

Comparison of Malaria Transmission and Vector Dynamics During Years when IRS Was/Was Not Conducted in Senegal

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Background

In 2018, the Senegal National Malaria Control Program (NMCP) discontinued the U.S. President's Malaria Initiative (PMI)-funded indoor residual spraying (IRS) program implemented over the past 10 years. Efforts to ensure access and use of insecticide-treated nets (ITN) continued at national level including former IRS districts. To determine the effects of the discontinuation we compared entomology data from 2017, the last year of IRS, and 2018. The scope of our study focused on malaria vector densities, behavior, sporozoite infection rates and transmission in districts where IRS was withdrawn.

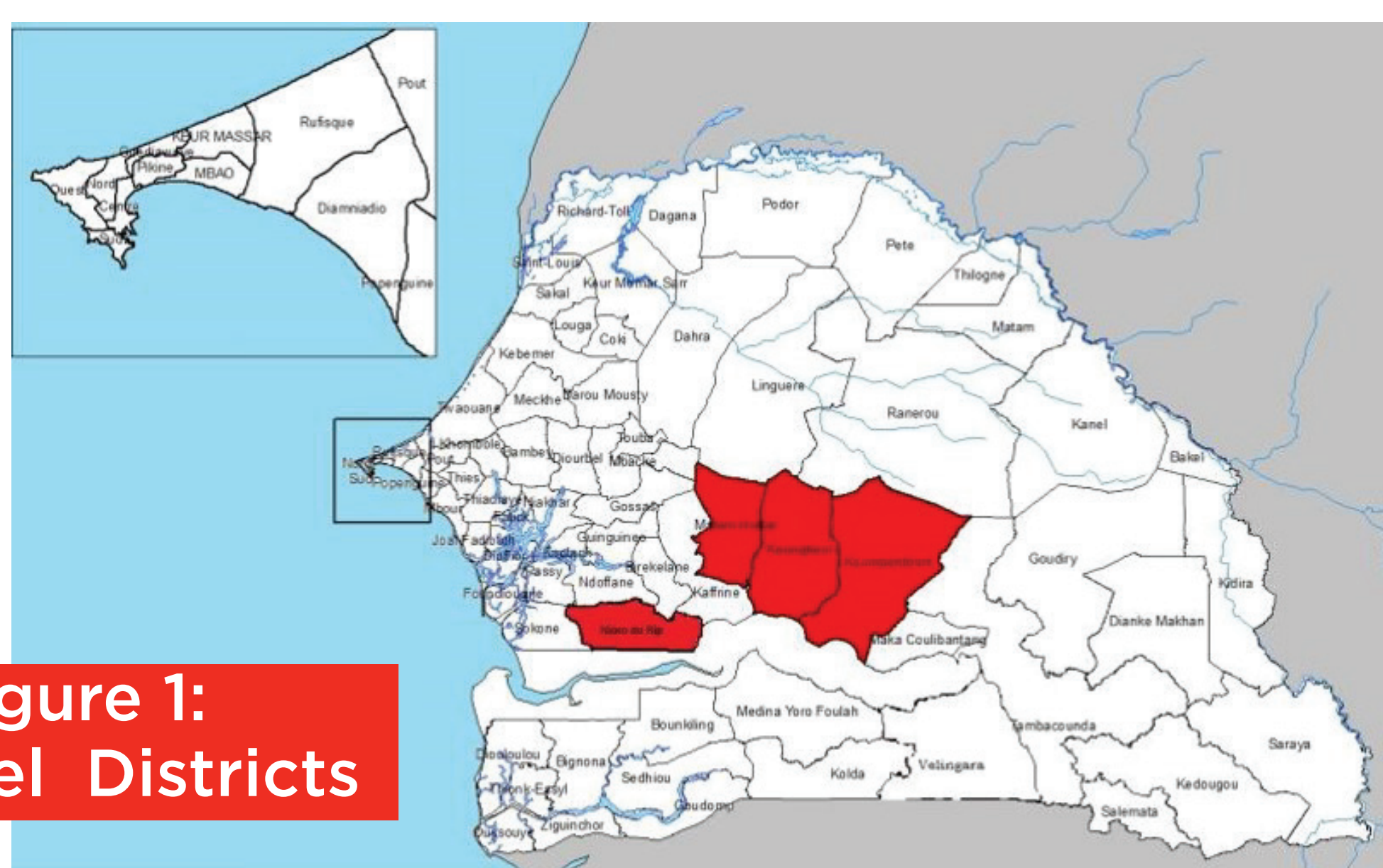


Figure 1: Sentinel Districts

Methods

- The study was conducted in the four former spray districts including Niourou, Malesm Hodar, Koungheul and Koumpentoum (Figure 1). These are part of the pre-elimination area in central Senegal.
- Every district had four sentinel sites where the same entomology activities were carried out.
- Malaria vector density, behavior and *Plasmodium falciparum* infection rates were monitored from July to December in both 2017 and 2018 in the four former IRS districts.
- Entomological data were collected monthly at each site using pyrethrum spray catches (PSCs), conducted in the early morning, and human landing catches (HLCs), conducted both indoors and outdoors at three houses over two successive nights.

Results and Discussion

Entomological parameters compared before and after IRS withdrawal

	# Person Nights	# Collected	Human Biting Rate	# Houses	# Collected	Indoor Resting Density	# Dissected	# Parous	Parity Rate	# Blood Tested	# Human Blood	Anthrophilic Rate	# Anopheles Tested	# Infected	Sporozoites Rate	EIR
An. gambiae s.l.																
2017	768	375	0.49	640	1203	1.88	234	127	0.54	384	110	0.28	260	7	0.027	0.013
2018	576	273	0.47	480	1031	2.15	190	117	0.62	465	74	0.16	260	4	0.02	0.009
Ratio			0.96			1.14			1.15			0.57			0.74	0.69
Chi square			NS			S			NS			S			NS	
An. funestus s.l.																
2017	192	452	2.4	160	683	4.27	274	312	0.51	91	8	0.09	108	1	0.009	0.021
2018	144	312	2.2	120	607	5.06	315	114	0.36	232	30	0.13	210	1	0.005	0.011
Ratio			0.92			1.18			0.71			1.44			0.56	0.52
Chi square			NS			NS			S			NS			NS	

- Anopheles gambiae* s.l. remained the predominant vector in 3 of the districts but the density of *An. funestus* was still higher compared to *An. gambiae* s.l. in Niourou.
- Overall biting rates of *An. gambiae* s.l. in IRS sites were very low for both 2017 and 2018 after withdrawal.
- The sporozoite rates of *An. gambiae* s.l. recorded during both years of collection were similar therefore induced approximately the same entomological inoculation rate (EIR) of 0.01 infected bite/person/night, all sites included.
- An. gambiae* s.l. Indoor resting density and anthropophilic rate were slightly higher during the unsprayed year.
- No significant change was observed with *An. funestus* s.l. except the parity rate which decreased in 2018 (chi-square test).

Conclusions

- We observed no evidence of increased malaria transmission during the year after IRS withdrawal in Senegal. Though IRS had been halted, a reversal situation of high vector densities and malaria transmission did not occur.
- With the exception of IRS, ITN distribution as a malaria control strategy was implemented in all districts in both years.
- The lack of increase in malaria transmission may be attributed to the decrease in total rainfall in the central region which decreased around 26% from 2017 to 2018 (NMCP Annual Report 2018).

Key References

PMI VectorLink Senegal 2017 Entomological report
 PMI VectorLink Senegal 2018 Entomological report
 Bulletin épidémiologique du Paludisme au Sénégal Année 2018

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