

RANDOM CONTROLLED TRIALS AND BEYOND

- +
 - Results from the first multi- country study of the effectiveness of spatial repellents to control vector borne diseases amongst forced displaced populations in conflict affected areas of N. Syria, Yemen and N. Nigeria, 2019 - 2024

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**REDUCING DEATHS AND SUFFERING
FROM TROPICAL DISEASES**



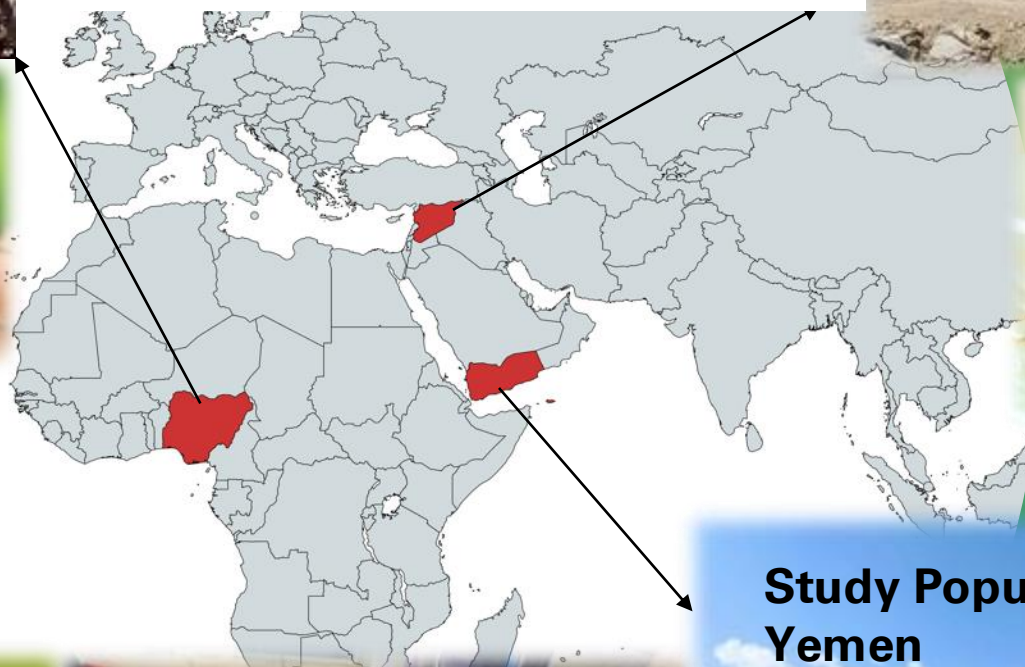
Perilous Journeys Few Can Imagine



Study Population 3: Borno, Nigeria



**Are spatial emanators
feasible to use in
humanitarian crises and
do they work against
different VBDs?**



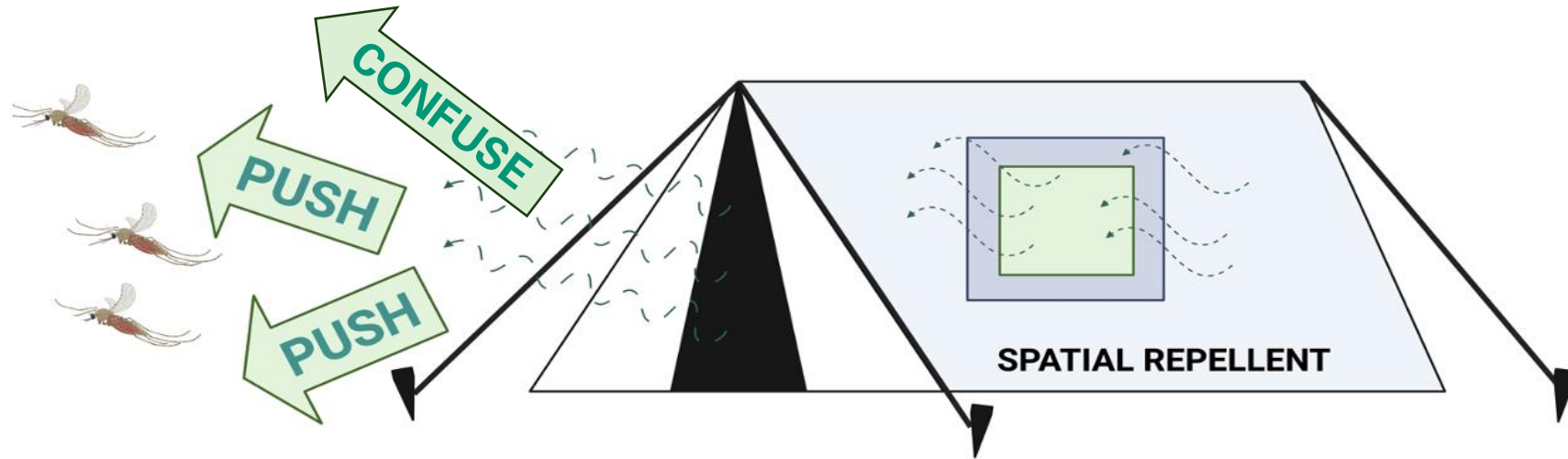
Study Population 1: NE Syria



**Study Population 2:
Yemen**



Trial Interventions: SR Effectiveness - Two Arm RCTs



scJohnson **GUARDIAN™**
A family company
at work for a better world

DURATION PER UNIT: up to one year

ACTIVE: 2500mg transfluthrin

UNIT COST: ~\$2.50

PER PERSON PER YEAR

COST: ~\$2.00



scJohnson
A family company
at work for a better world
MOSQUITO SHIELD™

DURATION PER UNIT: up to one month

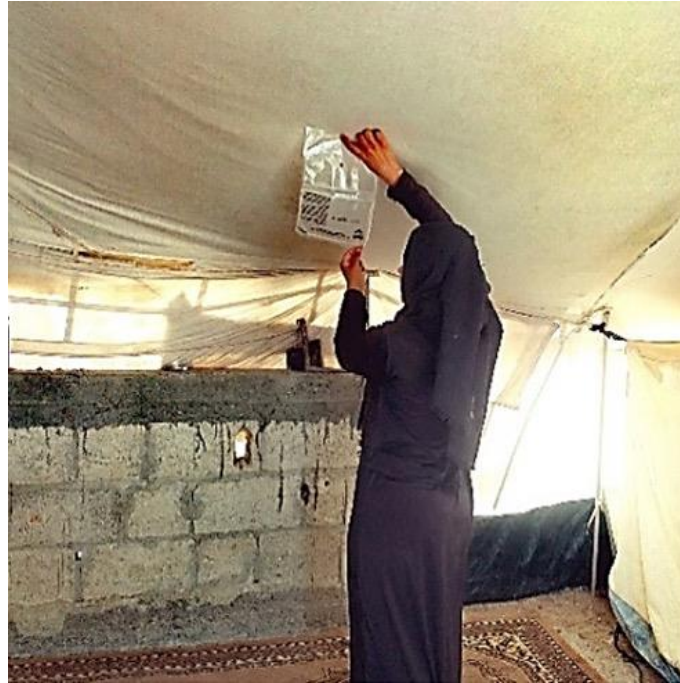
ACTIVE: 110mg transfluthrin

UNIT COST: ~\$0.30

PER PERSON PER

YEAR COST: ~\$5.84

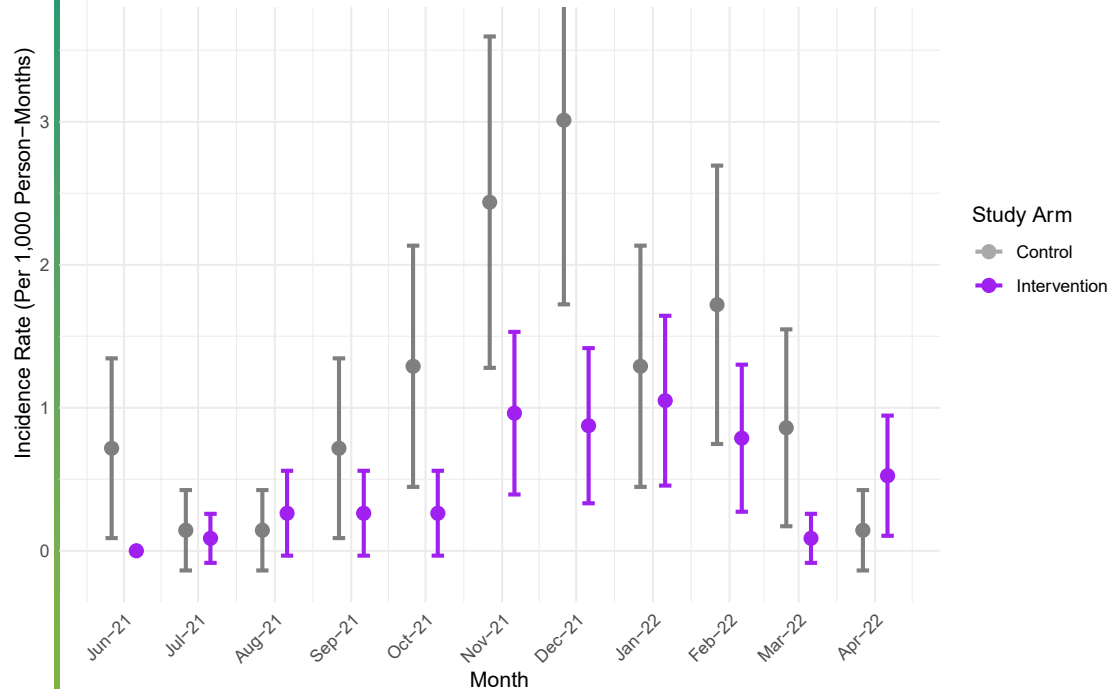
Study 1: Strong evidence for spatial repellents to protect from cutaneous leishmaniasis amongst the forced displaced in Syria



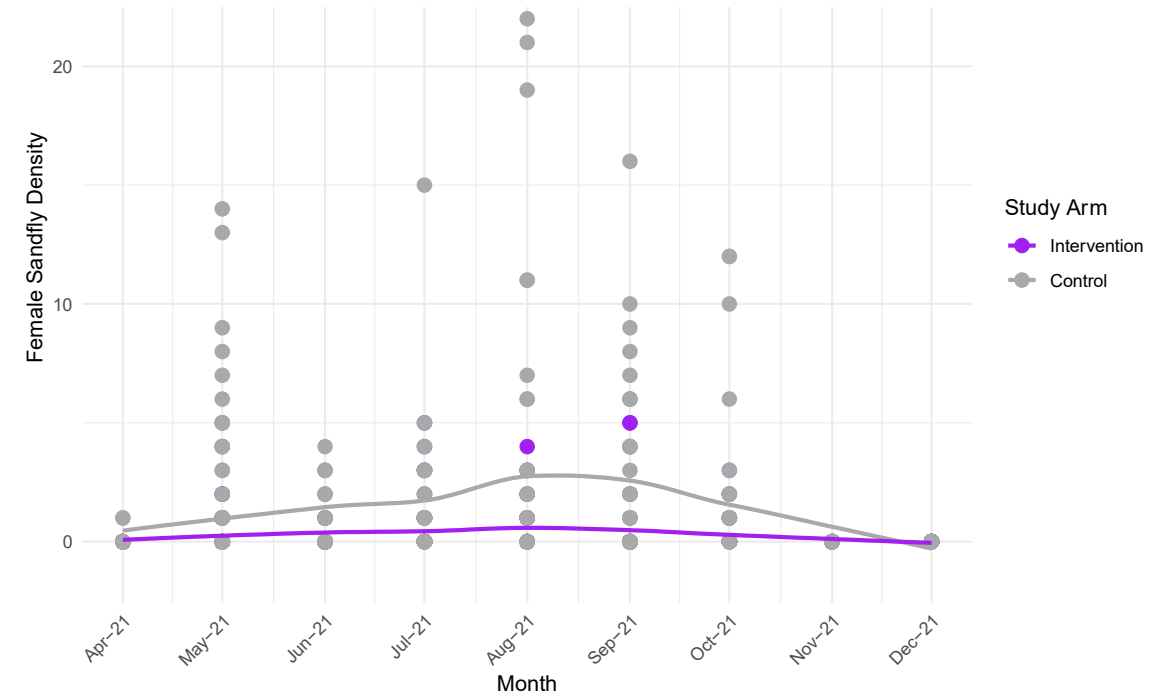
- Conducted a 2-arm, non-randomized cluster trial in 6 IDP camps in Ar-Raqqa governorate, North-East Syria
- 18,404 study population followed over 1 year, with Mosquito Shield™ distributed monthly in 2 camps
- Cutaneous leishmaniasis case detection at mobile clinics and health facilities

Strong evidence for spatial repellents to protect from cutaneous leishmaniasis amongst the forced displaced in Syria (2)

Allan R et al: Enhancing protection against vector-borne diseases in forcibly displaced communities: evaluating the efficacy of spatial repellents for cutaneous leishmaniasis control in North-East Syria. BMC Medicine. In print DOI : 10.1186/s12916-025-04244-2

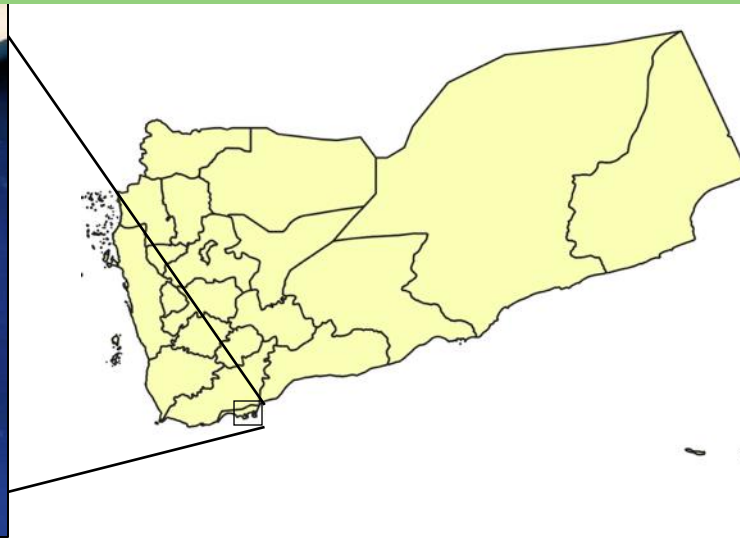


- Mosquito Shield™ spatial repellent reduced cutaneous leishmaniasis incidence by **48.0%** ($p < 0.0001$)
- Mosquito Shield™ spatial repellents received with high levels of acceptability, including willingness to pay



- Mosquito Shield™ spatial repellent reduced indoor female phlebotomine sandfly density by **78.0%** ($p < 0.0001$)
- Mosquito Shield™ spatial repellent reduced indoor blood-fed phlebotomine sandfly density by **79.0%** ($p < 0.0001$)

Study 2 _Design: Lahij governorate, South Yemen



Study dates: Dec 2022-June 2023

Study arm	Camp setting	Population	Number of households
Intervention Arm: Guardian + IEC & mobilisation for water container / waste management & camp medical services	Al Rebat	2711	500
Control Arm: IEC & mobilisation for water container / waste management & camp medical services	Al Bitra	1252	500
	Al Meshqafah	2008	

Strong entomological evidence that Guardian reduces aedes attacks on humans



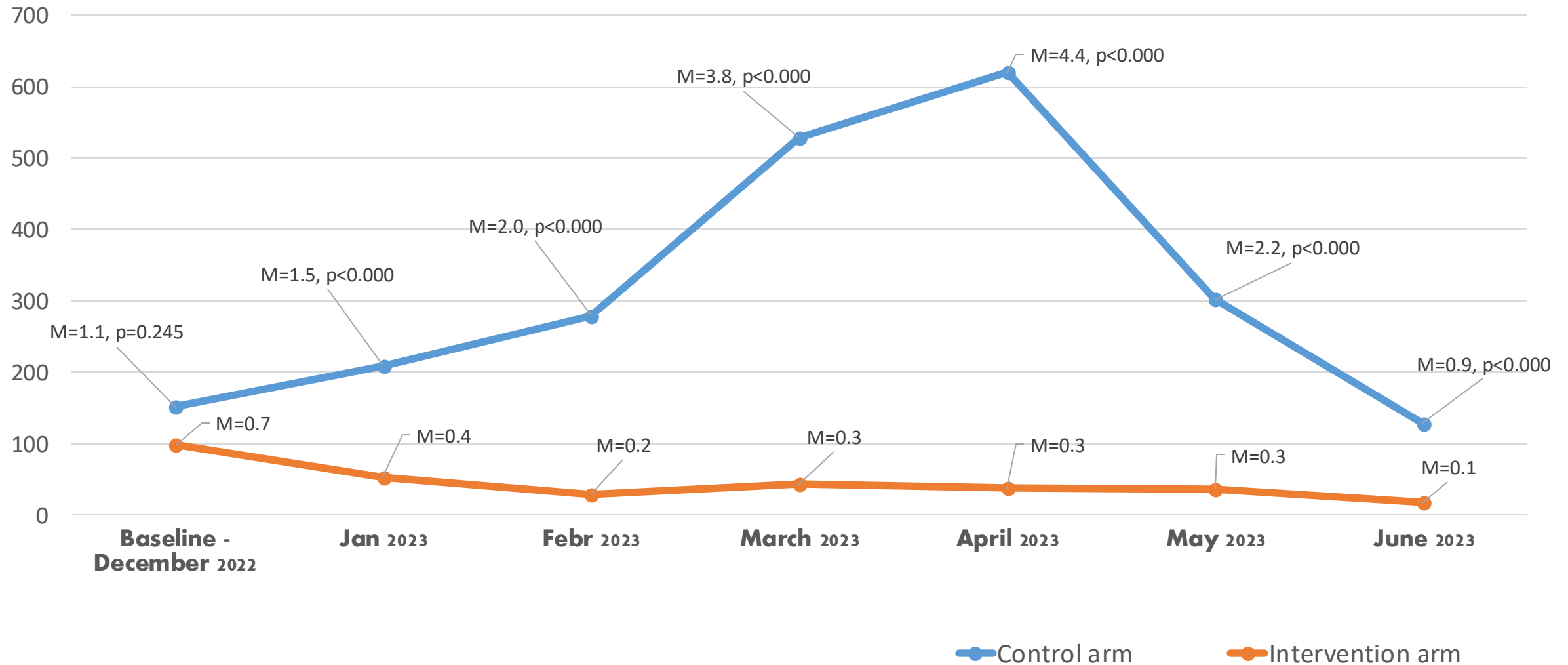
Captured with CDC light traps and aspirators in intervention and control arms during entomological monitoring in IDP camps

Study arm and location	Number of households with light traps, n	Total number of culex	Total number of Anopheles stephensi	Total number of Aedes aegypti, n	Number of female Aedes aegypti, n (%)	Number of blood-fed female Aedes aegypti, n (%)
Control	140	8704	14	2067	1084 (52.4)	517 (47.7)
Intervention	140	6424	4	215	118 (54.9)	53 (44.9)
Total	280	15128	16	2282	1202 (52.7)	570 (47.2)

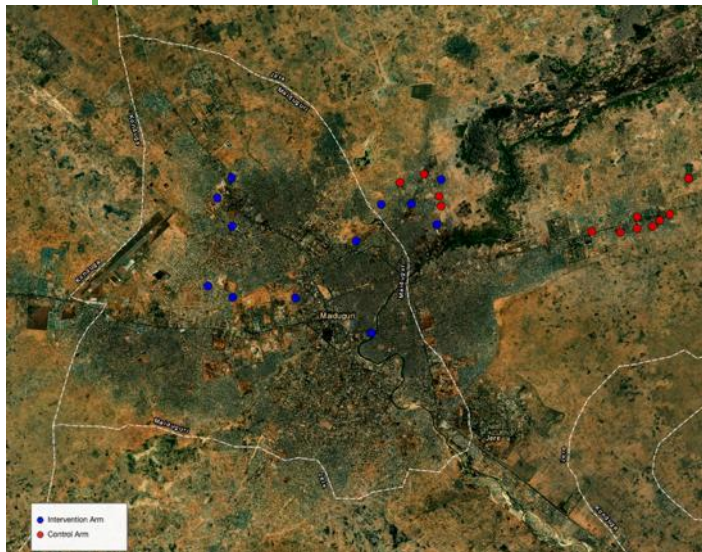
Results: Blood-fed female Aedes aegypti density in camps



Number of Aedes aegypti collected in IDP camps in Aden, Yemen (using light traps and aspirators combined)



Study 3. Strong evidence for spatial repellents to protect from malaria amongst the forced displaced in Northern Nigeria (1)



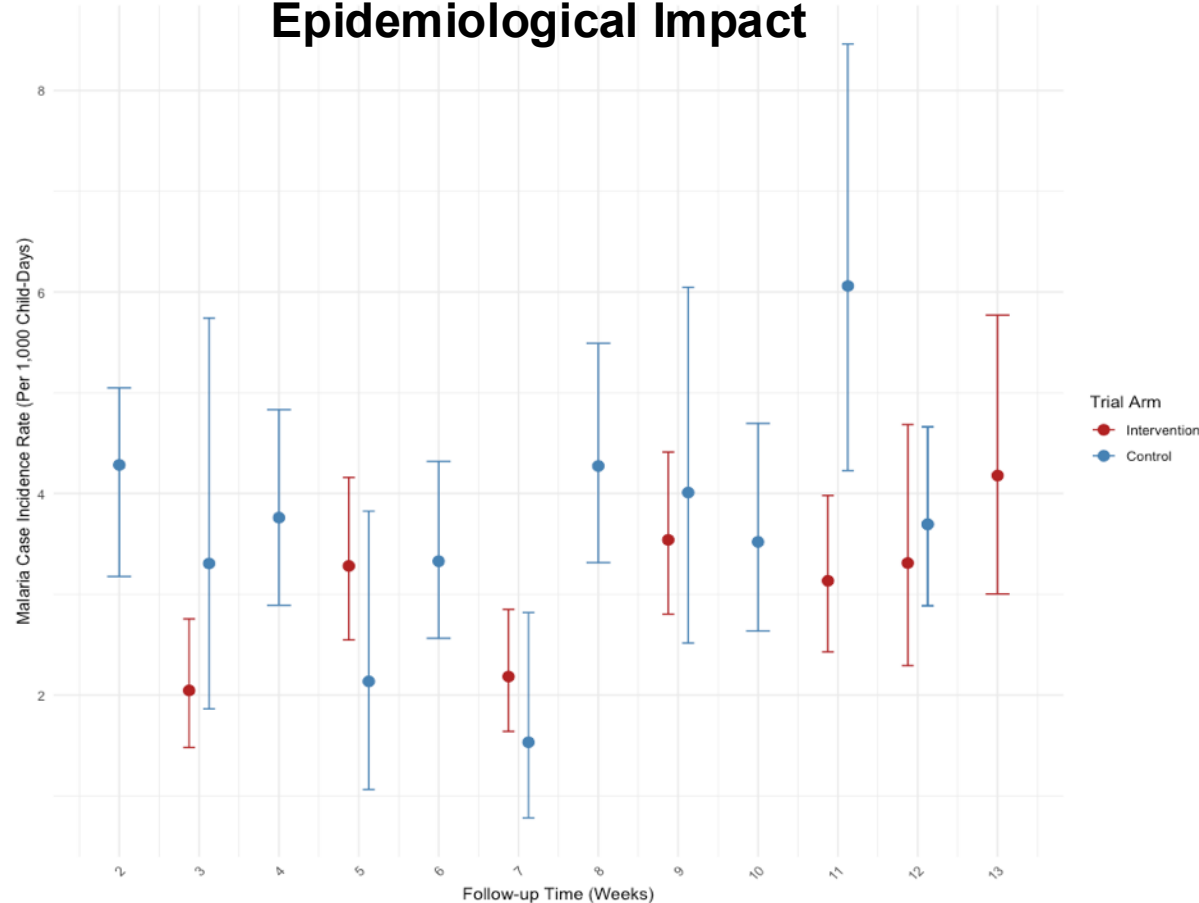
- Conducted a 2-arm, pragmatic, open-label, controlled trial in 24 IDP camps in Maiduguri, Borno State, Nigeria
- Tested 1,655 children aged 6 – 10 years old for malaria each month after Guardian™ spatial repellents distributed
- Guardian™ spatial repellents received with high levels of acceptability, including willingness to pay



REDUCING DEATHS AND SUFFERING
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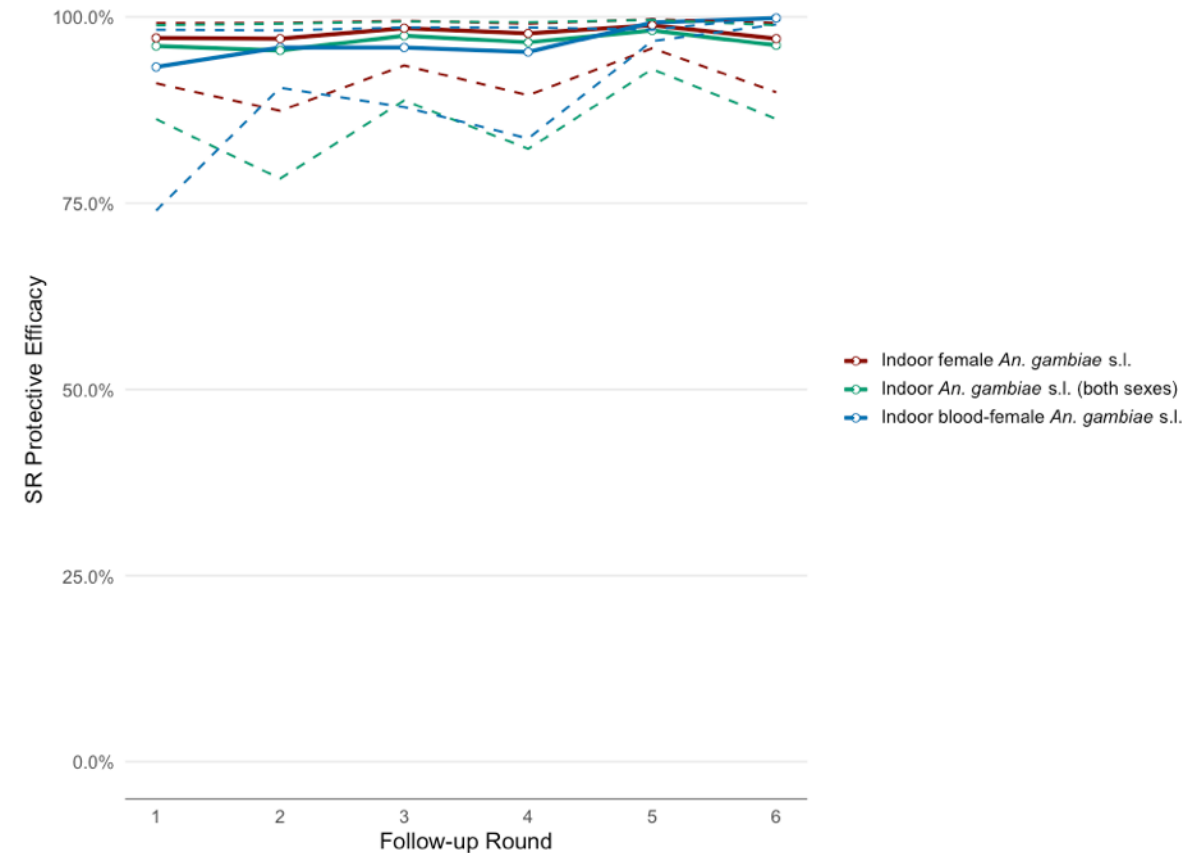
Strong evidence for spatial repellents to protect from malaria amongst the forced displaced in Northern Nigeria (2)

Epidemiological Impact



- Guardian™ spatial repellent reduced overall malaria infection by **32.1%** ($p < 0.0001$)
- **23.0%** protective efficacy from time to first malaria infection ($p = 0.006$)

Entomological Impact



- Guardian™ spatial repellent reduced indoor female *An. gambiae* s.l. by **98.14%** ($p < 0.0001$)
- Guardian™ spatial repellent reduced indoor blood-fed *An. gambiae* s.l. by **94.38%** ($p < 0.0001$)

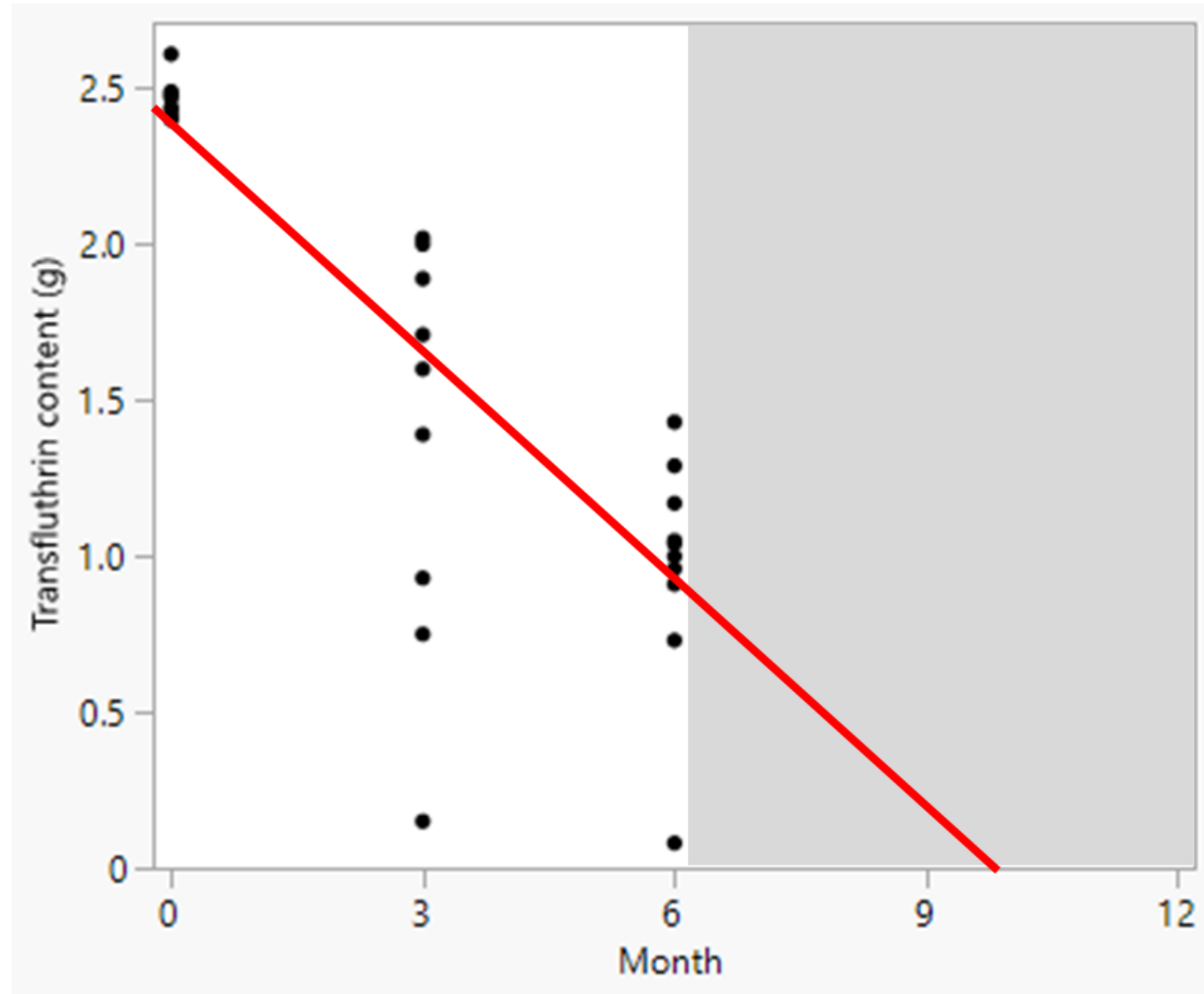
Acceptance Among Displaced Families

	Syria	Yemen	Nigeria
Survey shelter sample	370	250	
Retention	72%	98.8%	99%
Liked it	74%	67.6%	86%
Perceived it to be effective/reduced mosquito density	54%	75.9%	86%
Reported side effects	0%	0%	0%
Correctly positioned	92%	88.1%	
Easy to use	83%	99%	..
Changed once a month	88%	NA	NA
Willing to use in future	79%		90%
Recommend to friends			79%



Guardian emanation / vapour space durability :

- Chemical analysis of 10 emanators for each of the following time points: 0, 3, and 6 months post-deployment.
- Calculated daily emanation rate per product: 8.3 mg/day (*not remaining content...the opp. of ITNs/IRS*)
- Expected length of product life based on daily effective emanation rate: >9 months
- Trial duration: 6 months





SPATIAL REPELLENTS

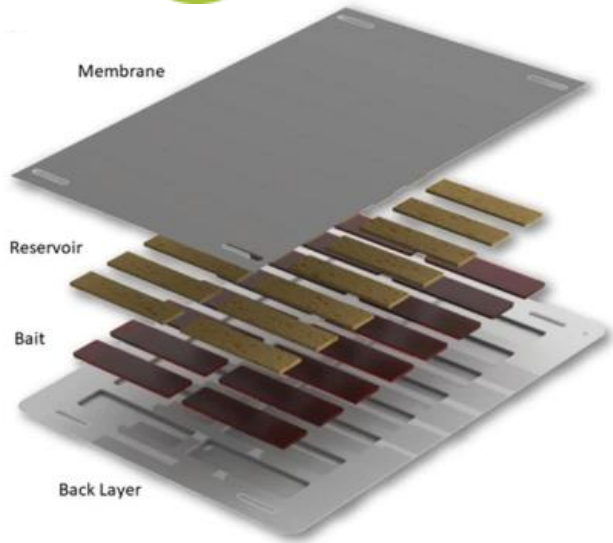


**ATTRACTIVE
TARGETED SUGAR
BAITS**

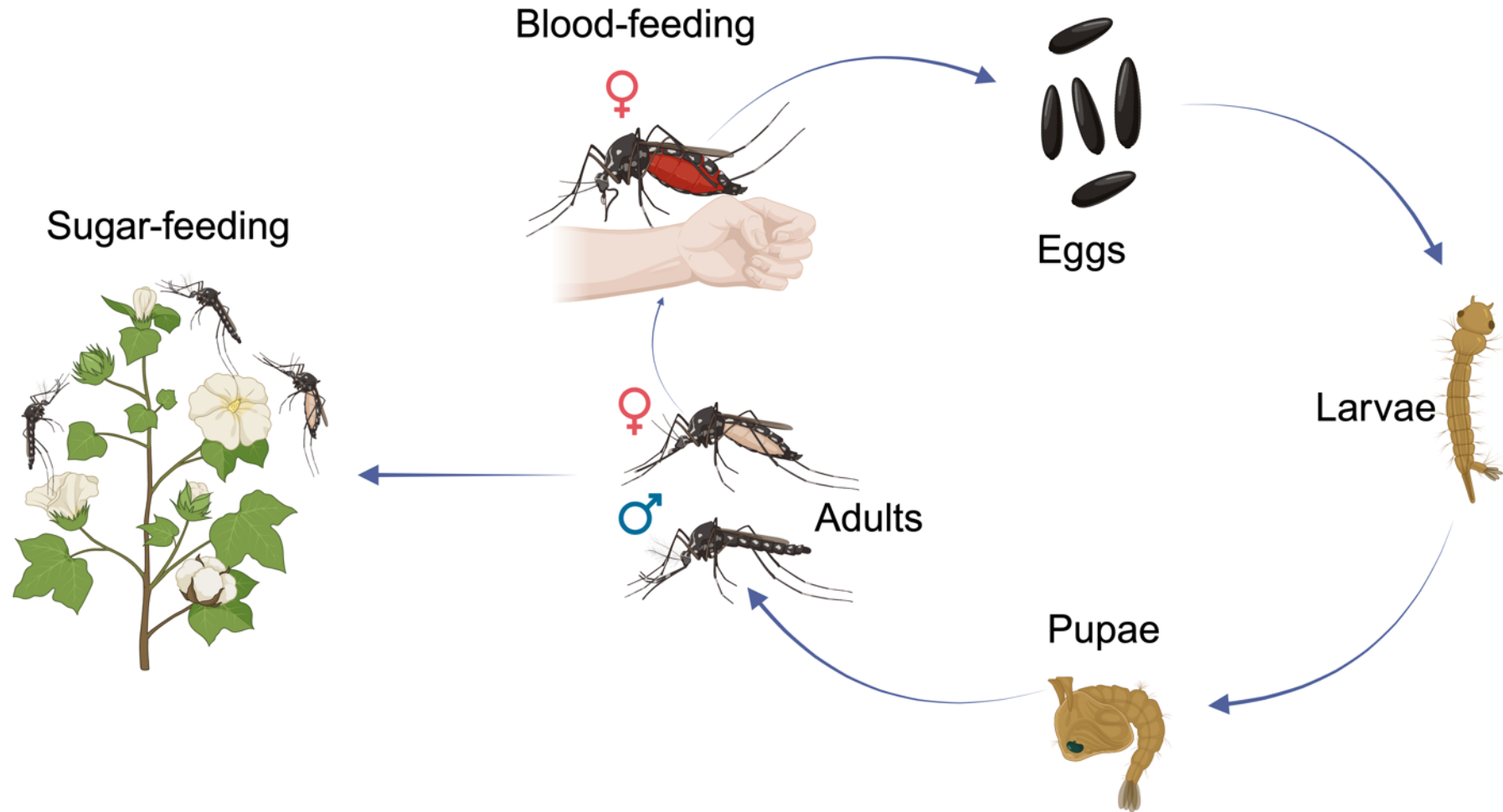


**LONG-LASTING
LARVICIDE**

ATSB exploit the fundamental requirement of vectors to sugar feed



- ATSB attract vectors to a sugar source to deliver a lethal ingestion toxicant
- Sarabi v1.2 contains date syrup bait laced with dinotefuran and bittering agent
- Remains efficacious for **6 months**



Strong evidence for ATSB to protect from malaria and dengue vectors amongst the forced displaced in Northern Nigeria (1)



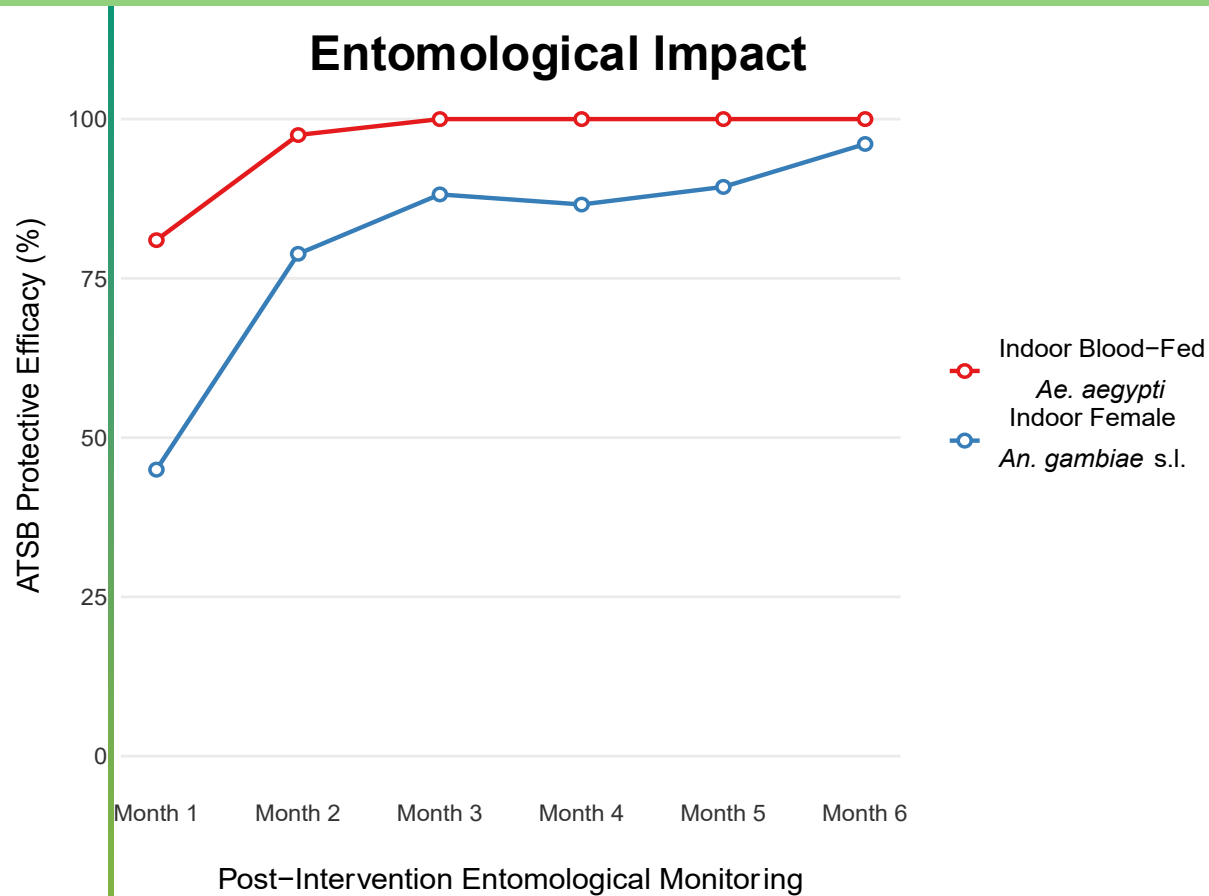
- Conducted a 2-arm, community-level trial in 2 IDP camps in Maiduguri, Borno State, Nigeria
- Monthly entomological monitoring after 3 ATSB units deployed per house (1 inside and 2 outside) over 6 months



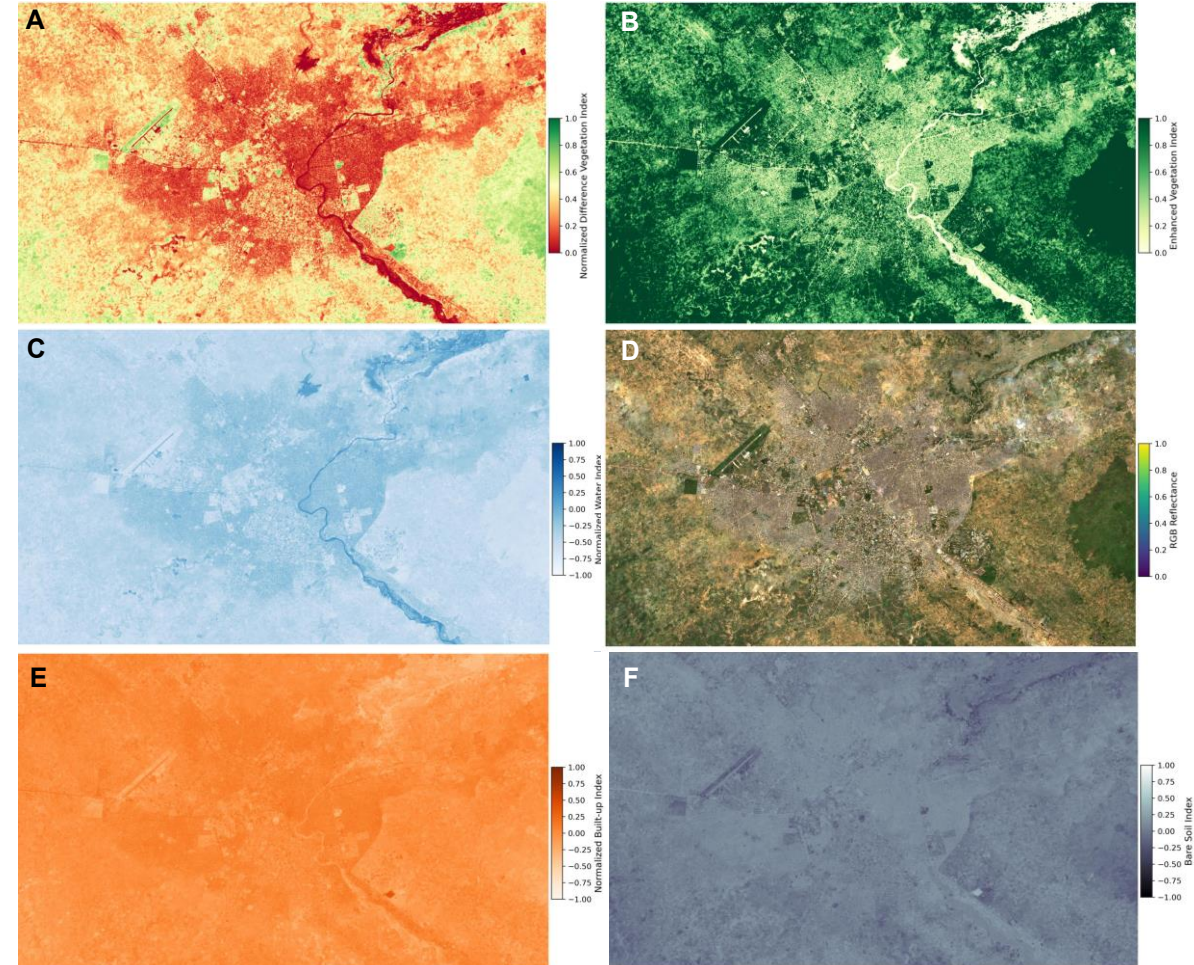
**REDUCING DEATHS AND SUFFERING
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Strong evidence for ATSB to protect from malaria and dengue vectors amongst the forced displaced in Northern Nigeria (2)

Entomological Impact

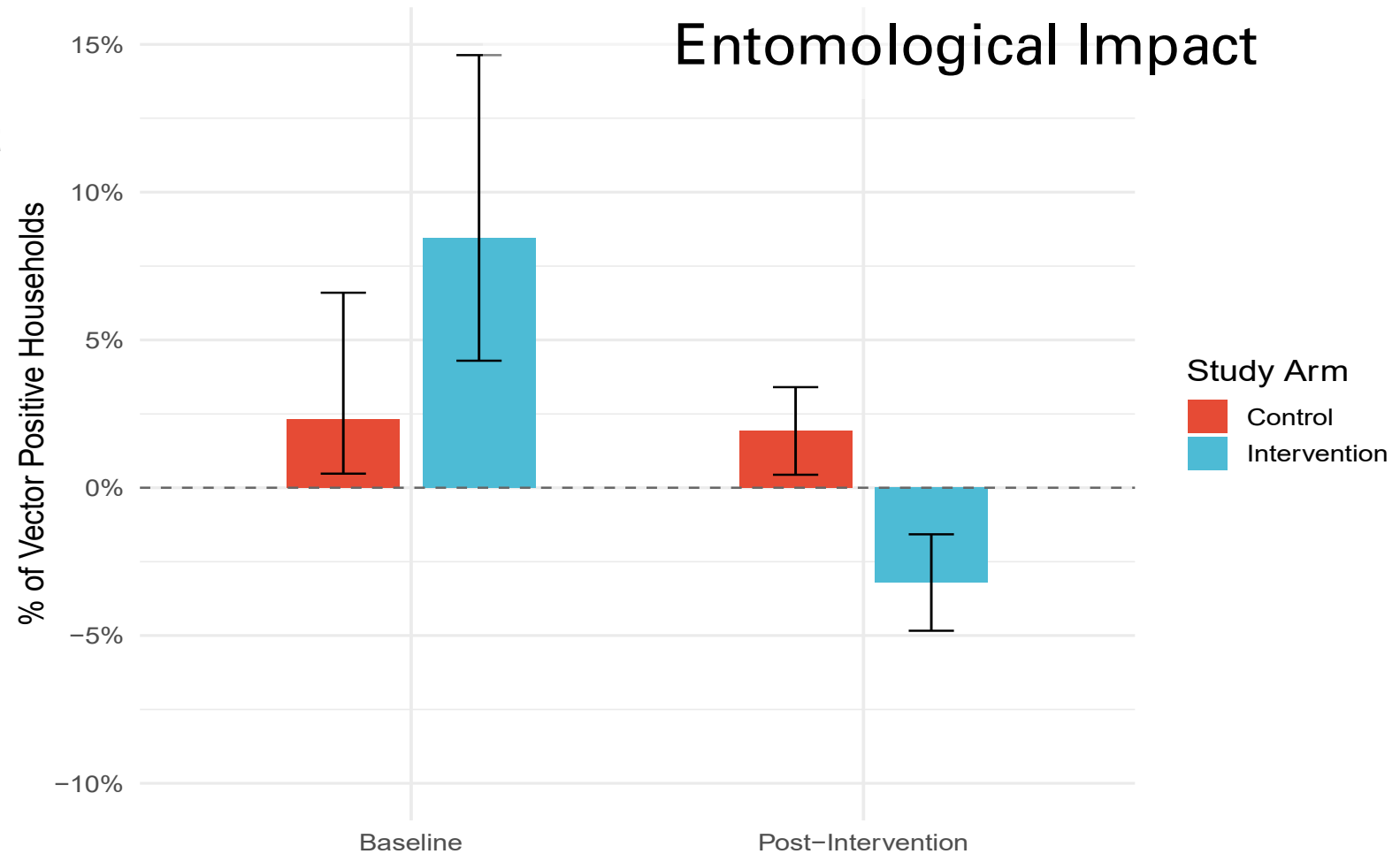


- ATSB reduced indoor blood-fed *An. gambiae* s.l. by **98.07%** ($p < 0.0001$)
- ATSB reduced indoor blood-fed *Ae. aegypti* by **92.54%** [95% credible intervals: 49.80% - 99.12%]



- Strongest environmental drivers of *An. gambiae* s.l. occurrence were green biomass and moisture indices
- Ecological site evaluation for targeted ATSB deployment

Strong evidence for SumiLarv 2MR to protect from malaria and dengue vectors populations amongst the forced displaced in Northern Nigeria

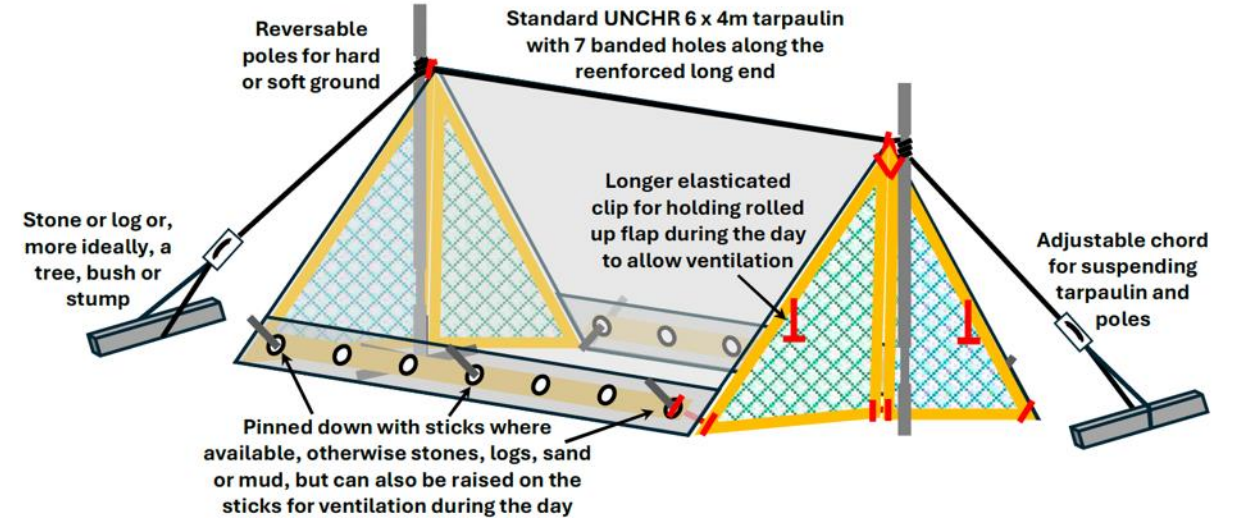


- Significant reduction in vector positive households following SumiLarv™ 2MR deployment

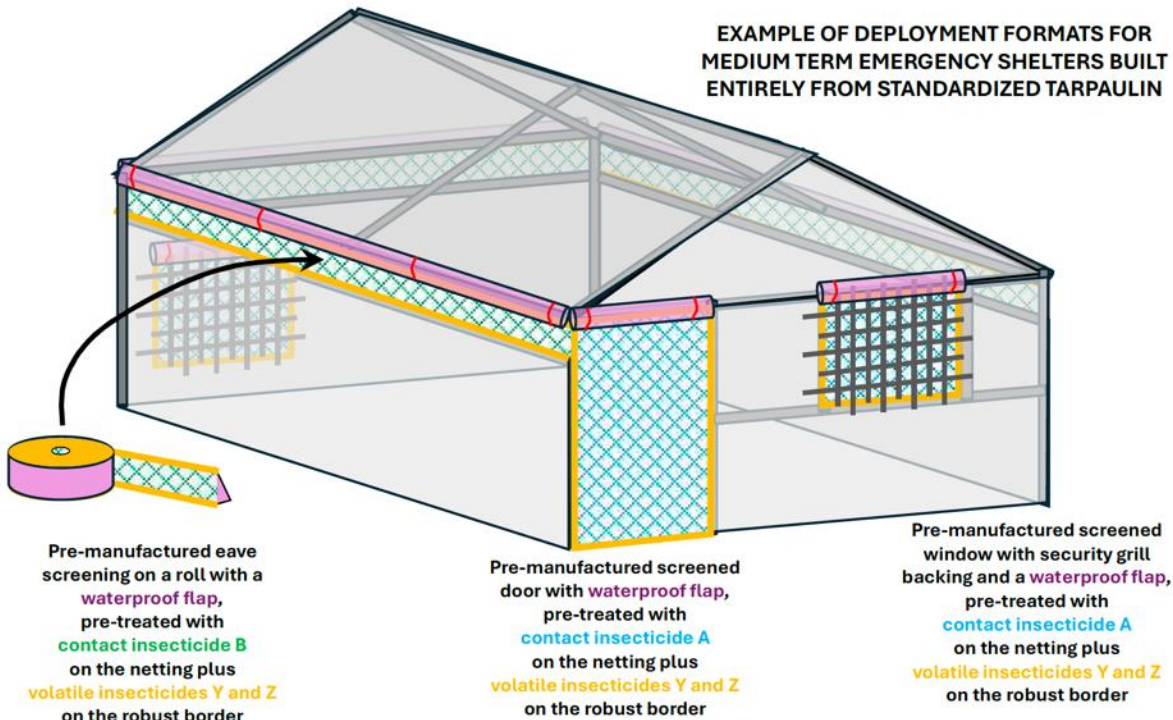
Next generation emergency shelter VC accessory panels



PROPOSED DEPLOYMENT FORMAT FOR AN URGENTLY NEEDED SHORT TERM EMERGENCY SHELTER BUILT FROM A SINGLE STANDARDIZED TARPULIN



EXAMPLE OF DEPLOYMENT FORMATS FOR MEDIUM TERM EMERGENCY SHELTERS BUILT ENTIRELY FROM STANDARDIZED TARPULIN



Spatial repellents in accessory panel seams. Multiple insecticidal AI in panels to create an effective matrix

Etofenprox treated textiles: IVCC/UCSF Semi-field test: Thailand

Much less dermal absorption/ greater wash resistance than permethrin

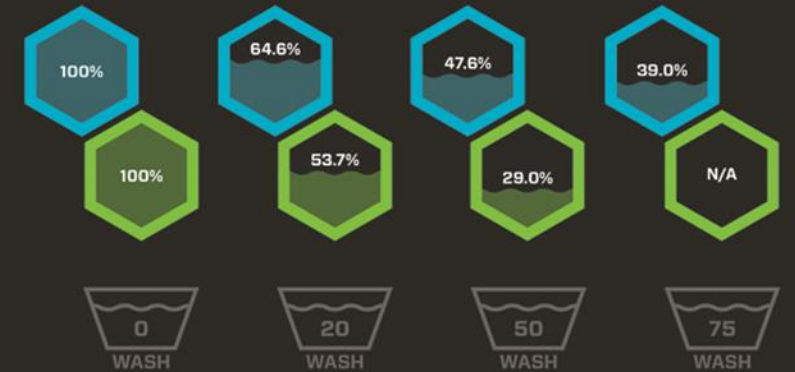
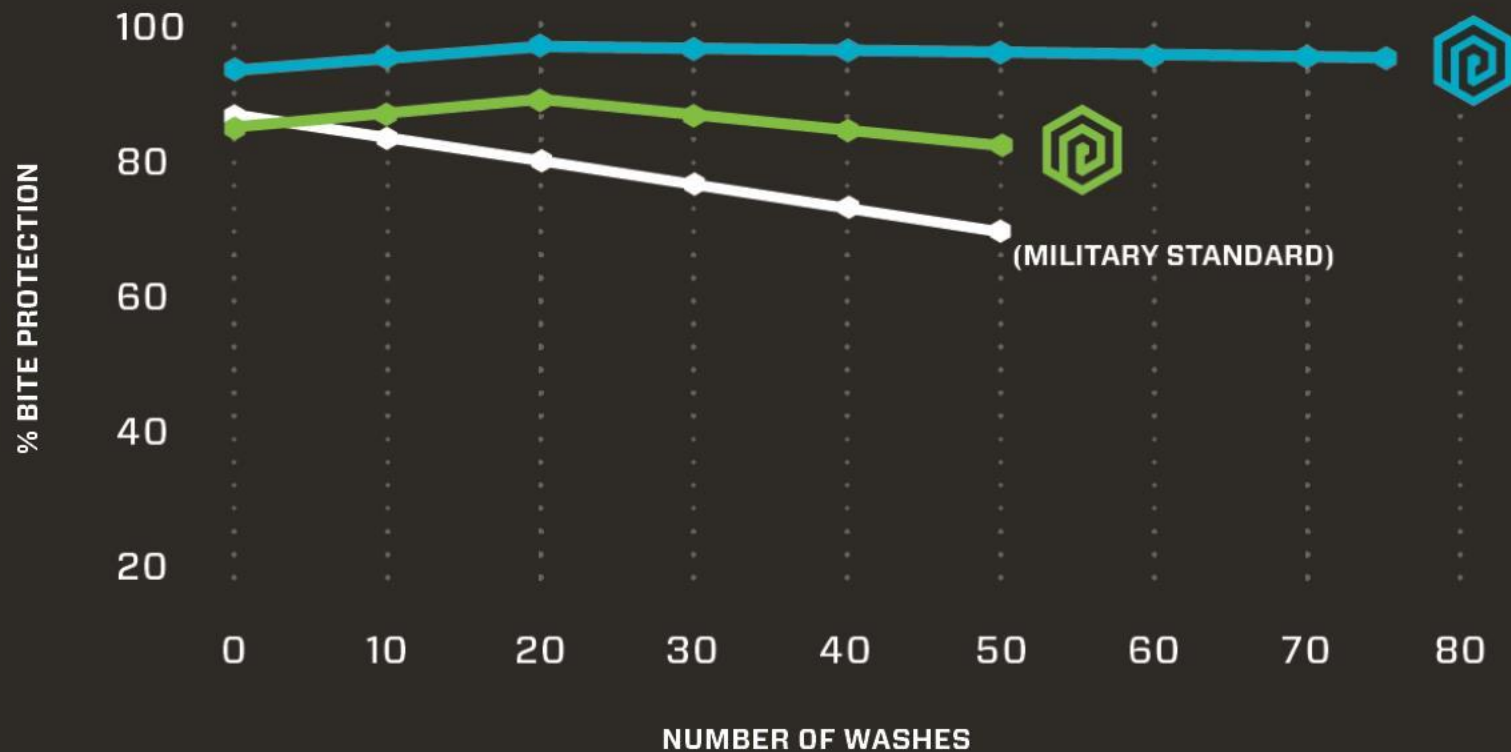
Discussions with Mitsui Chemicals Crop & Life Solutions, MCCLS (manufacturer), WarmKraft (EPA registrant), for treatment of other textiles, blankets?



Etofenprox versus permethrin

Superior wash resistance compared to permethrin

- The following chart shows the difference between etofenprox (blue) and permethrin (green) bite protection after extended washes



After 75 washes, etofenprox-treated textiles retain 39 percent of their original coating.

Etofenprox versus permethrin:

Parameter	Permethrin	Etofenprox
Acute Oral Toxicity LD ₅₀	>2,700 mg/kg	>5,000 mg/kg
Acute Dermal Toxicity LD ₅₀	>2,000 mg/kg	>5,000 mg/kg
Acute Inhalation Toxicity LC ₅₀	>2.6 mg/L	>2.1 mg/L
Sub-chronic Dermal Toxicity	500 mg/kg/day (rat)	No systemic toxicity
Subchronic Inhalation Toxicity NOAEL (rats)	11 mg/kg/day	10.6 mg/kg/day
Acute neurotoxicity NOAEL (rats)	25 mg/kg/day	2,000 mg/kg
Carcinogenicity	Likely to be carcinogenic to humans (according to the U.S. EPA)	Not Likely to be carcinogenic

WHO prequalified Long Lasting Insecticidal Hammock Nets (LLIHNs)



Fujian Yamei Industry and Trade Co., Ltd.





Material: 100% polyester
 Denier: 50D / 75D / 100D
 Weight: 25g/m² 30g/m² 40g/m²
 Mesh: 156 holes/inch²
 Color: Colors available on request

Insecticide: 55mg/m²+/-25%
Deltamethrin



Dimensional stability: Less than 5%
 Bursting strength: Min.250Kpa &
 Min.350Kpa
 Common Size: 240cm (Length) x
 120cm (Depth) x 150cm (Flap)