A VALIDATION OF MALARIA ATLAS PROJECT MAP IN SOKOTO, NORTHWESTERN NIGERIA.

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BACKGROUND

The Malaria Atlas Project (MAP) was first developed in 2006, to project estimates of malaria prevalence among children two to ten years of age where this data is not available. This data is obtained from malariometric studies and surveys conducted globally and this is modelled to provide estimates of malaria prevalence. The maps consider the vector –transmitted nature of malaria and the factors for vector survival. This study was conducted to compare the true estimates in the rainy and dry season with the MAP projections for Northwestern Nigeria.

METHODS

The study was conducted in Wamakko Local Government Area (LGA) of Sokoto State, located in the North Western Nigeria; it has an area of 732.146km² and was inhabited by a population of about 234,860 by 2015. It is located at coordinates [13°2'16"N 5°5'37"E](#). The geography of the area is predominantly flat plains with Sudan Savannah type vegetation and stands at an altitude of 292 m above sea level, near to the confluence of the Sokoto and Rima rivers.

All children in the selected settlements who met the age criteria of 2 to 10 years were recruited for the study. They had malaria testing with microscopy and RDTs. Mapping of the parasite species was done using a GIS map of Wamakko as base map done using a hand-held GIS device. Settlements, where the study was conducted, were identified and the findings were extended based on MAPs model.

Sources

Malaria Atlas Project. Malaria map of Africa. Maps. 2016.Available from: <http://www.map.ox.ac.uk/>
Hay SI, Snow RW. The malaria Atlas Project: developing global maps of malaria risk. PLoS Med. 2006;3(12):e473.

Other surrounding areas up to 5km further were designated as possible areas of parasite activity based on the maximum flight distances of the mosquito vector. Prevalence obtained was compared to the prediction for Sokoto by the MAPs project. Using the indices of rainfall, temperature and altitude averaged for the previous year (2015) of which was a variation of only 2mm of rainfall and 1.2°C in the average temperatures proposing uniform prevalence across the state.

Figure 1: Endemicity of malaria in Wamakko LGA Sokoto

RESULTS

The *Plasmodium* parasite rate was 34.8%, all of which were *P. falciparum*. Therefore PfPr₂₋₁₀ is 34.8%. Wamakko Local Government Area is thus mesoendemic for malaria based on the PfPr₂₋₁₀ of 34.8% which falls within the range of 11 and 50% for mesoendemicity, it also falls between 5 and 40% classifying the LGA as an area of intermediate endemicity. As shown in figure 1.

The overall prevalence of malaria for the study was 34.8% using microscopy and 33.8% using RDT as shown in table I. There was an agreement between the two diagnostic methods as shown by the kappa statistic. (p <0.001)

The obtained prevalence was similar to MAPs prediction, using a model similar to that by MAPs, the prevalence of malaria in Wamakko may be extrapolated to the whole of Sokoto state. Consider also that Sokoto projected as homogenous in terms of prevalence and endemicity by MAPs. The spatial distribution, locational map of Wamakko and comparison to the MAP prediction for 2015 is shown in fig 2.

DISCUSSION

Sokoto State has only slight variation in climatological data across the state, the only exceptions being along the basin of the Rima River, which has only Goronyo Local Government area of the state along its floodplain. The Temperature fluctuation across the state is 1.2 to 2°C annually and rainfall only differs by about 12mm even along the flood plains. The altitude is fairly stable across the state with uniform

Sudan Savanna vegetation except along the Rima River Basin. These factors allow a generalizability of the average prevalence from Wamakko to the entire state with a variation expected only in November, towards the end of the rainy season. This is likely because higher parasite rates are likely to linger around the river basin along the flood plains of the Sokoto-Rima River than in the other parts of the state. The monoparasitaemia noted during the study This is in keeping with recent studies in Nigeria

Table I: Malaria prevalence by RDT and thick films

TEST RESULT		THICK FILM		
	RDT	POSITIVE	NEGATIVE	TOTAL (%)
POSITIVE		295	49	344 (33.8)
NEGATIVE		59	614	673 (66.2)
TOTAL (%)		354 (34.8)	663 (65.2)	1017 (100.0)

CONCLUSION

The prevalence and endemicity of Wamakko are similar to MAPs predictions and may be generalizable to Sokoto state based on Malaria Atlas Project projections.

Fig 2: Malaria distribution map and MAP projections 2015