

Seventh Annual Research Meeting of the Noguchi Memorial Institute for Medical Research: Malaria Control and Elimination

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SUMMARY

Malaria is a leading cause of mortality in Ghana, especially among children under five and pregnant women. The Noguchi Memorial Institute for Medical Research (NMIMR) has collaborated with the National Malaria Elimination Programme (NMEP) to meet control and elimination targets. The seventh Annual Research Meeting (ARM) of the NMIMR highlighted the institute's decades-long contributions to malaria control in Ghana. Topics discussed included NMIMR's malaria research and its policy impacts, noting the Institute's support for public health programs that have shaped malaria policies in epidemiology, diagnosis, treatment, and prevention – including vector control. NMIMR continues to generate scientific data to support Ghana's malaria elimination efforts.

Keywords: Drug resistance, diagnostics, vector control, surveillance, Ghana

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INTRODUCTION

Malaria remains one of the major causes of mortality in Ghana, affecting children below five years of age and pregnant women.^{1,2} The Noguchi Memorial Institute for Medical Research (NMIMR) has worked with the National Malaria Elimination Programme (NMEP) to attain control and elimination targets over the years. The seventh Annual Research Meeting (ARM) of the NMIMR, 2022, showcased decades of the Institute's contribution to Ghana's malaria control activities.

Dr Abuaku presented the decades of malaria research at the NMIMR and the policy impacts. He reiterated the mandate of NMIMR and the fact that the support and contributions of the Institute to public health programmes of the Ministry of Health (MOH) and the Ghana Health Service (GHS) for malaria research has led to malaria policy directions of the MOH and WHO in the areas of

epidemiology, diagnosis, treatment and prevention. In terms of malaria epidemiology, transmission is perennial in the forest and coastal zones of Ghana, with parasite prevalence and sporozoite rates being higher in the forest zone compared with the coastal zone, whilst malaria transmission in the savannah zone has been characterised as highly seasonal.^{1,2}

Dr. Abuaku also presented on the therapeutic efficacy of artemisinin-based combination therapy (ACT) for uncomplicated malaria in 10 sentinel sites across Ghana. The declining efficacy of chloroquine and sulfadoxine-pyrimethamine in treating uncomplicated malaria in Ghana and the superiority of artemisinin-based combination therapies (ACTs) resulted in the change of national malaria treatment policy in favour of ACTs in 2004.⁴

The ACTs currently deployed have remained efficacious over the years. However, continuous use of ACTs has been shown to trigger an increase in mutant alleles of K13⁵, warranting the continuous monitoring of the prevalence of molecular markers of drug resistance and the timely implementation of a novel, cost-effective pooling methodology for molecular surveillance of antimalarial drug resistance.⁶

Over 90% of all malaria infections in Ghana are related to *Plasmodium falciparum*, and Pfhrp2-based malaria rapid diagnostic test kits remain efficacious diagnostic tools for uncomplicated malaria in Ghana.³ However, new tools are needed to distinguish between uncomplicated and severe malaria. Ms Elizabeth Obeng-Aboagye presented inflammatory cytokines as potential biomarkers for early diagnosis of severe malaria in children. These can be used to diagnose both uncomplicated and severe malaria. A correlation between levels of pro-inflammatory cytokines, such as interleukin (IL)-1beta and IL-17A, and malaria disease severity has been demonstrated. This can potentially develop diagnostic test kits for early diagnosis of severe malaria.

Prevention remains a key component of malaria activities. In a phase 1 clinical trial, the EBA-175-R11-NG vaccine was safe, well tolerated, and immunogenic.⁷ The positive impact of one-round Indoor Residual Spraying (IRS) in a highly seasonal transmission setting⁸, and the positive impact of mass drug administration, mass testing and treatment⁹ have all been demonstrated.

Dr. Samuel Dadzie presented on the countrywide monitoring of insecticide susceptibility status of *Anopheles gambiae* s.l. (Diptera: Culicidae) and the implications for malaria vector control in Ghana. The development of insecticide resistance was identified as a major challenge to malaria interventions. High resistance of vectors to all the pyrethroids and DDT have occurred in all parts of Ghana with reduced susceptibility to carbamates and organochlorines. This notwithstanding, the use of piperonyl butoxide has been shown to enhance the efficacy of pyrethroid insecticides against resistant *An. gambiae* s.l., the main malaria vector.¹⁰ The findings from the studies at the NMIMR have influenced a policy change. For the first time, new generation nets incorporated with the synergists were introduced into Ghana to help control mosquitoes. The data generated helps the NMEP decide whether to use a given insecticide for IRS and other interventions.

Generally, malaria parasite positivity rates from 30 sentinel sites have shown a decline in slide positivity rates (SPRs) from 23.7% in 2014 to 11.1% in 2021. The

NMIMR will continue to generate scientific data to support Ghana's national malaria elimination agenda.

CONCLUSION

In conclusion, malaria continues to be a significant cause of mortality in Ghana, especially among children under five and pregnant women. The NMIMR has been pivotal in supporting the NMEP through extensive research and policy advocacy. The seventh ARM showcased the institute's contributions to malaria control, emphasizing their role in shaping national and international malaria policies. NMIMR's ongoing efforts in research, surveillance, and policy development remain crucial to achieving Ghana's malaria elimination goals and improving public health outcomes.

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