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The useful life of bednets for malaria control in Tanzania: Attrition, Bioefficacy, Chemistry, Durability and insecticide Resistance

Project overview

Overgaard HJ, Moore SL, Kisinza W, Mandike R, Mageni Z, Massue D, Moore J, Kramer K, Lines J, Kilian A, Lorenz LM

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Ministry of Health and
Social Welfare



National Malaria
Control Programme



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PROJECT OBJECTIVES

Determine the useful life of LLIN products by assessing

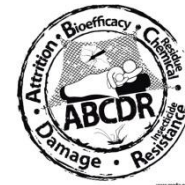
1. **Attrition** (net loss) and community use/acceptability
2. **Biological** efficacy
3. **Chemical** residue
4. **Damage**, physical degradation, fabric integrity
5. Determine insecticide **Resistance** in main malaria vectors
6. Identify geographical variations in ABCD & R components,
7. Capacity building by training two Tanzanian PhD students.



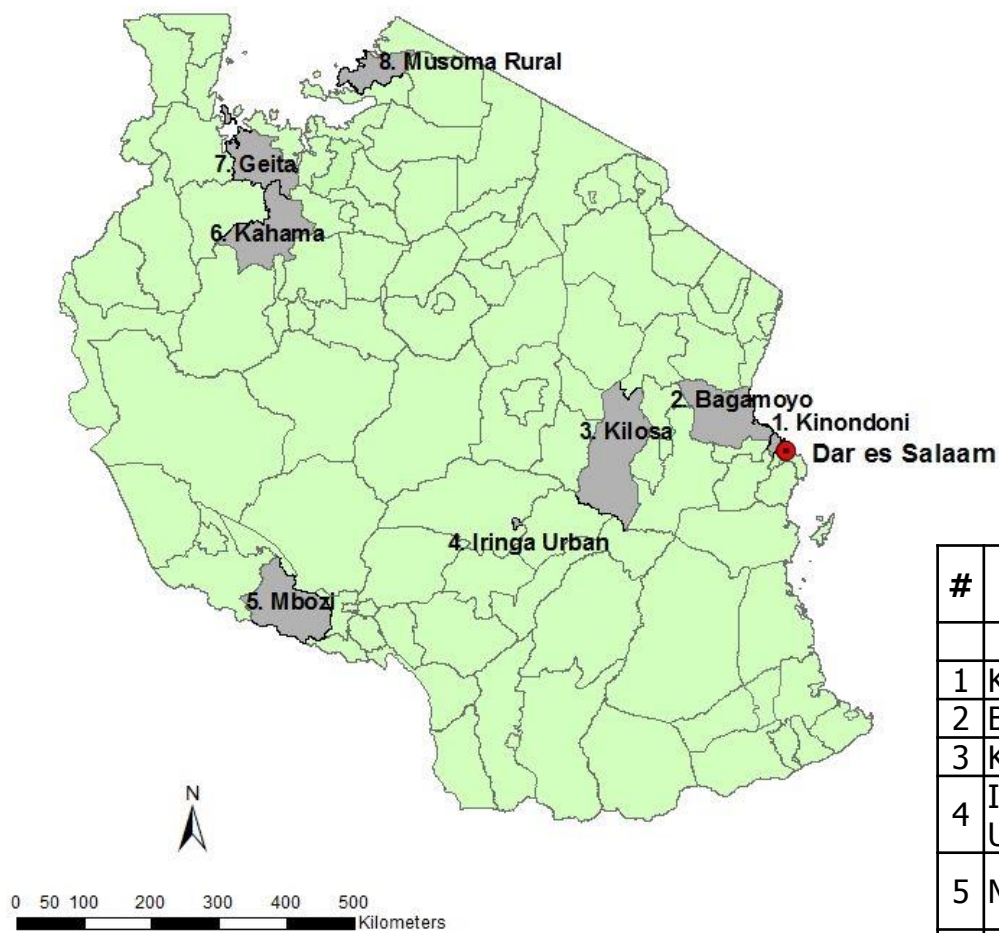
APPROACHES

- 1) **Retrospective study** of nets distributed by the Tanzanian Government from 2009; and
- 2) **Prospective study** of Olyset[®], Permanet[®], and Netprotect[®] over three years (12, 24, 30, and 36 months)

	2013				2014				2015				2016			
Quarters	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Retrospective study				X												
Prospective study				0				12				24		30		36



STUDY LOCATIONS – 8 DISTRICTS



#	District	Malaria prevalence ¹		Zone
		Min	Max	
1	Kinondoni	0.3%	3.6%	Dar es Salaam
2	Bagamoyo	7.4%	10.2%	Eastern
3	Kilosa	6.9%	13%	Eastern
4	Iringa Urban	0%	0.4%	Southern Highlands
5	Mbozi	0%	4.5%	Southern Highlands
6	Kahama	4.4%	6.8%	Western
7	Geita	21.0%	32.9%	Lake
8	Musoma	14.6%	25.6%	Lake



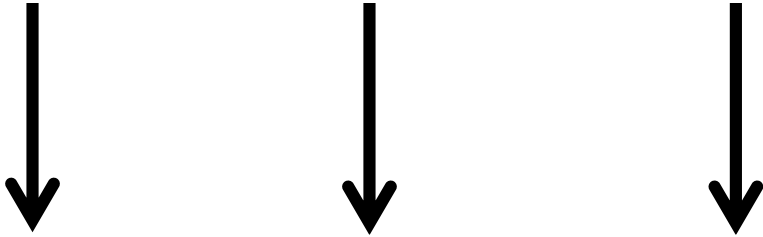
STUDY DESIGN – retrospective study

- 10 villages / district = 80 villages in total
- 45 households / village = 3,600 households in total
- Three-stage random sampling survey
- Olyset[®] nets (U5 and UCC campaigns)
- A-component: Nets from 3,600 households assessed
- BCD-components: 200 households randomly sampled
- GPS points taken from each participating household



STUDY DESIGN – prospective study

- 10 villages / district = 80 villages in total
- 45 households / village = 3,600 households in total




	Olyset®	Permanet® 2.0	Netprotect®	Sum
Total no. of HH	1,200	1,200	1,200	3,600
HH per village	15	15	15	45
Total no. nets*	~3,000	~3,000	~3,000	~9,000


****1,200 HH x 2.5 sleeping places per HH = 3,000***

NUMBER OF NETS ASSESSED AND TESTED PER NET PRODUCT




Month

Component		Evaluated in	12	24	30	36	Sum
A	Attrition	Field	1,200	1,096	992	888	4,176
D	Damage	Field	1,200	1,096	992	888	4,176
D	Damage	Lab	104	104	104	104	416
B	Bioefficacy	Lab/Semi-field	48	48	48	48	192
C	Chemical	Lab	48	48	48	48	192

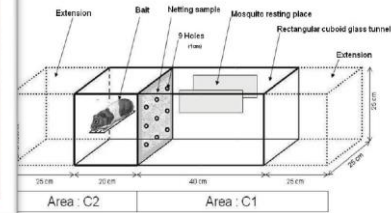
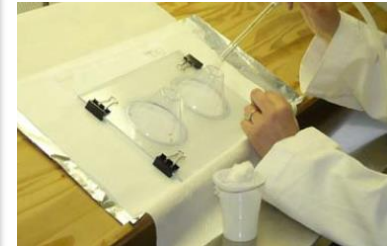
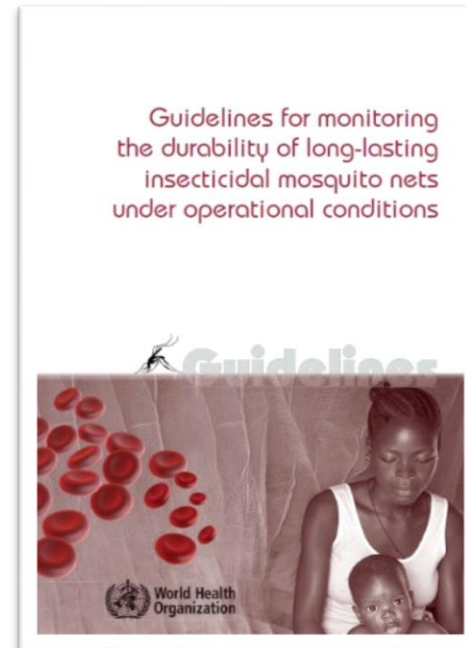


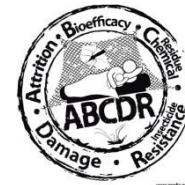
Selection of nets at each time point

- D component: 13 nets from each district = 104 nets
- B+C components: 6 nets from each district = 48 nets

Follow WHO guidelines

- Attrition
 - rate of LLIN loss from a HH
- Biological efficacy
 - WHO-recommended lab tests
 - Semi Field Tunnel (SFT)
 - Semi Field System (SFS)
- Chemical content
 - HPLC
 - Colorimetric tests
- Damage/ degradation (fabric integrity)





RESPONSE & EXPLANATORY VARIABLES

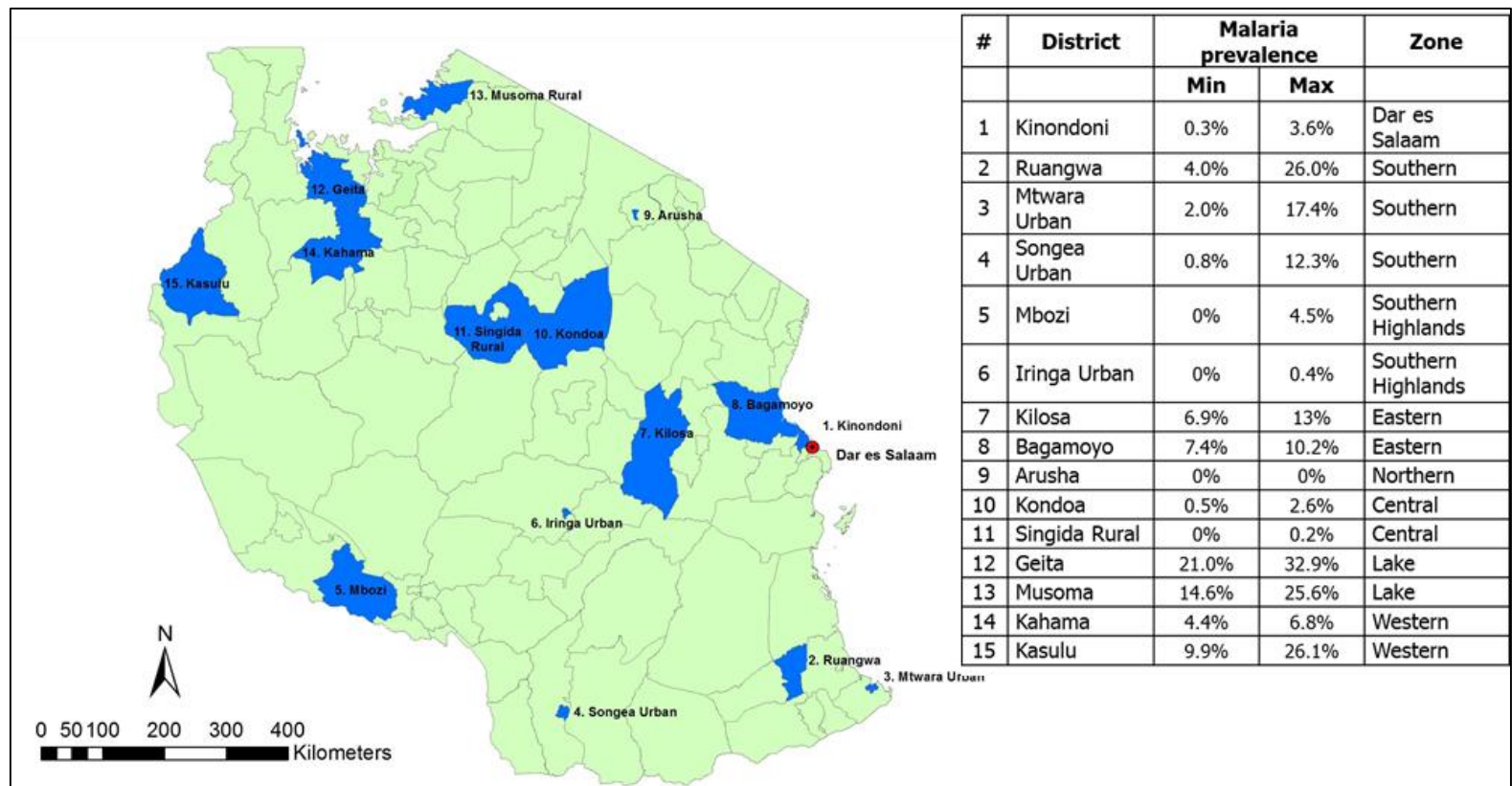
Component	Response variables
Attrition	Net presence.
Biological efficacy	Mosquito knockdown after 60 minutes. Mortality after 24 hours. Percent bloodfed.
Chemical residue	Amount of active ingredient (gram/m ²).
Damage	Proportionate Hole Index (pHI).

Explanatory variables

- time after distribution
- net type
- location
- patterns of use
- net status
- washing and handling
- perceptions of nets
- socioeconomic status

INSECTICIDE RESISTANCE

- Determine susceptibility of *Anopheles gambiae* s.l. to insecticides used in public health and agriculture.
- Determine insecticide resistance mechanisms.





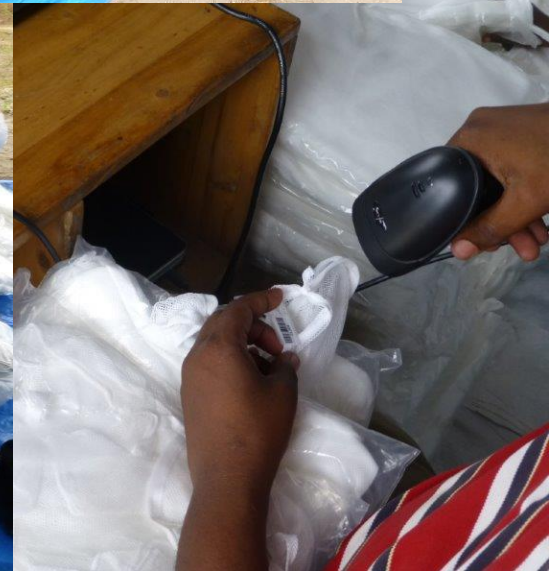
SPECIFIC OBJECTIVES OF GIS COMPONENT

1. Determine spatial risk factors for variation in **LLIN** loss and effectiveness.
2. Identify and predict areas in Tanzania where **LLIN** interventions may be successful and explanations for why.
3. Determine spatial risk factors for variation in insecticide **resistance** in malaria mosquitoes.
4. Identify and predict areas in Tanzania at risk for insecticide **resistance** in malaria mosquitoes.
5. Assist in national decision making of selecting the appropriate malaria control strategy in the appropriate location.

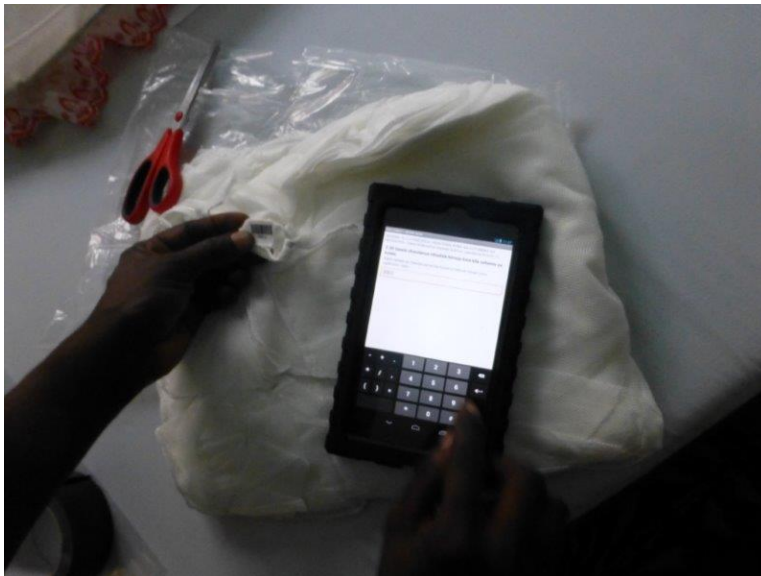
TRAINING WORKSHOP – SEPTEMBER 2013



NET PACKING AND PREPARATION



FIELD WORK – OCTOBER 2013





ACKNOWLEDGEMENTS

- IHI and SAVVY enumerators and field teams
- Village key informants
- Village leaders
- Household heads/interview respondents
- Net providers





THANKS FOR YOUR ATTENTION!



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