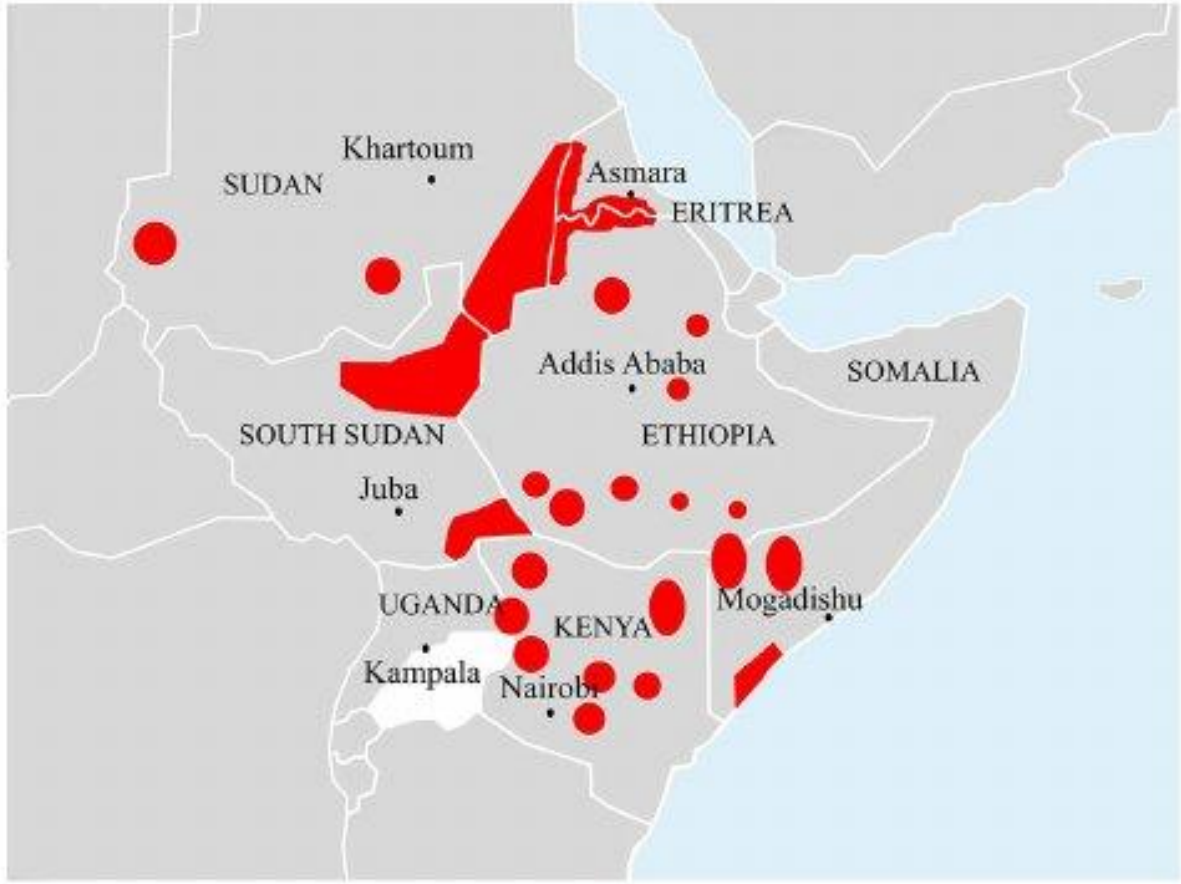
Strengthening Surveillance of Leishmaniasis in Uganda and Kenya through a Collaborative Multisectoral One Health Capacity Building Approach in Endemic foci.

Introduction

- Leishmaniasis, caused by a unicellular protozoan *Leishmania* spp. parasites
- Transmitted by the bite of infected female phlebotomine sandflies
- Annually, an estimated 700,000 to 1 million new cases are reported (WHO, 2023) in 79 countries.
- East Africa region remains the most affected by VL, accounting for 72% of cases globally
- VL is endemic in Uganda, Kenya, Eritrea, Ethiopia, South Sudan, Sudan, and Somalia
- Uganda & Kenya still account for 15 % of the global cases



Introduction

- VL endemic in Karamoja region of Uganda, Pokot and Turkana region of Kenya. Cross border cases
- Target to eliminate visceral leishmaniasis as a public health problem by 2030 (WHO 2021-2030 neglected tropical disease road map)
- October 2023, VL endemic East African countries developed a strategic framework detailing strategy toward disease elimination
- Weak surveillance, reporting, low multisectoral engagement, & cross-border surveillance.

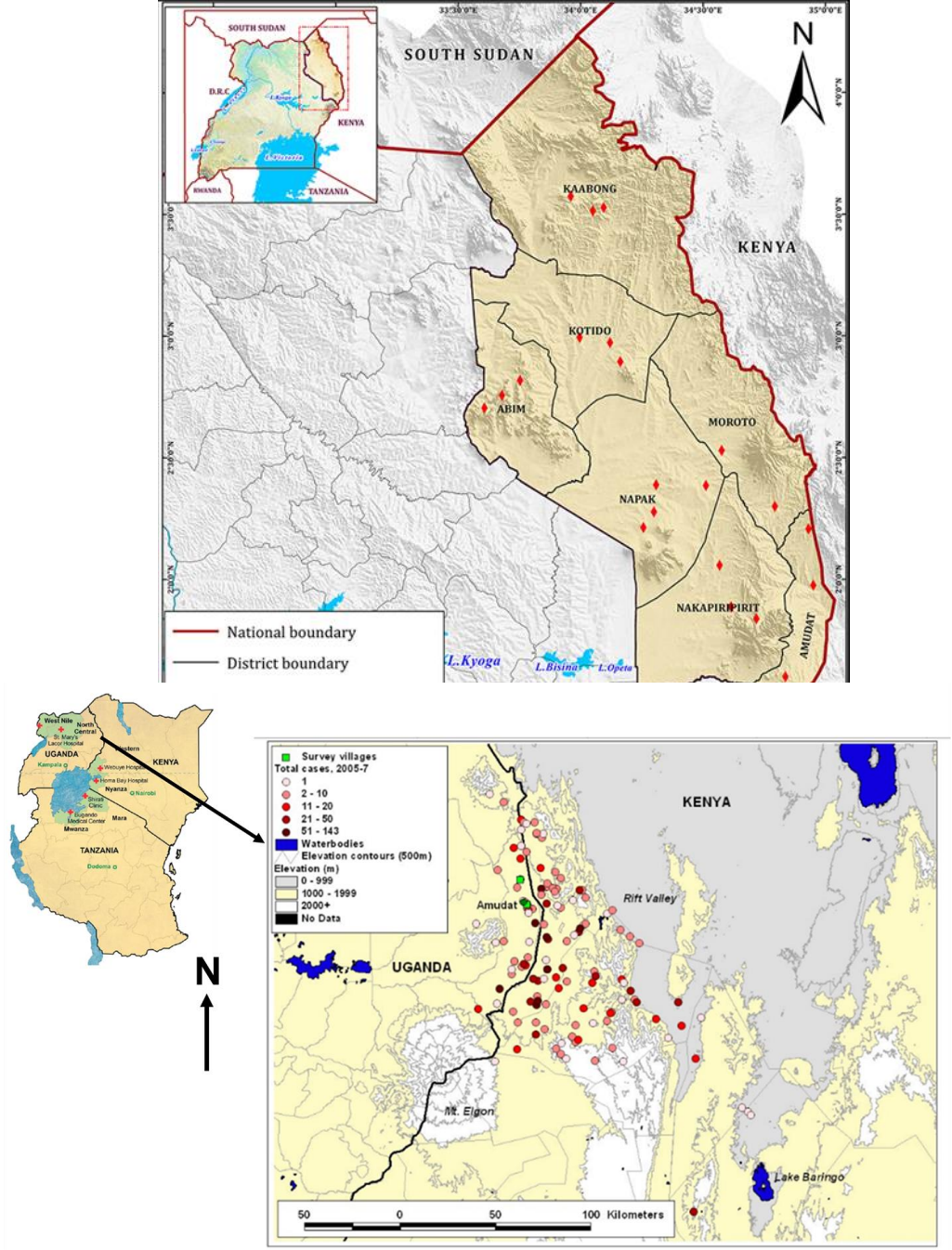
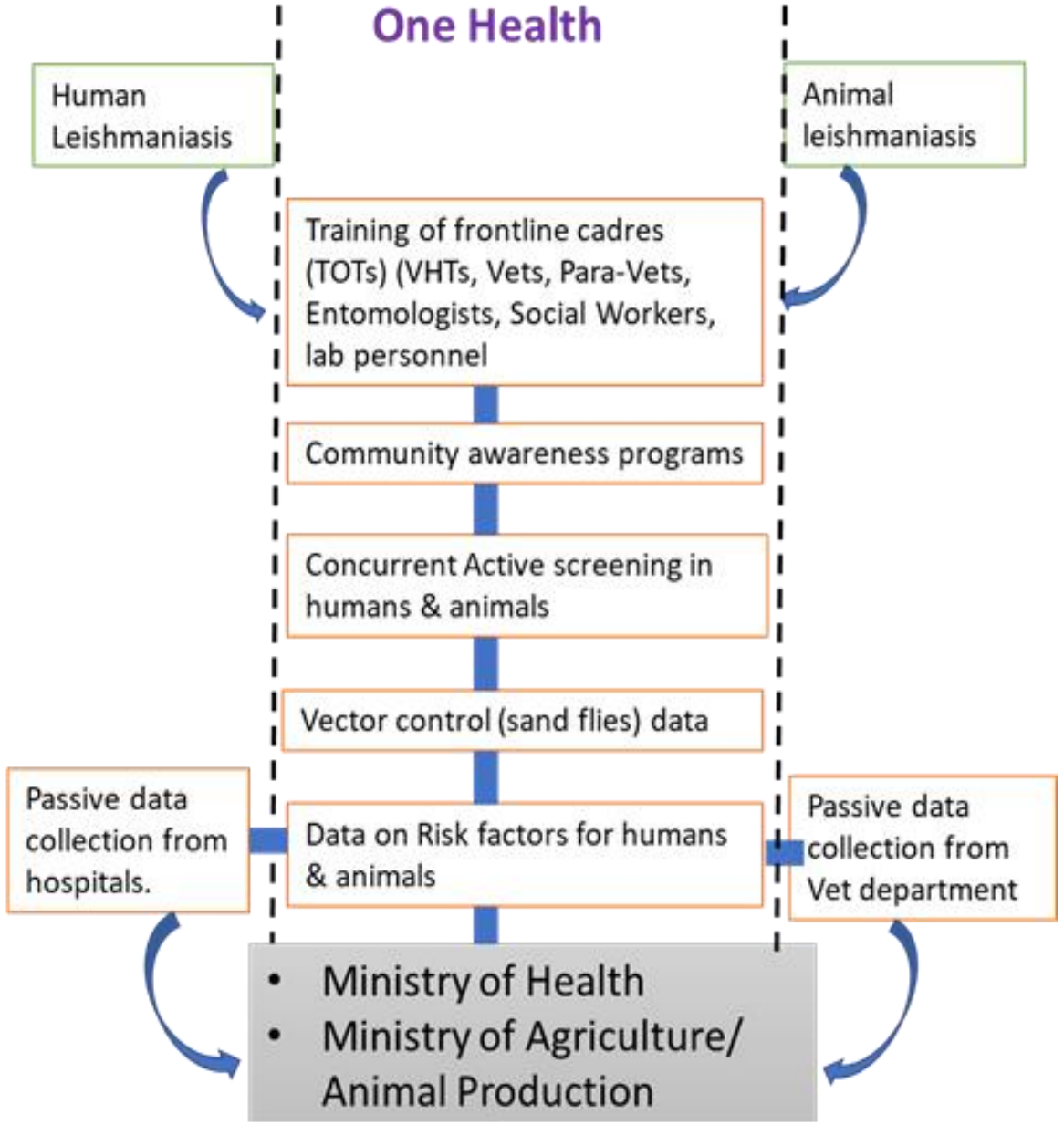


Figure 1: *Mapping showing cross-border endemic foci in Uganda and Kenya recorded at Amudat hospital, Uganda, 2005-2007 (Malaria Consortium, 2010).*

Objectives

1. Build capacity of frontline workers in Uganda & Kenya to execute leishmaniasis surveillance & reporting through one health competencies.
2. Carry out a spatial & temporal mapping of leishmaniasis hotspots & decipher the risk factors associated with the disease within endemic foci.
3. Strengthen surveillance & reporting of leishmaniasis data within line ministries and across the border.
4. Strengthen multisectoral & cross border surveillance for enhanced reporting & knowledge sharing.

Methodology



- The project was launched on the **17th of February, 2023** at Makerere University

Community engagement

- Meeting with multidisciplinary stakeholders and political heads

(Moroto and Amudat)

- Visit to kala-azar treatment facilities (Moroto and Amudat hospitals)

Objectives

1

Build capacity of frontline workers in Uganda & Kenya to execute leishmaniasis surveillance & reporting through one health competencies.

A one health course on leishmaniasis (Frontline workers in Uganda and Kenya)

Table 1. Course structure

S/N	Module code	Module title	Notion hours
1	OHL100	Introduction to One Health and Leishmaniasis	6
2	OHL101	Leishmaniasis surveillance, climate change and risk factors	12
3	OHL102	One Health and Control of Leishmaniasis	10
4	OHL103	Stakeholder engagement and effective communication on disease control	6
5	OHL104	Gender, risk analysis and control of leishmaniasis in the One Health context	6

On health course on leishmaniasis training

- 26 Multidisciplinary participants from Uganda and Kenya
- Entomologists
- Veterinarians (paravets)
- Nurses/Medics
- Laboratory Technologists
- VHTS
- Social workers

Objectives

2

Carry out a spatial & temporal mapping of leishmaniasis hotspots & decipher the risk factors associated with the disease within endemic foci.

1. Digitalization of patient records
2. Trends of VL in Karamoja
3. Climate variability
4. Climate variability and VL trends
5. Risk factors for VL

Review of records on leishmaniasis cases Moroto and Amudat

Captured data

	Nakapiripirit										
	Household Head	Chief's nar	Patient ID	Client category (N.R.F)	Sex (Male/Female)	Age	District of Origin	County	Subcounty	Parish	Village
1	Loling sibiyano	Lorugeng	66/018	National	Female	55	Napak	Bokora Cou	Matany	Nakicumet	Kokeris
2		Loruka	49/018	National	Male	7	Nakapiripir	Chekwii Ea	Moruita	Komoret	Komoret
3	Ekemer	Lotita	70/017	National	Male	22	Nakapiripir	Chekwii Co	Loregae	Loregae	Lowoi
4	Tuber Noa	Loruka	46/018	National	Male	16	Nakapiripir	Chekwii Ea	Moruita	Moruita	Moruita
5	Pedo Saptos		94/020	National	Female	25	Nakapiripir	Chekwii Co	Loreng	Loreng	Loreng
6			108/021	National	Male	7					Naronit
	Napak										
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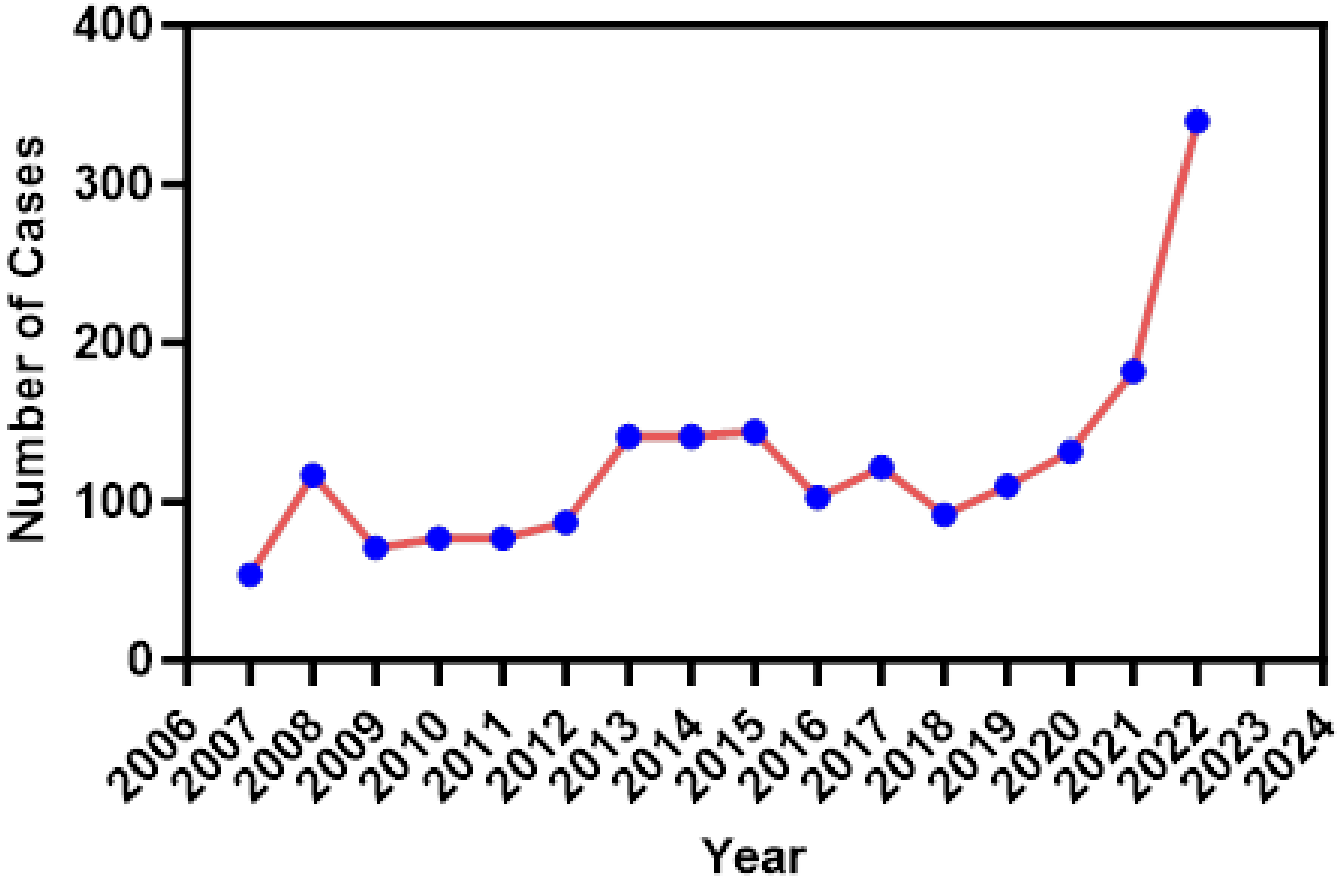
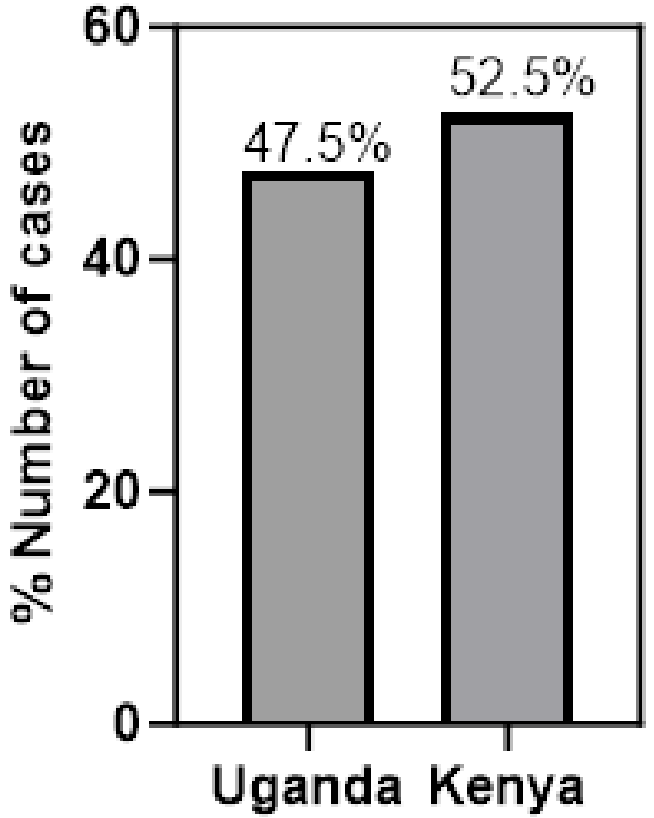
2			108/021	National	Male	7					Naronit

Trends in Kala-azar cases

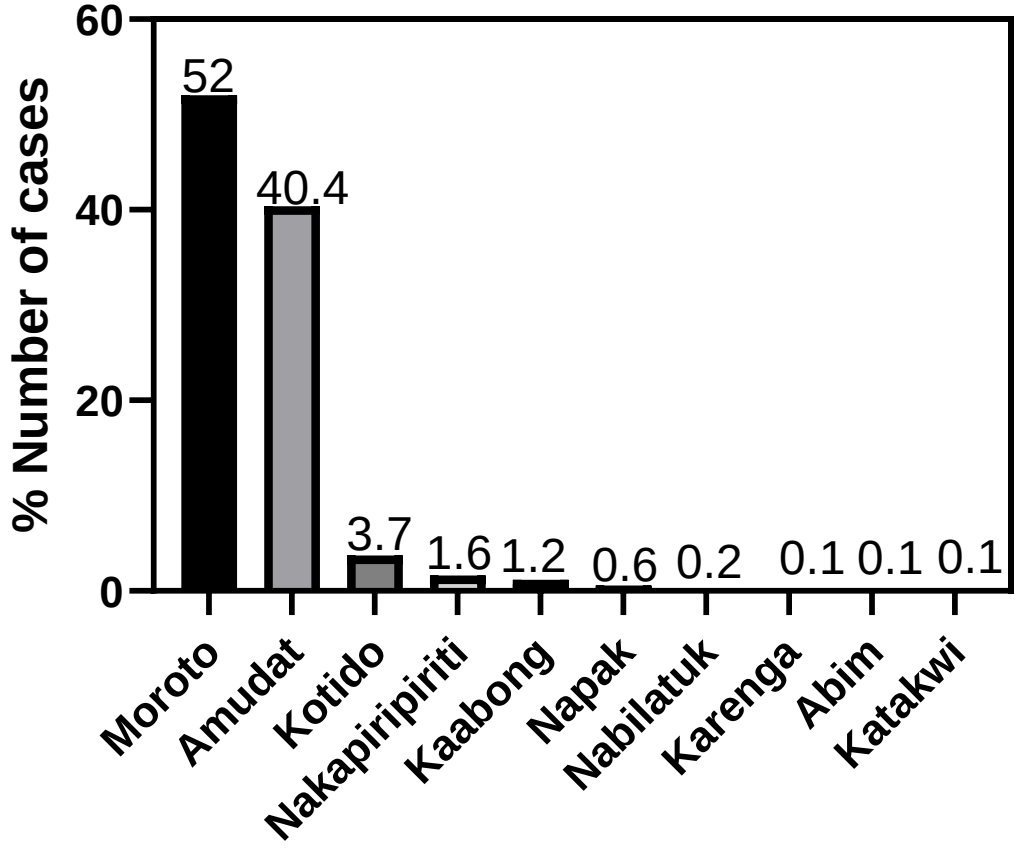




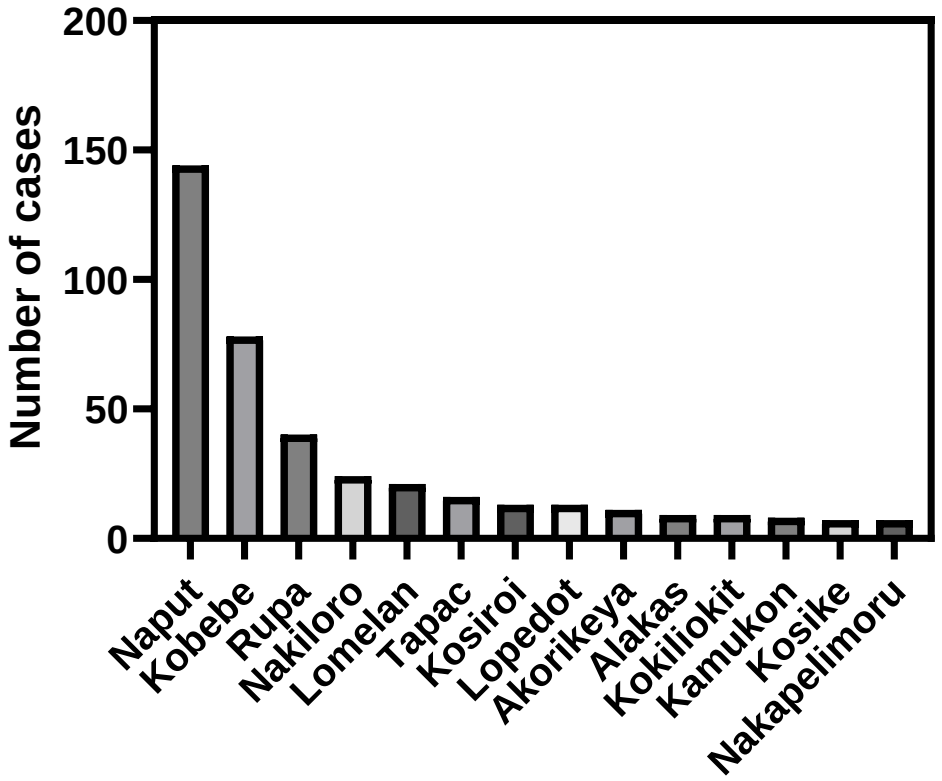
- Cases increased with enhanced active case search

Uganda cases

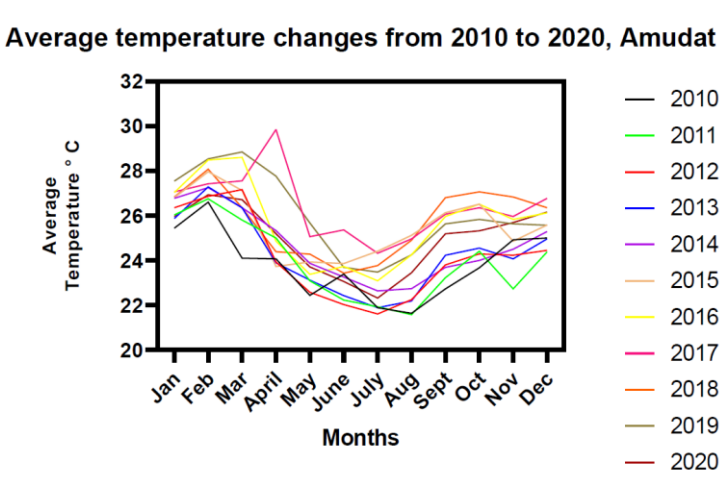
Cases per endemic district

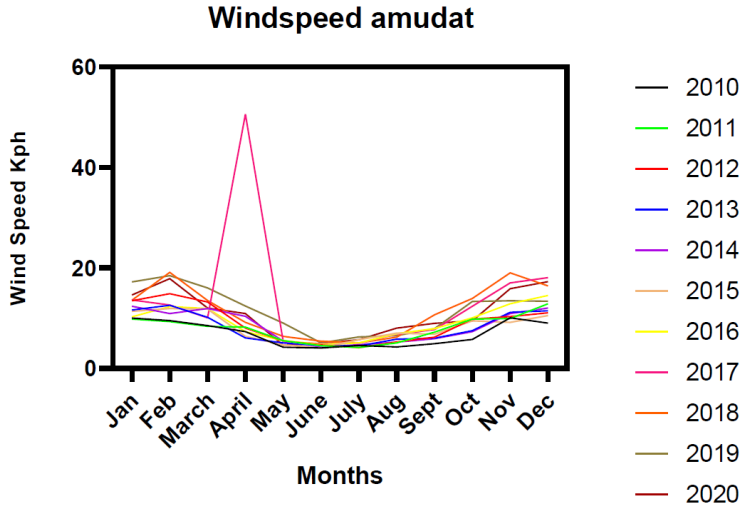


Cases per endemic village



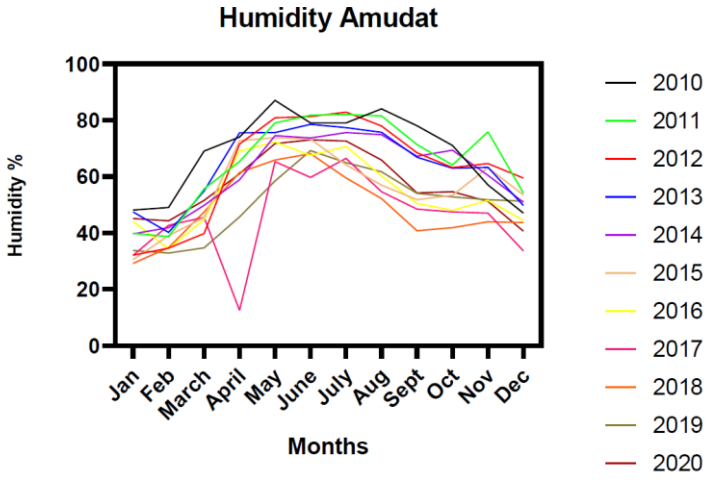
Climate variability (2010-2020) in Karamoja

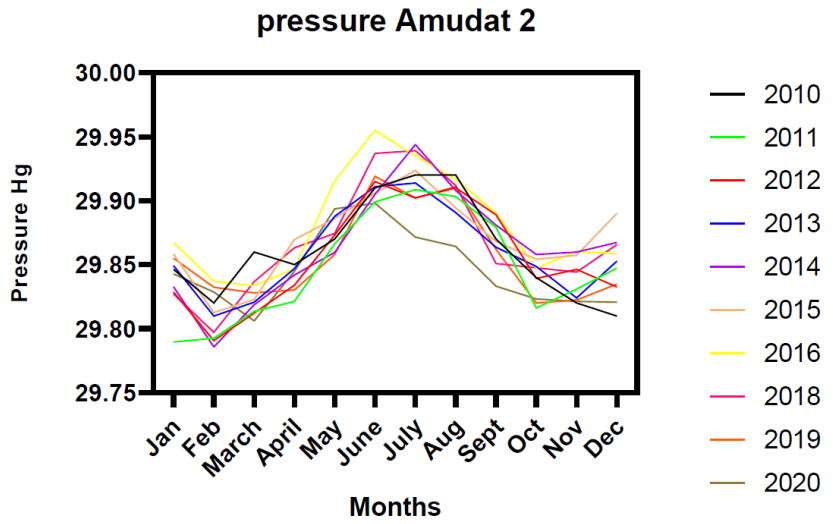




High temp: 2016, 2017, 2018,& 2019

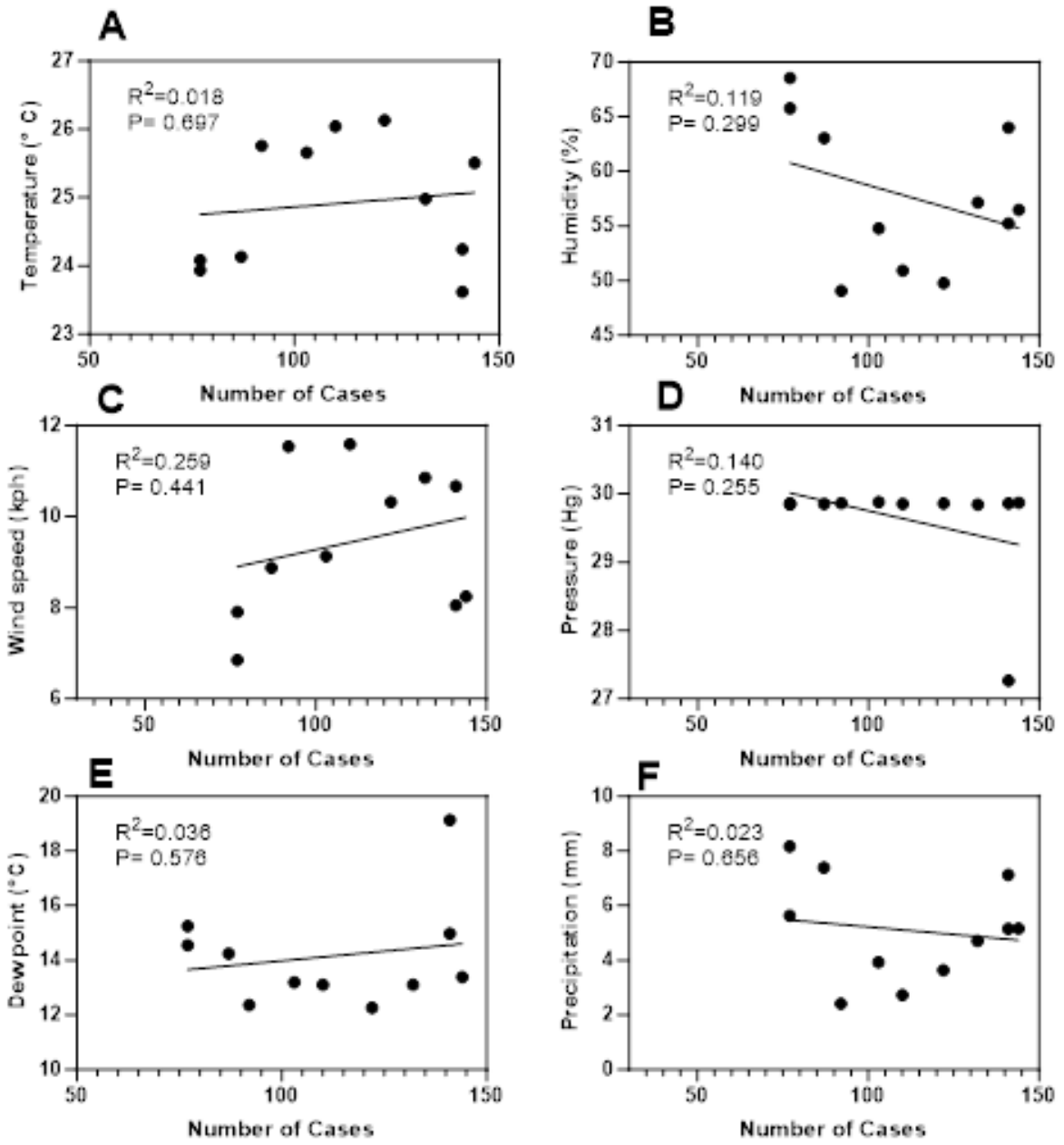
Low temp: 2010, 2011, & 2012





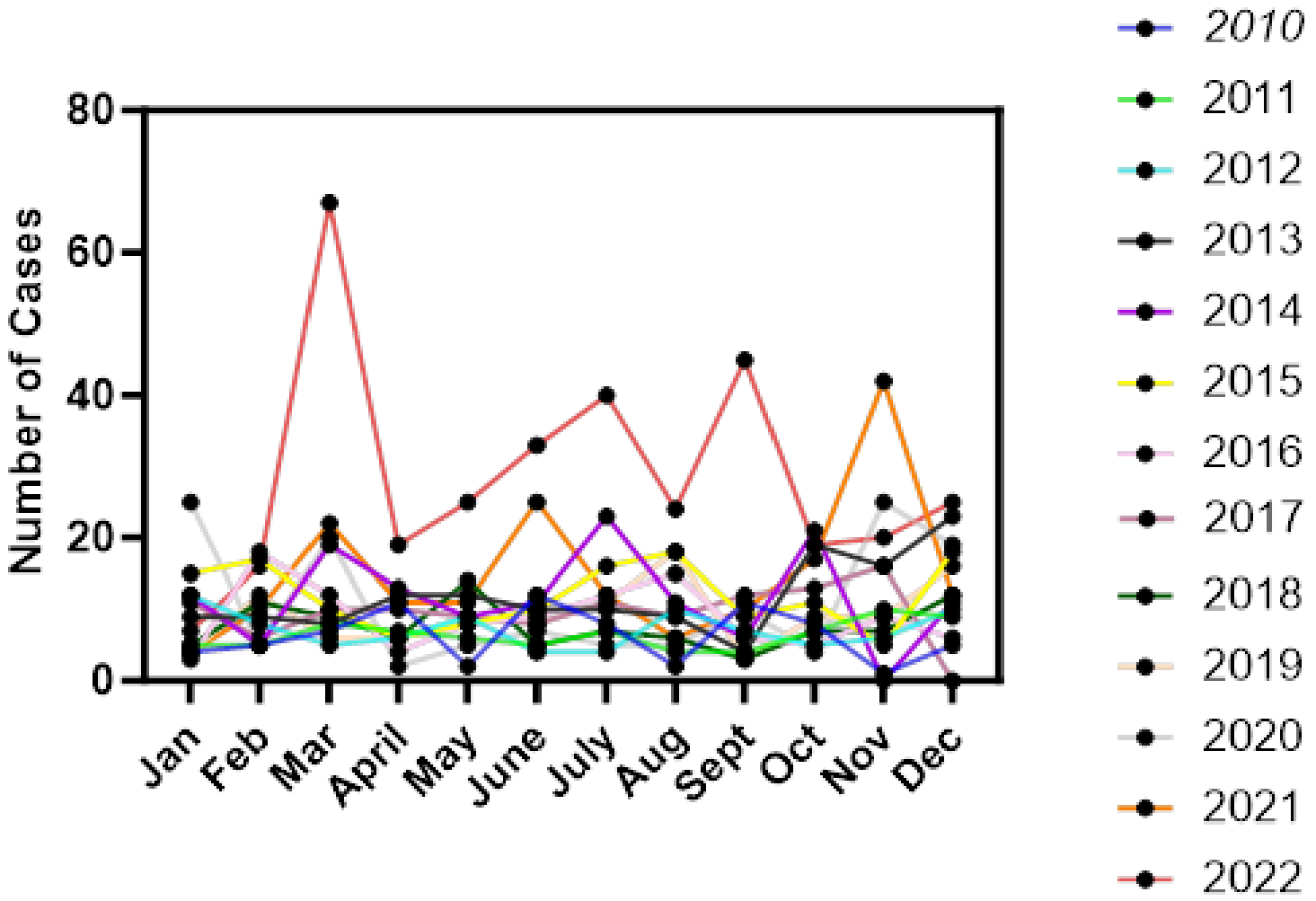
Climate variability and VL cases

- No observed relationship
- Number of cases still determined by active case search



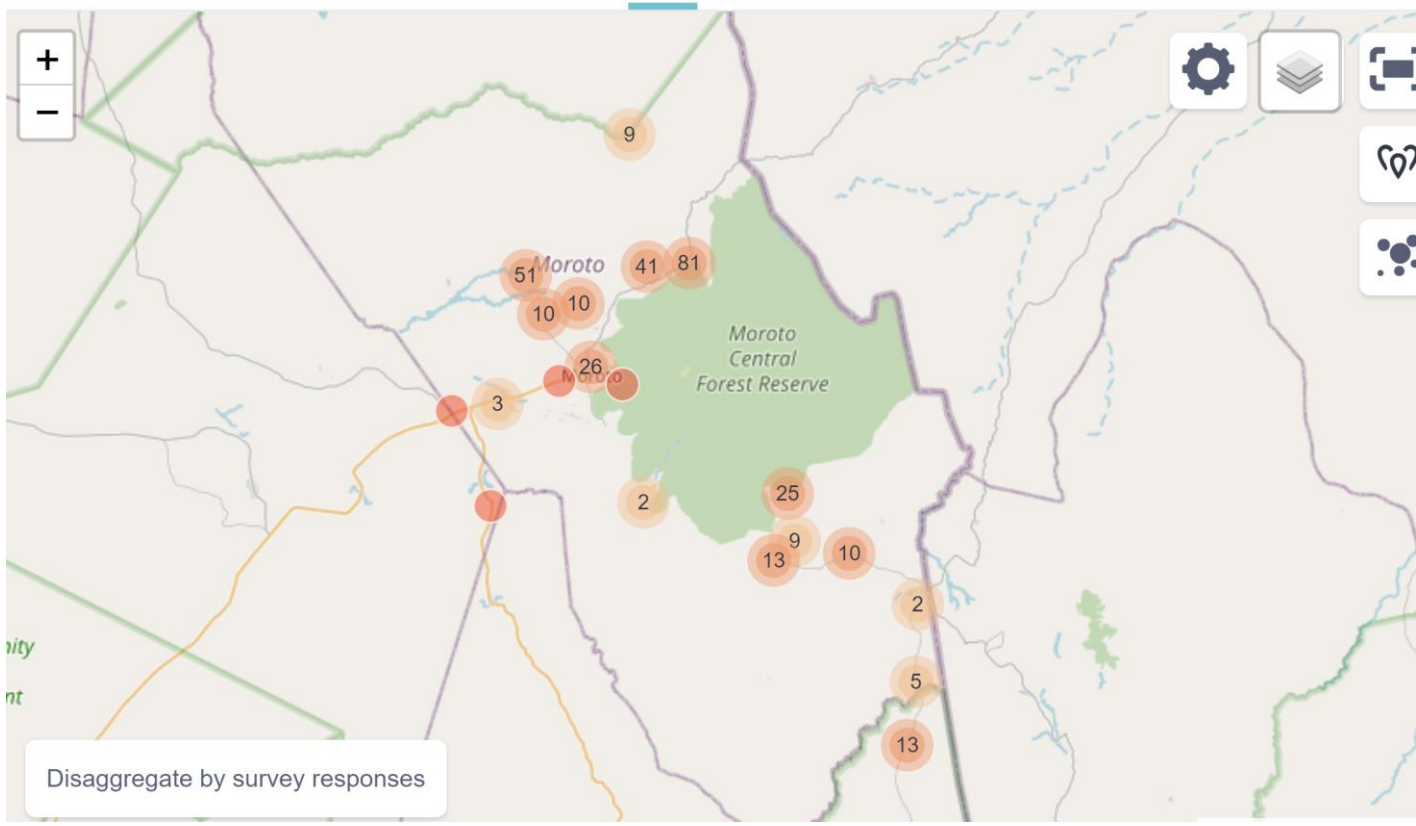
Seasonality and VL cases

- Dry season Sept-March
- Wet season April-Aug
- No significant variation in case loads



Risk factors for persistence of VL

- ODK based data capture tool
- Villages reporting more than 50 cases between 2017-2022 (5 years)
- Villages that reported cases previously but have not reported since 2017-2022



Risk factor analysis for VL

- Young children more likely to get VL
- Large house holds are more protected
- House holds with livestock and poultry are protected
- Applying insecticides is protective
- Being knowledgeable about VL is protective

Variable	Bi-Variate Analysis cOR (95%CI), P-value	Multi-variate Analysis aOR (95%CI), P-value
Age in years	0.97(0.97-0.99), **0.01**	0.95(0.93-0.98), 0.001
Marital status		
Married	1	
Not Married	1.65(0.96-2.83), **0.07**	
Education level, n(%)		
No Education	1	
Primary	0.81(038-1.72), 0.59	
Secondary	1.03(0.11-10.05), 0.98	
Household size, n(%)		
<5 people	1	
6-10 people	0.84(0.49-1.45), 0.53	
11-15 people	0.39(0.14-1.11), **0.08**	
16-20 people	0.24(0.06-0.95), **0.04**	
Rear Animals		
No	1	
Yes	0.38(0.19-0.76), **0.006**	
Have Dogs		
No	1	
Yes	1.33(0.74-2.41), 0.34	
Rear Livestock		
No	1	
Yes	0.34(0.17-0.86), **0.02**	0.34(0.13-0.85), 0.022
Rear Poultry		
No	1	
Yes	0.41(0.21-0.78), **0.007**	0.40(0.17-0.95), 0.04
Apply Insecticide		
No	1	
Yes	0.33(0.20-0.55), **<0.001**	
Knowledge on Kaalazar Symptoms		
No	1	
Yes	0.53(0.27-1.05), **0.068**	
Knowledge on Kaalazar Transmission		
No	1	
Yes	0.38(0.22-0.62), **<0.001**	0.37(0.18-0.78), 0.009
Farming activity		
No	1	

Risk factor analysis for VL

- Charcoal burning increases infection likelihood
- Eating more than 2 meals a day is protective
- Prescence of many termite molds increases infection rate

Charcoal burning			
Activity			
	No	1	
→	Yes	1.68(1.0-2.80), **0.049**	4.18(2.02-8.63), <0.001
Mining Activity			
	No	1	
	Yes	0.56(0.34-0.93), **0.025**	
No of Rooms in Household			
	One room	1	
	>one Room	0.40(0.23-0.69), **0.001**	
Meals had in a day			
	I meal	1	
→	2 meals	0.47(0.26-0.84), **0.011**	0.24(0.15-0.40), <0.001
	3 meals		
Sleeping Arrangement			
	Sleeping outside	1	
	housing	0.49(0.32-0.77), **0.002**	
Ground level sleeping			
	Above the Ground	1	
	Sleeping on ground	5.30(2.89-9.71),**<0.001**	
Livestock shelter distance from house			
	<5meters	1	
	>5meters	0.98(0.60-1.62), 0.94	
Termite molds near house			
	No	1	
	Yes	0.47(0.27-0.82), **0.008**	0.37(0.17-0.79), 0.01
No of termite Moulds			
	< 3moulds	1	
→	>3 moulds	1.97(1.17-3.31), **0.01**	
Acacia tress near house			
	No	1	
	Yes	0.73(0.35-1.49), 0.38	
No of acacia tress			
	<10 trees	1	
	>10 trees	1.18(0.71-1.97), 0.51	

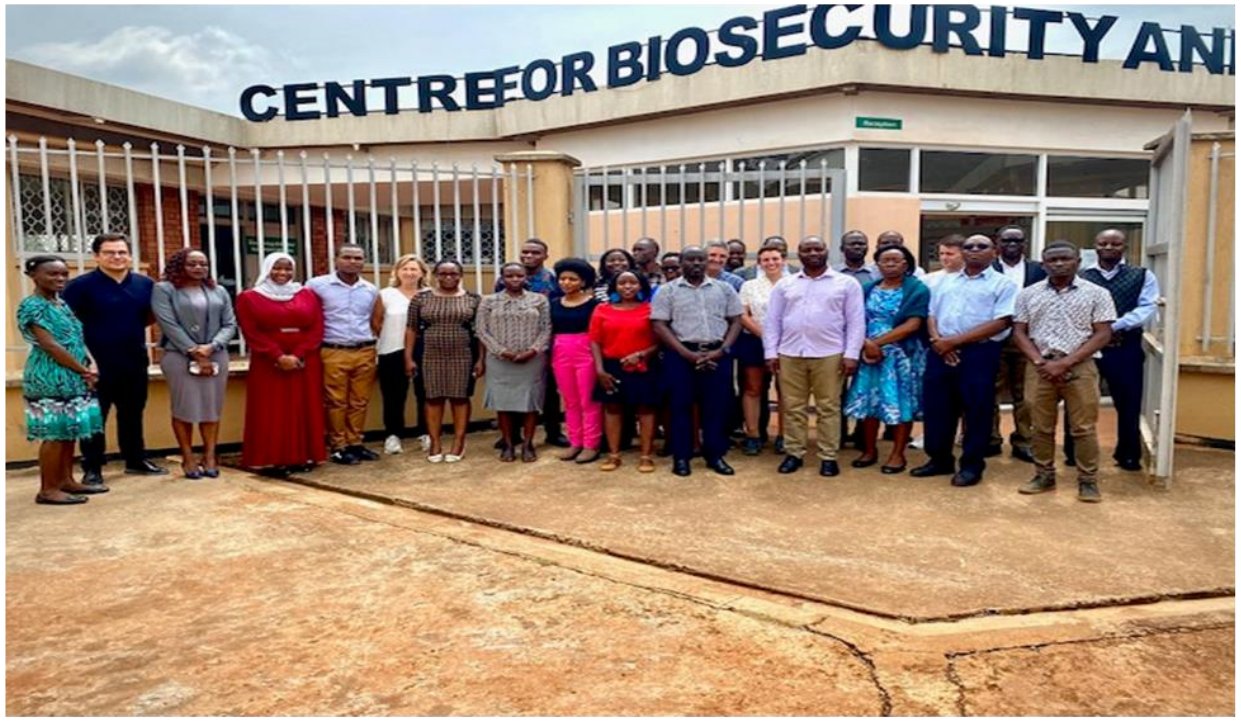
Objectives

3

Strengthen surveillance & reporting of leishmaniasis data within line ministries and across the border.

- Specimen collection from dogs and humans
- Speciation and characterization

One health kala-azar seminar at Makerere University



Group photo for participants (left) and seminar session in progress (right).

Dr. Santiago Cerrato from LETI PHARMA, Spain training Makerere University Scientists on Leishmaniasis diagnosis.

Dog sample results

	N1H code	LETIPharma code	PCR amplicon	Age
Moroto Municipality	AI36	CF-TDR-001M	Not detected.	A
2.5331936, 34.6582375	AI37	CF-TDR-002M	Not detected.	A
08/08/20223	AI38	CF-TDR-003M	Not detected.	A
	AI39	CF-TDR-004M	Not detected.	A
	AI40	CF-TDR-005M	Not detected.	A
	AI41	CF-TDR-006M	Not detected.	A
	AI42	CF-TDR-007M	Not detected.	A
	AI43	CF-TDR-008M	Not detected.	A
	AI44	CF-TDR-009M	Not detected.	A
	AI45	CF-TDR-010M	Not detected.	A
	AI46	CF-TDR-011M	Not detected.	P
	AI47	CF-TDR-012M	Not detected.	A
	AI48	CF-TDR-013M	Not detected.	A
	AI49	CF-TDR-014M	Not detected.	A
	AI50	CF-TDR-015M	Not detected.	A
	AI51	CF-TDR-016M	Not detected.	A
	AI52	CF-TDR-017M	Not detected.	A
	AI53	CF-TDR-018M	Not detected.	A

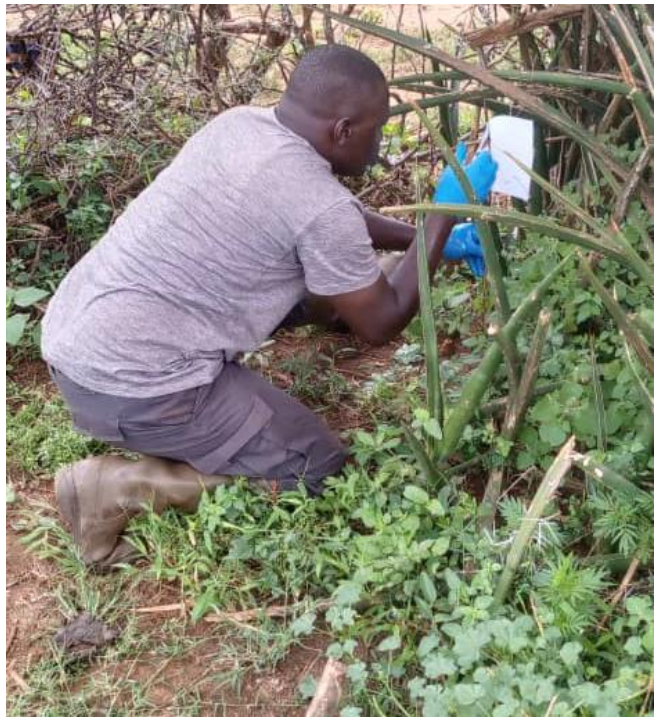
- Sample size of 139 too small
- Prescence of other reservoirs

Objectives

3

Strengthen surveillance & reporting of leishmaniasis data within line ministries and across the border.

Sandfly trapping



Objectives

4

Strengthen multisectoral & cross border surveillance for enhanced reporting & knowledge sharing.

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- Cross border meetings between Uganda and Kenya.

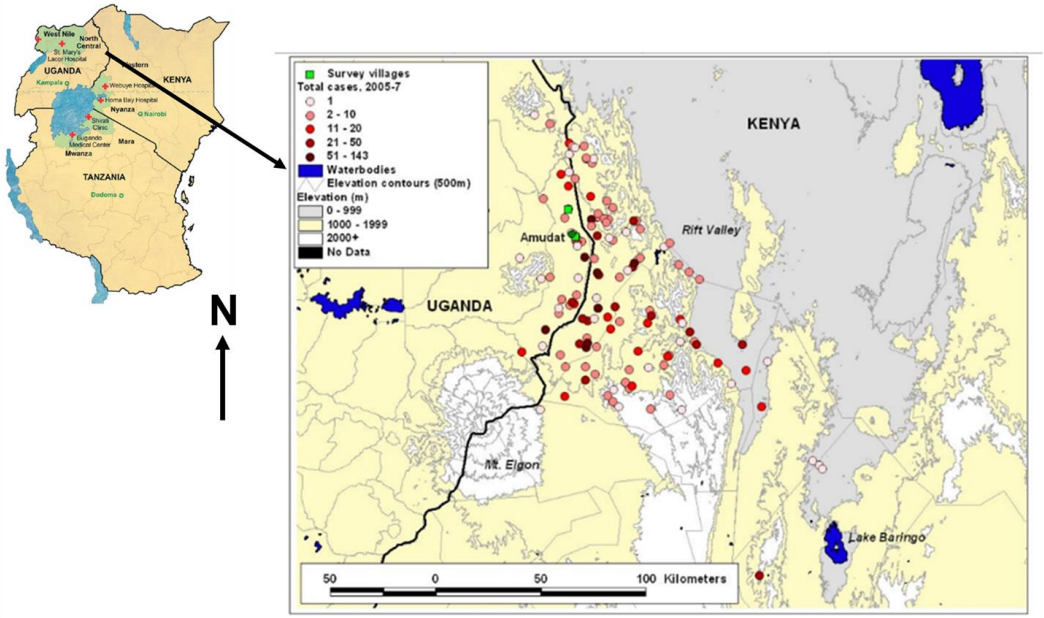

Figure 1: *Mapping showing cross-border endemic foci in Uganda and Kenya recorded at Amudat hospital, Uganda, 2005-2007 (Malaria Consortium, 2010).*

7

Community dissemination workshop

- Multidisciplinary participants from Uganda and Kenya
- Representatives from local government, District Health Office, Entomology, hospital representation, Veterinary office, VHTs

Publications

1. Dogs as reservoirs for VL in East Africa
2. Visceral leishmaniasis and temperature variability in Karamoja
3. Risk factors for visceral leishmaniasis in Karamoja region
4. Clinical profiles, disease outcomes and commodities

Next steps

1. To map the spatial and temporal distribution of Visceral Leishmaniasis (VL) and Post kala-azar dermal leishmaniasis (PKDL) in endemic foci of Karamoja over fifteen years (2008-2023)

2. To investigate the socioeconomic and environmental factors for the persistence of Visceral Leishmaniasis within endemic foci of Karamoja.

Next steps

1. To identify the presence and characterize *Leishmania* species in dogs and wild rodents in visceral leishmaniasis endemic villages of Karamoja

2. To investigate the leishmania infectivity and host blood feeding preference for phlebotomine sandflies in VL endemic villages of Karamoja

3. To strengthen the surveillance of visceral leishmaniasis through the adaption of sustainable approaches
   - Integrating VL data into DHIS2 health reporting
   - Digital tracking of VL patients and update of distribution maps
   - Training of VL frontline workers

Thank you all for listening!

World Health Organization

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