



NIMR

# House construction quality and malarial fever: *determine underlying factors for malaria hotspots in Tanzania*

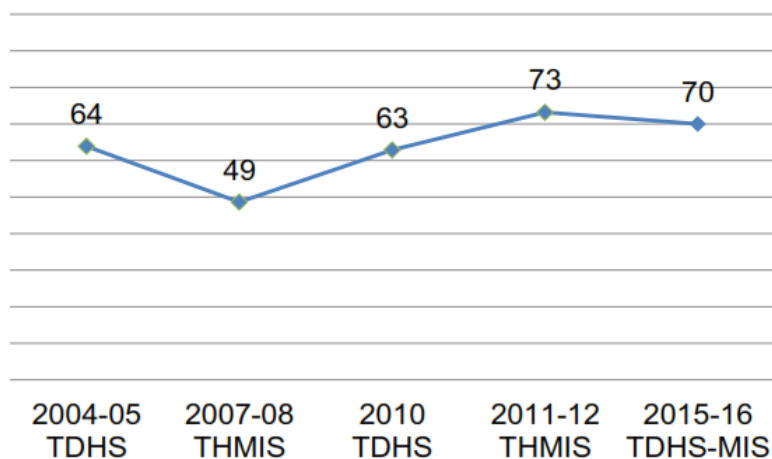
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**The 6<sup>th</sup> East African Health and Scientific Conference**  
**29<sup>th</sup> – 31<sup>st</sup> March, 2017**  
**BUJUMBURA, BURUNDI**

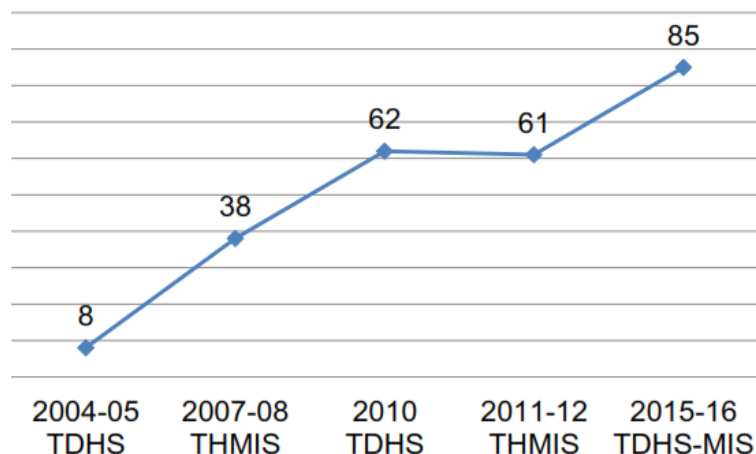
# Background

- Malaria interventions are among the core factors explaining the observed decline in the malaria burden in endemic countries during the past decade.

*Population who slept under an ITN last night among those living in a household with at least one ITN*



*Among children with recent fever who took an antimalarial, percentage who received ACT*



High level of ITN usage at households

Case management levels increasing

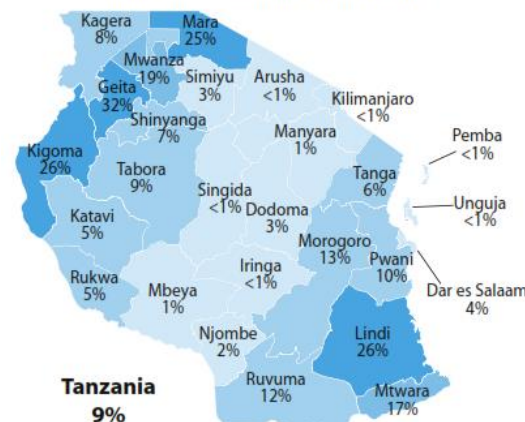
Source: TDHS/MIS 2015-16

# Background

- Malaria is still a major public health concern (for pregnant women and children < 5years).
  - It is among the top causes of morbidity and mortality in the country.
- Malaria Prevalence (*rapid diagnostic testing results*) has risen from 9% in 2011-12 to 14% in 2015-16 (National Surveys)
- Factors associated with existing of transmission hotspots are not known with certainty.

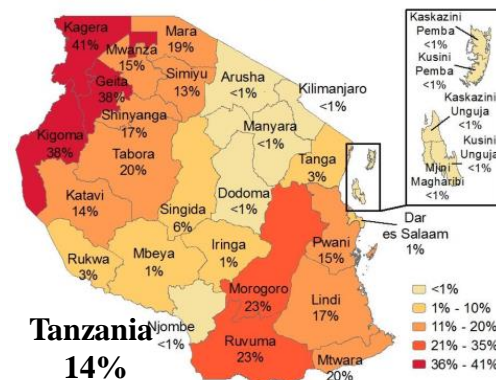
## 2011-12

Percent of children 6-59 months testing positive for malaria by rapid diagnostic test (RDT)



## 2015-16

Percentage of children age 6-59 months who tested positive for malaria by mRDT



### NMCP strategic plan for 2015-2020

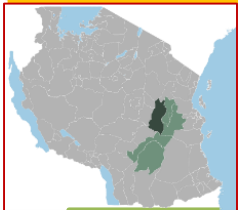
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*To reduce malaria prevalence from 9% in 2012 to 5% in 2016 and to 1% in 2020*

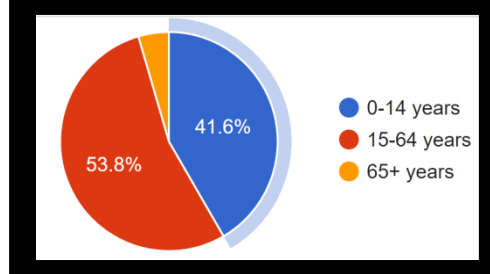
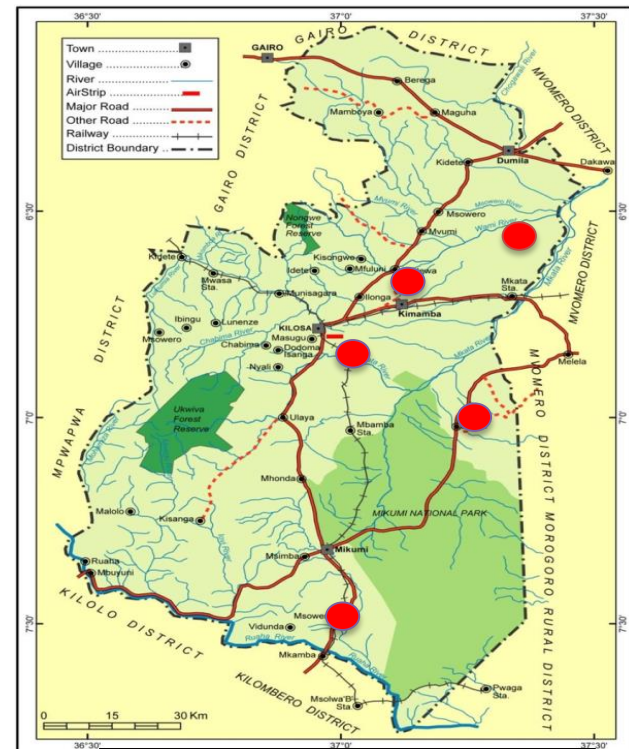
# Objective

- **To determine the association between house construction quality and occurrence of malarial fever among rural communities of Kilosa District in Tanzania**

# Methodology: Study Site

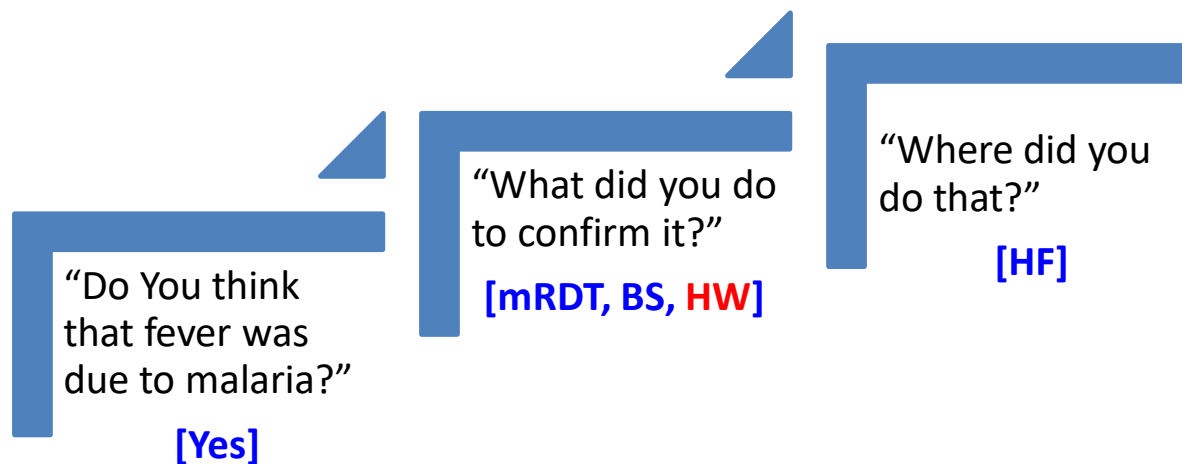


- A community-based study conducted in Kilosa district in central Tanzania in 2015
- Total population = 438,175 (Census 2012)
  - Literacy rate = 75%
  - Access to Improved water sources = 59%
  - Use Improved Toilet Facilities = 24%
- Main Economic activities including Agriculture (78%) Livestock Keeping (39%)
- Five villages of Tindiga, Malui, Mbwade, Parakuyo and Kilangali were involved



# Methodology: Assessment of Fever and Malaria

- Record of occurrence of fever in a period of past 3 months for each member of the household prior the visit
- Informers (Heads of Households) were asked if *the fever was believed to be due to malaria and later confirmed*
- Malarial Fever (Confirmed cases) were determined through a series of questions



# Methodology: Other Determinants

## House Quality Index

- The House quality **index** was determined using the types of materials used for walls, windows and roof construction
- A good quality house was one with materials that **restrict mosquito entry**, i.e.
  - Walls **[cement or baked bricks]**;
  - Roof **[iron sheets or tiles]**; and
  - Windows **[with mosquito mesh]**
- Principal component analysis was used to construct house quality index (*using the first component*)

## Individual Risky Behavior

- Location of each individual during mosquito peak biting hours was used to define risky behavior
- Risky location-time was considered when an individual was
  - *outside-the-house or inside-the-house (but not-under-the-net) between 06.00pm and 08.00pm and/or 08.00pm and 10.00pm*

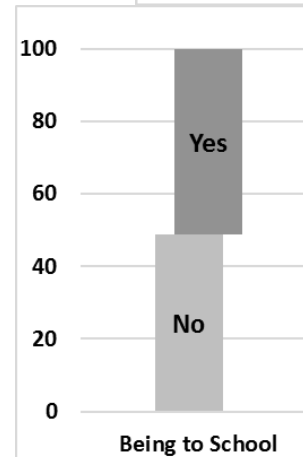
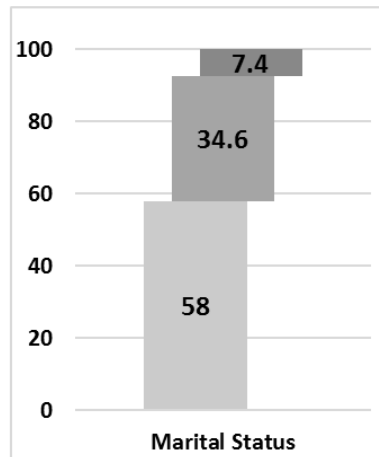
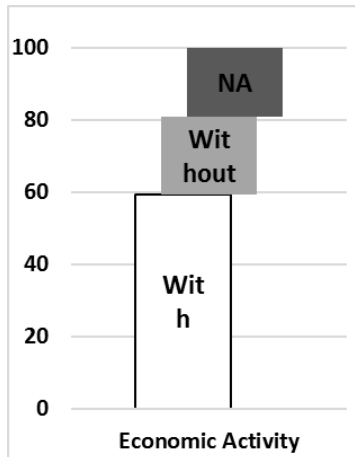
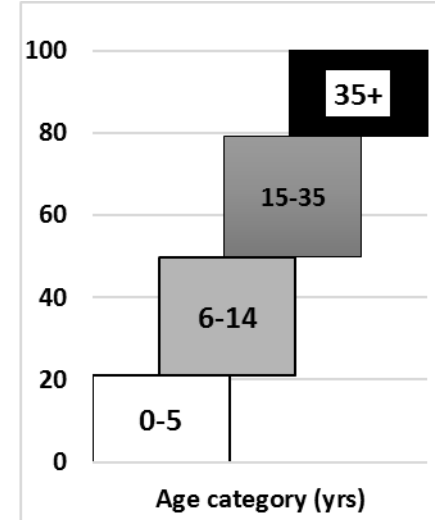
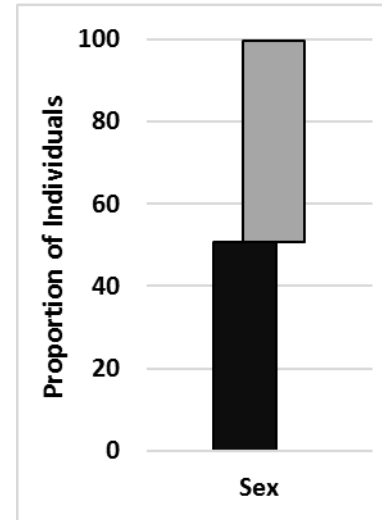
# Modeling

- Multivariate logistic regression model was used to associate house quality index and confirmed malaria
- Model accounted for
  - demographic characteristics,
  - location of the residence
    - less swampy vs. swampy
  - individual risky behavior
- Significance tested at 5% level



# Results: Demographic Characteristics of the Study Population

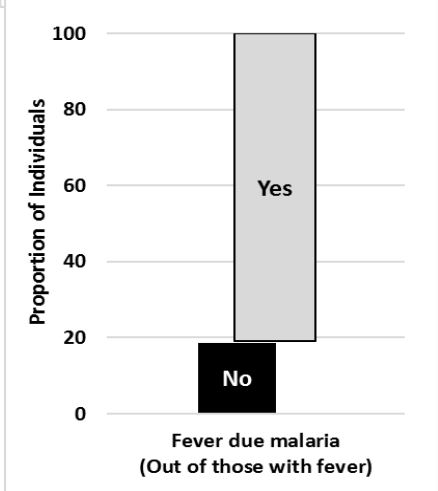
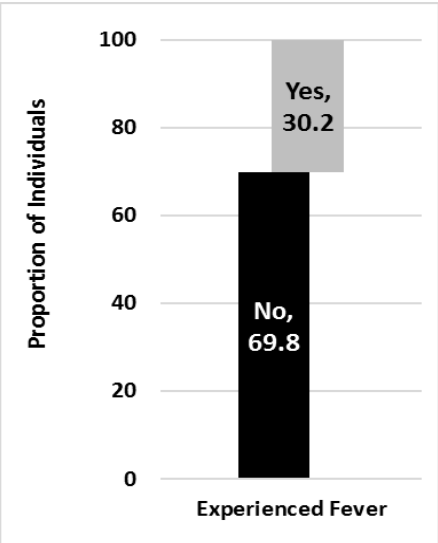
- A total of 3,784 individuals were assessed
- 51.1% were females
- Mean age of 20.7 years (SD=18.2)
- A half had been to school



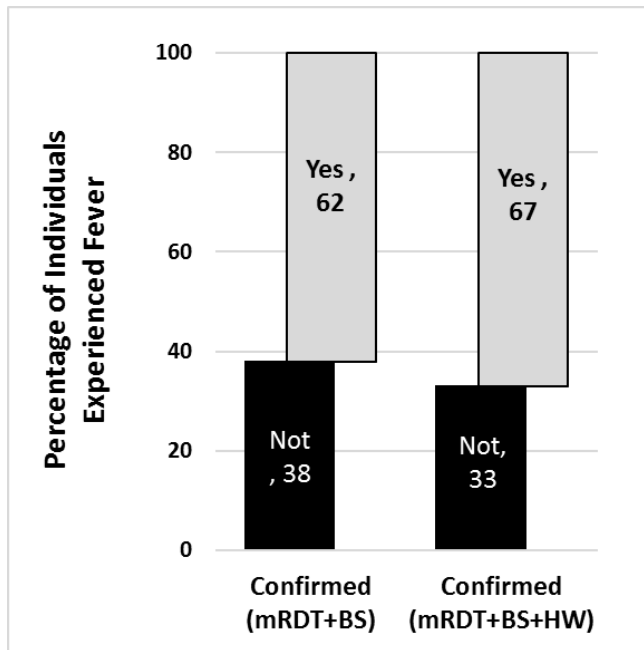
- Over 58% were single
- About 60% had an income generating activity

# Occurrence of Fever and Malaria

- One third (30.2%) reported to have experienced fever in the past 3 months
- Fever was high among
  - Females
  - Individuals between 6-14yrs
  - Those who never being to school
  - Singles
  - Individuals with income generating activities
- 81% believed it was due to malaria.



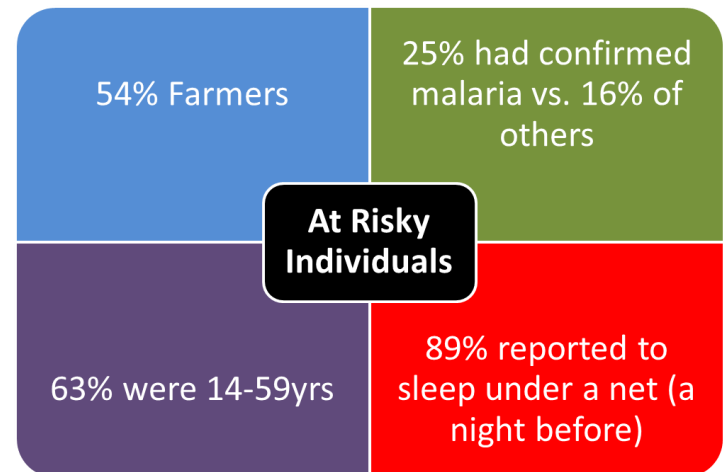
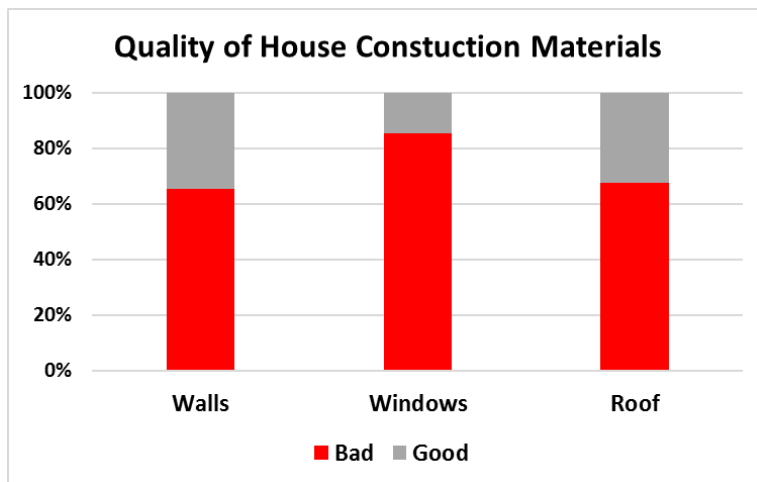
## Confirmed Fevers



- 62% used mRDT and Microscopy
- 5% confirmed by the Health Workers at the HFs

# House Construction Quality and Individual Behavior

- Among all assessed individuals, only 39.4% were living in houses built with Good Quality w.r.t. **restrict mosquito entry**
- Poor windows contributed to poor house quality



- Over a third of individuals were reported to be at risky locations at risky times

# Factors Associated with Occurrence of Fever and Malarial Fever

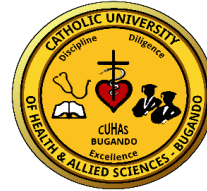
Variable	Fevers			Malarial Fevers		
	OR	95% CI	p-value	OR	95% CI	p-value
Sex (1=Males)	0.81	0.7;0.93	0.004	0.81	0.69;0.94	0.007
Age in yrs (Ref: 0-5 years)						
6-14	0.64	0.51;0.81	<0.001	0.66	0.52;0.85	<0.001
15-35	0.41	0.32;0.52	<0.001	0.42	0.33;0.54	<0.001
35+	0.48	0.37;0.62	<0.001	0.47	0.36;0.63	<0.001
Being to School	0.74	0.61;0.9	0.002	0.77	0.62;0.94	0.012
Money generating activity (Ref: With)						
Without	1.14	0.89;1.47	0.304	1.20	0.92;1.57	0.181
Not Relevant	0.78	0.62;0.97	0.025	0.80	0.63;1.02	0.07
<b>Being at Risky location-time</b>	<b>1.20</b>	<b>0.87;1.66</b>	<b>0.259</b>	<b>1.34</b>	<b>0.95;1.87</b>	<b>0.092</b>
<b>Reside in a Good Quality House</b>	<b>0.85</b>	<b>0.73;0.99</b>	<b>0.032</b>	<b>0.78</b>	<b>0.66;0.92</b>	<b>0.003</b>
<b>House Location (Less swampy =1)</b>	<b>0.58</b>	<b>0.43;0.80</b>	<b>0.001</b>	<b>0.52</b>	<b>0.37;0.73</b>	<b>&lt;0.001</b>

- Residing in good quality houses lessen odds of fever (15%) and 22% for malaria
- Locating house in a less swampy area decreased chance of getting fever (42%) and malaria (48%)
- Being at risky location at risky time increased risk of malaria infection by 34% (!)
- *Age Stratification analysis for malarial fever: Effect of Risky location-time was **NOT** significant for U5yrs, **5 times** for school children and **45% higher** for Adults*

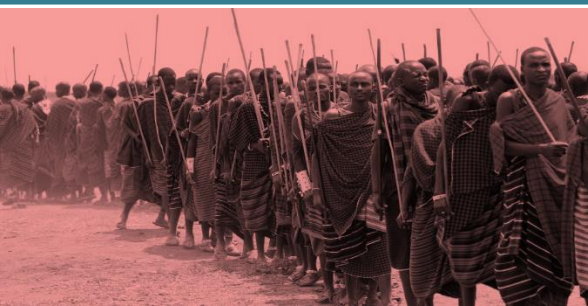
# Conclusion

- The results suggest that house quality is significantly related to occurrence of fever and malaria
  - Residing in a house that restrict mosquito entry reduced the odds for malaria infection **by a quarter**
- Indication that being inside the house but not inside a mosquito net puts an individual at risk of malaria infection → effect differs between U5, School Kids and Adults
- These findings shade light to responding to difficult questions concerning drivers for malaria hotspots in many countries:
  - Housing and Construction sector are needed in the fight against malaria
    - Building better houses can compliment interventions such as use of treated nets, screening, and other case management
  - Need to employ interventions which are long term, less cost, sustainable, same effect as the existing ones (!)
  - Communities need to be educated on proper utilization of mosquito nets to sustain the gains in malaria control
- Longitudinal research is needed to assess if similar patterns exist in all other regions of the country and whether or not the scenario is similar throughout the year and for all transmission levels

# Acknowledgement



Kilosa communities and administration  
Research Assistants  
Financial support from Grand Challenge Canada



*Asanteni Sana  
Welcome to Tanzania*

**The Land of Kilimanjaro**

