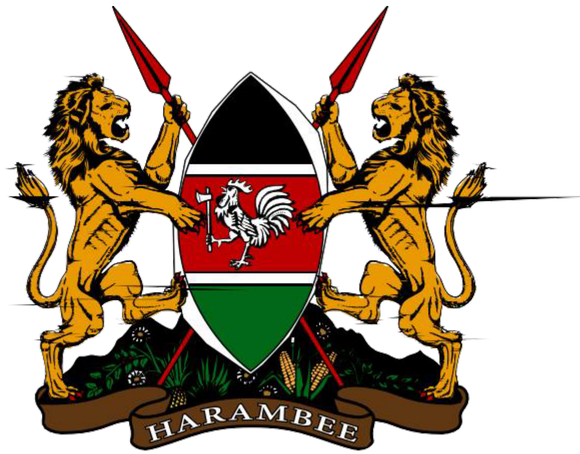
MINISTRY OF HEALTH

STATE DEPARTMENT FOR PUBLIC HEALTH AND PROFESSIONAL STANDARDS

GUIDELINES ON THE USE OF SPATIAL REPELLENTS IN KENYA



Republic of Kenya

Ministry of Health

GUIDELINES ON THE USE OF SPATIAL REPELLENTS IN KENYA

In Search of Better Health

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Guidelines on the Use of Spatial Repellents in Kenya – Edition 1, January 2026

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FOREWORD

The Guidelines for the Use of Spatial Repellents in Kenya is a critically significant document that complements and strengthens the existing malaria vector control strategies. The conclusive evidence of the public health impact of spatial repellents against malaria in Kenya, as demonstrated in a recent randomized controlled trial in Busia County prompted the development of this document. The recent WHO conditional recommendation (August 2025) supporting the use of spatial emanators alongside insecticide-treated nets validates Kenya's forward-thinking approach and positions these guidelines as a model for evidence-based implementation of this new intervention class.

This document aims to guide the implementation of spatial repellents as an additional vector control tool to help achieve the ambitious targets set in Kenya's Malaria Strategy 2023-2027. These guidelines outline specific methods for deploying spatial repellents, integration with existing interventions, distribution strategies, social and behaviour change communication approaches, and mechanisms for monitoring and evaluation.

The Ministry of Health is committed to formulating evidence-based policy and strategy. Consequently, using these guidelines will promote the effective scale-up of spatial repellents as part of the integrated vector management approach to malaria control. We urge all stakeholders to internalize these guidelines and incorporate its recommendations as part of the malaria vector control efforts.

We would like to thank all who contributed their time, expertise, and dedication to the development of these important guidelines.

Dr. Patrick Amoth, CBS
Director General for Health

ACKNOWLEDGEMENTS

The Government of Kenya extends its sincere gratitude to the following organizations and individuals for their invaluable contribution towards the development of these guidelines for scaling up spatial repellents, as part of our national malaria control efforts.

We extend our sincere gratitude to Unitaid for the generous financial support, provided through the University of Notre Dame, which was instrumental in making this work possible. We appreciate the Kenya Medical Research Institute (KEMRI) and the Advancing Evidence for the Global Implementation of Spatial Repellents (AEGIS) consortium for their invaluable technical support and exemplary leadership in generating the local evidence that underpins these guidelines.

We acknowledge the contributions of the National Malaria Control Programme (NMCP), the Vector Control Committee of Experts, and our esteemed technical partners, including the World Health Organization (WHO), the U.S. President's Malaria Initiative (PMI), and academic institutions across Kenya.

We especially commend the dedicated team that drafted this document, led by KEMRI and NMCP. We are grateful to everyone from the government agencies, research institutions, implementing partners, and the private sector who provided input and review.

Lastly, we sincerely appreciate the communities and study participants in Busia County, whose invaluable participation in the spatial repellent trial was instrumental in generating the evidence that informed these guidelines.

Together, we remain committed to advancing malaria control efforts and improving the health and well-being of all Kenyans.

Dr. Joel Gondi
Director, Primary Healthcare

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Abbreviations and Acronyms

ACT:	Artemisinin Combination Therapy
AEGIS:	Advancing the Evidence for the Global Implementation of Spatial Repellents
CBO:	Community Based Organization
CDC:	Centers for Disease Control and Prevention
CHIKV:	Chikungunya Virus
CHP:	Community Health Promoter
CGHR:	Centre for Global Health Research
CHMT:	County Health Management Team
CSO:	Community Service Organization
DDSR:	Division of Disease Surveillance and Response
DENV:	Dengue Fever Virus
DVBNTD:	Division for Vector Borne and Neglected Tropical Diseases
EIR:	Entomological inoculation rate
EOC:	Emergency Operations Centre
GF:	Global Fund to Fight AIDS, Tuberculosis and Malaria
GVCR:	Global Vector Control Response
HCW:	Health Care Worker
HLC:	Human landing catch
HRP:	Histidine Rich Protein
icipe:	International Centre for Insect Physiology and Ecology
IRM:	Insecticide resistance management
IRS:	Indoor residual spraying
ITN:	Insecticide treated net
IVCS:	Integrated vector control strategy
IVM:	Integrated vector management
Kdr:	Knock down resistance
KRA:	Kenya Revenue Authority
KEMRI:	Kenya Medical Research Institute
KEMSA:	Kenya Medical Supplies Agency
KeNAAM:	Kenya NGOs Alliance Against Malaria
KMIS:	Kenya Malaria Indicator Survey
KMTC:	Kenya Medical Training College
LLIN:	Long-lasting insecticidal net

LSM:	Larval source management
LSTM:	Liverpool School of Tropical Medicine
M&E:	Monitoring and evaluation
MCH:	Maternal and Child Health
MIS:	Malaria Indicator Survey
MoH:	Ministry of Health
MSDS:	Material Safety Data Sheet
NGAO:	National Government Administrative Officer
NGO:	Non-governmental organization
NMCP:	National Malaria Control Programme
ONV:	O'nyong'nyong virus
PAMCA:	Pan African Mosquito Control Association
PBO:	Piperonyl butoxide
PCPB:	Pest Control Products Board
PLWD:	People Living with Disability
PMI:	U.S. President's Malaria Initiative
PSK:	Population Services Kenya
PUBReC:	Pwani University Biosciences Research Center
SBCC:	Social Behavioural Change and Communication
SCHMT:	Sub County Health Management Team
SR:	Spatial Repellents
TUM:	Technical University of Mombasa
UKAID:	United Kingdom Agency for International Development
UND:	University of Notre Dame
UNICEF:	United Nations Children's Fund
UNHCR:	United Nations High Commission for Refugees
USAID:	United States Agency for International Development
UoN:	University of Nairobi
VBD:	Vector Borne Disease
VCAG:	Vector Control Advisory Group
VCCoE:	Vector Control Committee of Experts
YFV:	Yellow Fever Virus
WNV:	West Nile Virus
WHO:	World Health Organization

DEFINITION OF KEY TERMS

Spatial Repellents:	Tools that function by releasing volatile chemicals into the air to repel or confuse mosquitoes, leading to reduced biting.
Vector Control:	Measures taken to limit or eradicate the insects or other animals that transmit disease pathogens.
Insecticide Resistance:	The ability of insects to withstand the effects of insecticides due to genetic changes and selection.
Epidemiological:	Relating to the study of how often diseases occur in different groups of people and why.
Entomological:	Relating to the scientific study of insects.

EXECUTIVE SUMMARY

Malaria remains a significant health burden in Kenya, contributing to 19% of outpatient consultations and 10% of hospital admissions nationally. Despite the substantial reductions in transmission achieved in the past two decades, malaria incidence has stalled, with a slight increase observed in recent years. Notably, cases rose from 95.7 cases per 1000 people in 2019 to 104.3 per 1000 people in 2023.

The primary malaria vectors in Kenya include *Anopheles gambiae s.s., An. arabiensis, and An. funestus s.s.*, with other species such *An. stephensi, An. coluzzii* and *An. merus* contributing to transmissions. However, the effectiveness of the current control methods is undermined by insecticide resistance, particularly to pyrethroid insecticides, and adaptations in mosquito behaviour enabling them to evade the current control interventions.

The primary vector control tools used in Kenya are: Long-lasting insecticidal nets (LLINs), distributed through mass campaigns in malaria-endemic and epidemic-prone counties, as well as through routine maternal and child health clinics (MCH); Indoor residual spraying (IRS) conducted in two of the eight lake endemic counties, and larval source management (LSM) implemented on a small scale in selected parts of the country.

The major challenge facing these tools is insecticide resistance, particularly to the pyrethroid class of insecticides. The resistance manifests in two forms: physiological resistance, where mosquitoes survive the insecticide dose applied, and behavioural resistance, where mosquitoes alter their behavioural patterns. The behavioural pattern change is expressed as biting outdoors or indoors earlier in the evening or later in the morning, to evade insecticides deployed on LLINs or through IRS. Changes in mosquito behaviour are particularly difficult to address due to the limited tools available for outdoor or daytime control of mosquitoes. There is a need, therefore, to develop, evaluate and operationalize new vector control tools, as part of an integrated approach, alongside existing strategies and Spatial repellents (SR) provide a favourable opportunity in this regard.

Spatial repellents (SR) are vector control tools designed for indoor or peri-domestic environment deployment, which function by releasing volatile chemicals into the air. These volatile chemicals repel mosquitoes away from the space or cause behavioural changes in the mosquitoes leading to a reduction in human bites. Moreover, at higher concentrations such as near the source of the chemical, these products may also kill the mosquitoes. There is a paucity of data to support SR use outside of homes for health impact, highlighting the need for prioritising operational research.

A randomized control trial was conducted to evaluate the efficacy of SR alongside high LLIN coverage in reducing malaria incidence in Busia County, western Kenya. The trial demonstrated a significant reduction in the risk of malaria infection within clusters that received SR, in addition to LLINs distributed by the NMCP through a mass campaign, compared to clusters

that received LLINs only. These results were evaluated and validated by the World Health Organization Vector Control Advisory Group (WHO VCAG), which confirmed that Spatial repellents conclusively demonstrated their effectiveness as vector control tools against malaria control in this setting. Following the conclusive evidence from the Kenya trial, the WHO issued a conditional recommendation on **13 August 2025** supporting the use of spatial emanators (also known as spatial repellents) indoors in addition to ITNs to prevent and control malaria in both children and adults in areas with ongoing malaria transmission. This represents the first new class of vector control intervention recommended by WHO in over 40 years. Additionally, WHO prequalified two spatial emanator products—Mosquito Shield and Guardian, manufactured by SC Johnson & Son, Inc.—making them eligible for international procurement. Meanwhile, and based on the weight of the locally generated evidence, SR have been incorporated as an additional vector control tool in the Kenya Malaria Strategy 2023-2027 to be deployed together with the LLIN mass campaigns.

This document serves to guide the national scale-up of SR and it equally outlines opportunities for building capacity for evidence-based deployment of SR in different malaria endemicities and ecologies in Kenya. Consequently, it details deployment strategies, including targeted populations, integration with interventions for large-scale deployment, distribution methods, social behaviour change and communication strategies to ensure successful uptake. Additionally, it addresses the infrastructural requirements for effective SR deployment as well as the monitoring and evaluation framework for SR efficacy. Lastly, this document emphasises the need for compliance with human rights, equity and gender considerations, and relevant regulations and existing guidance.

1. INTRODUCTION

Major investments have been applied in the fight against malaria globally, yet the disease reduction has stagnated and malaria continues to burden human populations and health systems worldwide. A total of 249 million cases were reported in 2022, indicating a 5 million increase from 2021 and resulting in 608,000 deaths [1]. Vector control through insecticide-treated nets (ITNs) was estimated to account for 68% of all averted malaria cases and indoor residual spraying (IRS) accounted for another 11%, from 2000 to 2015 [2], thus demonstrating the value of vector control in global malaria control approaches. The current stagnation in malaria control is attributed to multiple factors including the widespread insecticide resistance across multiple insecticide classes [3], behavioural adaptation such as daytime biting [4] and shifting in biting patterns to early and late morning biting when people are not under the protection of their ITNs. Additionally, biting is occurring outside the peri-domestic spaces where vector control interventions are typically deployed [5,6]. Other contributing factors are changes in vector distribution likely due to global warming and changes in human land use, and diagnostic as well as treatment failure due to HRP2/3 deletions and ACT resistance. These threats cumulatively indicate the urgent need for the development and deployment of additional tools to combat malaria.

The Global Vector Control Response (GVCR) 2017-2030 aims for the reduction of vector-borne disease-related mortality by at least 75% by 2030, relative to the 2016 rates [7]. To achieve this ambitious target, the GVCR acknowledges the need for additional, complementary, vector control tools [7], such as spatial repellents (SR). Spatial repellents represent one of the alternative product classes [8] that could potentially contribute to the reduction in malaria vector biting pressure, thereby decreasing pathogen transmission.

Effective malaria control efforts in Kenya have effectively reduced prevalence and total malaria cases from 81% prevalence among children aged 6 months to 14 years in 2010 to 76% in 2020 in the same age group [9]. Overall, the national prevalence dropped from 8% in 2015 [10] to 6% in 2020 [9]. Despite these gains, an average of 4.9 million outpatient malaria cases were reported over the last five years and the incidence rose from 95.7 to 104.3 cases per 1000 population at risk of malaria during the same period (Figure 1) [11].

Malaria prevalence varies across different epidemiological zones, ranging from 19% in lake-endemic areas to less than 1% in low-risk regions (Figure 2). This diversity underscores the necessity for tailored approaches to implementing vector control interventions.

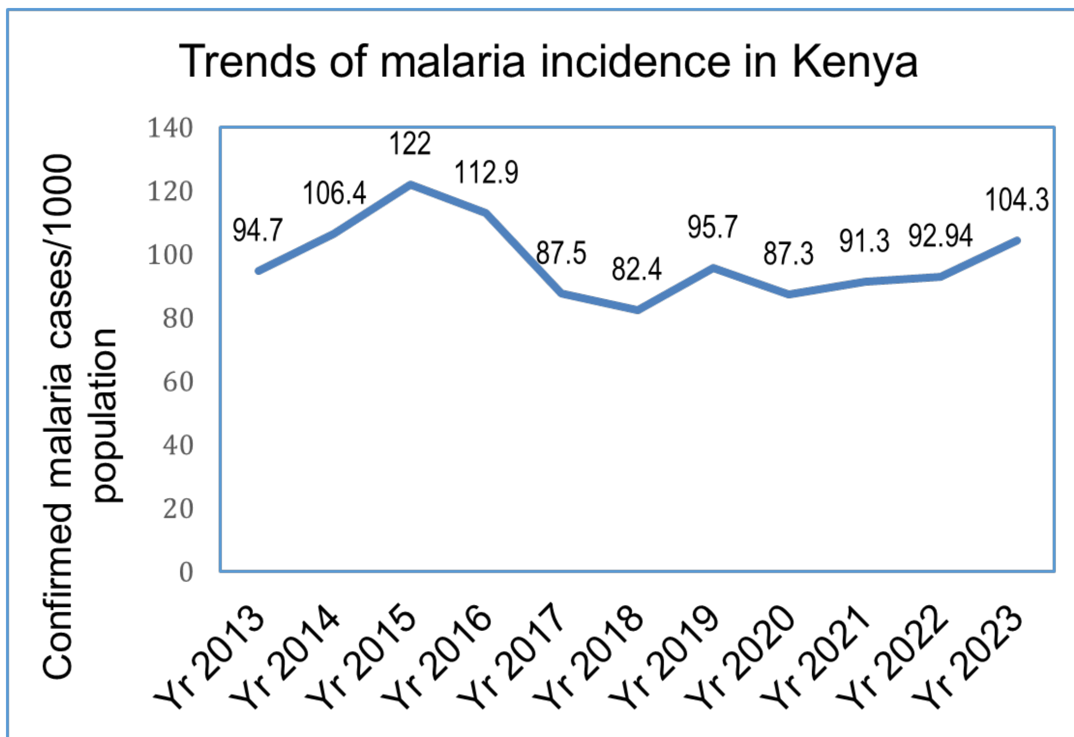
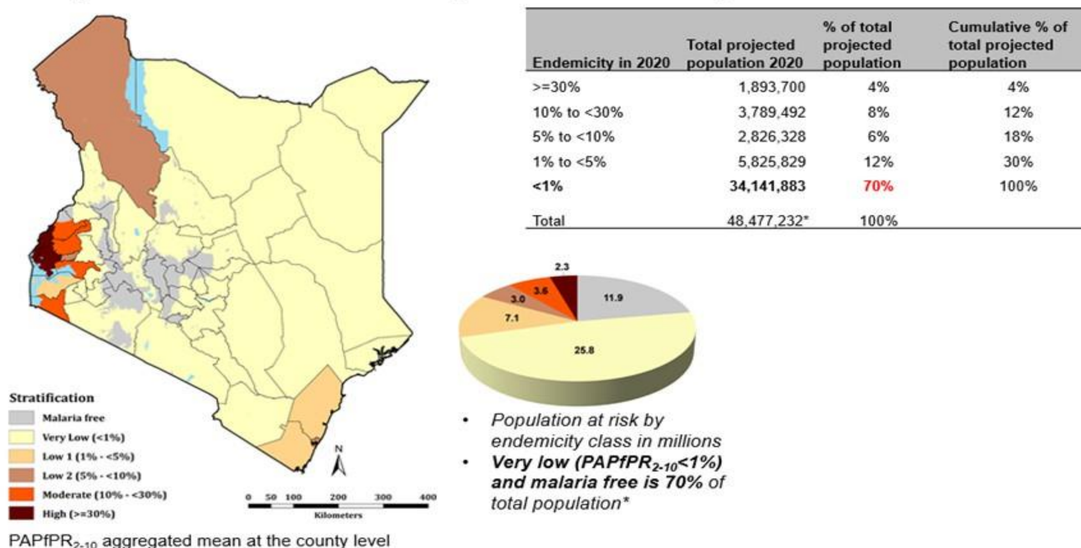


Figure 1: Trend of malaria incidence in Kenya 2013-2023 (Source: KMS 2023/24-2027/28)

The prevalence of malaria in Kenya among children aged 10-14 years has remained disproportionately high, underscoring the need for targeted interventions for this age group. The Kenya Malaria Strategy 2023/24 -2027/28 targets the reduction of malaria cases by 80% and mortality by 90% of the 2023 levels which will likely require additional vector control tools beyond LLIN and IRS to realize these goals.



Endemicity in 2020	Total projected population 2020	% of total projected population	Cumulative % of total projected population
>=30%	1,893,700	4%	4%
10% to <30%	3,789,492	8%	12%
5% to <10%	2,826,328	6%	18%
1% to <5%	5,825,829	12%	30%
<1%	**34,141,883**	70%	100%
Total	48,477,232*	100%	

Figure 2: Population at risk of malaria in Kenya categorised by endemicity

2. Spatial Repellents

The mode of action of the vector control products in the spatial repellents (SR) intervention class involves releasing volatile chemicals that disperse into the air. This mechanism of action creates a non-conducive environment for mosquitoes, causing mosquitoes to move away from areas where the SR products are deployed. Additionally, SR can inhibit host attraction and induce confusion, leading to avoidance of host biting even when mosquitoes succeed in landing on them [12–14]. Evidence to date indicates that SR leads to reduced mosquito biting [6,15– 19] when deployed in conjunction with high net coverage. Moreover, SR has demonstrated epidemiological impact in controlling dengue in Peru [20] and malaria Indonesia [21], although the results from Indonesia failed to achieve statistical significance.

A cluster randomized control trial (cRCT) conducted in Busia county, Kenya, to evaluate the 4-week duration Mosquito Shield® SR (SC Johnson, Racine, WI, USA) was concluded in October 2023. The results conclusively demonstrated a strongly significant positive outcome of SR efficacy in reducing malaria incidence as measured by time to first infection in children between 6 months and 10 years. Additionally, the study assessed the safety of the SR intervention product in communities, finding no concerns. This finding suggests that SR can safely be deployed in households [22].

The results of the Kenyan trial have been reviewed and ratified by the WHO VCAG, which endorsed the demonstrated public health value of the SR for the prevention of malaria in this setting. The trial, based on the analysis of time to first infection (primary endpoint), showed that SR provided additional benefits beyond what was offered by LLINs (nets treated with a pyrethroid + PBO) alone. In its review, the VCAG noted: "*VCAG concluded that the summary and supporting documents provided by the applicants demonstrated conclusive protective efficacy of the spatial repellent against malaria in a transmission setting characterized by high malaria transmission, efficient vectors, insecticide resistance and universal coverage of LLINs – a milestone for the spatial repellent intervention class. Furthermore, these findings contribute to the evidence of epidemiological impact against malaria for one of the two required trials*" [23]. The evidence from the Kenya trial was reviewed alongside other existing evidence of the efficacy of spatial repellents from other studies leading to the WHO recommendation of spatial repellents for public health use in Malaria control in August 2025.

2.1 Purpose of this Document

In light of the conclusive evidence of the public health impact in Kenya, SR have been included in the Kenya Malaria Strategy 2023/24-2027/28. This document outlines guidelines for achieving national scale-up of SR as a complementary malaria vector control tool in Kenya

3. Goal and Objectives

3.1 Goal

The goal of this guideline is to provide guidance for the national scale-up of SR in Kenya in high malaria burden and epidemic-prone counties of Kenya, to protect populations at continued risk of malaria, in line with Kenya's Malaria Strategy 2023/24-2027/28.

3.2 Objectives and Strategies

There are three core objectives in support of achieving scale-up of SR deployment in Kenya:

Objective 1: Strengthen capacity for evidence-based deployment of spatial repellents in high malaria burden and epidemic-prone counties to protect populations at risk of malaria by 2028.

Strategies:

a. Strengthen human and infrastructural capacity to plan, implement, supervise and conduct monitoring and evaluation of SR deployment in target areas.

b. Strengthen the evidence base for deployment of spatial repellents in non-peridomestic (public and private) spaces currently unprotected by traditional vector control tools, for prevention of residual malaria transmission

Path to Impact:

1. Conduct comprehensive needs assessments in target counties to identify gaps in human resources, infrastructure, and knowledge.
2. Develop and implement training programs for health workers, community health promoters, and other relevant stakeholders on SR deployment, monitoring, and evaluation.
3. Establish and equip regional training centres to serve as hubs for ongoing capacity building.
4. Create partnerships with academic institutions to integrate SR-related curricula into relevant courses.
5. Implement a mentorship program pairing experienced SR implementers with new teams.
6. Develop user-friendly guidelines and standard operating procedures for SR deployment.
7. Conduct regular refresher training and knowledge-sharing sessions to maintain and update skills.
8. Establish a feedback mechanism to continually improve capacity-building efforts based on field experiences.

Objective 2: Strengthen social and behavioural change communication.

Strategies:

a. Advocacy for SR adoption and deployment among stakeholders

b. Communication and community mobilization for sustained SR uptake

c. Community engagement and involvement for ownership and sustainability of SR intervention

Path to Impact

1. Conduct formative research to understand community perceptions, barriers, and motivators related to SR use.
2. Develop targeted, culturally appropriate SBCC messages and materials for different audience segments.
3. Train community health workers and local leaders in effective SR communication strategies.
4. Implement multi-channel communication campaigns using a mix of interpersonal, community-based, and mass media approaches.
5. Engage community influencers and opinion leaders as SR champions.
6. Establish community feedback mechanisms to continuously refine SBCC strategies.
7. Monitor and evaluate SBCC's impact on SR uptake, correct use, and adherence.
8. Foster partnerships with local organizations to enhance community mobilization efforts.
9. Integrate SR messaging into existing health communication platforms and campaigns.

Objective 3: Strengthen evidence-based decision-making.

Strategies:

a. Reinforce malaria epidemiology indicators for rational decision-making on stratified SR deployment.

b. Conduct routine M&E of SR efficacy, which may include user acceptance, case prevalence rates, entomological surveillance and/or insecticide resistance evaluations.

c. Support local innovation and evaluation of SR products through robust research.

Path to impact

1. Establish a robust surveillance system integrating SR-specific indicators with existing malaria surveillance.
2. Train local entomologists and health workers in SR-specific monitoring techniques.
3. Conduct regular entomological surveys to track changes in vector behaviour and insecticide resistance.
4. Implement a standardized system for monitoring SR coverage, use, and quality across deployment areas.
5. Establish partnerships with research institutions to conduct operational research addressing key knowledge gaps.
6. Develop and maintain a centralized database for SR-related data to inform decision-making.
7. Conduct regular data review meetings with stakeholders to interpret findings and adjust strategies.
8. Implement a system for rapid dissemination of research findings to relevant decision-makers.
9. Establish a feedback loop between field implementers, researchers, and policymakers to ensure research addresses practical needs.
10. Conduct cost-effectiveness analyses to inform resource allocation decisions.
11. Develop or adapt predictive models to guide targeted SR deployment based on surveillance data.

Some cross cutting considerations on the path impact include:

1. Ensure strong coordination between national and county-level stakeholders throughout implementation.
2. Integrate SR strategies with broader vector control and malaria elimination efforts.
3. Develop sustainable financing mechanisms to support long-term SR implementation.
4. Establish partnerships with manufacturers to ensure reliable SR supply chains.
5. Implement robust monitoring and evaluation systems to track progress towards objectives and impact on malaria burden.
6. Regularly review and update guidelines based on new evidence and field experiences.
7. Address equity considerations to ensure SR benefits reach all at-risk populations, including traditionally underserved groups.
8. Promote local and international partnerships towards resource mobilization.
9. Promote local and international partnerships towards resource mobilization.

4. Implementation of Spatial Repellents

4.1 Overarching Principles and Contexts

a. The Kenya national and county governments, and partners, shall contribute to support adequate resources for scale-up of SR deployment.

b. The Ministry of Health shall recommend to the Pest Control Products Board at the Ministry of Agriculture, SR products intended for scale-up to facilitate timely registration on the basis of sufficient local and international evidence of efficacy, cost-effectiveness, safety, and conformity with WHO specifications and recommendations. However, the applicants of these products must meet the national requirements.

4.2 Deployment of SR Interventions

Spatial repellents are easy to deploy and have a passive emanation mechanism of action (chemical release without the need for electricity and/or an external heat source). It is anticipated that SR will complement existing malaria vector control interventions for large-scale deployment, but may be considered for solitary deployment as follows:

- High malaria burden areas in integration with interventions for large-scale deployment such as ITNs for burden reduction.
- Malaria epidemic-prone areas such as those bordering endemic regions and those not receiving interventions for large-scale deployment could benefit from SR as additional evidence of their standalone efficacy is generated.
- In regions where residual malaria persists despite the implementation of primary vector control interventions
- Where implementing LLIN and/or IRS interventions poses challenges, including -
    - Housing structures that are inappropriate for IRS
    - Environmental compliance cannot be achieved to enable IRS
    - Public and private Institutions and confined institutions (e.g. prisons, barracks, hospitals, schools, hotels etc.)
    - Humanitarian assistance (e.g. internally displaced camps, natural disasters)
    - Climate change resilience in response to crises caused by adverse weather events such as flooding, and in fringe areas where increasing temperatures begin to provide favourable conditions for mosquito survival and malaria transmission.
- In areas where changes in vector behaviour towards early morning, daytime and/or early-evening biting has been documented.

4.3 Timing of SR deployment

The timing of SR deployment should align with the malaria transmission dynamics. In areas of perennial malaria transmission, deployment should occur all year round. In epidemic prone areas, SR deployment should be before the onset of high transmission. For outbreaks and emergencies, SR should be deployed immediately as part of the emergency response and forecasts. Deployment timing should consider the product's expected duration of efficacy per the manufacturer's specifications (i.e., replacement every 4 weeks vs a annualy replacement) and consider other ongoing interventions in the area. The SR product deployed in the Busia trial had a one-month duration but with continued investment in research and development, longer-lasting products are anticipated. For instance, a one-year product is already available, and this should simplify and reduce the cost of implementation.

4.4 Considerations of Insecticide Resistance

The clinical trial in Kenya demonstrated the public health value of a pyrethroid-based (transfluthrin) SR alongside high ITN population coverage, even in areas with high pyrethroid resistance in the mosquito populations. Based on this initial outcome, SR products may be deployed in areas characterized by pyrethroid resistance as was the case for Busia County where the Randomized Control Trial was conducted leading to epidemiological impact, but should be complemented with monitoring and evaluation.

4.5 SR Integration with Other Vector Control Interventions

The observed additional benefit of using SR in Kenya, against a background of high coverage PBO-treated LLINs, supports the integration of SR into the existing distribution of LLINs. There is a paucity of data on the efficacy of SR as a standalone tool, or in combination with IRS and LSM. This makes it premature to outline a large-scale SR deployment strategy along with IRS and LSM. Where achievable, it will be important to deploy SR with different insecticide classes from those used in LLINs to support insecticide resistance management. However, this approach may be constrained by the availability of registered SR.

4.6 Multisectoral Coordination, Linkage and Feedback at the National and County Level

The Vector Control Committee of Experts (CoE) is an entity established by Kenya's Ministry of Health through the National Malaria Control Program. At the national level, the CoE is responsible for organizing regular consultative meetings with key stakeholders to discuss issues relevant to vector control, provide strategic orientation, support sound decision-making and overall technical support, and assist in resource mobilization.

Responsibilities of the Control Committee of Experts:

- Coordinate implementation of SR at the national and county levels.
- Strengthen the system by collaborating with development and implementing partners.

- Coordinate with research and academic institutions to address vector control implementation gaps through data-driven decision-making.
- Coordinate the adoption of SR within Integrated Vector Management (IVM) strategies at the county level and across ministerial departments.
- Liaise with ministerial departments and regulatory bodies to enhance smooth procurement, logistics, implementation, and compliance of vector control.
- Incorporate and align SR guidelines and strategies with the Kenya Malaria Strategy and other vector control guiding documents.
- Refer to the stakeholder matrix (Section 11) for the roles and responsibilities of various partners and collaborators.

The Feedback Mechanism:

- Dissemination of current developments on SR to senior MoH leadership for government ownership;
- Meetings with key stakeholders for update on SR implementation.

4.7 Distribution Strategy for SR

4.7.1 Forecasting and Supply Planning

Before deploying spatial repellents, it is essential to conduct thorough forecasting and quantification to ensure optimal timing and sufficient product volume for an effective impact in the area. Key factors to consider include disease prevalence, mosquito species and behaviour, census and structure density, and seasonal changes in temperature and precipitation. All of these may significantly influence mosquito population density. The required quantity of products will be guided by the manufacturer's dosage guidelines and also estimated based on the average number of products required for the structures in the target area.

4.7.2 Distribution Channels

The distribution channels for SR deployment will vary depending on contexts. For instance, existing infrastructure, and cultural, socioeconomic, and environmental dynamics will be considered. Additionally, the distribution channels of ongoing interventions and the financial resources available must be considered.

The following channels are anticipated to be suitable for the distribution of spatial repellents:

4.7.2.1 Continuous community distribution channel

This approach leverages existing community health strategies in Kenya to ensure continuous replenishment and accessibility of SR by households. Based on the existing community health strategy, community health promoters (CHPs) linked to a specific facility can serve as SR distributors and the health facility will act as the SR storage and collection point.

This approach was recently piloted after the SR trial in Busia where CHPs were recruited and trained to enrol households and to issue household heads with distribution vouchers. The vouchers could be used to collect SR products from the health facilities or to receive SR products delivered by the CHPs. Overall, the distribution of SR by CHPs to the last mile proved to be most effective in attaining optimal coverage of SR.

4.7.2.2 Retail channel

Retail channels for SR distribution involve direct provision of supplies from licensed manufacturers, agents, and distributors to ensure product authenticity and quality. This approach expands access points for SR, thereby reducing the distribution burden on government agencies. However, risks of low awareness and stock-outs must be monitored to ensure that the target population is informed about SR, and that SR are available in sufficient quantity when needed (e.g., before peak season) in areas served by the retailers.

4.7.2.3 Mass distribution channel

The mass distribution of SR will be through the National Malaria Control Program (NMCP) organized campaigns to target populations, based on a coverage threshold (e.g., at least 80% of houses per village).

The process of SR mass distribution should encompass similar steps taken for LLIN and IRS campaigns, namely; macro- and microplanning, stakeholder engagement (at all governance levels), training (Trainer of Trainers (TOT) and training of community distributors), social mobilization for registration of households, data verification and validation, distribution to collection points and post distribution monitoring and evaluation.

4.7.3 Management Plan for SR Deployment

An accountability process should be pre-planned and established before the distribution of spatial repellents. This process should include the person responsible, tracking timelines and associated measures (e.g., stock volumes, quantity and location of distributed products, attrition rate, disposal verification). The data capture methods will be dependent on the distribution channel and local capacity. Regardless of the channels, temperature and humidity conditions of storage facilities must be monitored to ensure compliance with manufacturer requirements. Example forms are provided in Annex 1.

4.7.4 Inventory Management During Distribution

Security measures must be implemented to prevent loss or theft. Regular monitoring of expiration dates of stored SR should be conducted to prevent waste and mitigate stock-outs due to expiration. Chain-of-custody notes, MoH stock management tools, and stock control cards should be completed by designated officers to ensure accountability and minimize losses.

4.7.5 Transportation of SR

Transportation of SR, from the port of entry or manufacturing sites within Kenya to the central storage facility, should comply with the Safety Data Sheet (SDS) and Pest Control Products Act provided by the manufacturer and the Regulations therein. The vehicles must meet all the environmental and regulatory guidelines for transporting insecticides to minimize health and safety risks and avoid legal penalties. Vehicles that transport SR from central storage to satellite storage facilities must also comply with regulatory standards for transporting hazardous materials. Training on the safe handling and transportation of SR should be provided to all distributors, regardless of the distribution channel (see Section 4.7.2).

4.7.6 Disposal

The use of SR is expected to generate both domestic (secondary packaging) and chemical hazardous waste. All waste disposals must adhere to the guidelines outlined in the Pest Control Products (DISPOSAL) Regulation, 2024 as outlined in detail in section 9.

5. Social behaviour change & community engagement for SR in malaria vector control

5.1 Social Behavioural Change

Social behavioural change and communication (SBCC) are critical in the effective implementation of malaria control strategies, including SR. To ensure the successful uptake and proper use of SR, appropriate, timely and standardized messages must be prepared for the distribution personnel. Before SR distribution, a detailed SBCC plan and any associated materials (e.g., pamphlets) should be developed and vetted by relevant stakeholders, tailoring for each specific distribution channel (see Section 4.7.2).

These guidelines recommend the creation and dissemination of evidence-based SBCC messages for targeted audiences to facilitate the uptake and proper utilization of spatial repellents, as outlined in Table 1. Specific messages will be contained in the SBCC SOPs.

Table 1: Recommended SBC approaches for different target audiences

Category	Target Audience	Key Messages	SBC Approaches
Primary Audience	National & County governments & policy makers	Focus on knowledge, appropriate use, and proper disposal of SR devices	Formal, evidence-based materials delivered through workshops and seminars Concise documentation they can reference later such as evidence briefs and publications
	Household head, head of institutions (institutions e.g schools, correctional facilities, police stations, open markets , religious institutions , hospitals , hotels, workplaces/ sites, children homes)		Interpersonal channels such as: • House visits • Group discussions e.g. peer groups, "*chamas*", social welfare groups • Workshops and seminars • Health service Provider counselling Mass Media Channels I. Electronic • Community Radio • TV II. Digital Platforms • SMS- Short Messaging service • Social Media • Instant messaging - emails, instagram, facebook, chatbots etc III. Print Media • Fliers • Pamphlets • Brochures • Out-of-home media (billboards, wallscape, banners, posters,
	media/ communication platforms		

			transit advertisements, street furniture, arena stadium advertisements)
Secondary Audience	Health care workers, CHPs Community gatekeepers, NGAOs Persons responsible for emergency & refugee camps, private sector, civil Society organizations other non-health sectors	Focus on advocating for appropriate Use, Distribution and waste management of SR, Developing IEC materials, disseminating information on SRs	Community based channels such as: • Community Dialogue meeting • *Barazas* (community meetings convened by national government administrators) • Places of worship • Learning institutions • Security personnel camps and barracks • Community social events • Occupational workplaces/sites (e.g Constructions sites, mining, logging, Markets) • Recreational places (e.g club, bars, cinema halls) • Transport conveyances (e.g Buses, Water vessels, Trains) • Community radios
Tertiary Audience	CHMTs, SCHMTs, local leadership, county leadership, national leadership Development partners	Focus on providing strategic and policy support including Resource mobilization and appropriate allocation	Interpersonal channels • Workshops and seminars

5.2 Community Engagement

Likewise, community engagement is critical to facilitate the sustainability of a community-based interventions, such as SR. Community engagement is a process in which community groups, organizations, and individuals work together to build a dynamic relationship with a collective vision for the development and growth of the community. It is rooted in principles involving equity, trust, transparency, accessibility, contextualization, and autonomy to empower the population and partner on context-specific solutions.

5.2.1 Community Engagement Approaches for Scale-Up of SR Deployment

- Build partnerships with community leaders and organisations, using participatory approaches such as community dialogues and focus group discussions to identify local needs and priorities for SR.

- Involve community members in the planning and implementation of SR distribution.
- Carry out targeted communication and capacity strengthening through local community groups such as CBOs and places of worship.
- Implement politically and culturally acceptable activities.
- Human-centred design for community engagement in SR implementation where the community's needs, preferences, and experiences are at the core of the design and implementation process.
  - **Understanding User Needs:** Conduct thorough research to gain insights into the daily lives, challenges, and priorities of community members related to malaria prevention. Identify potential barriers to SR adoption and usage within the specific community context.
  - **Empathy:** Engage with community members to gain insights into their perspectives on existing malaria prevention methods and their openness to new interventions like SR. Consider cultural beliefs, practices, and local knowledge that are likely to influence SR acceptance and use.
  - **Co-creation:** Involve community members in the design of SR distribution strategies, ensuring they are practical and acceptable within the local contexts. Collaborate with local leaders and community groups to develop culturally appropriate communication materials and methods.
  - **Iterative Process:** Implement small-scale pilots of SR distribution, and gather feedback from users to refine and improve the implementation strategy before scaling up.
  - **Holistic Approach:** Consider how SR integrates into the broader context of community health, housing conditions, and daily routine while addressing potential unintended consequences or concerns raised by the community.
  - **Accessibility and Inclusivity:** As outlined in section 8 of these guidelines.
  - **Sustainability:** Design implementation strategies that ensure long-term sustainability by the community, including building local capacity for management and monitoring of SR usage.
  - **Feedback Mechanisms:** Set up clear channels for community members to share their experiences with SR and use this feedback to drive continuous program improvement..

By employing this human-centered design, the SR implementation is more likely to be embraced, effectively utilised and sustained within the community. This approach will not only enhance uptake and proper usage, leading to better malaria prevention outcomes, but also empower the community to take ownership of the intervention, ensuring the long-term success and sustainability of the SR program.

5.2.2 Potential Outcomes of Proper Community Engagement

- Empower communities to play greater decisive roles in malaria control efforts.
- Empower communities to take up responsibility for factors influencing their environment, thereby improving their protection against malaria and other vector-borne diseases.
- Promote equitable access to spatial repellents.
- Ensure communities engage in the implementation of SR for vector control.
- Develop community ownership to ensure sustainable malaria prevention efforts through using SR.
- Comprehensively understand the community's needs and desires regarding the uptake and use of SR.

These approaches are grounded in principles of equity, trust, transparency, accessibility, contextualization, and autonomy. They seek to empower the community and foster collaboration on context-specific solutions for effective SR deployment. The guideline emphasizes the adoption of these engagement strategies for specific distribution channels (e.g., community-based, retail, or mass distribution) and local contexts. The ultimate goal is to encourage uptake, ensure proper use of SR products, and support the sustainability of the intervention within the communities.

6. Capacity-Building for SR Implementation for Malaria Control

The effective implementation, scaling-up and achievement of the desired impact of vector control interventions, including SR, requires appropriate knowledge and skills. All persons responsible for the deployment, as well as the end-users, must be provided with the appropriate information for safe handling, proper application and effective use of the device. Therefore, before the implementation of an SR programme, a comprehensive capacity-building needs assessment tailored to SR deployment and monitoring and evaluation (M&E) must be conducted for all implementers.

6.1 Target Learner and Content

- **Health Providers:** Health providers will be trained on malaria epidemiology in Kenya and the current control strategies. They will also learn the role of SR in vector control, besides the correct installation, maintenance and appropriate disposal of SR.
- **Community Health Promoters (CHPs):** CHPs will be trained on malaria vector control, SR distribution mechanisms along with the correct installation for use and proper waste management.
- **Village elders** will be trained on malaria vector control, SR distribution, installation and waste management.
- **Private sector personnel (product distributors, workplace/ site managers)** will be trained on malaria vector control, SR distribution, installation and waste management.

6.2 Mode of Knowledge and Skills Delivery

The choice of delivery method would depend on the target audience, the specific skills or knowledge being imparted, and the resources available. For example, lectures and webinars might be appropriate for health providers to learn about the epidemiology of malaria, while demonstrations and role-plays might be more effective training methods for community health promoters learning about SR installation The guideline emphasizes the need to assess knowledge and skills acquisition through various methods such as observations, pre & post-tests, demonstrations, skits, and focus group discussions. These assessments will ensure that the capacity-building efforts are effective and that learners are equipped with the necessary knowledge and skills for a successful SR implementation.

Table 2: A summary of the proposed knowledge and skills delivery channels for different target audiences

Target Audience	Key Skills / Knowledge	Delivery Methods	Teaching Aids
Health Providers	Malaria epidemiology in Kenya Malaria control strategies SR knowledge and role in vector control SR installation, maintenance, and disposal	Lectures Workshops Webinars	Projectors Flip charts Demo materials
Community Health Promoters	Overview of malaria vector control SR distribution mechanisms SR installation Waste management	Demonstrations Role plays/ Skits Workshops Mentorships	Demo materials Pictorials Role play guides
Village Elders	Overview of malaria vector control SR distribution mechanisms SR installation Waste management	Chiefs' *barazas* Demonstrations Community radio talks	Pictorials Demo materials
Private Sector Personnel (product distributors, workplace managers)	Overview of malaria vector control SR distribution mechanisms SR installation Waste management	Workshops Demonstrations Webinars	Projectors Demo materials Flip charts
Local Leaders	SR implementation strategies Community engagement techniques	Workshops Chiefs' *barazas* Mentorships	Flip charts Pictorials
Healthcare Workers	SR implementation strategies Community engagement techniques	Lectures Workshops Webinars	Projectors Demo materials
General Public	Basic SR usage and benefits Proper disposal methods	Community radio talks Demonstrations Chiefs' *barazas*	Pictorials Demo materials

The modes of knowledge and skills delivery for capacity building in spatial repellent (SR) implementation include:

1. **Participant role plays and skits**: This is an interactive learning method where participants act out scenarios related to SR use, distribution, or community engagement. This method helps develop communication skills and problem-solving abilities in real-world contexts.
2. **Demonstrations:** Practical demonstrations of SR installation, maintenance, and proper use. These are highly effective for visual learners ensuring the correct SR product application.
3. **Community radio talks:** Radio shows can be an effective tool for capacity building around spatial repellents (SR), reaching a wide audience, including those in remote areas.

Radio shows enable real-time interaction through call-ins, making communication more engaging than one-way broadcasts. Health professionals, entomologists, or vector control experts can explain the technical aspects while community health workers can share practical experiences and tips. Local leaders can endorse and encourage SR adoption. This interactive format allows for Q&A sessions, providing opportunities for feedback from the community. Additionally, multilingual broadcasting in local languages ensures accessibility of information and materials about SR (e.g., local health centres, and community meetings).

4. **Lectures:** Traditional classroom-style presentations are an effective method for conveying theoretical knowledge about SR, malaria transmission, and vector control strategies. These structured deliveries are ideal for providing an overview of key concepts and policies to larger groups.
5. **Workshops:** These interactive sessions blend theoretical knowledge with practical exercises, offering hands-on learning opportunities. Workshops would be valuable for training on SR installation, maintenance, and disposal procedures, allowing participants to immediately apply concepts and gain practical experience.
6. **Mentorship:** Personalised guidance provided through one-on-one or small group sessions from experienced professionals. This approach will cultivate in-depth skill development through personalised learning and would be particularly effective for training community health workers or local leaders responsible for SR implementation.
7. **Apprenticeship:** Practical hands-on, on-the-job training where learners will work alongside experienced practitioners, providing real-world application of skills in SR distribution, installation, and community engagement.
8. **Webinars:** Virtual sessions that are accessible remotely and could be recorded for future reference. These sessions would be ideal for delivering updates and refresher training on SR policies and procedures, especially for healthcare workers (HCWs).
9. **Chiefs *barazas:*** Community gatherings led by local chiefs that would be effective for disseminating information and encouraging dialogue about SR implementation among communities.

For each of these delivery methods, the document notes that appropriate teaching/delivery aids should be defined where necessary. These could include:

- Projectors
- Flip charts
- Demo materials (e.g., SR products for hands-on practice)
- Pictorials
- Role play and skit guides

6.3 Knowledge and skills acquisition assessment

Appropriate tools for knowledge and skill acquisition assessment should be developed to align with the chosen assessment method. Tailoring these assessment tools to the specific learning objectives and audience will be essential for effective evaluation. Proposed approaches include:

Observations: Trained personnel could observe community health promoters, healthcare workers, and other implementers as they demonstrate SR installation, usage, and safety procedures. A standardized checklist should be used to assess their accuracy, adherence to guidelines and overall performance.

Pre-and Post-tests: Administration of written or oral tests before and after training sessions to measure knowledge improvement on SR properties, deployment strategies, safety considerations, and waste management practices.

Demonstrations: Trainees perform tasks such as SR product handling, installation in different settings, and disposal procedures under a trainer's supervision. Their performance will be evaluated using predefined criteria.

Skits/Role Plays: Trainers ask participants to reenact real-life scenarios such as SR distribution and community education, addressing concerns from residents, etc. This allows for the assessment of their communication skills and the application of SR knowledge in practical situations.

Focus Group Discussions: Facilitates discussions with trainees and community members to assess their understanding of concepts, gather feedback on the training process, and identify areas of improvement.

Practical Exercises: Provide trainees with hands-on tasks such as developing SR deployment plans for different settings, creating educational materials, or leading mock community engagement sessions to apply learning in real-life contexts.

Case Studies: Present real-world scenarios related to SR implementation challenges and have trainees propose solutions, evaluating their critical thinking and problem-solving abilities.

Peer Assessments: Trainees evaluate each other's skills in pairs or small groups, fostering collaborative learning.

Field Practicals: Organize supervised field visits where trainees apply their knowledge in real-world settings receiving guidance and feedback in the process.

Surveys: Distribute follow-up surveys weeks or months after training to assess knowledge retention and gather feedback on training applications in practice.

7. Monitoring and Evaluation (M&E) Plan

A pre-planned M&E strategy outlining the methods and endpoints should be developed before SR distribution (see Table 3). The decision to assess product characteristics, and effectiveness against epidemiological and/or entomological parameters must consider the setting's capacity and anticipated rigor of data capture.

The M&E of product characteristics should occur post-SR distribution through community-based or programmatic channels. This approach will be feasible as documentation of the timing of SR application, product quantity and location will be in place.

M&E should be performed in line with the expected efficacy of the SR product (e.g., quarterly for SR with a 12-month efficacy). The sampling frame for such M&E should have gender considerations, inclusivity of the intervention (number of groups not targeted by other interventions such as schools, prisons etc.) and the proportion of females and males anticipated to be covered based on forecasting.

Table 3: The plan for monitoring and evaluation of key indicators during the implementation of SRs

M&E Category	Indicator	Method	Outcome	Frequency[1]	Priority[1]	Special Considerations
Coverage	Proportion of structures covered out of target	Counting	Proportion of structures receiving product	Product dependent	1	End of distribution report
Application rate	Proportion of required product applied in each structure according to manufacturer instructions	Visual	Proportion of required product applied in each structure	Product dependent	1	
Attrition	Retention (Based on coverage achieved)	Counting	Retention rate	Biannual – Product specific , Biannual for 1 year+ products	1	
Equity	Number/Proportion of Vulnerable populations covered	New groups that now access services	#of new groups covered	Deployment dependent	1	
Adherence		Interview		Based on manufacturer specification	1	
Epidemiological	Parasite prevalence	Cross sectional surveys - schools or other	Parasite prevalence	Annual	1	
	Test positivity rate	Health Facility	Test positivity rate	Monthly	2	
	Case count	Health Facility	Case count	Monthly	2	
Entomological	Feeding Inhibition	Exit traps	Feeding rate	Biannual	1	Routine ento surveillance

	Human landing rates	Human landing catches	Human landing rates	Biannual	1	Must have malaria prophylaxis and must not be done in areas of arboviral disease risk
	Transmission Indicators	EIR, Sporozoite rates	EIR, Sporozoite rates	Biannual	1	Innovation needed
Quality Assurance	Longevity	HPLC	Concentration AI (mg/ surface)	Product dependent	1	Reliance on PCPB and KEMSA
		GC/MS				
		GCEAD				
		Pre-weights and post-weights				
	Durability and Post market surveillance	Visual inspection	Product integrity (rank)	Biannual	1	
		Visual inspection			1	

[1]Frequency dependent on the duration of efficacy of the product

8. Considerations on human rights, gender and equity in relation to SR distribution at-scale.

Populations at risk of malaria but traditionally unserved by LLINs or IRS (i.e., correctional facilities, police stations, schools) should be prioritised for SR deployment to ensure full coverage of at-risk groups alongside populations protected by large-scale deployment interventions. Additionally, gender equity and full participation of people living with disabilities (PLWD) must be emphasised. PLWD should have access to the implementation guidance and safety information for SR. Similarly, gender dynamics should be considered to ensure equal access and decision-making power in SR use within communities.

9. Compliance with Regulations & Guidance documents

All SR must be registered, distributed and disposed of, complying with the Pest Control Products Act Cap 346 of the Laws of Kenya. This includes adherence to product specifications, detailed method of analysis and safety considerations, and labelling guidelines. Safety and use of SR products in Kenya will also be governed by the Public Health Act Cap 254 of the Laws of Kenya in alignment with the relevant malaria control and vector control guidelines, Integrated Vector Management (IVM) and Insecticide Resistance (IR) frameworks.

9.1 Waste Management

A user-level waste management strategy should be developed in consultation with the product manufacturer to ensure environmental compliance before SR deployment. The strategy must align with the product formulations and specifications. Disposal guidelines must be outlined on the product label and/or leaflet per PCP Act Cap 346 (Labelling, Advertising and Packaging) Regulations, 2024 as well as the Sustainable Waste Management Act 2021, enforced by NEMA, along with other local and national guidelines. All waste that is generated must be handled as hazardous chemical waste.

Safety should be adhered to: -

1. In disposal & accidental release measures
2. During transport
3. Storage and handling conditions

9.2 Safety and Risk Management

Safety during SR deployment should be adhered to across all stages: during storage, transport, and disposal. Safety measures to address the accidental release of products before deployment or during transportation for disposal should be outlined. Products intended for distribution should have secondary packaging to protect distributors and users from contact with active ingredients. Handling of the SR must follow manufacturer-provided Material Safety Data Sheet (MSDS) guidelines (e.g., keeping products out of children's reach), including monitoring and reporting of adverse effects. First aid instructions should be integrated into SSBC messaging before or during SR deployment, similar to other vector control intervention strategies.

10. Operational research questions

The operational research (OR) questions priorities for implementing the SR guidelines should address questions that would facilitate enhanced uptake and integration with existing interventions, to maximise impact. These questions should focus on understanding potential changes in mosquito behaviour due to SR use, and the feasibility and effectiveness of SR outdoor deployment. They should address the optimal combination of SR with IRS, LSM and LLINs, as well as the best strategies for waste management and ways to mitigate misuse.

Additional priorities should include the sustained LLINs use post-SR deployment, the impact of SR on other insects and pests, assess the cost-effectiveness of SR deployment as standalone interventions or complementary to the existing interventions. Studies of the effects of varying climatic conditions on SR efficacy and the potential effects of long-term exposure to SR, particularly for children and pregnant women should be prioritised. A list of proposed OR questions is provided in Annex 2.

11. Stakeholders and Roles / Responsibilities (Kenya)

The scale up of SR in Kenya will require the engagement of multiple stakeholders whose roles are described in table 4 below:

Table 4: Stakeholders required for the national scale up of spatial repellents in Kenya

Partner	Division/Agency	Roles and responsibilities
Ministry of Health	NMCP	Resource mobilisation, policy and guidelines, coordination, M&E
	VBNTDU	Policy and guidelines, coordination, M&E
	KEMSA	Logistics management, procurement, and supply chain management
	DDSR	Outbreak response (Emergency Operations Centers)
	KEMRI	Research, technical support, product innoivation and evaluation, M&E
Ministry of Agriculture & Livestock Development	PCPB	Product registration and regulation, facilitation of importation, premise certification, waste management and guidelines for waste disposal
Ministry of Interior and National Coordination	National Government Administrative Officers	Community mobilization, security
Ministry of State for Special Programs		Disaster Preparedness and Response
Ministry of Information, Communications and the Digital Economy		Digitalization of information, communication and media
Ministry of Finance and National Treasury		Mobilization and allocation of resources, waivers and exemptions, subsidies, Kenya Revenue Authority (KRA) – exemptions
Ministry of Education		Consumers of spatial repellents in areas of potential mosquito exposure in the daytime and active school hours, academic research partners and school social behavioural change and communication
Ministry of Trade and Industry		Link to spatial repellents product manufactures and private sector, Kenya Reinsurance Corporation – Financial risk management and solutions for manufacturers

Ministry of Environment, Climate Change and Forestry	National Environment Management Authority (NEMA)	Environmental impact assessment and compliance, waste management
County governments		Implementation, Social Mobilisation, Coordination, Storage, Resource Mobilization, Monitoring, Surveillance
Community level	Learning institutions Corrective Institutions Hospitals Displaced populations/ Refugees Households	Correct application and use of SR
Industry Partners		Responsibility for R&D to produce new products Registration of products with PCPB for local consumption in Kenya
Development Partners	UN Agencies: WHO, UNHCR, UNICEF, Unitaid	Technical Support, Advocacy
	CSOs / CBOs: KeNAAM	Advocacy to ensure equity in implementation of SR for vector control
	NGOs: AMREF, PAMCA, Red Cross, MEDS	Consumers, supply chain, policy formulation and advocacy
	USAID / PMI, Global Fund, UNITAID, BMGF, UKAID	Technical Support, Advocacy
	CDC	Technical Support, Advocacy

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ANNEX

Annex 1: Example documentation of SR product and distribution

For proper product tracking and storage several forms were used:

1. **Shipment distribution log**- this involves detailing the boxes received from the manufacturer. It entails the number of boxes, any unique code on the box, manufacture and expiry dates.

Shipment distribution log

Shipment No	Code on Box	Number of Boxes in Shipment	Amount of Product	Manufacturing Dates	Expiring Dates	Received Date	Shipment Date eg (origin)	Received Date (destination)
				dd-mm-yy	*dd-mm-yy*	*dd-mm-yy*	*dd-mm-yy*	*dd-mm-yy*

2. **Stock card**- is a master list that contains all the products received per storage facility. These controlled the total volume of SR products per facility, it provided a space to indicate the goods issued, those received and the total in storage. This system enables effective monitoring, stock volume management and requisition planning within the storage facility

Stock card

Storage Container……………………………………					
Item Name:					
Cluster Number:			**Standard Unit of Distribution:**		
Date	**Origin/ Destination**	**Quantity Received**	**Quantity Issued**	**Stock Balance**	**Remarks/D. Note #/ Sign**

3. **Goods issued note**- this is a document that controls and tracks the SRs products being issued out from the store.

Storage Container………………………….. designation………………………………………

Warehouse Envelope

Date	Cluster Number	Description (Catalogue Number)				Received back to storage				
			Quantity Issued	Issued by (Name)	Signa-ture	Quantity returned	Returned by (Name)	Received by (Name)	Signature	Remarks

4. **Product handling and application instructions.**

- Different SR products are designed to cover different room sizes. During enumeration, the structure will be measured or estimated to ensure proper planning. This task can be performed either by the Community Health Promoter (CHP) or the household head.
- For rectangular rooms: measure the length and width then calculate the area by multiplying these dimensions.
- For round structures, measure the diameter and calculate the area.
- The product is installed 2-3 metres above the ground and places such as doorways, windows, back of the doors, furniture and other objects in the houses should be avoided to prevent obstructing the product.

5. **Monitoring and evaluation**

SR product monitoring and evaluation should involve follow-up questionnaires in the community after distribution and installation. The questionnaire should aim to answer the following questions:

1. Were the products hung properly and appropriately in all the rooms?
2. Which type of hanging materials were used by households?
3. Were the products replaced on time?
4. How has the product helped you as a household owner?
5. Have you noticed any difference in mosquito densities after the installation of the SR products?
6. Were any SR products missing? If yes what would be the reason for this?
7. How did the household receive the product, was it from the facility or the CHP?

Annex 2: Proposed Operational Research Questions to inform the implementation of SR in Kenya

Topic	Research questions
Other diseases	Can SR be used to control mosquito-borne filarial nematodes that cause lymphatic filariasis (*Wuchereria bancrofti, Brugia malayi, B. timori*), viral infections such as yellow fever virus (YFV), West Nile virus (WNV), Dengue virus (DENV), Chikungunya virus (CHIKV), O'nyong'nyong virus (ONNV), and sand fly transmitted Leishmania species that cause Leishmaniasis among others?
Entomology	Do mosquitoes change their behaviour to outdoor biting?
Entomology	Can SR be used outdoors in response to residual malaria transmission?
Other interventions	How to best combine SRs with IRS or LSM?
Entomological indicators	What are the best methods to assess SR impact on mosquito density, insecticide resistance, and repellency effects? How can these be evaluated in semi-field systems or experimental huts?
Waste disposal	What are the best strategies for waste management at household level?
Potential for misuse	Are the products being misused? How are they being used?
Net usage	How to ensure people keep using their net?
Nuisance and other pests	Does it reduce other nuisance mosquitoes and crawling insect pests?
Cost-effectiveness	Assessing the cost effectiveness of SR implementation
Adherence	How to improve adherence to the product's specification?
Installation	What are the best options for installation to inform further product design?
Perceived product value	Can the product design have multiple benefits beyond SR for example a calendar or make them more attractive
Climatic variability	Do different climatic conditions effect the efficacy of SRs
Safety	Monitoring the effect of sustained exposure over time - particularly children and pregnant women?

ANNEX 3: LIST OF CONTRIBUTORS

The following individuals contributed to the development of these guidelines and are duly acknowledged: Dr. Joseph Lenai (Ag. Director, Primary Health Care, MoH), Dr. Kibor Keitany (Head, NMCP), Patrick Mburugu, Edith Ramaita, Ismail Abbey, Paul Kiptoo, James Sang, Christine Mbuli and Solomon Karoki (NMCP), Dr. Eric Ochomo, Dr. Bernard Abong'o, Dr. Quentin Awori, Seline Omondi, Jane Ikapesi, Moureen Ekisa (KEMRI -Centre for Global Health Research, Kisumu) Dr. Luna Kamau and Dr. Damaris Matoke-Muhia (KEMRI-Centre for Biotechnology Research and Development, Nairobi), Dr. Joseph Mwangangi (KEMRI-Centre for Geographic Medicine Control Research, Coast), Prof. Marta Maia (KEMRI-Wellcome Trust, Kilifi), Lenson Kariuki, Daniel Mwiti and Sophia Moraa (Vector Borne and Neglected Tropical Diseases Unit (VBNTDU)), Dr. Githaiga Wagate and Hillary Kibet (Pest Control Products Board (PCPB)), Lilyana Dayo (County Government of Kisumu), Stephen Opiyo and Charles Oduor (County Government of Siaya), Dr. Edwin Onyango and George Muigai (County Government of Busia), Prof. Nicole Achee (University of Notre Dame (UND)), Prof. Sarah Staedke (Liverpool School of Tropical Medicine (LSTM)), Dr. David Mburu (Pwani University Biosciences Research Center (PUBReC), Prof. Dunstan Mukoko(UoN), Prof. Francis Mutuku (Technical University of Mombasa (TUM)), Erolls Sigei (Kenya Medical Training College (KMTC)), Dr. Elvis Oyugi (AMREF Health Africa), Rose Waringa (Precious Tears Initiative), Edward Mwangi (Kenya National Alliance Against Malaria (KeNAAM)), Oriwo Otieno (ENVU), Elizabeth Johnston, Dr. Madeline Chura, and Felix Mungai (SC Johnson), Milka Njunge (Sumitomo Chemical Company), Stephen Onyango, Harkirat Sehmi and Kangethe Ngure (Vestergaard) , Dr. Mildred Shieshia (Presidents Malaria Initiative (PMI)), Dr. Monicah Mburu and Zeddy Bore (PMI Kinga Malaria), Dr. Jonathan Schultz (US Centres for Disease Control and Prevention (CDC)), and Dr. Rachel Evans (Unitaid. All contributors reviewed a draft of the document and provided input before its finalization. This document was developed with funding from Unitaid through the University of Notre Dame.

Disclaimer

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