The WHO Vector Control Advisory Group (VCAG)

A JOINT ACTIVITY OF NTD AND GMP

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WHO response to enhance Innovation in Vector Control

Vector Control Advisory Group (GMP and NTD)

Established in 2012, six meetings held

<u>The objectives of VCAG are:</u>

1. **To conduct an initial review of concept and determine data required to validate the product class, claim or variation and (b).**
2. **To advise on the process to generate the required data**
3. **To assess the evidence for new vector control tools / approaches**
4. **To develop or refine the Target Product Profiles;**
5. **To establish public health value and support formulation of a WHO policy & use recommendation**

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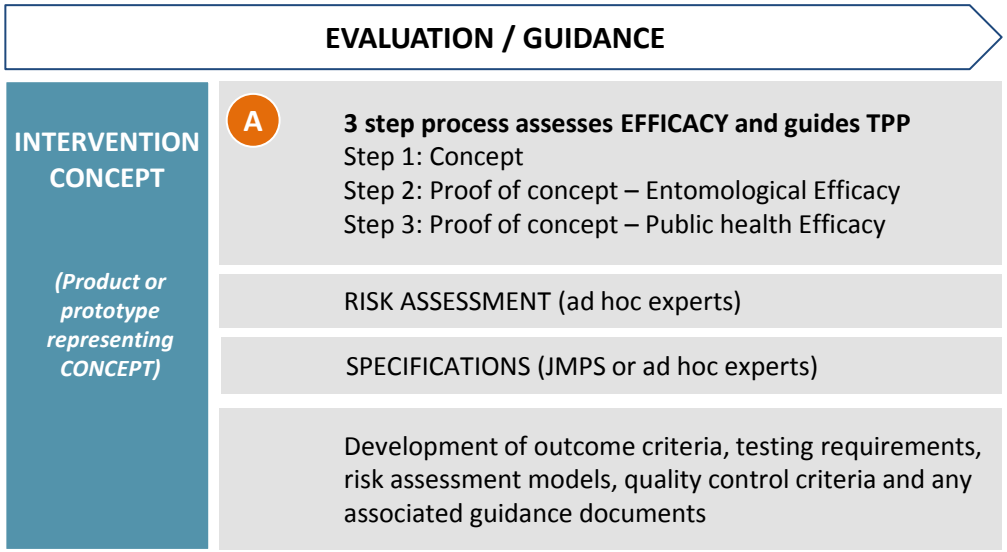
Summary of VCAG pathways for new intervention concepts in vector control



Policy development process

A. VCAG **assesses the data submitted**, determines the stage of paradigm development (1,2,3 above), and **provides guidance** to innovators appropriate to paradigm stage.
   - VCAG facilitates risk assessments and development of specifications, and guidelines for data generation

B. VCAG reviews final dossier of evidence (Step 3) and makes recommendations to WHO on **efficacy** and **public health application** of the new intervention concept.

C. WHO, advised by MPAC/STAG, sets policy on **public health use** for vector control, in the context of IVM.

D. WHO, advised by EAGs, develops **operational guidance on deployment** of new tools for disease control.

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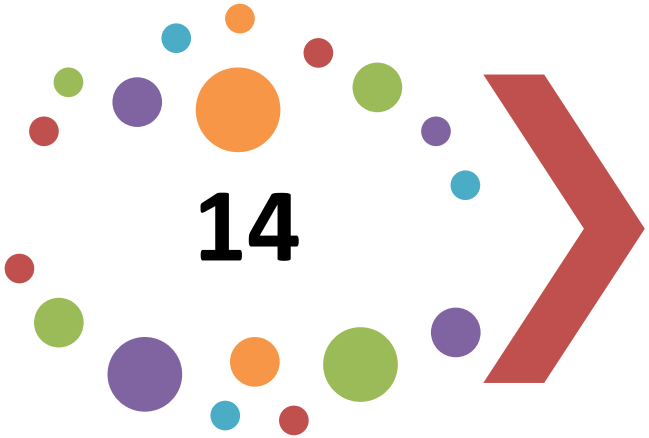
Summary of achievements



New or variant classes of tools (some with multiple products) included in VCAG program

(2013-2016)

Review and guidance for tools in VCAG program

- 6th VCAG Meeting April 2017
- Risk Assessments for 2 products
- New tools for Zika

Guidelines

- LLINs for pyrethroid resistance;
- Vector traps for surveillance and control (in progress);
- Vector control trial design manual (in progress)
- Policy pathways for new vector control tools

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Overview of New Products (by product class)

Step 3 Approved | Step 3 underway

New Product - Variation	Generic Exemplar	Prototype product
ITN against IR Vector (extend ITN)	Pyr + mix/comb LLIN	PermaNet 3, Interceptor G2
Treated walls against IR vector (extend IRS)	IRS/wall linings for IR pop	No claim reviewed
Peri-focal residual spraying (extend IRS)	Outdoor RS	PFS formulation, Bayer
Insecticide-treated curtain (extend ITN)	Fully screened house	FSH pyrethroid netting
New Product Class – (chemical)	**Generic Exemplar**	**Prototype product**
Attract and kill baits	Attractive Toxic Sugar Bait	Bait station
Spatial repellents	Passive emanator	metofluthrin or transfluthrin
ITM for specific risk groups	ITM	Blanket, Clothes
Vector traps	Adulticidal Oviposition traps	ALOT, IN2TRAP, AGO, TNK
Lethal house lures	Eave tubes	Eave tubes
Systemic insecticide	Rodent bait	Imidacloprid based bait
New Product Class – (biological)	**Generic Exemplar**	**Prototype product**
Microbial control in adult vectors	Bacterial infection	wMel Wolbachia in Ae. aegypti
Pop. reduction through genetic manipulation	GMM, self limiting	OX513A Ae. aegypti (RIDL)
	GMM, gene-drive	CRISP/Cas9 in An. gambiae
Pop. alteration of malaria vector mosquitoes	GMM, gene-drive	CRISP/Cas9 anti-parasite
SIT & incompatible insect technique (IIT)	Radiation + bacterial infection	Sterilized Aedes spp. + Wolbachia

Overview of New Products (by use)

New Products for *Anopheles*; Malaria	Generic Exemplar	Prototype product
ITN against IR Vector (extend ITN)	Pyr + mix/comb LLIN	PermaNet 3, Interceptor G2
Attract and kill baits	Attractive Toxic Sugar Bait	Bait station
Lethal house lures	Eave tubes	Eave tubes
Pop. alteration of malaria vector mosquitoes	GMM, gene-drive	CRISP/Cas9 anti-parasite
	GMM, gene-drive	CRISP/Cas9 in An. gambiae

New Product Class for *Aedes*; Arboviral diseases	Generic Exemplar	Prototype product
Vector traps	Adulticidal Oviposition traps	ALOT, IN2TRAP, AGO, TNK
Microbial control in adult vectors	Bacterial infection	wMel Wolbachia in Ae. aegypti
Pop. reduction through genetic manipulation	GMM, self limiting	OX513A Ae. aegypti (RIDL)
SIT & incompatible insect technique (IIT)	Radiation + bacterial infection	Sterilized Aedes spp. + Wolbachia
Peri-focal residual spraying (extend IRS)	Outdoor RS	PFS formulation, Bayer

Step 3 Approved

Step 3 underway

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Overview of New Products

New Product Class – for *Anopheles* and *Aedes*	**Generic Exemplar**	**Prototype product**
Spatial repellents	Passive emanator	metofluthrin or transfluthrin
Treated walls against IR vector (extend IRS)	IRS/wall linings for IR pop	No claim reviewed
Insecticide-treated curtain (extend ITN)	Fully screened house	FSH pyrethroid netting
ITM for specific risk groups	ITM	Blanket, Clothes

New Product Class – for NTD (leishmaniasis and plague) transmitted by sandflies and fleas	**Generic Exemplar**	**Prototype product**
Systemic insecticide	Rodent bait	Imidacloprid based bait

Step 3 Approved

Step 3 underway

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Conclusion: need for innovation in approach & tools

- **More holistic approach** and **country leadership** in vector-borne disease prevention and control efforts is critical
- **Policies and activities** should be **multi-sectorial** and should always be **evidence-based**
- Emphasis on **locally adapted**, "***multi-vector***" **and community-based approaches** – involvement of municipalities and local governments
- **Adoption of novel tools** is key (once thoroughly validated for operational use)
- Aim is to **ensure all countries can achieve success**, irrespective of their current disease burden/risk, capacities and resources

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Draft global vector control response

For consideration by the World Health Assembly at its 70th session under provisional agenda item 14.26

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Importance of vector control

… above all, the spread of Zika, the resurgence of dengue, and the emerging threat of Chikungunya are the price being paid for **a massive policy failure that dropped the ball on mosquito control in the 1970s**.

Margaret Chan

Director-General, World Health Organization

Opening Address at World Health Assembly 69th session

May 2016

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Global burden of vector-borne diseases

Vector	Disease	Estimated or reported annual cases	Estimated annual deaths	Estimated annual DALYs
Mosquitoes	Malaria	212 000 000	429 000	55 111 000
	Dengue	96 000 000	9 110	1 892 200
	Lymphatic filariasis	38 464 000	NA	2 075 000
	Chikungunya (Americas)	693 000 (suspected, 2015)	NA	NA
	Zika virus disease (Americas)	500 000 (suspected, 2016)	NA	NA
	Yellow fever (Africa)	130 000	500	31 000
	Japanese encephalitis	42 500	9250	431 552
	West Nile fever	2 588	111	NA
Blackflies	Onchocerciasis	15 531 500	NA	1 135 700
Sandflies	(Muco) cutaneous leishmaniasis	3 895 000	NA	41 500
	Visceral leishmaniasis	60 800	62 500	1 377 400
Triatomine bugs	Chagas disease	6 653 000	10 600	236 100
Ticks	Borreliosis (Lyme disease)	532 125	NA	10.5
	Tick-borne encephalitis (North Eurasia)	10 000 – 12 000	NA	167.8 / 100 000
Tsetse flies	Human African trypanosomiasis	10 700	6 900	202 400
Snails	Schistosomiasis	207 000 000	200 000	2 613 300
Various	Other: Rift Valley fever, O'nyong nyong virus, Mayaro virus, Crimean-Congo haemorrhagic fever, rickettsial diseases, plague *(limited data)*			

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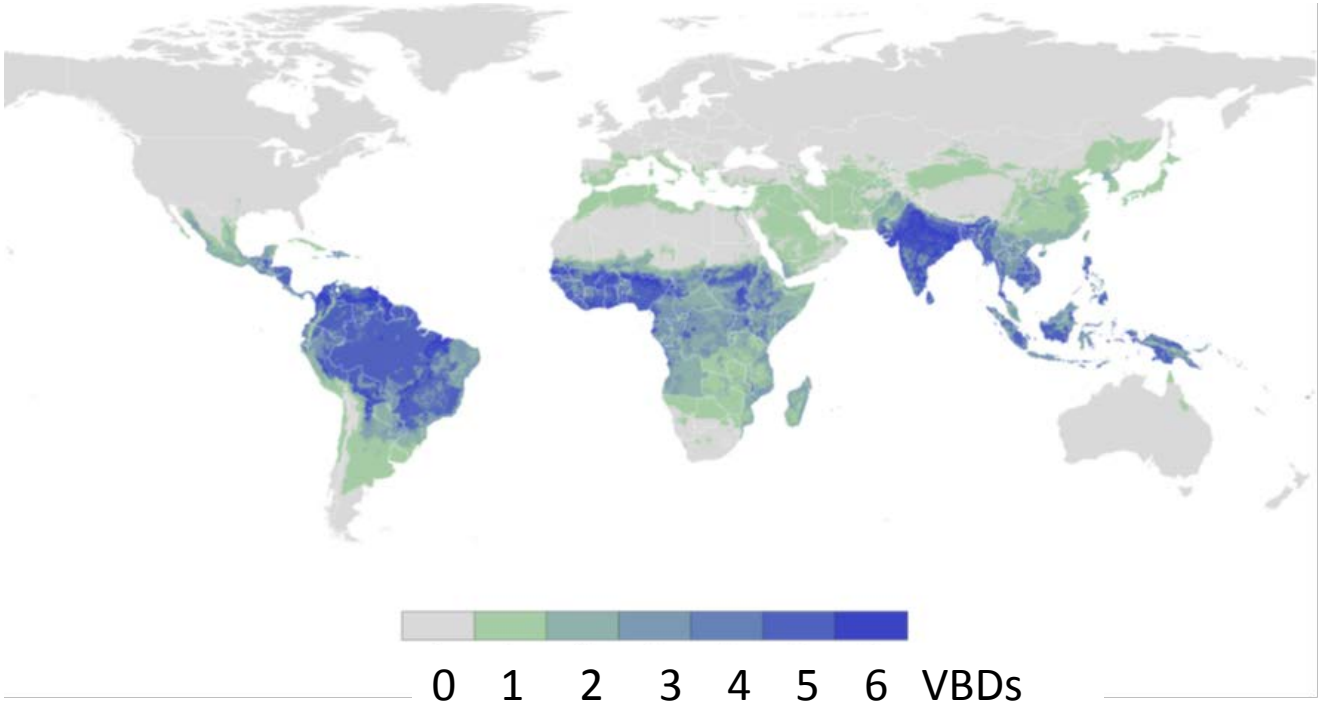
Global distribution of major vector-borne diseases



Combined global distribution of malaria, dengue, lymphatic filariasis, leishmaniasis, Japanese encephalitis, yellow fever and Chagas disease.

Today more than **80% of the world's population is at risk** from at least one vector-borne disease, with more than half at risk from two or more.

Golding et al. BMC Med. 2015; 13:249

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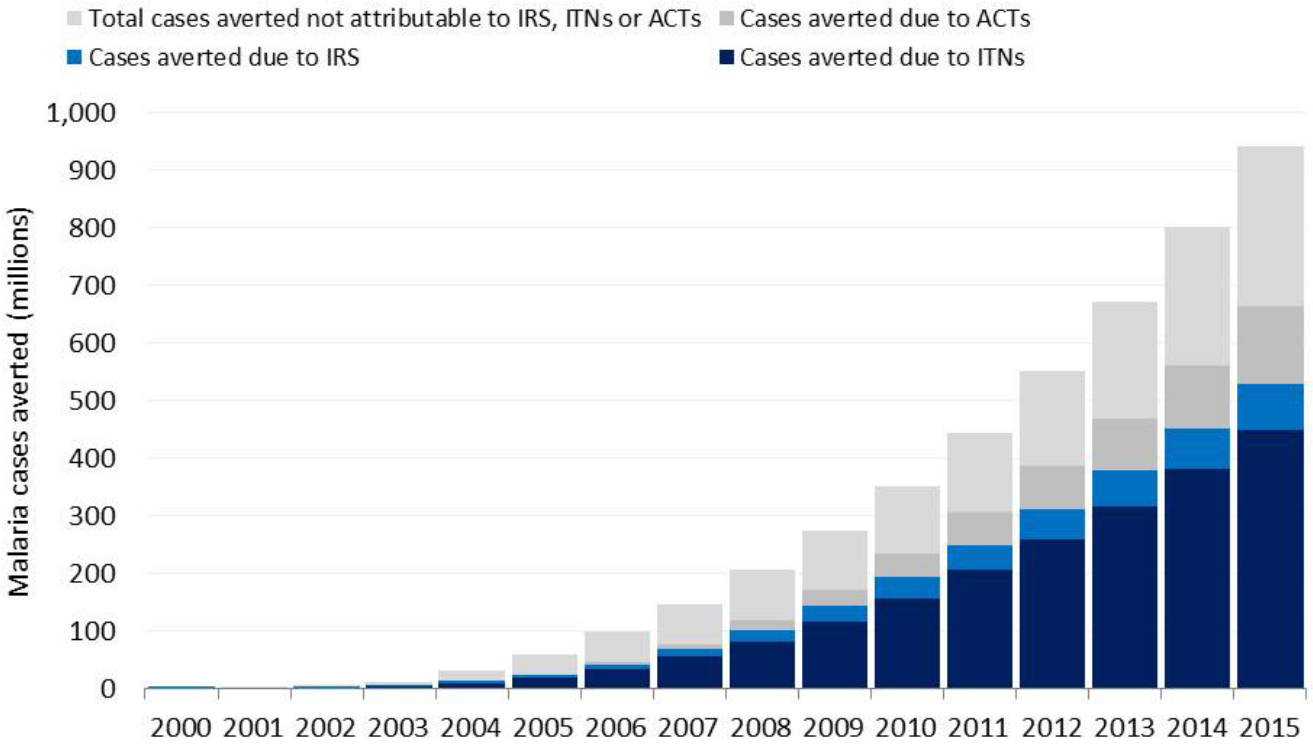
Major gains made against malaria through vector control

- Estimated 1.2 billion fewer malaria cases and 6.2 million fewer malaria deaths globally between 2001 and 2015 (cumulative) relative to 2000
- But current activities are insufficient to eliminate malaria from sub-Saharan Africa
- Need improved and additional tools and better strategies and implementation



70% of reductions in sub-Saharan Africa attributable to interventions.

Of this, **69% attributable to ITNs**, 21% to ACTS and **10% to IRS**

Cibulskis et al. Infect Dis Poverty. 2016; 5:61

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Challenges

- **Systemic:** insufficient public health entomological capacity including human and infrastructural
- **Structural:** strong centralised programme lacking in many countries, synergies not leveraged, and resource utilization not optimized
- **Informational:** weak evidence-base and poor linkage of entomological, epidemiological and intervention data
- **Environmental:** unpredictable, uncontrollable and complex changes
- **Movement of human and goods:** increased international travel and trade, humanitarian crises
- **Political and financial:** limited funds committed and sustained beyond malaria
- **Ethical:** implementation including novel interventions

Opportunities

- **Recognition:** importance exemplified in existing regional and global vector-borne disease control strategies
- **Expansion:** build on successes against malaria, onchocerciasis and lymphatic filariasis
- **Optimization:** re-align across multiple vectors, diseases, sectors and partners
- **Collaboration:** leverage existing networks for information and resource sharing
- **Adaptation:** create flexible systems to address specific conditions and challenges
- **Innovation:** new tools, technologies and approaches on the horizon
- **Technology:** advances in data collation, planning and implementation
- **Development:** alignment with Sustainable Development Goals

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Development of the global vector control response

Led by:

WHO Global Malaria Programme
WHO Department of Control of Neglected Tropical Diseases
Special Programme for Research and Training in Tropical Diseases

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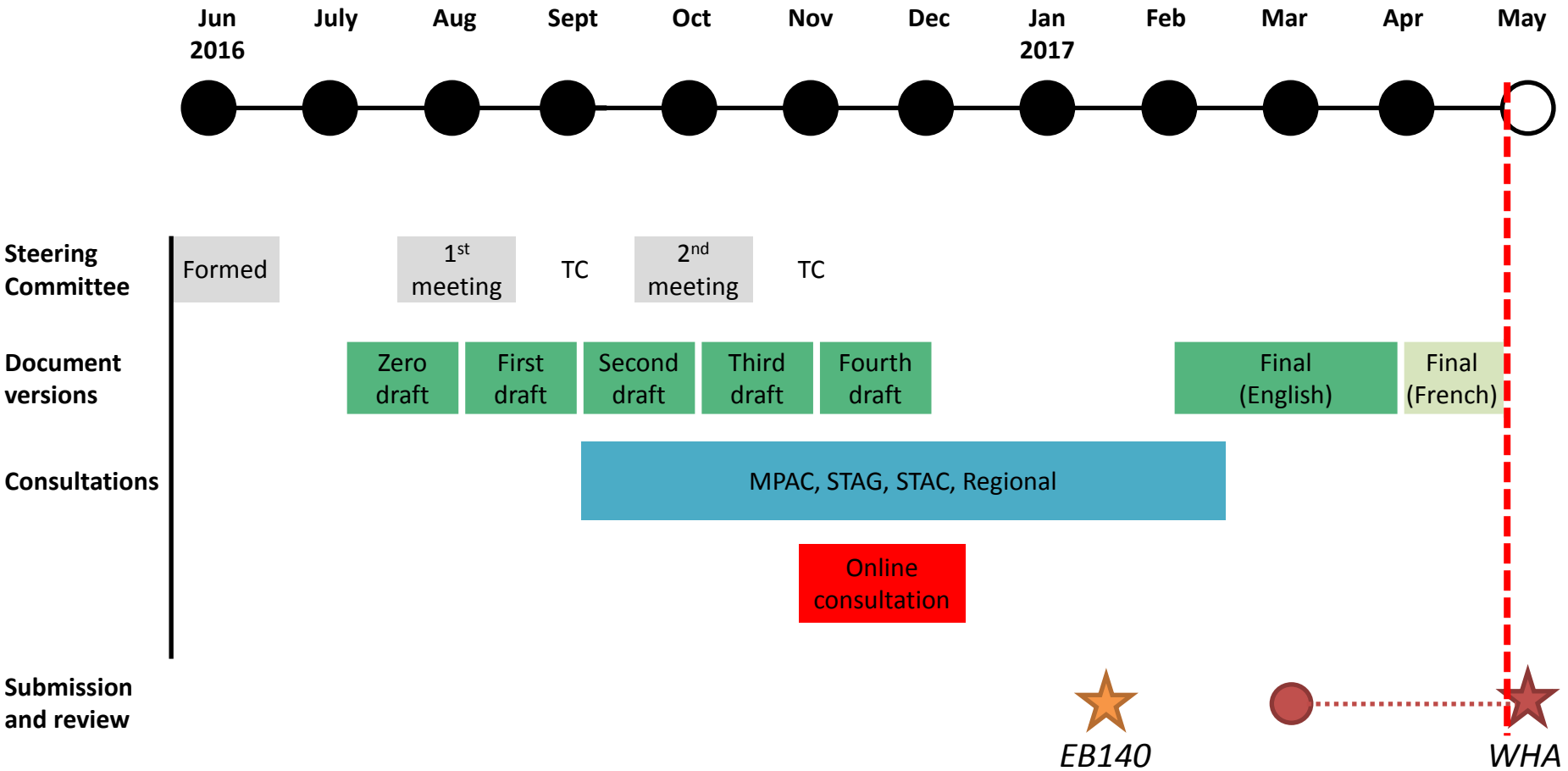
Development timeline

Status: Fifth draft (v5.4) produced based on feedback from online consultation and Executive Board 140th session (held 28 January 2017)



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Inputs for development

Lead	GMP, NTD, TDR
Steering Committee	Prof. Thomas Scott and Dr Ana Carolina Santelli (co-chairs) and other leading experts
WHO regional focal points	AFRO, EMRO, EURO, PAHO, SEARO, WPRO
Online consultation	Responses from Member States, research/academia, private sector, donor agencies, other UN agencies, NGOs (n = 80)
Presented for discussion at:	• Information session for Member State missions, Geneva • **WHO Executive Board 140th session, Geneva** • TDR Scientific and Technical Advisory Committee meeting, Geneva • NTD Strategic and Technical Advisory Group meeting, Geneva • GMP Malaria Policy and Advisory Committee meeting, Geneva • Informal consultation on response, Johannesburg • Asia-Pacific Malaria Elimination Network meeting, Bangkok • African Network for Vector Resistance meeting, Brazzaville • Regional consultation to accelerate progress towards ending HIV/TB/malaria in South-East Asian region, Dhaka • Pan-African Mosquito Control Association meeting, Lagos • European Mosquito Control Association meeting, Bečići • International Congress of Entomology, Florida • PAHO Vector Control Strategic Advisory Group, Washington DC • WHO Vector Control Advisory Group meeting, Geneva • WHO Malaria Vector Control Technical Expert Group meeting, Geneva • DDT expert group meeting, Geneva • Global Collaboration for Development of Public Health Pesticides meeting, Geneva • Malaria elimination meeting, Geneva • Roll Back Malaria Vector Control Working Group, Geneva

WHO Executive Board 140th session

Discussed as agenda item 9.2 on 28 January 2017:

- Interventions made by 22 countries (16 EB members, 6 non-EB members) and IFRC
- Support was positive with updates proposed for strengthening GVCR
- Resolution development for WHA70 proposed by Fiji and supported by five other EB members (Canada, China, Colombia, New Zealand, USA) and four EB non-members (Australia, Brazil, Panama, Switzerland)

OUTCOME:

➢ The CHAIRMAN took it that the Board wished to request the Secretariat, in consultation with Member States, to prepare a draft resolution for consideration at the Seventieth World Health Assembly. It was so agreed.

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Global Vector Control Response
5th draft (version 5.4)

http://www.who.int/malaria/global-vector-control-response/

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Rationale

Vector-borne diseases:

- account for around 17% of estimated global burden of communicable diseases
- disproportionately affect poorer populations
- impede economic development through direct and indirect costs (eg. loss of productivity and tourism)
- are strongly influenced by social, demographic and environmental factors

Vector control:

- if implemented well can prevent many major vector-borne diseases
- has contributed to major reductions in the incidence of malaria, onchocerciasis and Chagas disease
- has not been used to full potential or maximal impact for other diseases
- can be strengthened by realigning programmes to optimize the delivery of interventions that are tailored to the local context

Vision, Aim and Goals

- **Vision**: A world free of human suffering from vector-borne diseases.
- **Aim:** Reduce the burden and threat of vector-borne diseases through effective locally adapted and sustainable vector control.

Goals	Milestones		Targets
	2020	2025	2030
Reduce mortality due to vector-borne diseases globally relative to 2016	At least 30%	At least 50%	At least 75%
Reduce case incidence due to vector-borne diseases globally relative to 2016	At least 25%	At least 40%	At least 60%
Prevent epidemics of vector-borne diseases*		In all countries without transmission in 2016	In all countries

** Rapid detection of outbreaks and curtailment before spread beyond country.*

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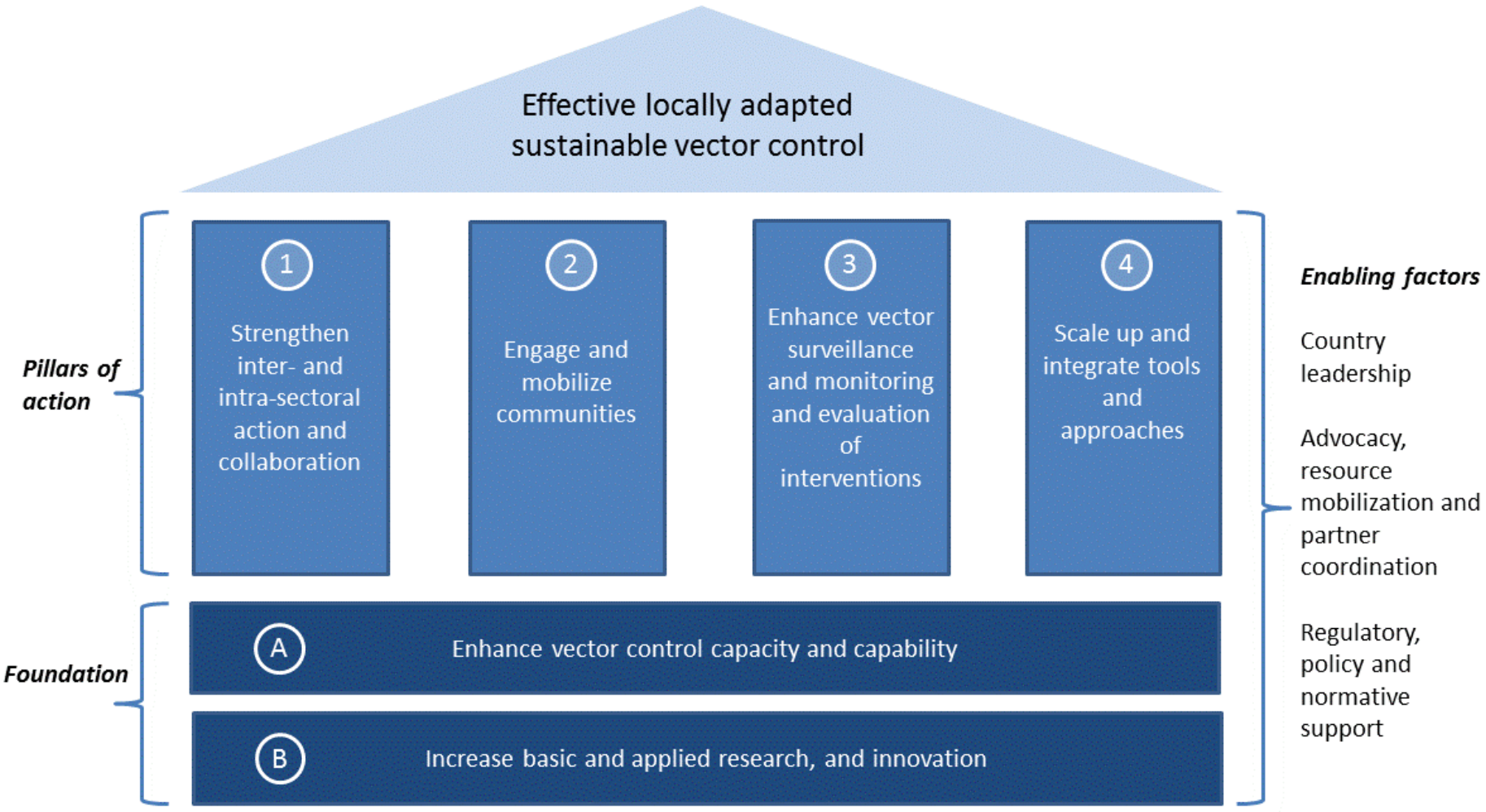
Overview



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Priority activities for 2017–2022* (1-5 of 10)

1. **National and regional vector control strategic plans developed/adapted to align with draft *global vector control response***
2. National vector control needs assessment conducted or updated and resource mobilization plan developed (including for outbreak response)
3. National entomology and cross-sectoral workforce appraised and enhanced to meet identified requirements for vector control, including for epidemic response
4. Relevant staff from health ministries or supporting institutions trained in public health entomology
5. National and regional institutional networks to support training and/or education in public health entomology and technical support established and functioning

** To be revised and updated for the subsequent period of 2023–2030.*

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Priority activities for 2017–2022* (6-10 of 10)

6. National agenda for basic and applied research on entomology and vector control established and/or progress reviewed
7. National inter-ministerial task force for multisectoral engagement in vector control established and functioning
8. National plan for effective community engagement and mobilization in vector control developed
9. National vector surveillance systems strengthened and integrated with health information systems to guide vector control
10. National targets for protection of at-risk population with appropriate vector control aligned across vector-borne diseases

** To be revised and updated for the subsequent period of 2023–2030.*

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Implementation costing - approach

- For full implementation of priority activities defined for 2017-2022
  - Includes: **staffing, surveillance and coordination**
  - Excludes: vector control commodities and their deployment, research and innovation implementation costs.
- Four-step approach:
  1. Country categorization by a) historic risk (2000 – 2015), b) current burden (2016) and c) number of major VBDs. Adjusted based on knowledge of other VBDs (eg. of local significance)
  2. Estimate of population as risk from at least one of the major VBDs (estimates generated by Oxford University)
  3. Estimate of resource requirements based on a) burden level, and/or b) population (eg. # subnational meetings or sentinel sites per 500,000 pop basis)
  4. Country-specific cost estimates for defined resources generated using WHO-CHOICE method

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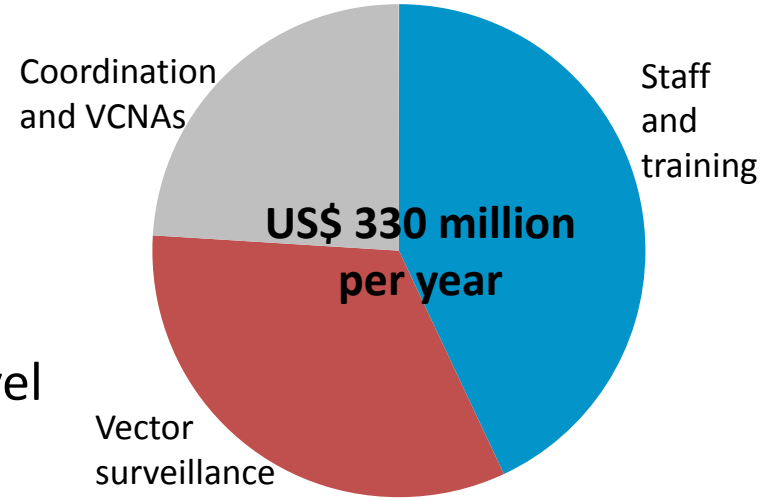
Implementation costing - outcome

- Annual estimate for full implementation:
  - US$330 million annually
  - US$0.05 per person per year
  - Represents a maximum and varies between countries depending on risk/ burden, population size and income level



- Relatively modest investment compared to:
  - Total projected cost for vector control against malaria, Chagas and dengue > US$4 000 million by 2022
  - Individual interventions
    - Malaria: ITNs = US$ 1.27/person/year; indoor residual sprays = US$ 4.24 /person/year
    - Dengue: community-based activities = > US$1.00 /person/year

- Accurate estimates of resources/costs will be derived from national vector control needs assessments at country and subnational levels.

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Concluding points

- Country leadership of vector-borne disease prevention and control efforts is critical
- Policies and activities should not be limited to the health sector and should always be evidence-based
- Action within countries and between countries should be harmonized and strengthened
- Emphasis on integrated, community-based approaches – involvement of municipalities and local governments
- Adoption of novel tools is strongly encouraged (when validated for operational use by WHO)
- Aim is to ensure all countries can achieve success, irrespective of their current disease burden/risk, capacities and resources

Thank you

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