children between 5 and 14 years old are mostly affected by the disease. Also, given that the Amodiaquine is available only as part of ASAQ in Madagascar, Artemisinin Combined Therapy (ACT) was used for 3 days of directly observed treatment. A total of 1686 children was recruited with 13,16% of lost follow up. As a result, we observed a decrease of 72% of malaria prevalence between pre-and post-intervention. A scaling up and an evaluation of cost efficacy of this prevention strategy will be recommended.

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THE EFFECT OF HOUSING IMPROVEMENTS ON MALARIA IN AFRICA, 2000-2015

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Improving housing is a promising strategy for sustainable malaria control. As Africa undergoes rapid economic and social change, it is vital to understand continent-wide changes in housing quality and their impact on malaria, to inform effective inter-sectoral malaria strategies. Here we provide the first formal quantification of changes in housing quality across sub-Saharan Africa (SSA) from 2000 to 2015 and of the effect of these changes on malaria endemicity. Data on housing quality were abstracted from 131 unique Demographic and Health and Malaria Indicator Surveys comprising over 1.1 million households, and combined within a Bayesian geostatistical framework to estimate changes in housing quality between 2000 and 2015. These estimates were linked with a large database of malaria prevalence surveys, environmental, sociodemographic, and intervention factors to estimate the effect of housing quality on malaria endemicity in SSA during 2000-2015. We will present data, trends, and maps on changes in house quality across SSA, evaluate the impact on malaria endemicity, and discuss the potential of improved housing as an intervention against malaria in a range of transmission settings across SSA. Alongside the current suite of interventions, improvements in housing quality linked to socioeconomic development may be an important strategy to support long-term and sustainable malaria control, elimination and the prevention of re-emergence.

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UNDERSTANDING MIGRANT BEHAVIORS AND MALARIA RISK IN AYEYARWADDY REGION, MYANMAR

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Myanmar reported less than 60,000 malaria cases in 2016, and with the growing threat of artemisinin resistance, is committed to eliminating malaria by 2030. Ayeyarwaddy is the third most populated region in Myanmar and accounts for nearly 10% of total malaria. Mobile and migrant populations (MMPs) in Ayeyarwaddy are considered at greater risk for malaria, but little is known about the their malaria knowledge and behavior. A cross-sectional cluster survey was conducted in September 2016 in Ngaputaw township, the area that accounts for 44% of total malaria confirmed cases reported in Ayeyarwaddy. MMPs aged 15 years-old or above were interviewed in 48 village clusters conveniently sampled along the road network. Data were collected about malaria knowledge, prevention measures and access to care through face-to-face interviews conducted by healthcare workers. Among the 230 MMPs interviewed, 70% reported that malaria can be transmitted through a mosquito bite, and 74% agreed with the statement that there is more risk to contract malaria when working at night. Sleeping under a mosquito net was mentioned as the preferred method for preventing malaria among 90% of the respondents, and 60% reported having at least one net. In relation to case management, 29% of respondents believed they had malaria at least once in the last 6 months, and of those, 95% reported they received a blood test. Additionally, 78% of respondents seeking any type of healthcare sought it in a public facility, and only 1% reported seeking care from village health volunteers (VHVs). MMPs demonstrated relatively good malaria knowledge and prevention practices amongst affected communities. Low utilization of VHVs may be due to the convenient sampling method along the road network. Their role in improving access to malaria diagnosis and treatment among MMPs should be further investigated.

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MALARIA DISASTER IN VENEZUELA: TIME FOR ACTIONS

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Venezuela was the first nation in the world to be certified by the WHO for eradicating malaria in 70% of its territory in 1961. From 2008 onwards, the number of malaria cases started to increase slowly and, by 2013, progressive malaria epidemics have been affecting the country. The national surveillance system has been reporting confirmed cases weekly since the 1940s, a backbone of the malaria national program. The Ministry of Health (MOH) prohibited the publication of official epidemiological bulletins -including malaria indicators- in late-2014. We reconstructed the national malaria epidemiological data (confirmed cases and deaths) from national sources (weekly reports, key informant interviews, field data and PAHO/WHO). We estimated the number of malaria cases - adjusting for relapses, recrudescences, under-reporting and self-medication- and deaths by 2016. Officially, the MOH reported to PAHO/WHO 136402 and 240631 cases in 2015 and 2016, respectively. However, our findings show 212787 and 437097 cases for the same years. Comparing annual malaria cases between 2000 vs. 2016, there is an increased from 30234 to 240631 cases (officially, 795%) and adjusted cases with an increase of 1446%. Similarly, the number of malaria-related deaths rose from 24 in 2000 to 150 in 2016. Venezuela contributed to nearly half of the malaria cases in the Americas in 2016; it is spreading to its neighbor countries and the national government has not shown effective response to address the situation. Several factors have been contributing to this malaria disaster including a)severe shortages of drugs, insecticides, supplies, etc.; b)massive internal migration to illegal gold mining areas; c)limited financial and logistic support to control activities in the field; d) inadequate prioritization of interventions; and, e)collapse of health services. Effective actions including support with cost-effective interventions are urgently needed by international malaria partners in order to manage the malaria epidemic in Venezuela. An international multisectoral task force is needed to address this regional malaria disaster.

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EFFECT OF MALARIA IN THE FIRST TRIMESTER OF PREGNANCY ON FETAL GROWTH: A PRE-CONCEPTIONAL COHORT STUDY IN BENIN

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In Africa, preventive drug strategies against malaria in pregnancy are recommended from the 2nd trimester, and bed nets are rarely distributed before the 1st antenatal care visit at 4 months of pregnancy. Therefore, women remain insufficiently, or not, protected during the 1st trimester. For the first time, we assessed the consequences of malaria in the first trimester of pregnancy on birth outcomes using a specifically-designed study. From June 2014 to March 2017, South Benin, 1214 women of child bearing age were recruited and followed up monthly until 411 became pregnant. Pregnant women were then followed up from 5-6 weeks of gestation until delivery. Microscopic malarial infections were detected monthly. Five ultrasound scans were performed for the datation of pregnancy and fetal growth assessment. Path analysis was used to assess the direct effect of malaria in the 1st trimester (i.e., not mediated by malaria in the 2nd or 3rd trimester) on small-birthweight-for-gestational age (SGA) according to Schmiegelow's charts. This preliminary analysis was based on the first 180 deliveries. The prevalence of SGA was 11.9%. Malaria in the 1st, 2nd and 3rd trimester of pregnancy accounted for 24.7%, 18.8% and 17.7%, respectively. After adjustment for malaria in the 2nd and 3rd trimester and other potential confounders, we found a marginally significant direct effect of malaria in the 1st trimester on SGA (aORa=2.34 [0.86-6.38]; P=0.10). We did not evidence any effect of malaria in the 2nd or 3rd trimester. Using a multivariate logistic regression model, women with repeated infections in the 1st trimester—and not thereafter—had the highest risk of SGA compared to uninfected women (aORa=6.86 [1.24-38.00], P=0.03). These preliminary results suggest an independent effect of malaria in the 1st trimester on fetal growth, which should be confirmed on the full sample. If confirmed, they may argue in favour of implementing additional preventive measures starting before or during the 1st trimester of pregnancy.

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FACTORS ASSOCIATED WITH SUBMICROSCOPIC MALARIA PARASITE CARRIAGE IN SICK CHILDREN AGED 6 - 59 MONTHS OLD IN URBAN AND PERI-URBAN FACILITIES IN BLANTYRE, MALAWI

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The extent and role of submicroscopic malaria (SM) in *Plasmodium* transmission and clinical disease in urban settings remain unclear. SM contributes to pathogen transmission in sub-Saharan Africa urban settings that experience relatively low incidence, and therefore being able to identify human reservoirs is critical for successful malaria control and elimination. This study assessed factors associated with submicroscopic *Plasmodium* parasite carriage in outpatients presenting to urban and peri-urban facilities in Blantyre, Malawi. Children 6-59 months old attending sick child clinics were enrolled from four urban and two peri-urban facilities from April 2012-October 2015. Children were tested for malaria by both microscopy and real time PCR (rt-PCR). SM was defined as a positive PCR test that was negative by microscopy in any sick child. To evaluate factors associated with SM carriage, we compared all children who had SM in the study to a computer-generated, random sub-sample of children who were *Plasmodium* negative by both microscopy and rt-PCR in the ratio of 1:2. Of the 3,348 children enrolled, 69 (2.1%; 95% CI: 1.6%-2.5%) had SM. Almost all children (98.6%) with SM were not prescribed antimalarial drugs by the attending clinician on the day of clinic visit. There were no statistically significant differences in SM prevalence between urban and peri-urban areas (2.5 vs.1.8%, p=0.2); between patients with or without history of fever (0.3% vs. 3.9%, p=0.7); between patients whose temperature was ≥ 37.5oC vs. < 37.5oC (1.5% vs. 2.4%, p=0.1), nor; between rainy and dry seasons (1.7% vs. 2.4%, p=0.2). In multivariate analyses, residing in an urban site was associated with increased odds of SM, while age (24-59 months) and fever (≥ 37.5oC) were associated with decreased odds of SM. Our results show that SM parasite carriage is occurring in sick, under-five children in both urban and peri-urban settings in Malawi. Further studies are needed to investigate the effect of untreated SM parasitemia on illness outcomes in these children, the burden of SM parasite carriage in older age groups and its significance in malaria transmission in urban settings.

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DECLINE OF MULTIPLE INFECTIONS OF *PLASMODIUM FALCIPARUM* FROM 2007 TO 2012 AND DIFFERENCE IN MULTIPLE INFECTIONS BETWEEN HUMANS AND MOSQUITOES IN WESTERN KENYA

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With vector control and efficacious interventions implemented over 15 years, malaria prevalence declined dramatically from approximately 80% in 1996 to 26% in 2008 in an intensely studied rural area in western Kenya, but has stagnated at around 40% since 2009. Our previous studies have reported that overall rates of multiple infection and genetic diversity of *P. falciparum* in human blood did not change from 1996 (baseline) to 2001 and 2007 following intensive malaria control interventions in the same area. An additional follow up study was performed on blood samples collected in a cross-sectional survey in 2012. To explore if the lack of change in the rate of multiple parasite infections in humans was related to vector-parasite interactions, we also genotyped midgut parasites from mosquitoes collected from within the study area in 2012. In total, 258 blood smear-positive samples and 61 oocyst-positive mosquitoes were genotyped employing eight microsatellite markers. The results from blood were compared to our previously reported data in 2007. Differences in rates of multiple infections in humans and mosquitoes were also assessed. Preliminary results show that mean allele counts (MAC) declined from 2.76 (2007) to 1.64 in 2012 (p<0.001), while there was no significant change in the overall proportion of multiple alleles (MA) between 2007 (87.7%) and 2012 (83.3%) in human samples. In addition, overall MAC was significantly higher in human blood (1.64) than in mosquito midguts (1.48) (p<0.001), but no differences were seen in overall MA between human blood and mosquito midgut (p=0.084). For individual *loci*, adl and taa60, both MAC and MA were significantly higher in human blood compared to mosquito midguts while for pfpk2 and p195, MAC was significantly higher in human blood. No differences in MAC or MA were detected at any other *loci*. The decline in mean allele counts in 2012 may indicate reduced multiple infections within-host. Results from this study also suggest a higher level of multiple infections in humans compared to mosquitoes. Further analysis of genetic diversity and population structure of parasites in the two hosts is needed on these samples.