



WHODUNIT – When the bed net becomes a pest!

Netting the Problem

Recently, there was news that a burger chain had replaced cheese, a dairy product with a vegetable oil substitute. Why? – because its taste and texture are the same and it was cheaper. But it was still called a cheese burger. The statutory authority called it out as a foul. Now, let's assume that a bed net used to ward off insects like mosquitoes is the burger. Just like the cheese's stickiness helps hold the two halves of the burger together, there is a chemical that is used to help bind an insecticide to the fibres of the bed net. The bed net then becomes an insecticide-treated net. However, in earlier years, the nets would lose their coating of insecticide under repeated washing and required periodic dipping in insecticide. But over time, new formulae in binding agents and insecticide enabled the bed nets to remain effective even after washing. Since these bed nets now lasted over a three-year period, they became long-lasting insecticide nets. But then the manufacturer of a particular brand of net changed the chemical binder over a public outcry because they leached into the environment for a long time causing harm to fertility, children's development and increasing cancer risk. So, the manufacturer moved the cheese to adapt to the changed situation substituting it with another perhaps less expensive option. Foul? The statutory authority (WHO) is still to get to that. It is a classic case of whether health equity vis-à-vis one health concern may have got trumped by environmental concerns about others. What has health equity got to do with a mosquito net?

Net Result

The insecticide-treated bed net becomes the protective coat for the person using it as mosquitoes rain down looking for a tasty bite of blood. The contact absorption with the insecticide kills the mosquito making them drop like flies (which incidentally also drop like well, flies, as do other insects). Even if the mosquitoes and other said insects don't die immediately, the net repels them enough not to try again, thereby [reducing](#) the number of mosquitoes looking for human blood to feast on and even shortening their life spans if they've ingested insecticide on contact. So, if even more than half the population uses these nets it is likely to protect even those not using the nets. Protecting the majority therefore protects all (wish

the same could be said of majoritarian-driven governments!). Hence, what the mosquito net does is give people a fair chance of not getting malaria through a bite from an infected mosquito. And those people largely include children below the age of five and women.

The parasite hopping to and fro making its home in and infecting human and mosquito alike (but harming only the humans) also keeps evolving. “‘In the malaria community we always say we do not have any magic bullet,’ says Dr. Dorothy Achu, WHO’s team lead for tropical and vector-borne diseases in the Regional Office for Africa. [Immunization campaigns alone won’t be enough to stop epidemics, and measures such as insecticide-treated bednets also need to continue, physicians say.](#)”

So, when a key ingredient in the binder was changed did it or did it not affect the efficacy of the insecticide-treated nets? Researchers in Papua New Guinea say it did. The only brand of such nets in use in that country was PermaNet 2.0 manufactured by Vestergaard, Switzerland. The news was made public by [BNN Bloomberg](#) and Vestergaard responded with a [position statement](#) that its nets fulfil the “WHO requirements for quality, safety and efficacy” and that the substitution was not a question of the expense but because the supplier of the harmful chemical ([PFAS](#)) discontinued it and the “solution chosen was the best viable alternative in terms of efficacy”. But who determines efficacy? The WHO.

A Tangled Net

UN agencies and global funders including the Global Fund use what is called the WHO prequalification for products to feature in their procurement. But it was only in 2017 that vector control (under which insecticide-treated bed nets (ITN) come), moved from the WHO Pesticide Evaluation Scheme (WHOPES) to get added to the WHO prequalification product streams of vaccines, medicines and diagnostics. Vestergaard had applied and received its [WHO Prequalification](#) in 2017. Further, the WHO states that it is incumbent on the manufacturer to keep it updated on any change that can affect the product’s safety, efficacy, and/or quality. According to Bloomberg, the change Vestergaard made took place much prior to 2017, which it admitted when it said “no process existed” to inform about the change before 2017. A Global Fund-commissioned [ITN Bioefficacy Landscaping Narrative Report 2021](#) pointed out that while all prequalified product changes must be reported and assessed, the extent, if any of such changes and their effect on bioefficacy if they took place before 2017 “remains unclear”. Further, “the previous system [WHOPES] did not incorporate a lifecycle approach to product oversight, and subsequent changes to source materials, formulations and manufacturing processes may limit the usefulness of historical data.”

Netty Issues

PermaNet 2.0 was used in comparative trials with NetProtect in a study in Cambodia, which finds mention in the Sixteenth WHOPES meeting report in 2013. PermaNet 2.0 was evaluated as part of the investigators’ study at their own cost and was chosen as a positive control since rules required a WHOPES-approved net to be included in the study. It was not part of the WHOPES-supervised study for NetProtect. It was mentioned in the report for scientific interest and had no bearing on the WHOPES report’s conclusions about NetProtect though PermaNet 2.0 did show better results. But a 2015 [Lancet article](#), while keeping NetProtect unnamed and referencing the 2013 WHOPES report, pointed out that it

had concluded that the NetProtect did not meet the efficacy criteria and the WHO interim recommendation be withdrawn in July 2013. However, the WHO informed countries using it including Rwanda only in October 2013, which was also one month after Rwanda had already withdrawn these nets after it failed their national tests for WHO-efficacy standards.

Papua New Guinea's research on the coating formulation change of PermaNet 2.0 prompted by an alarming rise in malaria cases in that country was published in [2020](#) in Nature and the Malaria Journal in [2022](#). The Global Fund merely sent other nets when the evidence was presented. The WHO informed Bloomberg that they were concerned and had asked for the data to be shared with them. This, despite Papua New Guinea featuring as a "country success story" in the 2017 WHO [report](#) for its 2015 malaria reduction strategy, 80% of which was funded by the Global Fund.

In contrast to the above delayed responses, in November 2018, a complaint to the Global Fund's Office of the Inspector General (OIG) by an unnamed source was dealt with speedily when they reported that between January 2017 (when WHO Prequalification Unit took over vector control) and April 2018, an affiliate of TANA Netting, United Arab Emirates, used an unapproved chemical formula in its production of its WHOPES-approved DawaPlus 2.0 nets, reducing its lifespan. It also fudged its manufacturing records to cover up its non-fulfilment of the WHO-approved insecticide dosage. Action was swift. The OIG opened an [investigation](#) and also visited the manufacturing site in Pakistan in 2019 to examine available records. OIG scathingly said that the "red flags" of non-conformity were never challenged within the Global Fund and quality control testing did not fulfil WHO standards, which would have ensured the manufacturing issue was caught out earlier. The Global Fund subsequently suspended all existing orders with TANA moving them to other contracted suppliers. The 21 countries (the majority in Africa) were updated. The Global Fund also stated it would seek financial and other remedial redressal and commissioned the 2021 study. But an Aidsmap source pointed out that the OIG audit needed to examine and report other aspects such as [what had happened in the communities where the deficient nets had been sent](#), some of whom had in fact complained about the nets not having the same effect.

The 2021 Global Fund-commissioned ITN Bioefficacy Landscaping Report spoke of the importance for all partners at every level to find "a shared way forward" to make sure that both ITN quality and bioefficacy are done in an inclusive manner. Recommendations included the "urgent need for post-market surveillance", as well as "ongoing coordination, data transparency and communication around bioefficacy quality issues, their investigation, and resolution so as to combat mistrust." All of which applies to the Global Fund and WHO as well. Why are communities and countries who are among the most affected by malaria not receiving the accelerated response and complete transparency they expect from the Global Fund and WHO when they raise issues about what is being supplied to them?

Given that a single inspection team works across all four WHO prequalification categories, it's likely many vector control category products fall through the inspection net. There needs to be greater attention paid to the quality checks that take place at both country and WHO levels and the frequency with which they have to be carried out for prequalified products. An WHO [ITN Product Review Report](#) pointed out that insecticide nets are considered "simple" among health products. In reality, they offer a far more complex challenge of bioefficacy along the entire chain from the net's contact point with the mosquito to reaching every household. For instance, in the [case of Rwanda](#), no legal action was taken against the Denmark

company making NetProtect as initially threatened by the government. It concluded that in the time lag between WHO standards being fulfilled and actual delivery of the nets, insecticide resistance had developed rendering the mosquito nets ineffectual. So also, while Bloomberg had pointed out, unused pre-2013 PermaNet 2.0 nets were WHO-effective but post-2013 were not. Yet, PermaNet 2.0 in unwashed state were found to be compliant in a subsequent investigation using an advanced test. This raises, as pointed out by the 2021 ITN Bioefficacy Landscaping Report, issues with product consistency during manufacturing and its impact, if any, on malaria transmission.

Networking

Malaria has a bad name, literally meaning “bad air” although it's not a contagious disease at all. [Lisa Lim](#) has pointed out the implications of this misnomer. In Madagascar, instead of tazomoka or “mosquito fever”, words used are tazo or “fever” and tazomahery or “strong fever”. So, when long lasting nets are not what they're touted to be, in the words of James Frimpong, of the malaria control programme in Ghana, which had received the faulty DawaPlus nets, it can [dent trust and lay waste the tremendous funds and efforts that go into the planning and logistics for the distributions of the nets](#).

The [emergence of GPI global public investment](#) funding framework can enable the world's collective weight to be put behind vector control so that it not only gets the attention, time and resources it deserves like the immunization programme does but can also assure more inclusive decision making and accountability mechanisms across the board. It can also facilitate a better regional-global balance in manufacturing and procurement, a long-pending demand, which came up again even in the Gavi Vaccine Alliance 2024 mid-term review.

In conclusion, as the [2023 Malaria Progress Report](#) on Africa stated, “malaria intervention adaptation must also be prioritised within the climate change and health agenda.” AND is the operative word. The choice of one must not cancel the choices available to the other as happened with the nets. Cancel culture is a problem, let it not infect the bloodstream of global health initiatives without due diligence about its potential impact and offering alternatives that are timely and take into account the views of the vulnerable they seek to protect.

[Read More](#)
