Conflict of Interest

The author has declared no conflict of interest.

Development of an algorithm to identify high-risk villages to screen for Human African Trypanosomiasis in Maniema, Democratic Republic of Congo

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Introduction

- Human African Trypanosomiasis (HAT) is a parasitic neglected tropical disease, that is heading towards elimination

- The disease has two stages and is complex to diagnose and treat given the current tools available

- In 2018, just 977 cases of HAT (*T.b.gambiense*) were reported worldwide, of which 660 were in the Democratic Republic of Congo (DRC)

- The MSF mobile HAT project in DRC was faced with increasing difficulties in finding HAT cases, as was the national control programme (PNLTHA)

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Objectives

- To identify villages where it was most likely to find HAT cases for planning screening activities for disease control
- To create an algorithm that would predict where HAT cases would be found, based on village risk factors, to improve time- and cost-effectiveness of control activities

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Context

- The DRC experiences recurrent humanitarian crises, associated with violence and displacement, with acute health needs, and limited access to health care

- The Maniema Province poses geographical challenges making access to villages difficult. Infectious disease epidemics and endemic disease and health issues such as malnutrition are also present

- This work was undertaken in the health zones of Tunda, Lusangi, and Kibombo in the Maniema Province

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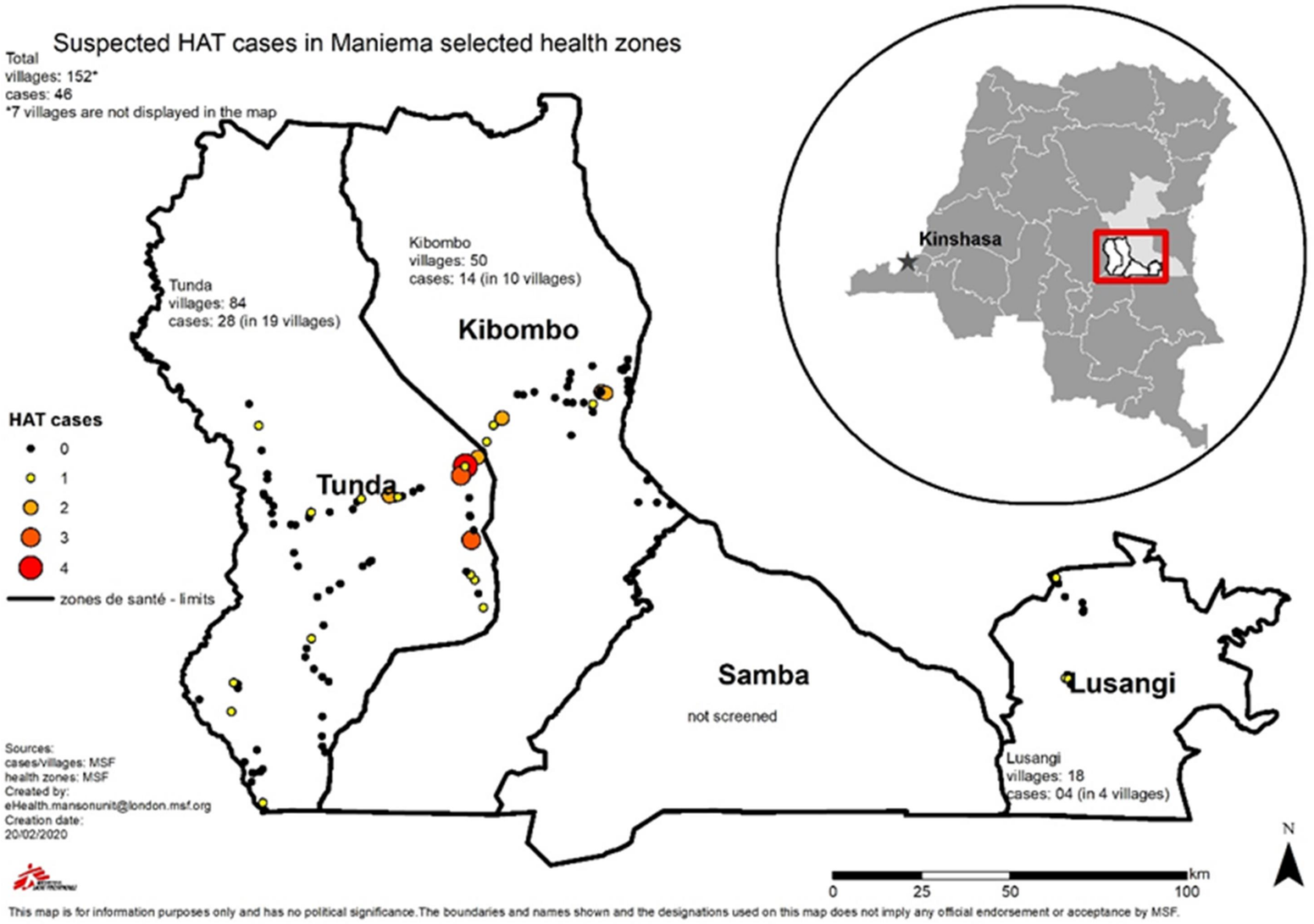
Location of the project



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Methodology

- Background research and consultation
- Study design and implementation into regular field activities
- Data analysis
- This study fulfilled the exemption criteria set by the MSF Ethics Review Board (ERB) for a posteriori analyses of routinely collected clinical data, and thus did not require MSF ERB review

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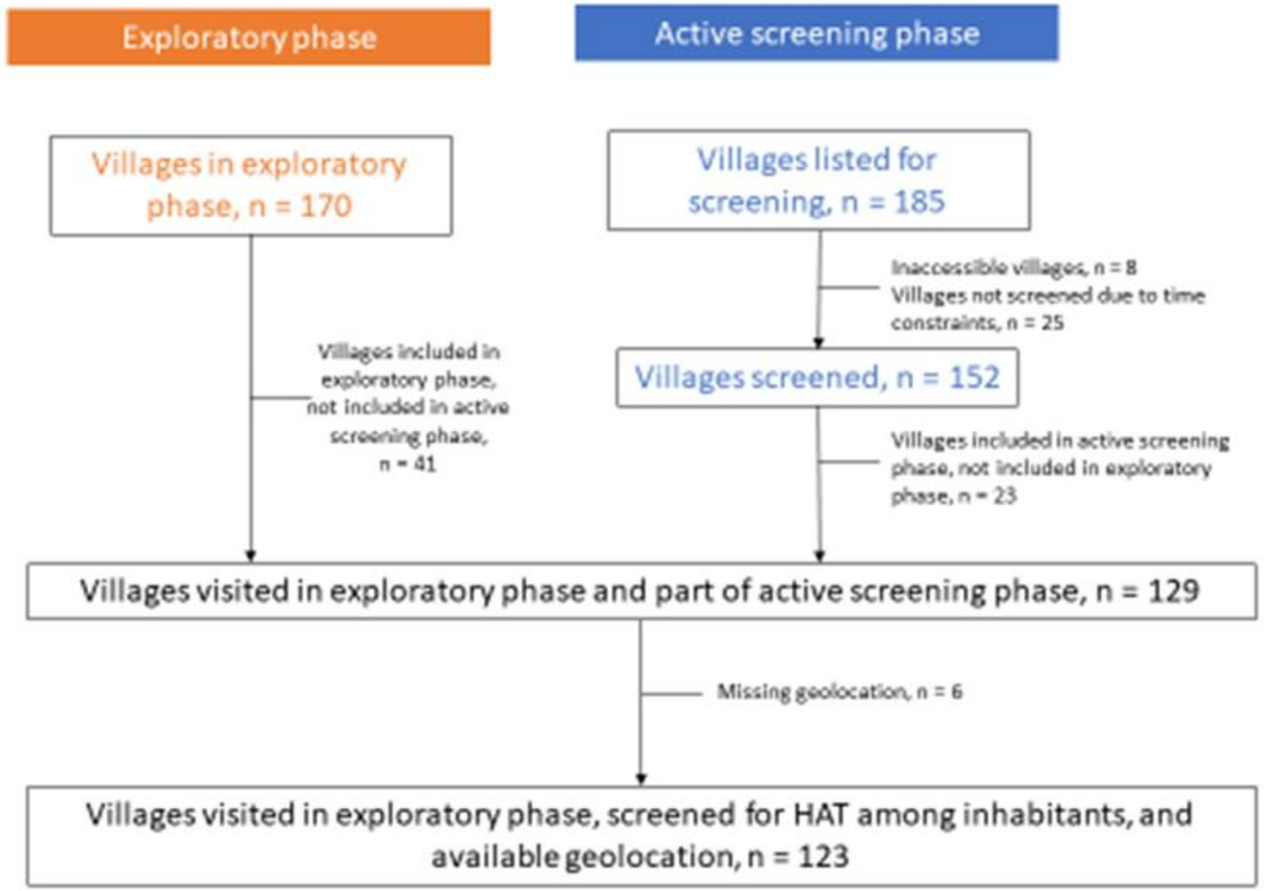
Selection of villages



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Exploratory Phase

- Information, Education and Communication (IEC) activities explaining the transmission route of HAT and diagnosis and treatment activities
- Population counts
- Collection of global positioning system coordinates (GPS)
- Assessed risk factors through a questionnaire including presence of tsetse flies, professions, distance between villages and water, vegetation type

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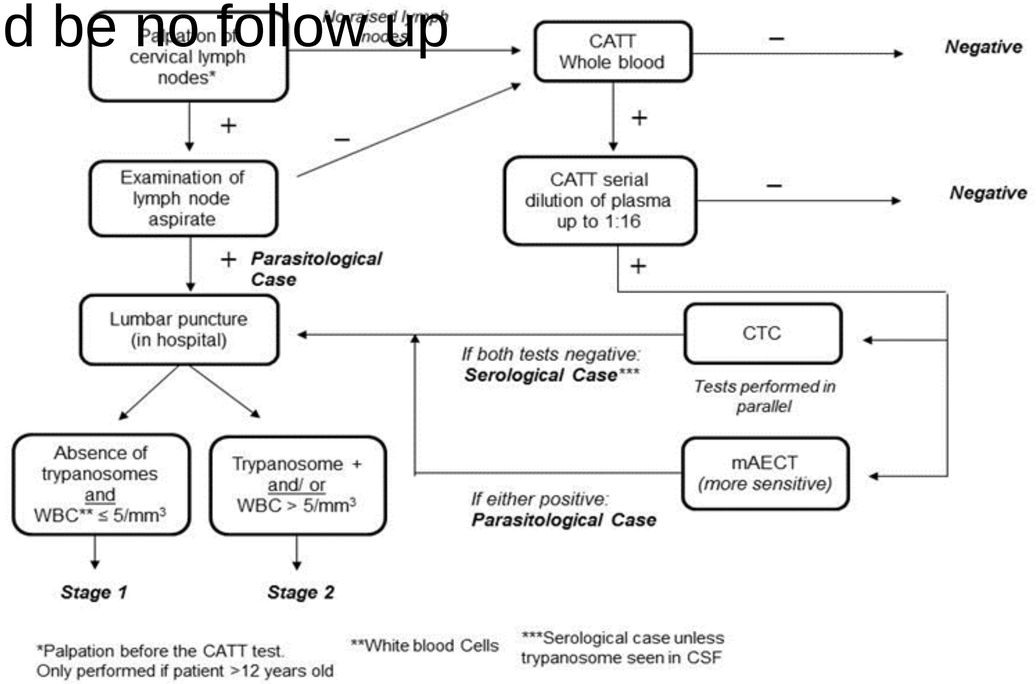
Active Screening

- Screening set up in villages selected – only accessible by motorbike and foot
- Agreement reached that all strong suspected cases (those with CATT 1:16 positive) would be treated with pentamidine as there would be no follow up



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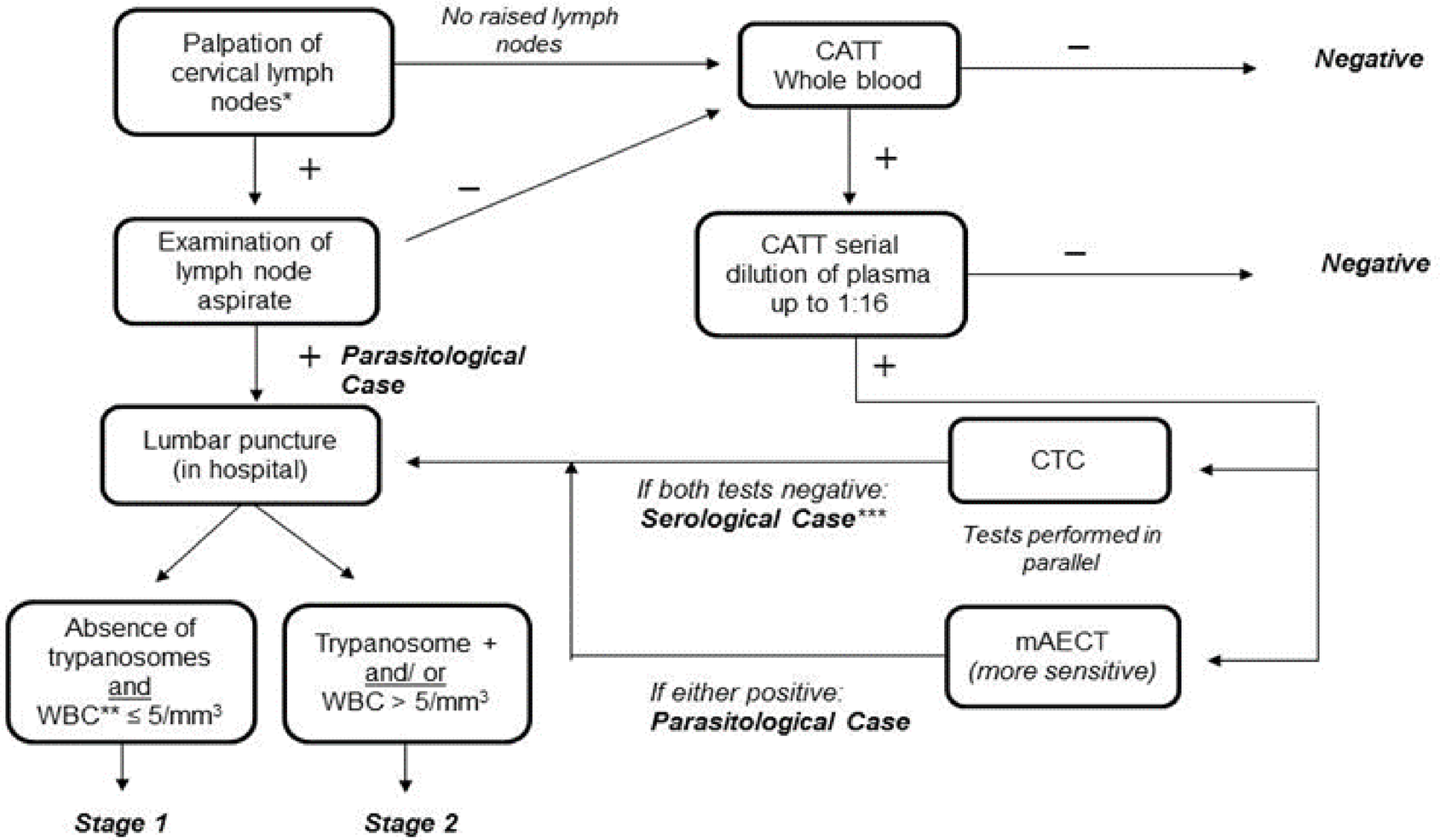
Diagnostic tree



*Palpation before the CATT test.
Only performed if patient >12 years old

**White blood Cells

***Serological case unless trypanosome seen in CSF

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Data Analysis

- Data on village level
  - Number of positive suspected cases
  - Risk factors
  - Number of inhabitants
- Incidence of suspected cases in the villages was estimated, stratified by risk factors

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Results

- 32,343 individuals were screened for HAT from an estimated population of 41,764 (77.4%)
- 46 CATT 1:16 positive serological cases (strong suspected cases), no parasitological cases
- Incidence of strong suspected cases was 1.4 per 1000 individuals, distributed over 33 of 152 screened villages (21.7%)
- With so few cases, developing an algorithm was not possible, however, some interesting data was found….

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Results from the active screening and parasitological tests

Health Zone	Health Area	Total Population Screened	CATT whole blood		Lymph node aspiration		CATT dillutions			CATT 1/16	WOO		mAECT		Number of Serological Suspect cases	Stage 2 Parasitological confirmed
			Number	Positive	Number	Positive	Number	1/4 pos	1/8 pos	Number	Number	Positive	Number	Positive		
Kibombo	Lokenye	137	137	2	0	0	2	1	0	0	0	0	0	0	0	0
	Likeri Metho	1074	1074	16	0	0	16	13	4	0	0	0	0	0	0	0
	Kasuku	2703	2703	27	0	0	27	21	12	4	4	0	4	0	4	0
	Kaswa	4304	4304	67	0	0	67	41	25	7	7	0	7	0	7	0
	Methoiste Kil	3605	3605	27	0	0	27	18	7	3	3	0	3	0	3	0
Tunda	Lusamba	2459	2459	67	2	0	67	46	17	5	5	0	5	0	5	0
	Ndeo manon	3273	3273	48	0	0	48	25	10	1	1	0	1	0	1	0
	Ongeri	2916	2916	72	5	0	72	41	11	3	3	0	3	0	3	0
	Otanga	3285	3285	52	0	0	52	47	31	17	17	0	17	0	17	0
	Wenga	1890	1890	15	0	0	15	7	2	1	1	0	1	0	1	0
	Weta	1549	1549	42	2	0	42	24	5	1	1	0	1	0	1	0
Lusangi	Kilalaulu	1738	1738	16	0	0	16	11	5	1	1	0	1	0	1	0
	Mabanda	1263	1263	4	0	0	4	3	1	0	0	0	0	0	0	0
	Wagela	2147	2147	27	0	0	27	11	7	3	3	0	3	0	3	0
	Total	**32343**	**32343**	**482**	**9**	**0**	**482**	**309**	**137**	**46**	**46**	**0**	**46**	**0**	**46**	**0**

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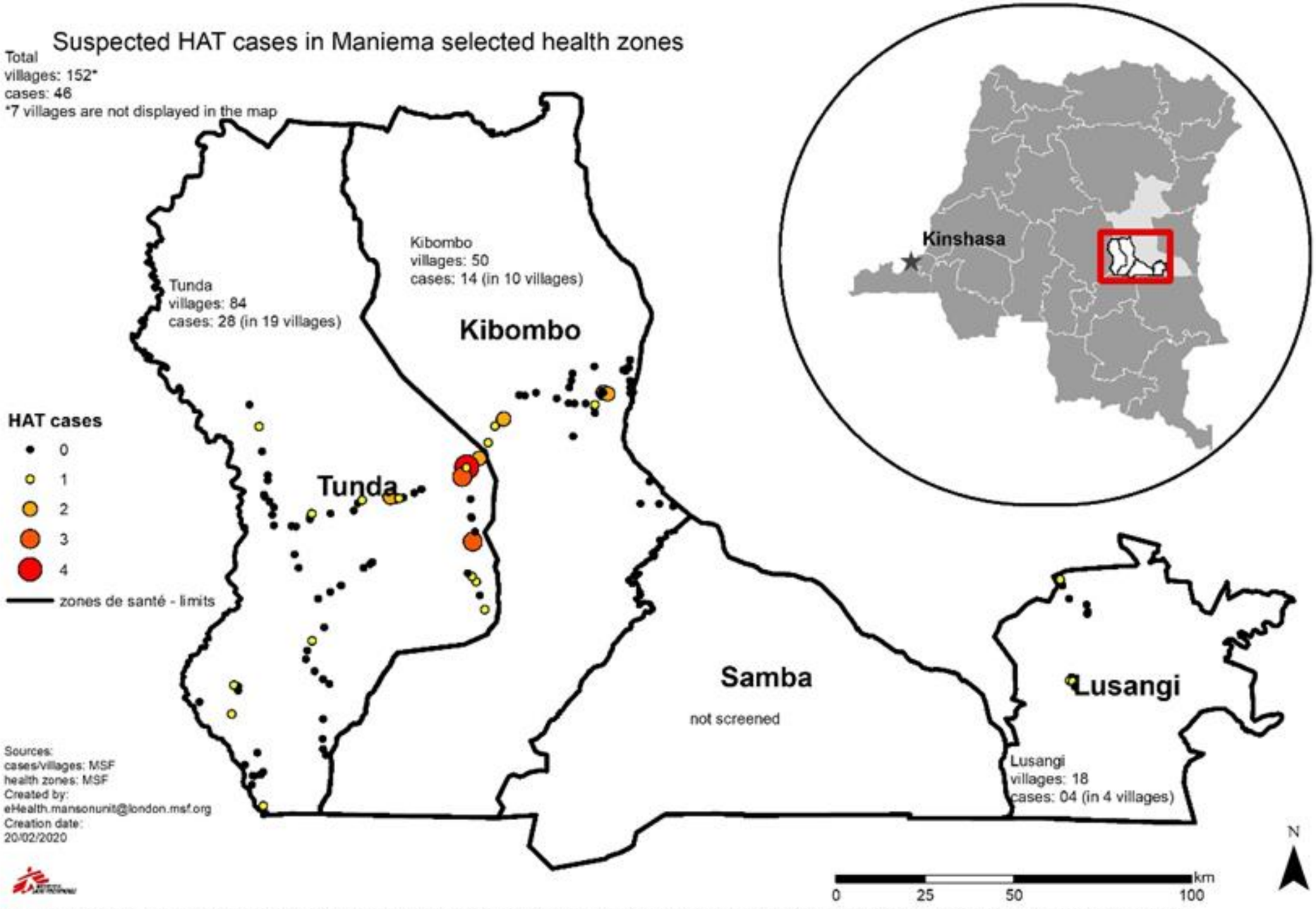
- Villages >1 km from forests had lower incidences (0.3; 95%CI: 0.0 – 1.5) per 1000 inhabitants compared with villages close to forests (1.5; 1.1 – 2.0)

- Villages close to woodlands, bare soil, and burned areas had lower incidences than villages located ≥1 km from these features

- Villages with suspected HAT cases tended to be closer to other villages with suspected cases than villages without suspected HAT cases

Suspected HAT cases in Maniema selected health zones



This map is for information purposes only and has no political significance.The boundaries and names shown and the designations used on this map does not imply any official endorsement or acceptance by MSF.

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Conclusions

- The team overcame huge barriers, including the lack of accessibility to villages, maintaining a cold chain for the CATT, transportation of a generator, heavy logistics, blocked paths, and flooding as well as security incidents

- Given the low prevalence of disease, active screening campaigns might not be efficient or cost-effective and likely risk factors do not hold sufficient predictive power to warrant their use in the construction of screening programmes

- Data did indicate that active screening should be carried out for villages within a radius of 5 to 10 km of those with confirmed cases

- Data highlights the success of previous active screening efforts, as the numbers remain low

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Recommendations

- We recommend that MSF integrates passive screening into its health programmes in historically endemic areas, establishing a reactionary response when parasitological confirmed cases are detected

- Active screening should be carried out for villages within a radius of 5 to 10 km of those with confirmed cases

- Continuous training of medical and laboratory staff and a reformed strategy within national control programmes, MSF, and other actors in this field is essential for preventing reoccurence of HAT epidemics and to achieve HAT elimination

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Next Steps

- Explore opportunities to integrate HAT screening into MSF projects
- Develop a new intervention strategy – based on lessons learned from an ongoing assessment of activities of the mobile HAT team
- Incorporate rapid diagnostic tests (RDTs) and fexinidazole into future intervention strategies

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