

Evaluation of the residual effectiveness of Fludora™ Fusion WP-SB, a formulated combination of clothianidin and deltamethrin, for the control of pyrethroid-resistance malaria vectors on Bioko Island, Equatorial Guinea.

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Insecticide resistance to malaria vectors has been identified in some 60 malaria endemic countries. This has posed a global health challenge in the fight against malaria. Pyrethroid-resistance is the most commonly reported. Unfortunately, pyrethroids are not only relatively safe and less expensive, but also the only class of insecticides currently recommended for use in insecticide-treated mosquito nets. The global decline of indoor residual spraying coverage in recent times has been attributed to pyrethroid-resistance. The quest for safer insecticides with different modes of action against malaria vectors is a priority. As part of its vector control monitoring strategies, the Bioko Island Malaria Control Project (BIMCP) in Equatorial Guinea conducted routine insecticide resistance tests using the WHO's standard susceptibility tests from 2013 to 2016. During the same period, the frequency of the target-site knockdown resistance (*kdr*) in the local vector population was also determined using polymerase chain reaction based *kdr* genotyping. Biochemical analysis for metabolic resistance was also conducted in 2015. Fludora Fusion was evaluated for 9 months on Bioko Island from 2016 to 2017, using the WHO's standard test procedure for determining residual effectiveness of insecticides on sprayed surfaces. The product is a formulated combination of clothianidin and deltamethrin (a pyrethroid). In 2016, the percentage mortality of the vectors to 0.05% deltamethrin was as low as 38%. The frequency of the West African form of knockdown resistance (*kdr-w*) in the vector population was as high as 80%, and metabolic resistance analysis indicated high upregulated cytochrome P450s. However, the residual effectiveness of Fludora Fusion recorded mortalities above 80% after 72 hours for 8 months. Although both target-site knockdown resistance and metabolic resistance to pyrethroids were implicated in the local malaria vector population, Fludora Fusion was effective under field conditions in controlling the resistant vectors for a period of 8 months on wooden surfaces on Bioko Island.