
Spatial analysis of the association between LLIN use and malaria prevalence in a longitudinal cohort in northeast Uganda

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Abstract **Background:** Methods:**Results:**Conclusions:150 – 250 words.

Keywords LLIN · Spatial analysis · Malaria · RDT · Microscopy ·

1 Introduction

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2 Methods

2.1 Study design

This study employed a prospective observational design with cross-sectional surveys conducted during 4 time periods. The first in November to December 2016; second collection in June to July 2017; third collection in X to Y 2017; and fourth collection in X to Y 2018. In March 2017, in-between the first and second survey, Magoro received free LLIN under the second national mass distribution campaign, and the details of the distribution are contained in the 2016 National LLIN implementation guidelines(health 2013).

2.2 Study setting

This study was conducted in the northeast region of Uganda, specifically in the sub-county Magoro (Fig @ref{fig:googmap_overlay}). The field data were collected between [Start Date] and [End Date]. Details

Grants or other notes about the article that should go on the front page should be placed here. General acknowledgments should be placed at the end of the article.

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of the sample size and sampling of households are detailed in previous study(Wanzira, Katamba, and Rubahika 2016).

2.3 Data collection tools and techniques

Questionnaire data regarding [x, y, and z] were collected by [person] using pre-tested, structured questionnaire during face-to-face interviews with respondents. [people] were trained prior to data collection, through [lecture, video and etc] on completing the questionnaires, mock interviews, and field practice. [A monitoring system was in place to validate, standardize, and maintain quality of data and tasks such as spot checking, back checking, and provided necessary feedback to the teams working in the field]. Different types of checklists were used in different data collection tools for qualitative segment. A team of [x] research assistants with [y] background, along with the lead [doctor/nurs] to collect field data.

Malaria data were collected by [person] using rapid diagnostic tests (RDT) and smear microscopy(Makler, Palmer, and Ager 1998).

2.4 Variables assessed

The demographic variables for respondents were age (years) and gender. The household level variables assessed were number of people per household, net use per household, and RDT and microscopy tested per household.

2.5 Data analysis

2.6 Ethical considerations

The [year] MIS was approved by two ethical review bodies that included the Makerere University School of Biomedical Sciences Higher Degrees Research and Ethics Committee (SBS-HDREC) and the Uganda National Council for Science and Technology (UNCST). All participants interviewed gave their informed consent to participate in the 2014 MIS in addition to granting permission that information from survey could be published. The data used in this analysis was anonymous with no individual names of participations were captured.

3 Results

Something something about table 1.

Table 1: Demographic characteristics, net usage, and malaria status of study population.

	Time 1 (N=194)	Time 2 (N=198)	Time 3 (N=200)	Time 4 (N=200)	p
Demographic					
Age mean (sd)	23.1 ± 15.8	22.4 ± 15.1	25.4 ± 17.5	25.4 ± 19.1	0.165
People per HH mean(sd)	5.6 ± 3.0	5.8 ± 3.3	5.1 ± 2.9	5.4 ± 2.9	0.129
Net usage					
Nets per HH mean(sd)	1.9 ± 1.7	2.9 ± 1.6	2.4 ± 1.3	2.0 ± 1.5	< 0.001
Nets per person mean(sd)	0.4 ± 0.3	0.6 ± 0.3	0.6 ± 0.3	0.5 ± 0.3	< 0.001
Nets per two mean (sd)					< 0.001
0	120 (61.9%)	66 (33.3%)	70 (35%)	105 (52.5%)	
1	74 (38.1%)	132 (66.7%)	130 (65%)	95 (47.5%)	
Malaria					
RDT tested per HH mean(sd)	4.7 ± 2.6	4.3 ± 2.3	4.0 ± 2.1	4.0 ± 2.2	0.010
Proportion + by RDT	0.4 ± 0.3	0.5 ± 0.3	0.3 ± 0.3	0.2 ± 0.2	< 0.001
MIC tested per HH mean(sd)	4.4 ± 2.7	3.5 ± 2.6	3.8 ± 2.0	4.0 ± 2.2	0.006
Proportion + by microscopy	0.2 ± 0.2	0.3 ± 0.3	0.1 ± 0.2	0.1 ± 0.2	< 0.001

Table 2: Coefficients from spatial model

	Dependent Variable			
	RDT+		MIC+	
	Net Cov	≥ 1 net per 2	Net Cov	≥ 1 net per 2
netCov	0.695 (0.497, 0.855)	0.813 (0.73, 0.94)	0.735 (0.5, 1.09)	0.859 (0.709, 1.01)
Time				
stime2	1.14 (0.992, 1.36)	1.08 (0.913, 1.22)	1.61 (1.25, 1.97)	1.44 (1.18, 1.76)
stime3	0.689 (0.588, 0.805)	0.681 (0.55, 0.791)	0.778 (0.581, 1.07)	0.781 (0.591, 0.994)
stime4	0.612 (0.527, 0.723)	0.614 (0.51, 0.734)	0.713 (0.553, 0.91)	0.784 (0.575, 0.989)
Spatial				
longitude	0.00216 (0.000147, 0.0363)	0.00253 (0.000115, 0.0263)	0.0153 (0.000206, 1.01)	0.0104 (0.0000946, 0.61)
latitude	0.870 (0.178, 4.97)	0.751 (0.169, 5.04)	0.31 (0.0222, 3.18)	0.211 (0.0186, 3.39)
sig ²	1.01 (1.00, 1.02)	1.01 (1, 1.02)	1.02 (1.01, 1.08)	1.03 (1.01, 1.08)
phi	1.22 (1.22, 7.24)	1.04 (1.04, 6.69)	1.11 (1.11, 6.82)	1.04 (1.04, 6.96)

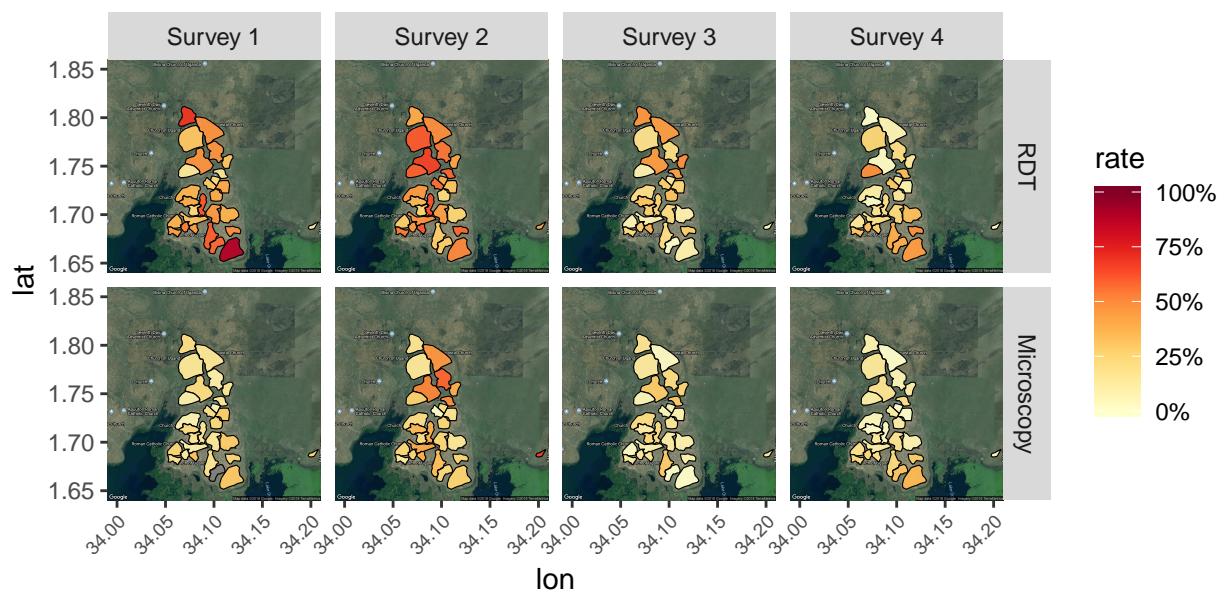


Fig. 1: Maps of microscopy and rapid diagnostic test positivity using village shapes by survey time.

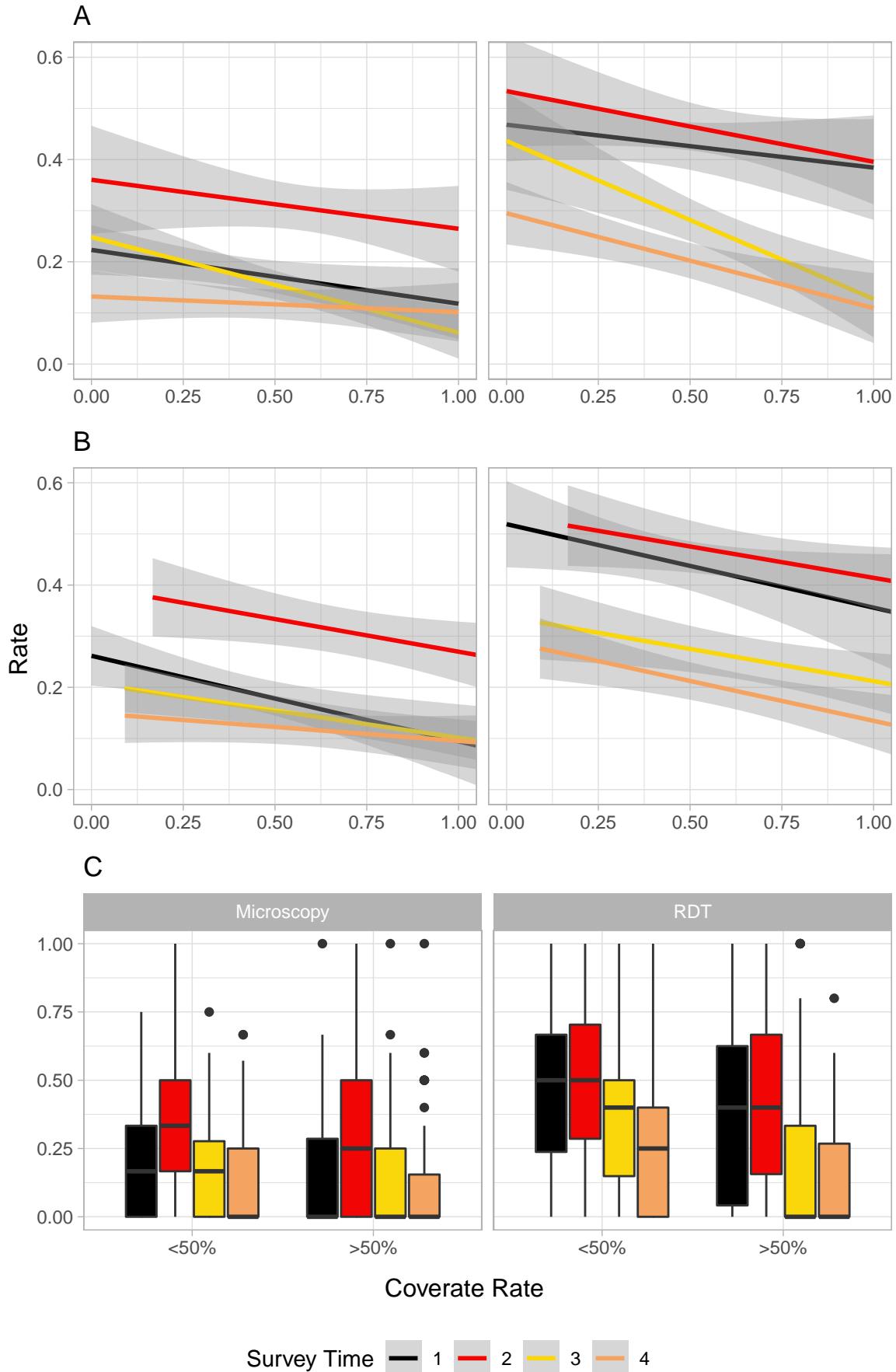


Fig. 2: Relationship between LLIN use and Positivity. **A:** Net coverage (i.e. proportion of net/tested in HH) vs. positivity. **B :** Sleeping under the net (i.e. Proportion of people sleeping under/per net in HH) and positivity. **C :** Net per two (i.e.>50% people in HH) and positivity

3.1 Subsection title

Referencing Table 1 is cool. as required. Don't forget to give each section and subsection a unique label (see Sect. 3).

Paragraph headings Use paragraph headings as needed.

$$a^2 + b^2 = c^2 \quad (1)$$

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