



## **WEBINAR Q&A**

### **APMEN TECHTALKS**

Hosted by the APMEN Vector Control Working Group (VCWG)

**“All about bednets: Cradle to grave”**

**15 June 2022, 2:00 PM Singapore Time**

#### **Panelists**

##### **Dr Ole Skovmand**

Independent Consultant, MCC47, France

##### **Prof Stephen Russell**

Founder and Technical Director,

Nonwovens Innovation and Research Institute, Ltd, United Kingdom

##### **Tim Freeman**

Programme Manager

Rotarians Against Malaria, Papua New Guinea

##### **Thuan Thi Nguyen**

PhD Candidate,

Institute of Tropical Medicine Antwerp Belgium

NIMPE, Vietnam

#### **Moderator**

##### **Dr Leo Braack**

Co-Chair of APMEN Vector Control Working Group

Senior Vector Control Specialist, Malaria Consortium

**Question:**

Sandeep Sathua	What is the best method for chemical treatment or imprignation for better efficacy/ survival of ITNs ?
Stephen Russell	Live answered

Stephan Karl	Was there a difference in the damage scores for polyethylene vs polyester nets. Were specific damage types more likely to occur in specific net types?
Stephen Russell	

Jeffrey Hii	1) Is there a general consensus for a threshold of damage and insecticide loss? 2) given that the optimum lifespan of most LLINs is less than 3 years in the field what advancements and improvements have been made in textile technology that would bring long-term cost saving? 3) what is the lead time for a 'more durable' PQ LLIN product (RD>50%) that can be used by E(limination)-2030 countries going to the last mile?
Stephen Russell	

Maxine Whittaker	How is this research being translated into policy ( WHOPEs) and practice ( at the manufacturing level) as well as into behavioural change communications to reduce some of the damage whilst making the nets more resistant to damage
Stephen Russell	

Alex Ahebwa	In regards to fabrics, Q1: which fabric types are suitable for insecticide treatment and/or outdoor use? Q2: What's the most appropriate method for fabric treatment, between spraying and dipping? Thank you.
Stephen Russell	

Raffy Deray	Is the material make (cotton vs polyester) and thickness (denier) important in ensuring durability of LLIN?
Stephen Russell	

Michael Macdonald	Asia has a large number and variety of untreated commercial nets in the market. Are there plans to apply the Resistance to Damage to these nets?
Stephen Russell	

Binesh Haria	Where on the nets are the most holes,on the bottom or in the middle of the net?
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Stephen Russell	
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Anitta KAMRA	Did the team take cognizance of the set up of the household? meaning giving one net to 3 girls or boys- are they sleeping on one bed?
Tim Freeman	live answered – most people living in rural areas in PNG will sleep on the floor on sleeping mats. After the age of six, boy and girls sleep separately but they will sleep close together in terms of the girls sleeping close to other girls etc – we distribute extra large nets which are big enough for three adults to sleep under hence why one net for every three girls or every three boys.

Floriane Gsell	How was the number of nets allocated calculated (1 for 3 boys or girls)?
Tim Freeman	Live answered – see above.

Dr S N Sharma	What are guidelines for the disposal of old LLINs while replacing with the new ones? Any environmental issues at the country's level ?
	Please see the WHO Guidelines for Malaria, page 6. <a href="https://apps.who.int/iris/rest/bitstreams/1427681/retrieve">https://apps.who.int/iris/rest/bitstreams/1427681/retrieve</a>

Indra Vythilingam	When the net quality is poor, what do we do- so much money is wasted. Can we ask the company to supply extra nets - so that new nets can be distributed to the people
Tim Freeman	The problem for us is that if we receive nets of poor efficacy, we would only be asking company to supply more of the same type of net – apart from that, it would cost us even more money to supply the nets of poor quality into households in the field which is wasting even more money. What we need is nets of proven efficacy in the field like to old Permanet 2 and at this moment it is not clear which of the nets on the market are good even though they once were passed by WHOPES as being compliant to 80% mortality after 20 washes. None of the nets we have recently tested in PNG have been very good in terms of these criteria.

Lili Ranaise Mbakop	How do you explain the fact that malaria continue to increase in many districts despite the bed nets distribution
Tim Freeman	As above. We believe that our rise in malaria is mostly attributed to inferior quality of nets in terms of efficacy. Nets in the past that once killed any mosquito that touched them, no longer have the same effect. We believe now that this problem is not just restricted to Permanet 2 but other brands as well. We are still looking for nets that worked as well as the pre- 2012 Permanet 2 and so far we have not found one.

Dahlia Silitonga	Why the LLINs allocation is one bed net for 3 girls or boys? thank you.
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Tim Freeman	As above that three adults can easily sleep under one extra large bednet.
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Prudence Hamade	The reduced efficacy of nets may also be a problem of insecticide resistance. Have any studies been done on that in PNG Has any other factor changed like rainfall or climate issues
Stephen Carl	Yes we are doing insecticide resistance monitoring in PNG. There is no pyrethroid resistance in the Anopheles populations.
	There is no insecticide resistance in PNG

Jenny Kerrison	Russ Stephenson RAM Australia. To Tim Freeman. An interesting presentation Tim. On a recent village stay, I noted that perhaps human activities may have also impact on apparent LLIN efficacy. I was sitting outside my host hut at dusk, enjoying the spectacular sunset and villagers came walking along, and stopping for a chat. In the end there were a dozen people or so and the same number of children were gathered together outside watching a movie on a mobile phone. I was tired and took my leave at 9pm. I suspect that many people no longer go to bed at dusk so then do not have the protection of their bednet as they once had when they went to bed earlier. Could this also be a factor impacting on the apparent efficacy of bednets?
Tim Freeman	Earlier biting of mosquitoes and late night activities of people no doubt contribute to some increased transmission. However, when we see that mosquito nets no longer kill mosquitoes and there was a sudden rise in malaria, we think the biggest culprit is inferior efficacy of nets. Good quality nets have a general herd effect and protect even people who are not always under a net. I feel that if early biting or late night activities had been the central problem we would have seen a much more gradual rise in malaria.

Ephrem Ejigu	My question is how do you get nets distributed to the remote regions especially in critical conditions of higher breeding rate at these regions with water bodies and rivers as such
Tim Freeman	Distribution is always a challenge in PNG. We work throughout the year and there is no clear dry or wet season so weather can be a challenge at any time of the year. However, we are able to reach all areas of PNG by road, dinghy, airplane, helicopter and trekking though perseverance helps when weather and other factors such as Covid 19 are bad!

Annisa Rahmalia	To Tim Freeman. Thanks for the presentation! Were other interventions (e.g. treatment regimen etc) are being taken into account in analysing the impact of bednet distribution on malaria cases?
Tim Freeman	Originally, it was thought that drug shortages may have been a contributing factor to increased malaria. However, since 2017, there

	has been a very steady supply of RDTs and malaria medicines in PNG so this is not likely a factor. We think it likely that the drugs shortages we faced were a result of increasing malaria and not the other way around.
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Ephrem Ejigu	How did you evaluate the proper utilization in PNG immediately after the distribution?
Tim Freeman	We have no capacity to evaluate utilisation after each distribution as this would require many more staff. However, every three years, we have a Malaria Indicator Study (MIS) carried out by the PNG Institute of Medical Research where all these aspects are monitored and taken into account.

Ephrem Ejigu	Dear Dr. Ole, Thank you for the nice presentation! How did you evaluate the proper utilization after immediate distribution of LLINs.
Ole Skovmand	Toé, L.P., Skovmand, O., Dabiré, K.R. et al. Decreased motivation in the use of insecticide-treated nets in a malaria endemic area in Burkina Faso. <a href="https://doi.org/10.1186/1475-2875-8-175">https://doi.org/10.1186/1475-2875-8-175</a>

Angus Spiers	It is important to differentiate "quality" and "performance" of ITNs. Quality has been defined by specifications that were set by WHOPES. These weren't really linked to performance, and so this is where problems arise. It should be noted that the vast majority of ITNs are produced consistently to the required quality.
Tim Freeman	It is not clear what you mean by quality. From the PNG point of view, nets received approval or certification from WHOPES when they were able to fulfil certain levels of performance i.e. 80% mortality after 20 washes. Our observations suggest that many new nets on the market today are unable to pass these criteria when new let alone after twenty washes.  From our understanding, WHO PQ VCP is working to establish detailed product specifications as provided in dossiers by manufacturers to set a baseline. In relation to the PNG case, this basically means that these baseline specifications will be that of the altered and inferior product. This is likely to be the case for many products that have changed since their original WHOPES approval. If this is the case, it means that nets of inferior performance are now being produced at a more consistent quality rather than improved or originally approved WHOPES efficacy.
Ole Skovmand	Very good point, this is why we want to raise the test level and make specifications based on measurements, not just statements. Better specifications based on better measurements of the products should guarantee performance to a higher degree, a field where I hope we can co-operate/ Today you have for example a specification that says the more you wash this net, the more insecticide there is in total content!!

KHIN MON MON	To Dr Ole, According to the Tim's presentation, quality of ITN is reducing and so, how should the manufacturing process can be controled or monitored?
Ole Skovmand	By using the WRI0-1-5 method

Dr S N Sharma	In case there is reduction of malaria cases by 50% after introduction of LLINs with 100% coverage, is it by this intervention ? if yes what percentage contribution ? though EDCT is already there

Lejar Pribadi	To Dr Ole, can we reuse the bednet to protect the villager? How long the bednet can be used after its expired?
Ole Skovmand	Surface dosage will continue to raise during storage; you can use the WRI 0,1-5 method to see how much insecticide is left and how it is distributed between surface and storage and then calculate how many washes it can still resist by setting a threshold of 1-2 mg/m <sup>2</sup> at the surface for deltamethrin and alfacypermethrin; we do not have that threshold for other insecticides

Syukrin Ali	Regeneration times and wash resisting index are both important aspects for ITN quality, especially if they come in different material and manufacturer. Some ITN with different material are not into a good washing resistance index, causing it to tear off/hole. any suggestion for the best option?
Ole Skovmand	yes, and they should be measured as I described

Stephan Karl	How does regeneration time differ between coated vs infused nets? Is regeneration time important at all in coated (polyester) nets or does it only apply to infused (polyethylene) nets?
Ole Skovmand	if done correctly, polyester nets and polyethylene nets can have the same release rates

Sandeep Sathua	After Soap or Acetone wash, does teh samples need clean water wash as well? Because, that's more consumer centric action.
Ole Skovmand	live answered

Maxine Whittaker	Same questionas I had to Stephen - how does this research get translated into WHOPEs policy and manufaturing practices. Thank you
Ole Skovmand	live answered

Jeffrey Hii	#Ole/Stephen/Tim/Thuan: ‘transmission-reducing effectiveness index’ of the LLIN is a function of LLIN use rates, the physical integrity and chemical status, wash resistance, and behavioural and insecticide resistance in the local vector populations. Would you consider this index as more appropriate for LLIN procurement and distribution policies compared to “Standard Reference Price or Customized Reference Price for budgeting purposes” established by GF <a href="https://www.theglobalfund.org/media/5861/psm_llinreferenceprices_table_en.pdf">https://www.theglobalfund.org/media/5861/psm_llinreferenceprices_table_en.pdf</a> .
Ole Skovmand	It will demand a high level of knowledge for those exploiting such an index and I am pretty sure that in most cases, this knowledge do not exist, so we should find something simpler and more general. I hope that using proper regeneration time for wash resistance measurements will improve these data a lot, the resistance to damage that Russel and his group developed will give priority to stronger nets, historical data on net failure documented as Tim and his group did, and some regional considerations of resistance status could give a much better guidance than the current GF politics. For the time being it is far too simple and counter productive. Price first has deteriorated quality and GF has not been able to handle that.
Stephen Russell	
Tim Freeman	Reference prices or even insecticide content are meaningless if nets do not work. I do not know enough about this index to use it or how accurate it is. The easiest thing is that we would recommend that all brands of nets are tested (at least in the laboratory) for mortality using cone bioassay tests before being procured. Ideally the mortality should be tested up to 20 washes but five washes should already give you a good indication how efficacious the net is. This should not be so expensive to do, particularly if the nets are only tested at 0, 5, 10, 15 and twenty washes. The cost of not doing this and distributing nets with poor efficacy leads to much higher costs in the field due to increased malaria with all the associated increases in costs of testing and treatment etc.
Thuan Thi Nguyen	

Reuben Zulu	after 21 washes of the ITNs, can they be disposed as ordinary waste?
Ole Skovmand	There is still insecticide living in ITNs after 25W-30W. So, ITNs should not be disposed as ordinary waste.

Wulan	Why the ITN washed using Acetone? does some people use acetone for cleaning ITN?
Ole Skovmand	No, it is just to know how much insecticide is actually at the surface, because soap washing cannot tell that

Prudence Hamade	To Ole Aside from the what is used to wash the net does the type of soap used and the actual method of washing ( washed in a machine by hand beating the net etc0 and how it is dried in the sun, in the shade
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	and what happens to the insecticide containing water after washing and how does this affect the environment
Ole Skovmand	I remember that Dr Guillet once told me that they made test of river water for insecticide during the Onchocercose campaign in West Africa where pyrethroids were used when river levels were high (rainy season). They never found much but once people started washing nets in rivers, they found. But I have never seen an environmental impact study. We have found as others have that changing between the defined “soap” of CIPAC and the “savon de Marseille” we obtain different results, so surely soap washing is a delicate test method

Duncan Kobia Athinya	What was the mosquito exposure method used while measuring MKD
Ole Skovmand	When Biolytrics Laboratories in Hanoi run these tests they used <i>Anopheles dirus</i> or <i>Culex quinquefasciatus</i>

Duncan Kobia Athinya	At what level of damage would the nets be used for alternative purposes
Thuan Thi Nguyen	Thanks Duncan for the question. In our study, when there were holes and tears in the nets that people saw the nets were no long prevent insects and mosquitos from entering, they discarded the nets.

Jeffrey Hii	how do you define >50% broken nets? Are they classified as “unserviceable” based on a combination of PHI (proportionate hole index) and/or residual insecticide concentration?
Thuan Thi Nguyen	Thanks Jeffrey. we calculated the number of nets observed at households, categorized them as broken nets or intact nets and divided the number of broken nets by the total number of nets observed at the household

Michael Macdonald	does the Ministry of Health still have the net retreatment program where they visit villages and treat all the conventional untreated nets from the market?
Thuan Thi Nguyen	thank you Michael for your question. in our more recent studies from 2017-2021 in Ninh Thuan and Binh Phuoc provinces, we observed only LLINs were distributed to the population. We did not observe any net retreatment activities by the MOH though

Annisa Rahmalia	interesting insight! Do you know if there are any changes in the bednet distribution program since you conducted this study?
Thuan Thi Nguyen	thanks Annisa for the question. The national malaria control program increased the number of nets and gave extra nets to the people who stay in the field. however, many other challenges remain with the



	uptake - the design of the nets was not suitable for people who live and work in the forest and not suitable for the housing style for example
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Yohanna Lamogo	My question is directed to Thuan the last presenter. Is there any difference between insecticide treated net and long-lasting insecticidal net? If yes how can you differentiate between them?
Thuan Thi Nguyen	thanks, Yohanna for the question. The insecticide treated nets are the nets in softer fabric that are retreated by dipping in insecticide every two years. the long lasting insecticidal nets are the ones in harder fabric (polyester like) and do not require retreatment.

Krishnamoorthy Kaliannagounder	Is there any regular monitoring on the physical status of the nets including PHI as it is important besides usage of nets
Thuan Thi Nguyen	Thank you Krishnamoorthy for the question. The national malaria program conducts annual survey on bed nets. They often survey the population and ask how many nets people have at home as an indicator for bednet ownership and how many are broken for bednet status. However in many ethnic minority settings in vietnam, people live both at the village and fields. so these survey questions are not sufficient to measure the ownership and status of bed nets across time and spaces

Syukrin Ali	as we know Southeast Asia region are tropical with sometimes hot weather makes it harder to frequently using ITN, and for village and field that have higher risk for malaria, we need to think of better option for people (cool material, low cost ITN etc)

Anitta KAMRA	Moving the bednet contributes in getting the bednet destroyed at a point in time.