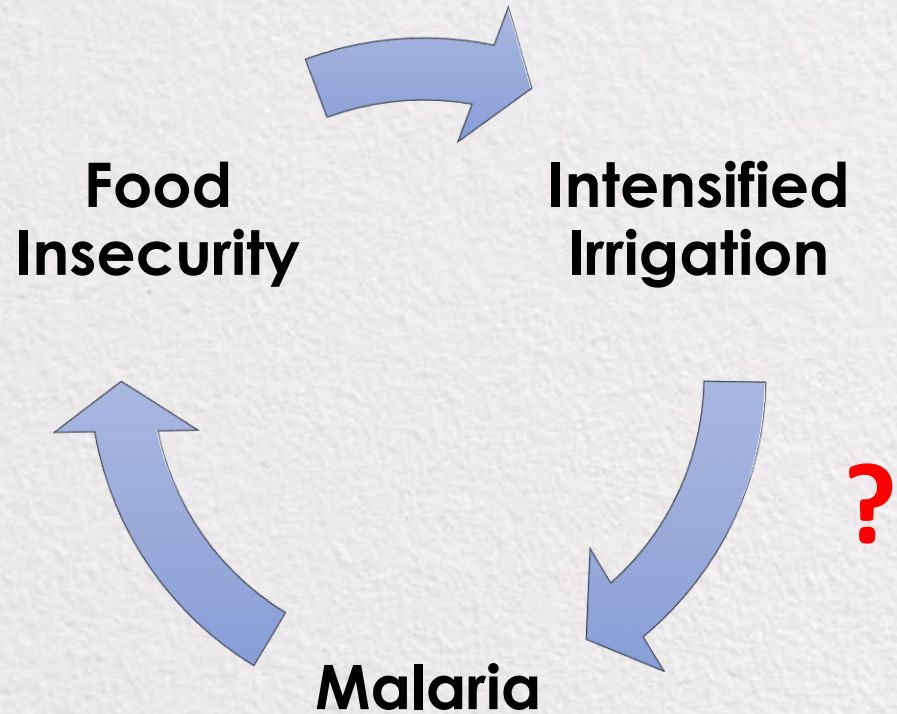


Rice Irrigation Farming and Malaria Risk

Key Findings- Malaria

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Project Premise



- Land transformation for irrigated agriculture increases malaria vulnerability for those residing in close proximity to irrigation schemes
- The risk can be mitigated through innovation at this nexus (?)

Data Analysis

- Outcomes:
 - Primary: Malaria parasitemia infection (malaria rapid test)
- Predictors:
 - Main: distance of the household from the irrigation scheme boundary
 - ✓ Malaria infection prevalence compared between households within 1.5 km radius of the scheme from households > 1.5 km from
 - ✓ The scheme
 - Demographic and socioeconomic factors

Baseline Characteristics

- Survey One: 445 households
 - **1662** with malaria rapid test done
- Survey Two: 443 households
 - **1648** with malaria rapid test done

Individual characteristics	Survey One (n=1,698)	Survey Two (n=1,658)
Gender		
Male	820 (48.3)	826 (49.8)
Female	878 (51.7)	832 (50.2)
Age group (years)		
< 5 yrs	239 (14.1)	210 (12.7)
5-15 years	530 (31.2)	562 (33.9)
> 15 years	929 (54.7)	886 (53.4)
Slept under LLIN last night		
Yes	1,584 (93.3)	1,592 (96.0)
No	114 (6.7)	66 (4.0)

Modern (finished floor, roof, and external wall materials).

- Survey One: 131 of 445 (29.4 %)
- Survey Two: 137 of 443 (31.6%)

Variable	Survey one	Survey two
Household-level Characteristics	N=445	N=433
Number of occupants in a household		
Median (IQR)	5 (3-6)	5 (3-6)
1–4	302 (67.9)	290 (67.0)
>4	143 (32.1)	143 (33.0)
Gender household head		
Male	336 (75.5)	335 (77.4)
Female	109 (24.5)	98 (22.6)
Education status of household head		
No formal education	14 (3.2)	16 (3.7)
Primary school	321 (72.1)	317 (73.2)
Secondary school or higher	110 (24.7)	100 (23.1)
Main housing structure		
Finished household wall	425 (95.5)	225 (95.3)
Finished household roof	350 (78.7)	195 (82.6)
Finished household floor	132(29.7)	72 (30.5)

Adequate number of LLINs (one LLIN for every two home residents)

- Survey One: 90.4%
- Survey Two: 87.2%

Variable	Survey One	Survey Two
Household-level	N=445	N=443
Own at least LLIN		
No	7 (1.6)	8 (1.9)
Yes	438 (98.4)	425 (98.1)
Number of LLIN per household		
1 LLIN	39 (8.9)	32 (7.5)
2 LLIN	102 (23.3)	100 (23.5)
3 LLIN	158 (36.1)	154 (36.2)
4 LLIN	95 (21.7)	103 (24.2)
≥ 5 LLIN	44 (10.1)	36 (8.5)
One LLIN for every two household members		
No	42 (9.6)	54(12.8)
Yes	396 (90.4)	371 (87.3)

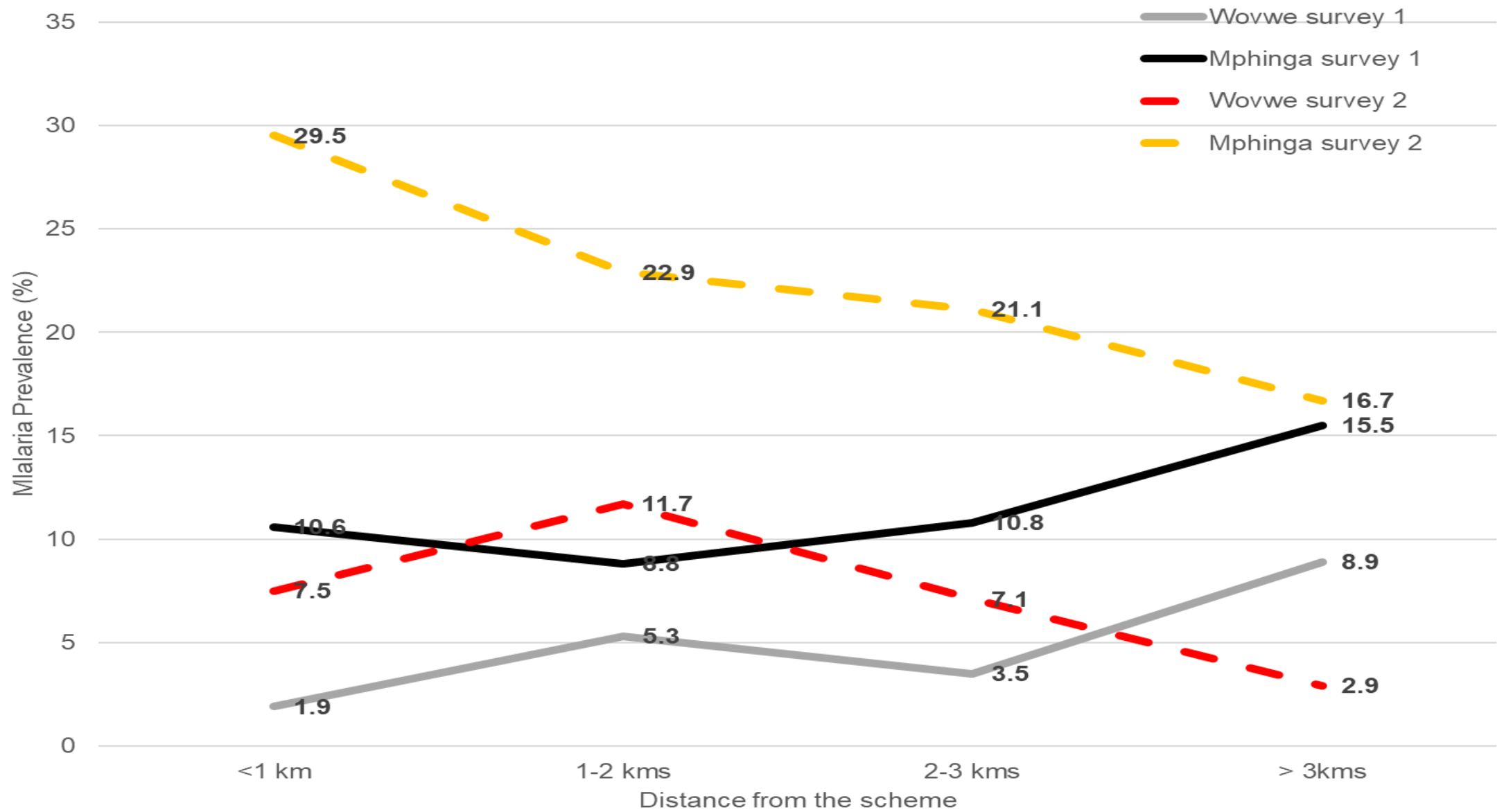
Malaria Prevalence

- Survey One
 - 7.3% (121/1662)
 - 10.7% (13/121) symptomatic

- Survey Two
 - 18.5% (305/1648)
 - 23.8% (71/305) symptomatic

Distribution of malaria infection, comparing survey one and two			
Variable	Participants with malaria infection		
	N (%)		
Distance from the scheme	Survey One	Survey Two	P-value
≤ 1.5 kms	54 (44.6)	237 (77.7)	< 0.001
>1.5 kms	67 (55.4)	68 (22.3)	< 0.001
Scheme			
Wovwe	28 (23.1)	63 (20.7)	0.797
Mphinga	93 (76.9)	242 (79.3)	0.631
Household a member of the scheme			
No	12 (9.9)	59 (19.3)	0.437
Yes	109 (90.1)	246 (80.7)	0.027

Malaria Prevalence by household distance from the scheme



Distribution of malaria infection, comparing survey one and two

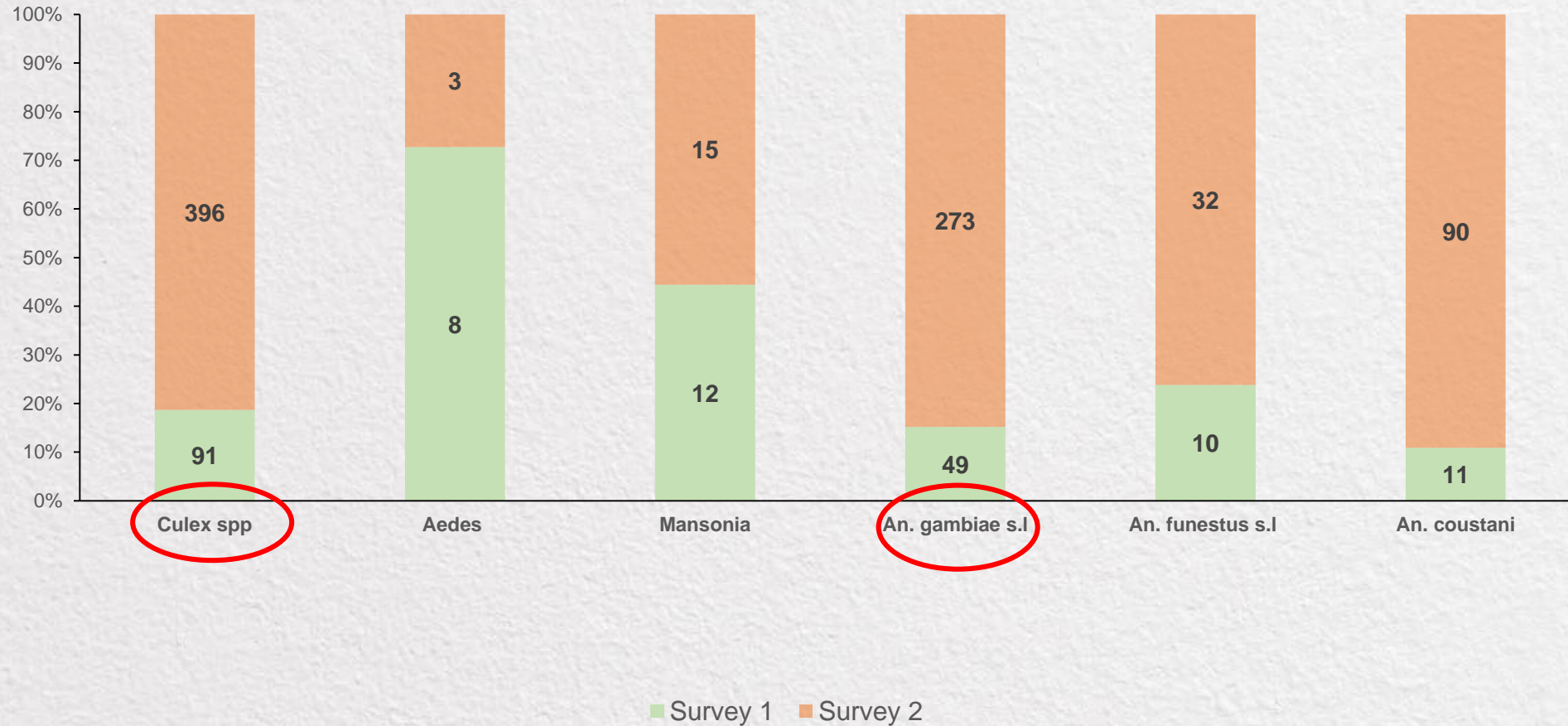
Variable	Participants with malaria infection, N (%)		p-value
	Survey One	Survey Two	
Gender			
Male	81 (66.9)	171 (56.1)	0.103
Female	40 (33.1)	134 (43.9)	0.224
Age group (years)			
< 5 yrs	8 (6.6)	26 (8.5)	0.863
5-15 years	71 (58.7)	162 (53.1)	0.429
> 15 years	42 (34.7)	117 (38.4)	0.671
Slept under a bed net last night			
No	24 (19.8)	19 (6.2)	0.199
Yes	97 (80.1)	286 (93.7)	< 0.001

Factors associated with malaria infection

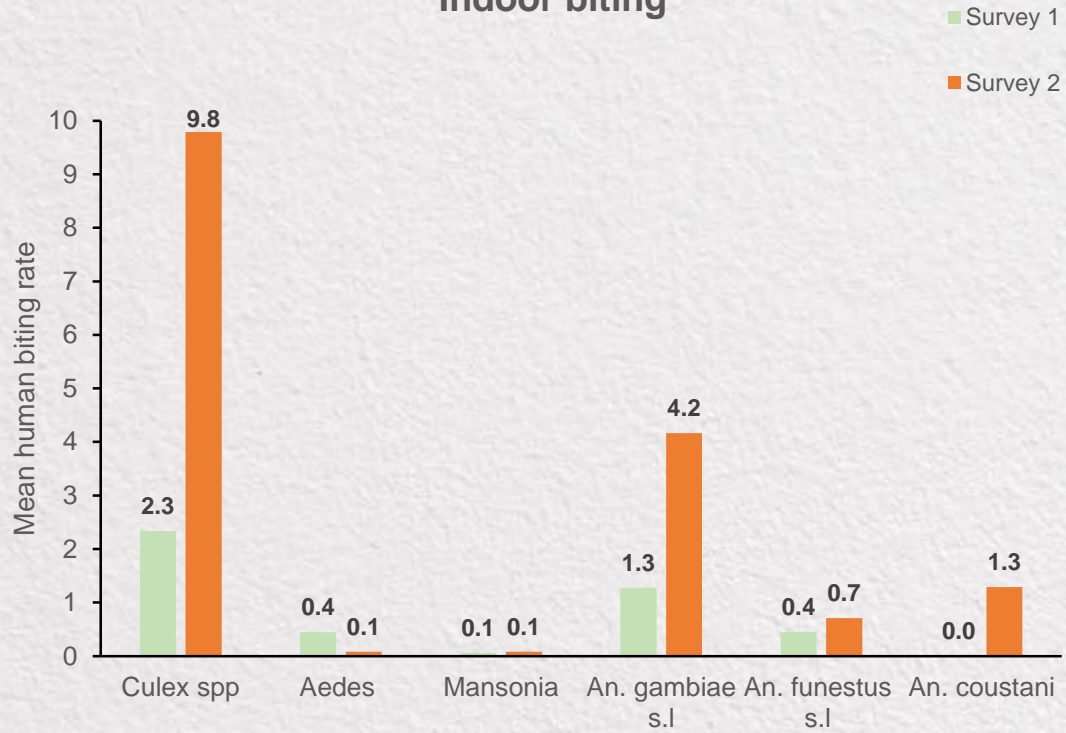
Variable	Survey One		Survey Two	
	Adjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Female vs male	0.49 [0.38-0.63]	<0.001	0.82 [0.63- 1.06]	0.131
School aged children vs < 5 years old	4.02 [1.31-12.3]	0.015	3.31 [1.79- 6.12]	<0.001
Slept under LLIN vs did not sleep under LLIN	0.25 [0.14-0.43]	0.001	0.33 [0.19- 0.56]	<0.001
Residence ≤ 1.5 kms vs residence > 1.5 kms	0.54 [0.34-0.85]	0.009	1.22 [0.73- 2.03]	0.456
Resident of Mphinga scheme vs resident of Wovwe	4.87 [2.98-7.98]	<0.001	4.64 [2.86-7.52]	<0.001
House with finished wall vs unfinished wall	0.49 [0.26-0.92]	0.027	1.00 [0.53- 1.89]	0.993

Variable	Adjusted OR	95% CI	p-value
School aged children vs < 5 years old	0.30:	(0.11-0.81)	0.018
Residence ≤ 1.5 kms vs > 1.5 kms	0.54	(0.37-0.80)	0.002
2 LLIN	6.01	(4.00-9.02)	<0.001
3 LLIN	3.21	(1.43-7.21)	0.005
4 LLIN	5.57	(1.96-15.92)	0.001
≥ 5 LLIN	7.47	(1.73-32.26)	0.007
One LLIN for every two household members	6.52	(2.62-16.25)	<0.001
House with finished floor vs unfinished floor	0.46	(0.33-0.62)	<0.001

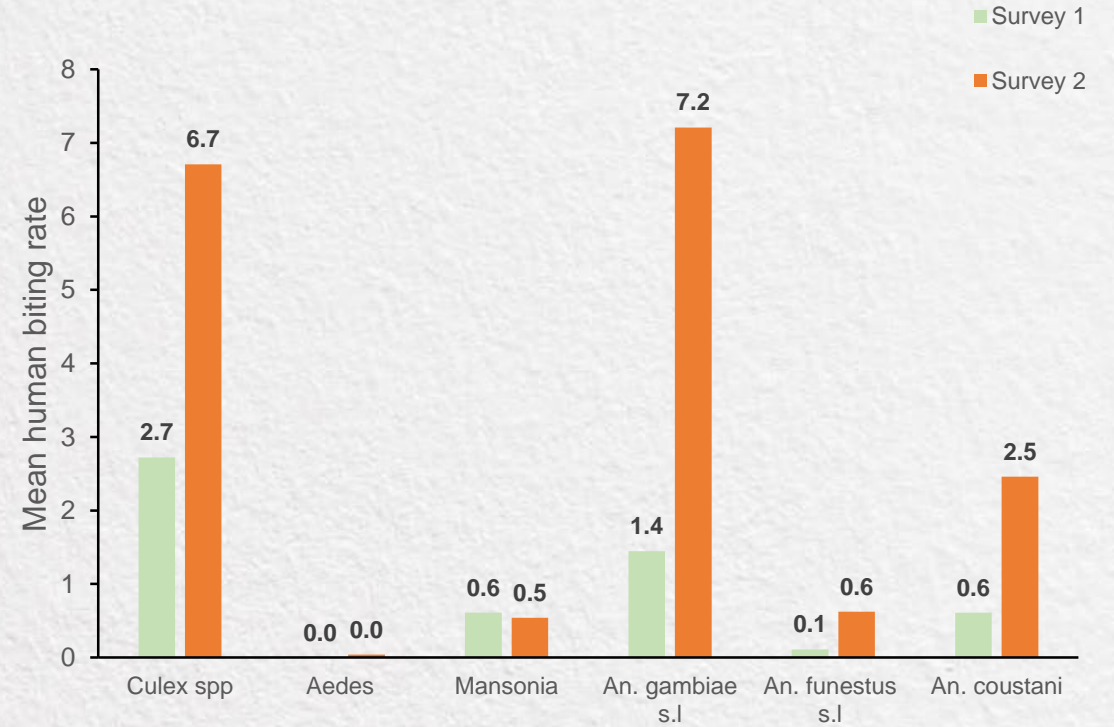
Mosquito abundance



Indoor biting

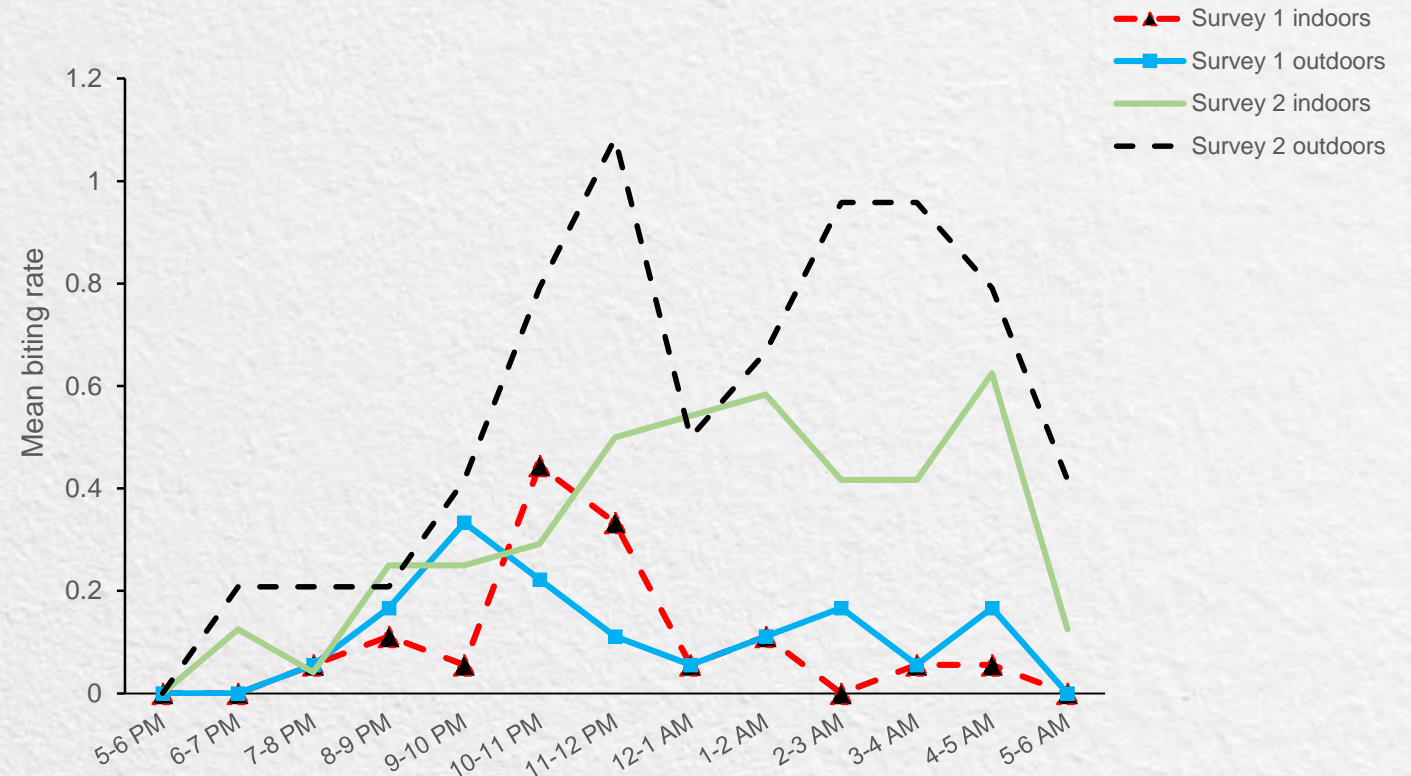


Outdoor biting



- Higher mean hourly biting rates in Survey Two compared to Survey One
- Survey One:
 - Peak **outdoor** between 10 PM and midnight.
 - Peak **indoors** earlier between 9-10 PM.
- Survey Two :
 - Peak **outdoor** biting rates between 9 PM –midnight, and between 2-5AM
 - Peak **indoors** biting rates from 11 PM-4-5 AM


Mean hourly biting rates for *An. gambiae* s.l by survey



Conclusions

- Malaria infection distribution between the surveys
 - Significant increase in prevalence of malaria infection from Survey One to Survey Two.
 - Significant differences observed in the distribution of infected individuals by distance of their residence from the scheme (residents of homes closer to the scheme had higher rate of infection than those beyond 1.5 kms in Survey Two compared to Survey One where residents closer to the scheme had lower infection rate).
 - Mphinga scheme had significantly more infected individuals than Wovwe scheme in both surveys
 - Individuals reporting LLIN use tested positive for malaria in Survey Two than in Survey One (3 times increase in prevalence compared to 1.3 times increase in non-users).
 - No difference in malaria infection between residents of households that were members of the scheme compared to non-scheme members.

- Increased odds of malaria infection
 - a resident of Mphinga scheme
 - school age child aged 5-15 years.
- Decreased odds of infection
 - reported use of LLIN the previous night reduced the odds of testing malaria positive.

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- *Culex* species, a non-malaria vector and *An. Gambiae*, the main malaria vector in Malawi were the dominant biting mosquito species both indoors and outdoors.
 - Biting rates increased significantly for both species from Survey One to Survey Two reflecting an increase in intensity of mosquito feeding
 - Peak biting times in Survey Two were longer compared to Survey One

Thank You.

