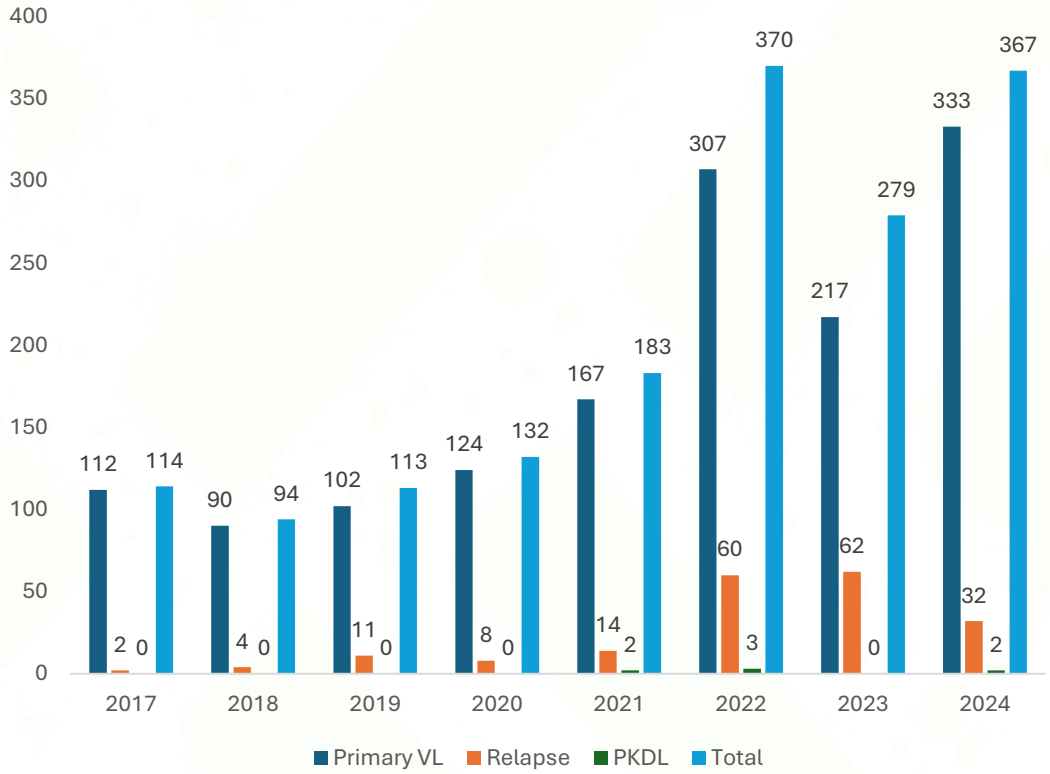
VL DATA

VL cases by Type(2017-2024)



VL Cases followed up after 6 months

	2017	2018	2019	2020	2021	2022	2023	2024
VL cases followed up	NA	NA	NA	NA	NA	58	42	83
% cases followed up	NA	NA	NA	NA	NA	15.7%	15.1%	22.6%
Total VL Cases	**114**	**93**	**110**	**132**	**183**	**370**	**279**	**367**

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Lessons learnt/Success

- Three fold increase in the number of VL cases identified and treated despite having a low geographical coverage
- Number of new endemic foci (from 120 to > 400 new endemic villages)
- Early identification of VL cases shortening duration of symptom onset to treatment
- VL case geolocation- support providing data for current epidemiological mapping and change in VL trends across the endemic districts
- Reduction in case fatality rate from baseline at >3% to 1.5% for VL cases identified and treated
- Supported continuous onjob mentorships for health workers and VHTs at peripheral facility level

Lessons learnt/Success

- Provides opportunity for integration with Malaria, HIV screening
- Improved access to VL services by creating demand for more treatment and diagnostic centers
- Improved patient follow up at 6 months (from 0% to 30%)
- Strengthened IDSR reporting for VL cases within DHIS2 since there is weekly update for VL cases identified
- Better treatment outcomes for VL and PKDL especially that cases are identified early
- Mobile and Migratory populations(MMDPs) targeted
- Improved SBCC coverage(community dialogue meetings, community awareness, distribution of IEC materials)

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Acknowledgement

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Operationalization of VL elimination framework/VL Theory of Change

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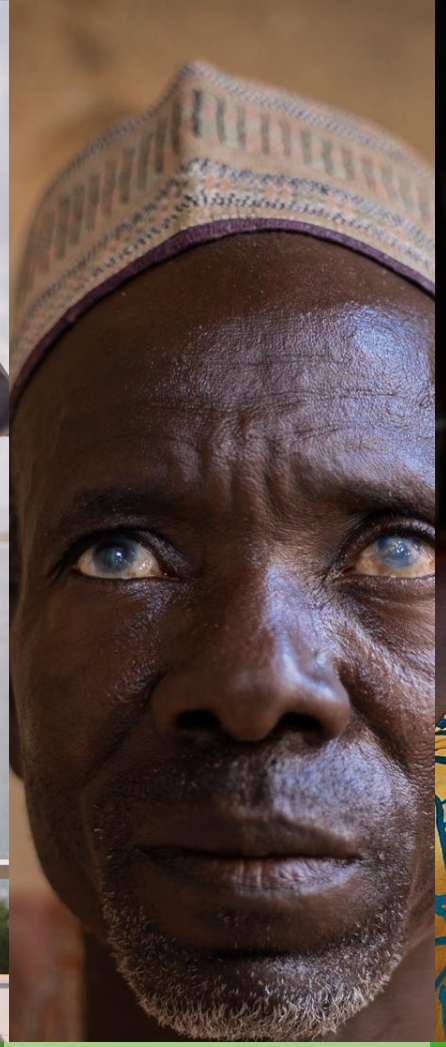
Presenters

Ivan Ankunda has … years of experience working on neglected tropical diseases (NTDs), in Uganda. Since …., he has been working at ……, initially with ……leishmaniasis programme, and since 2020, including skin NTDs, …….

Duncan Ochol is

MOST COMMON NTDS



Intestinal Worms

1.7B People Require Treatment

Lymphatic Filariasis

892M People Require Treatment

River Blindness

217M People Require Treatment

Schistosomiasis

229M People Require Treatment

Trachoma

177M People Require Treatment

Visceral Leishmaniasis

700K - 1M People Require Treatment Annually

The VL program supported by the END Fund

- The END Fund supports VL control and elimination activities in five countries: Ethiopia, Kenya, South Sudan, Sudan and Uganda
- The key investors are the ELMA Philanthropies, the Children Investment Fund Foundation (CIFF) and UBS bank

Goal

- To contribute to the global target to eliminate VL as a public health problem

Objectives

- To ensure delivery of VL diagnosis, treatment and management in all endemic regions
- To reduce case fatality rate due to VL <1% (WHO elimination target) and meet regional targets
- To ensure government ownership of the VL elimination program
- To promote regional collaboration and coordination of VL elimination activities

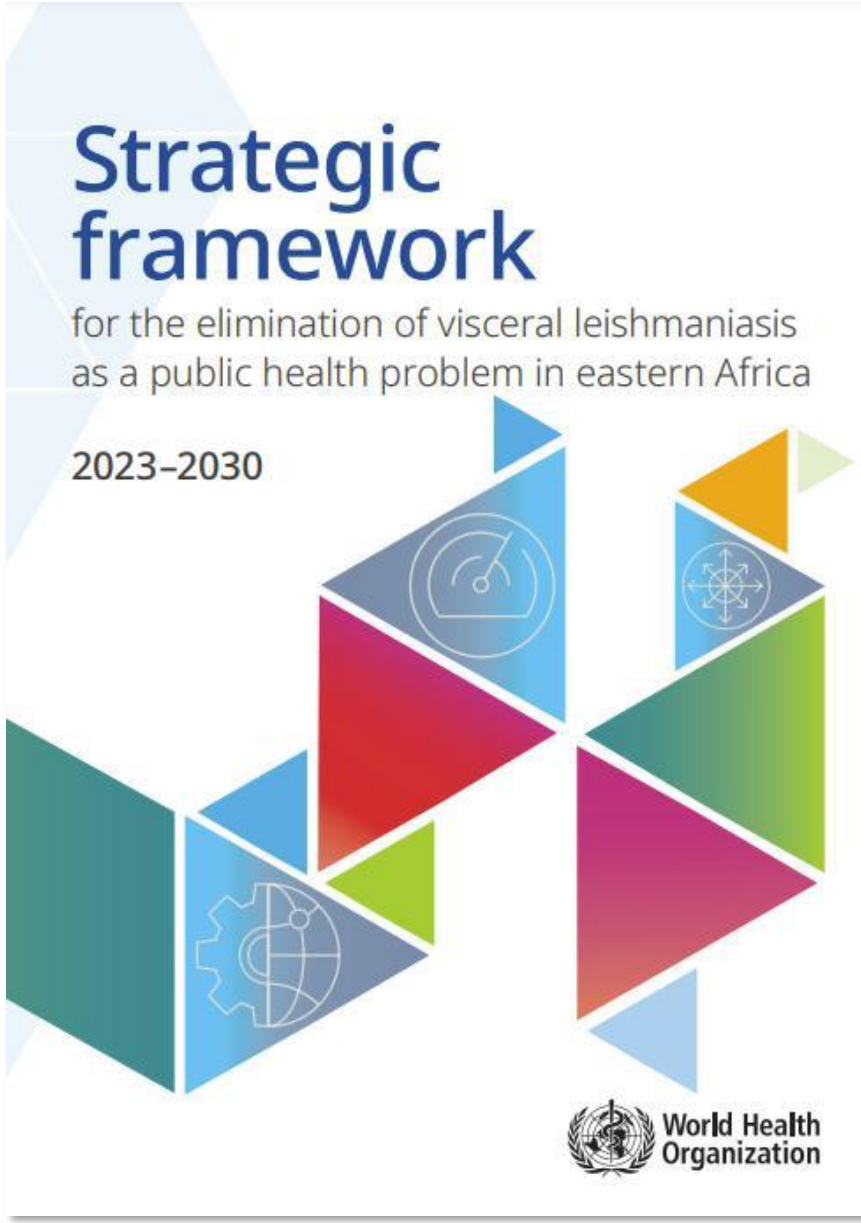
VL elimination Strategic framework

Goal:

- **Improving the health status of the vulnerable at-risk population by eliminating VL as a public problem.**

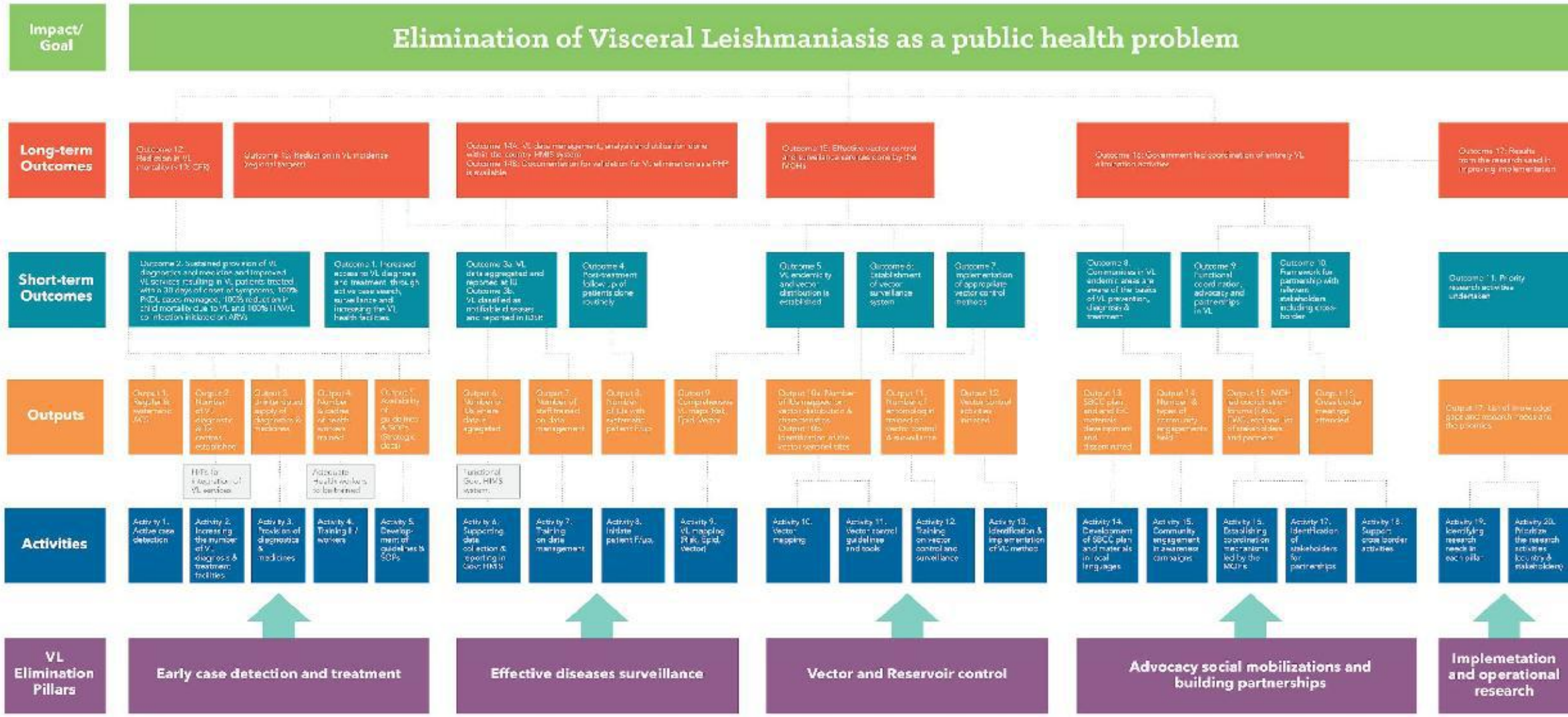
Strategic interventions (pillars)

1) Early case detection and complete treatment
2) Effective disease surveillance
3) Vector and reservoir control
4) Advocacy, social mobilization and building partnerships
5) Operational and implementation research



The importance of Theory of Change

- The strategic framework for elimination of VL as PHP in E. Africa was launched in June 2024 and currently in the preparatory phase
- To provide a road map for planning, implementation and evaluation of the elimination activities
- To demonstrate the linkages of the different interventions required to meet the elimination goal
- To assist countries in designing the VL elimination programs and evaluate the effectiveness
- To identify the gaps in interventions and the subsequent use of the evidence for advocacy.


Impact/ Goal
Elimination of Visceral Leishmaniasis as a public health problem
Long-term Outcomes
Short-term Outcomes
Outputs
Activities
VL Elimination Pillars
Early case detection and treatment
Effective diseases surveillance
Vector and Reservoir control
Advocacy social mobilizations and building partnerships
Implemetation and operational research

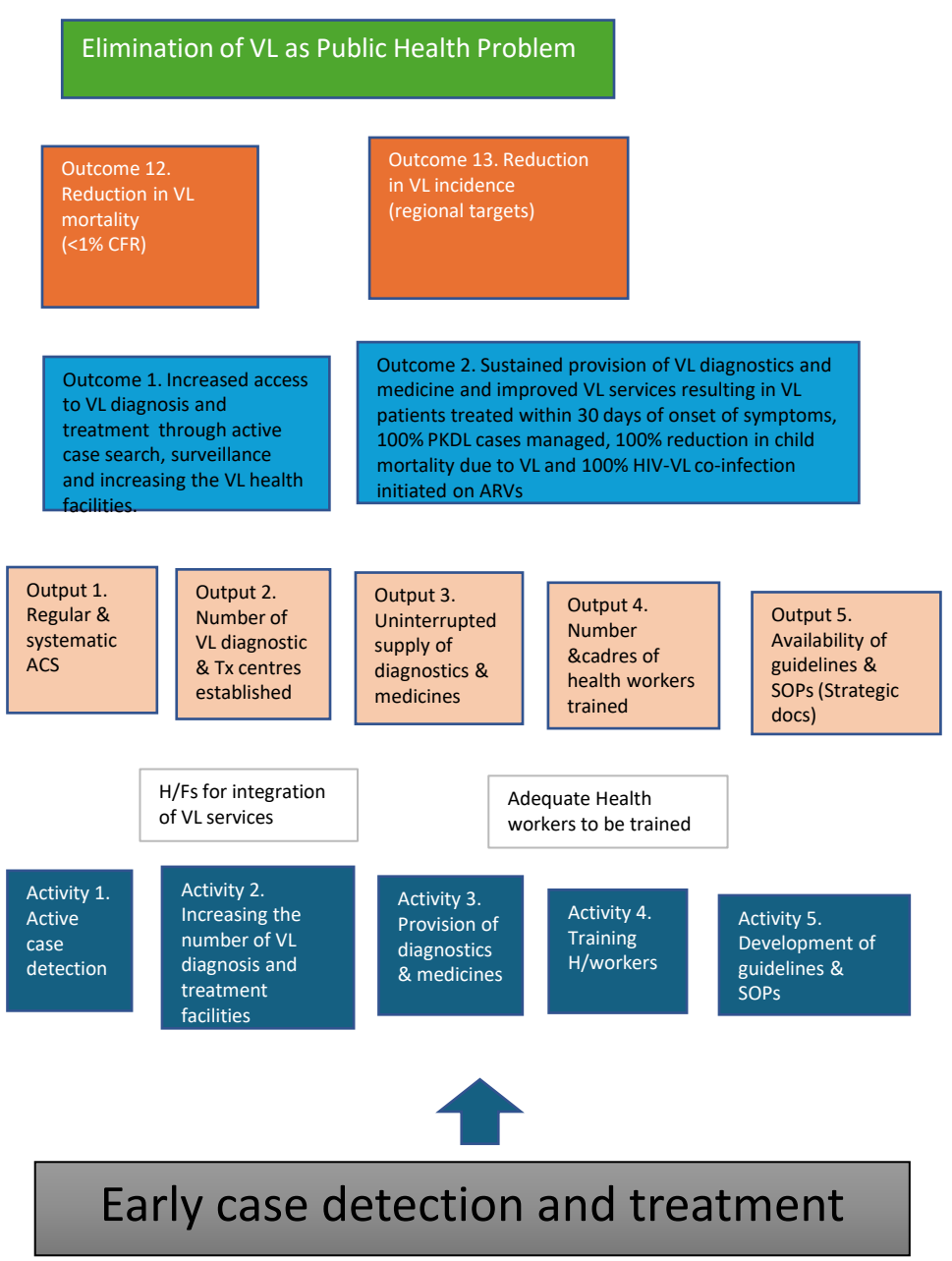
Early case detection and treatment

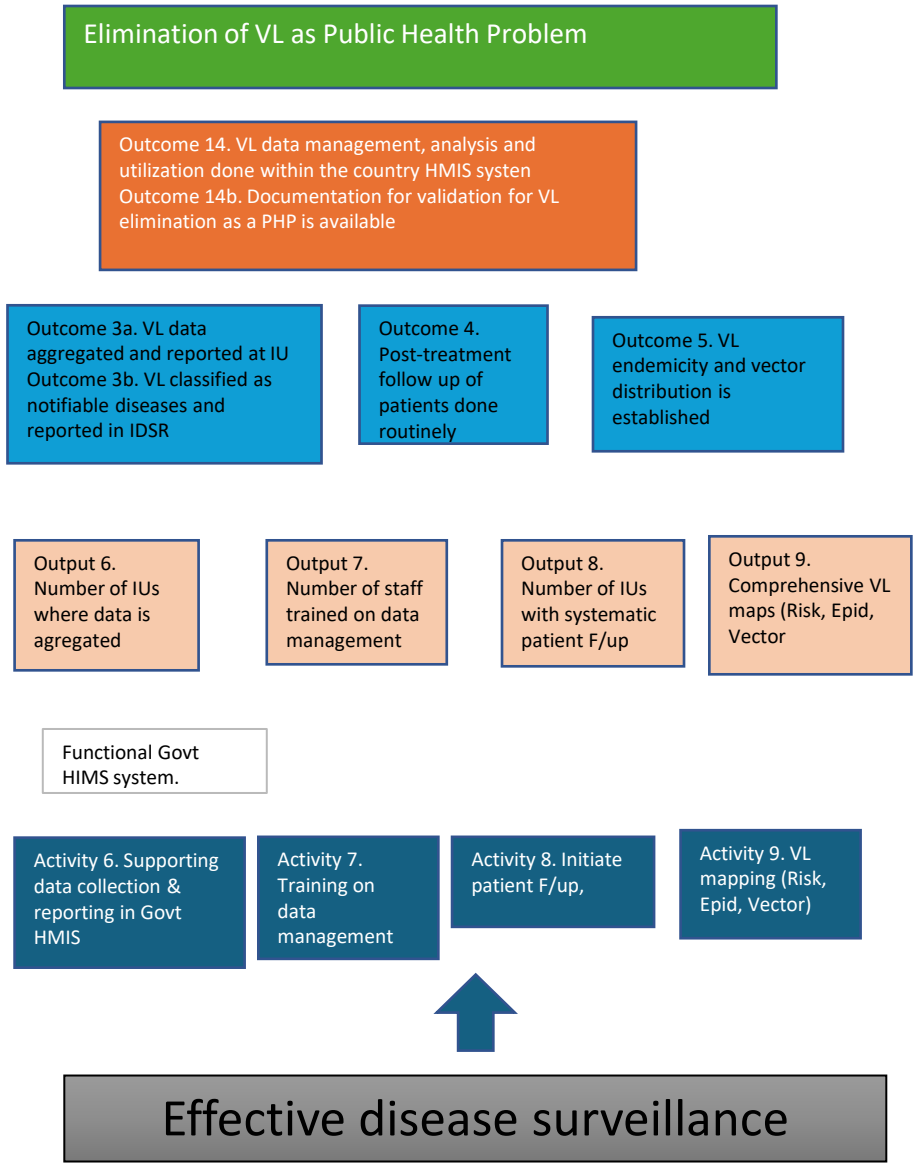
Key Activities

- Procurement of diagnostics and medicines to ensure uninterrupted supply.
- Active case search and enhanced passive case detection
- Integration of VL services in the primary health care
- Development of guidelines and SOPs and training of health workers to standardize diagnosis and treatment and improve the quality of care

Outcomes

- Reduction in incidence of VL and meeting the regional targets
- Reduction in CFR





Effective diseases surveillance

Key activities

- Provision of data collection, collection and analysis tools and training
- Integration of VL data into the country HMIS
- Aligning reporting requirements with the WHO and national standards
- Monitoring the disease trends and patient outcomes

Outcomes

- Early detection of upsurges and outbreaks and effective response
- Comprehensive data management and utilization at the various levels

Vector and Reservoir control

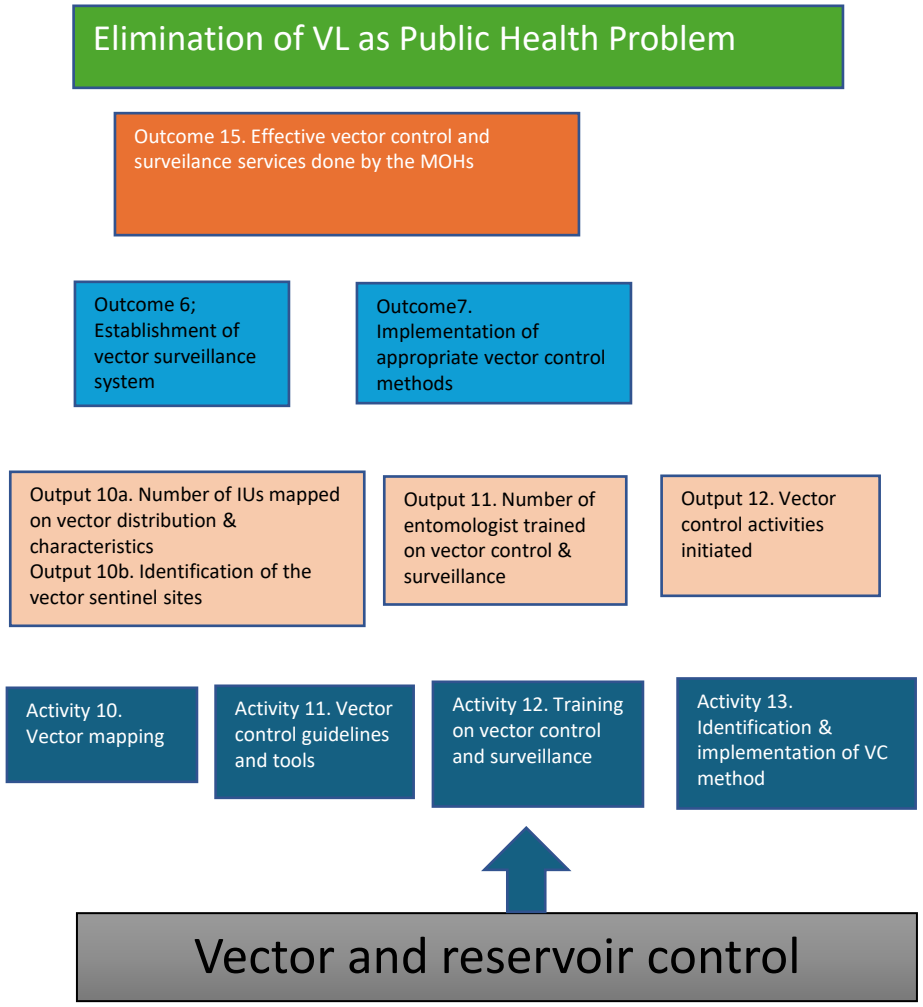
Pillar 3

Key activities

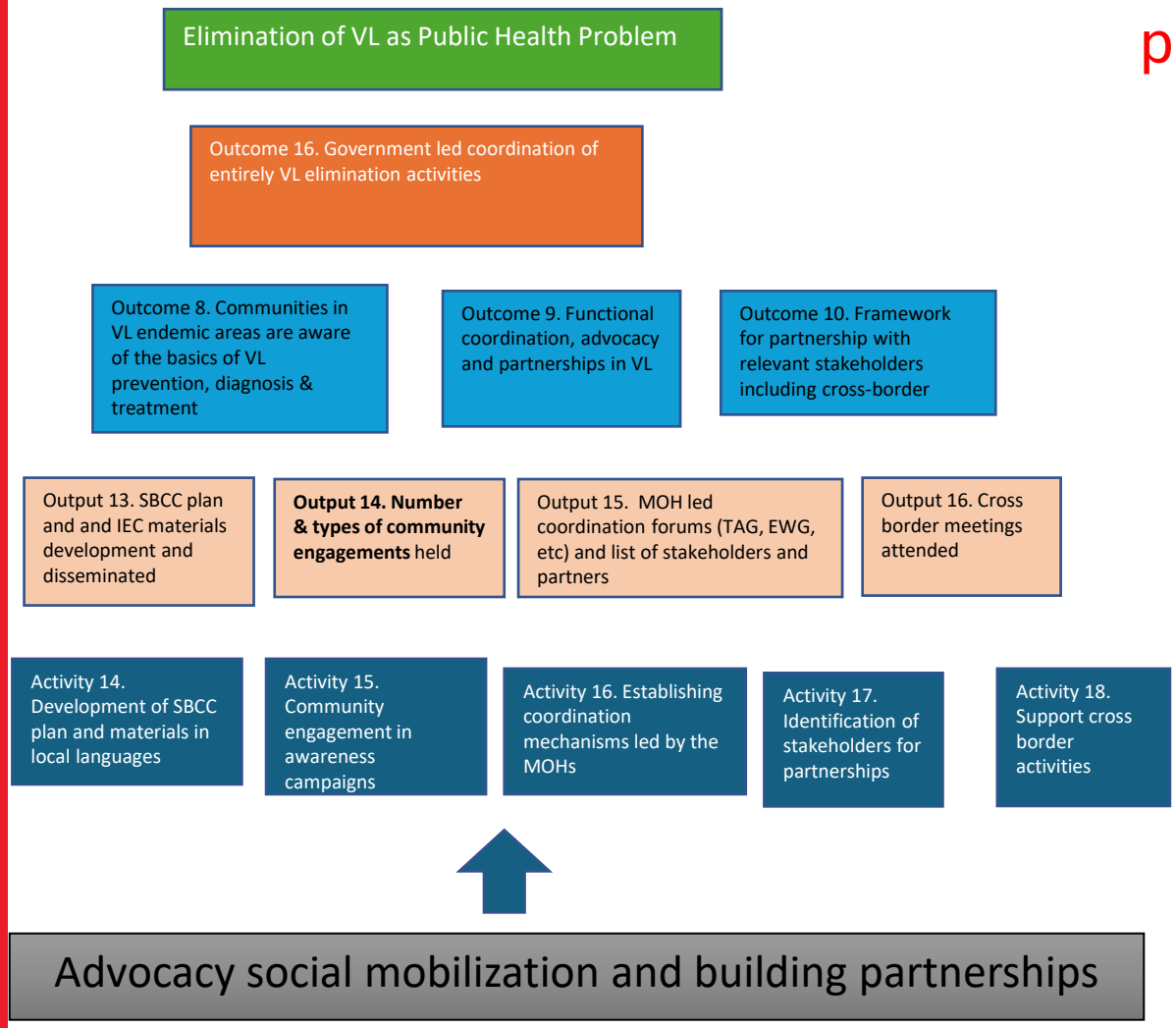
- Mapping for vector presence, distribution and infectivity
- Development of country specific vector control guidelines and tools
- Identification of the most appropriate vector control methods, implementation of the vector control methods
- Establishing vector surveillance system

Outcomes

- Effective vector control and surveillance system



Pillar 4



Advocacy social mobilizations and building partnerships

Key activities

- Advocacy for elimination and coordination of the activities
- Partnerships and information sharing
- Cross-border activities
- Social and behaviour change communication to address the misconception about VL and improve health seeking behaviour.
- Development of advocacy and partnership frameworks and SBCC materials

Outcomes

- Coordinated VL elimination activities

Pillar 5

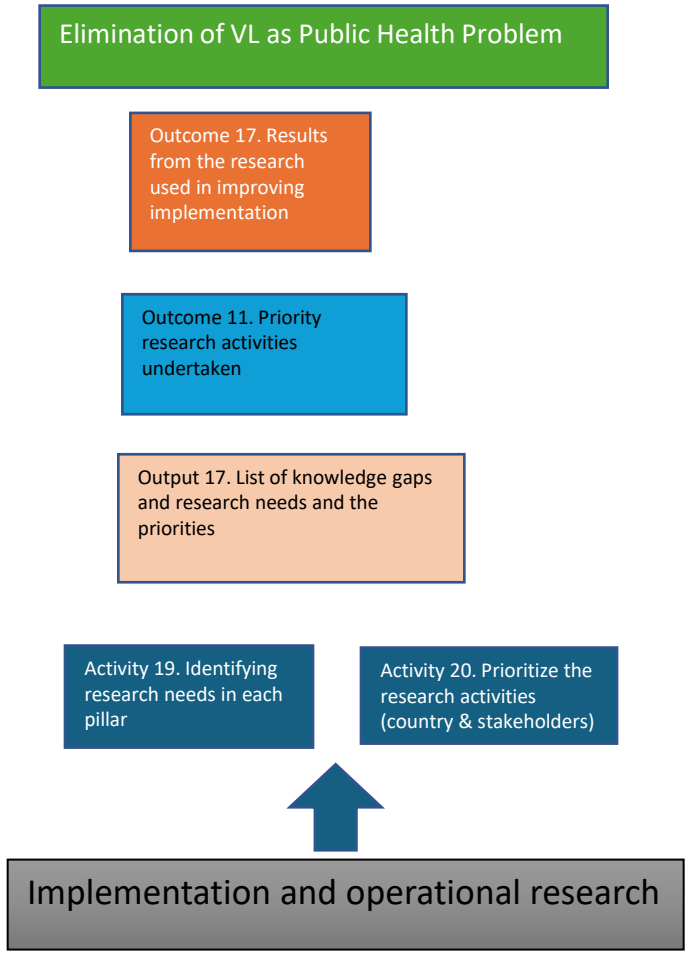
Implementation and operational research

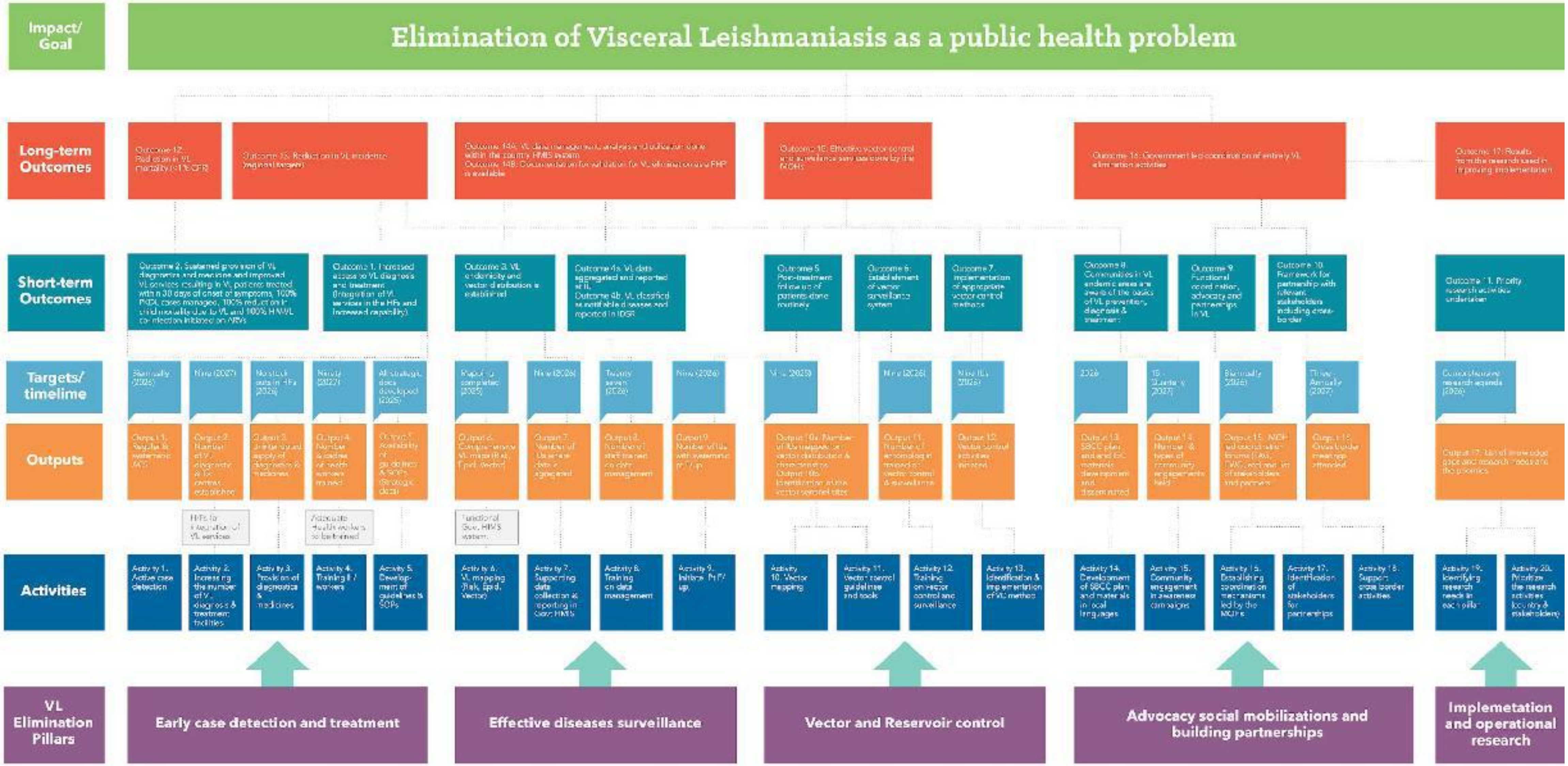
Key activities

- Identifying research gaps and research needs
- Conducting relevant research activities e.g. mapping, modeling
- Impact assessments of the various interventions
- Analysis is routine and other available data to produce new knowledge for improving program implementation

Outcomes

- Improved implementation of the VL elimination activities




Impact/ Goal
Elimination of Visceral Leishmaniasis as a public health problem
Long-term Outcomes
Outcome 12: Reduction in VL mortality (<1% CFR)
Outcome 16: Effective vector control and surveillance services done by the MOHs
Outcome 17: Results from the research used in improving implementation
Short-term Outcomes
Outcome 1. Increased access to VL diagnosis and treatment (Integration of VL services in the HFs and Increased capability)
Outcome 3. VL endemicity and vector distribution is established
Outcome 5. Post-treatment follow up of patients done routinely
Outcome 6. Establishment of vector surveillance system
Outcome 7. Implementation of appropriate vector control methods
Outcome 9. Functional coordination, advocacy and partnerships in VL
Outcome 10. Framework for partnership with relevant stakeholders including cross-border
Outcome 11. Priority research activities undertaken
Targets/ timeline
Outputs
Activities
Activity 1. Active case detection
Activity 2. Increasing the number of VL diagnosis & treatment facilities
Activity 3. Provision of diagnostics & medicines
Activity 4. Training HF workers
Activity 5. Development of guidelines & SOPs
Activity 6. VL mapping (Risk, Epid, Vector)
Activity 7. Supporting data collection & reporting in Govt HMIS
Activity 8. Training on data management
Activity 10. Vector mapping
Activity 11. Vector control guidelines and tools
Activity 12. Training on vector control and surveillance
Activity 13. Identification & implementation of VC method
Activity 14. Development of SBCC plan and materials in local languages
Activity 15. Community engagement in awareness campaigns
Activity 16. Establishing coordination mechanisms led by the MOHs
Activity 17. Identification of stakeholders for partnerships
Activity 18. Support cross border activities
Activity 19. Identifying research needs in each pillar
Activity 20. Prioritize the research activities (country & stakeholders)
VL Elimination Pillars
Early case detection and treatment
Effective diseases surveillance
Vector and Reservoir control
Advocacy social mobilizations and building partnerships
Implemetation and operational research

Conclusion

- Partnerships, collaboration and coordination is required for effective implementation of the strategic interventions
- Elimination of VL as a public health problem is possible in eastern Africa

Questions


THE END FUND

End of Day 2

Merci Beaucoup!

Don’t forget to

Scan the Code to Register

World Health Organization
African Region

ESPEN EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Kuwait Fund For Arab Economic Development

THE END FUND ENDING NEGLECTED DISEASES