

New Nets Project

Evaluating the impact of next-generation insecticide-treated bed nets



Insecticide-treated bed nets (ITNs) are a critical tool for vector control, responsible for 69 percent of all malaria cases averted in Africa since 2001.^{1,2} Standard ITNs are treated with a pyrethroid insecticide to repel or kill mosquitoes, protecting people sleeping under them as well as controlling vector populations. However, the emergence and intensification of pyrethroid insecticide resistance in mosquitoes—now reported in more than 85 percent of all malaria-endemic countries that monitor resistance—threatens the long-term effectiveness of these tools.³ With global progress against malaria recently stalled, new classes of ITNs have been developed. These ITNs have the potential to significantly reduce malaria cases in countries experiencing pyrethroid resistance, but higher cost and a lack of data on their protective efficacy and overall cost-effectiveness has limited their uptake.

New Nets Project

The New Nets Project, a partnership funded by Unitaid and the Global Fund and led by IVCC, aims to accelerate the scale-up of next-generation, dual-active ingredient ITNs and to provide National Malaria Control Programs, donors, and implementers with clear evidence of their impact on malaria burden by:

- Generating epidemiological evidence of the ITNs' impact through randomized controlled trials.
- Helping shape the market for the new ITNs and support procurement mechanisms to negotiate lower prices.
- Conducting pilot studies to understand the impact and cost-effectiveness of the new ITNs as compared to the standard ITNs in real-world situations.
- Highlighting operational best practices for conducting national campaigns with multiple types of ITNs.

PATH is leading pilot studies assessing the real-world effectiveness and cost-effectiveness of next-generation ITNs in Burkina Faso, Rwanda, and Mozambique and provides technical assistance to the National Malaria

Elimination Program in Nigeria to implement a complementary study.

Evaluating next-generation ITNs

The New Nets Project will evaluate Interceptor® G2 (BASF) and Royal Guard® (Disease Control Technologies) ITNs in comparison to standard, pyrethroid ITNs and ITNs treated with piperonyl butoxide (PBO)^a—an insecticide synergist.⁴

The **Interceptor G2 (IG2) ITN** from BASF SE received World Health Organization (WHO) prequalification status in January 2018 (PQT-VC Reference: 002-002; 29/01/2018). It contains alphacypermethrin and chlorfenapyr and has been shown to be effective against pyrethroid-resistant mosquitoes in laboratory and experimental hut trials.⁵

The **Royal Guard (RG) ITN** from Disease Control Technologies, LLC, received WHO prequalification status in March 2019 (PQT-VC Reference: 003-003; 29/03/19). It contains alpha-cypermethrin and pyriproxyfen, an insect growth regulator.

In addition to the piloted distribution campaigns, the New Nets Project is supporting one of two ongoing randomized control trials to evaluate the malaria prevention efficacy of IG2 and RG ITNs in Benin and Tanzania.^{b,6,7}

Pilot studies

Observational studies will accompany the piloted distribution of next-generation ITNs to collect data from 2019 to 2022 on the entomological and epidemiological impact of new ITNs and the sociocultural factors that influence their uptake and usage. In each study district, enhanced surveillance data will include a combination of the following components:



Epidemiology: Compare trends in malaria case incidence reported to the national health system and malaria prevalence during annual cross-sectional surveys.



Entomology: Evaluate the impact of different ITNs on vector habitats and biting rates by measuring trends in vector population

^a PBO was added to pyrethroid-treated LLINs to enhance the lethality of the chemical, specifically in mosquitoes exhibiting metabolic resistance.

^b The randomized control trial in Tanzania is funded by the Joint Global Health Trials scheme of the UK Department for International Development, Medical Research Council, and Wellcome Trust.

^{*} Mosquito graphic created by ProSymbols from Noun Project.

density, indoor and outdoor human landing rates, and estimated entomological inoculation rates.



Anthropology: Map social determinants of the impact of new ITNs and assess transmission risk as the intersection between time at risk of a mosquito bite and human activities not under the protection of an ITN. This data will inform models and provide context for analysis of other study components.



Costing and cost-effectiveness: Estimate cost and cost-effectiveness of new ITNs through data on product price, delivery, and deployment costs, and effectiveness based on incidence rates.



Durability monitoring: Monitor the durability of the IG2, Royal Guard, PBO, and standard ITNs to understand attrition, physical integrity,

insecticidal effectiveness, and insecticidal content of the ITNs over time.

Overview of piloted distribution and study activities by geography

Selected geographies represent a range of transmission contexts, have well-documented pyrethroid resistance and moderate to high malaria burden, and had ITN distribution campaigns scheduled for 2019 or 2020.

Geography	ITNs evaluated	Study components
Burkina Faso ^{c,d}	IG2 PBO Standard	Epidemiology; entomology; anthropology; costing
Mozambique (North) ^d	IG2 PBO Standard	Epidemiology; entomology; durability; costing
Mozambique (West) ^d	IG2 RG Standard	Epidemiology; entomology; costing
Nigeria ^e	IG2 RG PBO Standard	Epidemiology (including antenatal care surveillance); entomology; anthropology; durability; costing
Rwanda ^{c,d}	IG2 Standard	Epidemiology; entomology; anthropology; costing

Antenatal care surveillance

Data collection during first routine antenatal care (ANC) visits has been proposed as an alternative method to measure trends in prevalence and intervention use and coverage over time.

This addition to the New Nets Project scope, funded by the Bill & Melinda Gates Foundation assesses the potential use of pregnant women attending ANC services as a sentinel population for malaria prevalence and intervention coverage. The project will measure malaria prevalence and intervention coverage during first ANC visits in three districts in Burkina Faso and Mozambique. The results will be compared to similar estimates generated by annual cross-sectional surveys accompanying the pilot distribution of next-generation ITNs in the same study districts.

Consortium information

The New Nets Project is led by IVCC and implemented by PATH, the Alliance for Malaria Prevention, Imperial College London, Liverpool School of Tropical Medicine, London School of Hygiene & Tropical Medicine, PSI, and Tulane University, with support from Unitaid; the Global Fund to Fight AIDS, Tuberculosis and Malaria; the Bill & Melinda Gates Foundation; and the US Agency for International Development.

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^c Durability monitoring in Burkina Faso is led by PMI and not considered part of study activities. Durability monitoring in Rwanda is led by the Rwanda Biomedical Centre and is not considered part of the study activities.

^d Led by PATH.

^e Led by the National Malaria Elimination Program.



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