Investigating exposure to a neglected fungal disease at the human-animal interface in Kenya

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HISTOPLASMA CAPSULATUM

BACKGROUND & RATIONALE

HUMAN HISTOPLASMOSIS IS A PRIORITY DISEASE IN KENYA AND A NEGLECTED TROPICAL DISEASE [1,2]

- Poorly recognised yet important co-infection in HIV patients [3,4]
- Paucity of data relating to human burden of disease, and the contribution of animals and environment to infection dynamics
- Bat/ bat guano exposure [5,6], environment [7], and clinical status [8], important in disease epidemiology

CURRENT LITERATURE

- Widespread case reports including sporadic observations in Kenya [4,9-11]
- Hospital-based case series predominately in North, South and Central America [12-14]

Histoplasma yeast phase within a human macrophage [15]

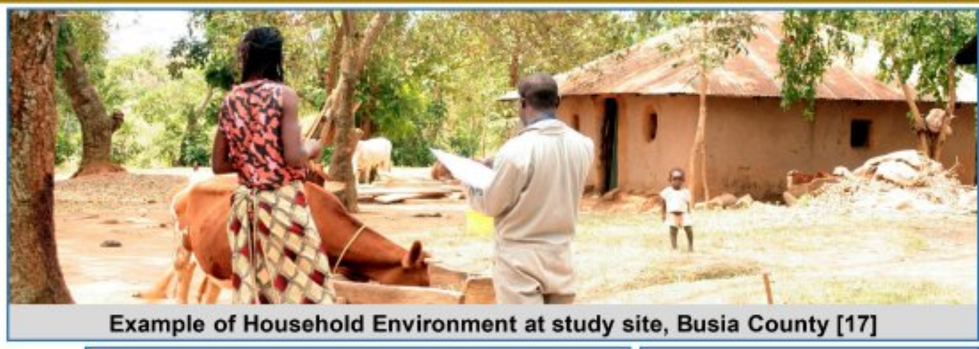
CROSS-SECTIONAL HOUSEHOLD SURVEY IN WESTERN KENYA [16,a]

RESEARCH AIMS

1. IS THERE EVIDENCE OF HUMAN EXPOSURE TO *HISTOPLASMA* IN BUSIA COUNTY, WESTERN KENYA?
2. HOW MIGHT DEMOGRAPHIC, CLINICAL AND HOUSEHOLD FACTORS BE ASSOCIATED WITH EXPOSURE?

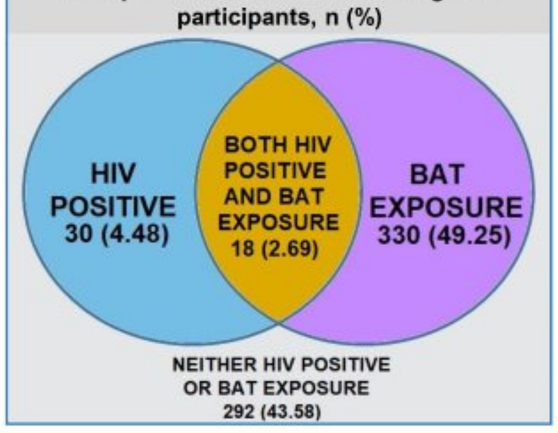
METHODS

- ✓ Biobanked samples and metadata from 2113 study participants in 143 locations, western Kenya (2010-12) originating from the PAZ project [16,a]
- ✓ Random selection of 670 study participants from 178 households
  - Systematic selection of participants with variable HIV status and bat exposure
  - Serum samples tested with IMMY LATEX AGGLUTINATION TEST (LAT)
  - UNI- & MULTIVARIABLE ANALYSES to explore factors associated with presence of *Histoplasma* antibody [16,a]

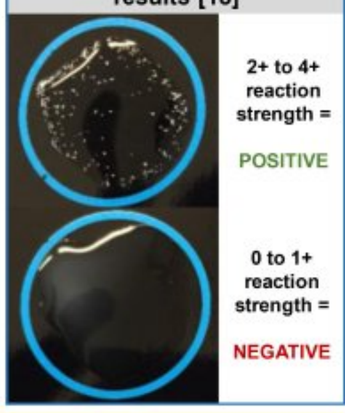


Example of Household Environment at study site, Busia County [17]

Composition of dataset including 670 participants, n (%)



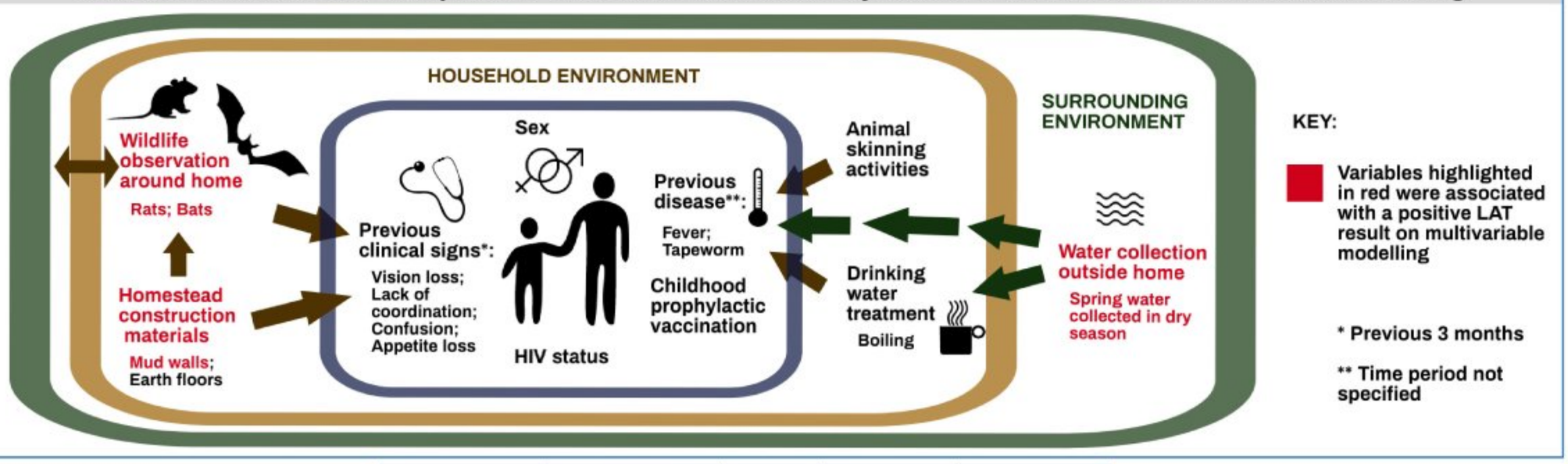
Latex Agglutination Test results [18]



RESULTS

CAUSAL WEB HYPOTHESISING CONNECTIVITY BETWEEN DEMOGRAPHIC, CLINICAL & ENVIRONMENTAL VARIABLES:

Variables included here with *p* value <0.20 on univariable analysis and contributed to multivariable modelling



MULTIVARIABLE LOGISTIC REGRESSION MODEL n=670, 1 observation missing for bats variable; *= Odds Ratio and *p* value for respective interaction terms			LAT positive, n (%)	LAT negative, n (%)	Odds Ratio	95% CI for Odds Ratio	p value (Likelihood Ratio)
Rats observed around home		Yes	100 (16.4)	509 (83.6)	3.0	1.1-8.5	0.04
		No	4 (6.6)	57 (93.4)			
Bats observed around home x Mud walls in house (interaction term)					1.5*	1.0-2.3*	0.05*
	Bats observed	Yes	61 (17.5)	287 (82.5)			
		No	43 (13.4)	278 (86.6)			
	Mud walls	Yes	100 (16.2)	519 (83.8)			
		No	4 (7.8)	47 (92.2)			
Spring water collected in dry season x Mud walls in house (interaction term)					1.6*	1.0-2.4*	0.05*
	Spring water in dry season	Yes	68 (17.6)	318 (82.4)			
		No	36 (12.7)	248 (87.3)			

1. Anti-*Histoplasma* antibody present in 15.5% serum samples (n=104, 95% CI 12.9,18.5)
2. Epidemiological factors found to be associated with a positive LAT result on multivariable analysis

CONCLUSIONS

- Evidence of high level of exposure to *Histoplasma* in Busia County, western Kenya
- Associations between presence of *Histoplasma* antibody and epidemiological variables suggest possible routes of exposure, but do not infer direct causality. Factors surrounding these associations may be linked with lifestyle and socioeconomic influences, and a complex interplay between host, wildlife, and environment, as hypothesised in the causal web.

FURTHER STUDIES IN UNDER-REPRESENTED GEOGRAPHICAL REGIONS WARRANTED to investigate risk factors for exposure, and the influence of wildlife, environmental and socioeconomic factors

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