



Global Malaria Programme



PROGRAMME

Insecticide Resistance – Databases and Global Status Update

Malaria Vector Control Unit

RBM Vector Control Working Group 10th Annual Meeting Geneva, Switzerland 28 - 30 January 2015

WHO Global Technical Strategy for Malaria, 2016 – 2030



Draft Global Technical

Strategy for Malaria

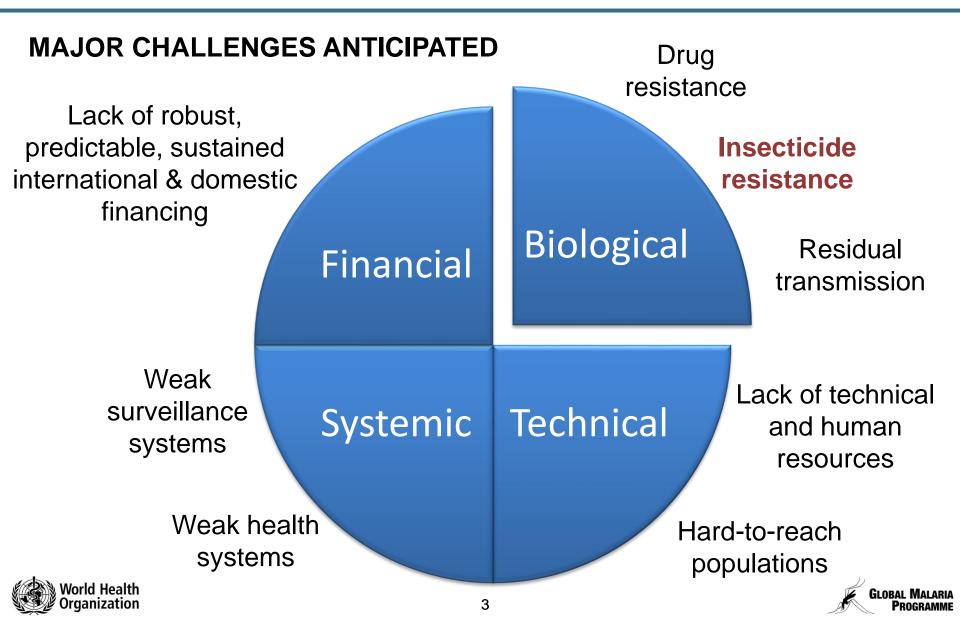
DRAFT GLOBAL TECHNICAL STRATEGY AT A GLANCE

Vision – A world free of malaria						
Goals	Miles	tones	Targets			
Goals	2020	2025	2030			
 Reduce malaria mortality rates globally compared with 2015 	<u>></u> 40%	<u>></u> 75%	<u>≥</u> 90%			
2. Reduce malaria case incidence globally compared with 2015	<u>></u> 40%	<u>></u> 75%	<u>></u> 90%			
3. Eliminate malaria from countries in which malaria was transmitted in 2015	At least 10 countries	At least 20 countries	At least 35 countries			
 Prevent re-establishment of malaria in all countries that are malaria-free 	Re-establishment prevented	Re-establishment prevented	Re-establishment prevented			





WHO Global Technical Strategy for Malaria, 2016 – 2030



Global Plan for Insecticide Resistance Management in malaria vectors (GPIRM): a call to action



May 2012 - If we take action now, we can stay ahead of the curve and maintain the fabulous gains that we have made.





Global Plan for Insecticide Resistance Management in malaria vectors (GPIRM): a call to action

5-pillar strategy

Short-term (~3 years) Preserve susceptibility and slow the spread of resistance on the basis of current knowledge, and reinforce monitoring capability and activities Medium-term (3–10 years) Improve understanding of IR and tools to manage it, and adapt strategy for sustainable vector control accordingly Long-term (≥10 years) Use innovative approaches for sustainable vector control at global scale

λĒ	0	Plan and implement insecticide resistance management strategies in malaria-endemic countries.
of strategy	0	Ensure proper, timely entomological and resistance monitoring and effective data management.
	0	Develop new, innovative vector control tools.
e pillars		Fill gaps in knowledge on mechanisms of insecticide resistance and the impact of current insecticide resistance management strategies.
Five	V	Ensure that enabling mechanisms (advocacy, human and financial resources) are in place.



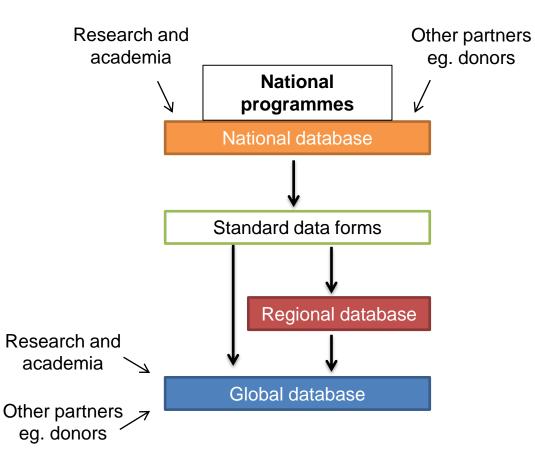


Databases





DATA CONSOLIDATION (2000-2014)

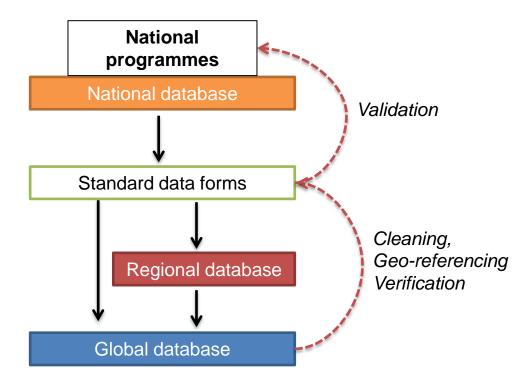






Insecticide resistance data: Reporting

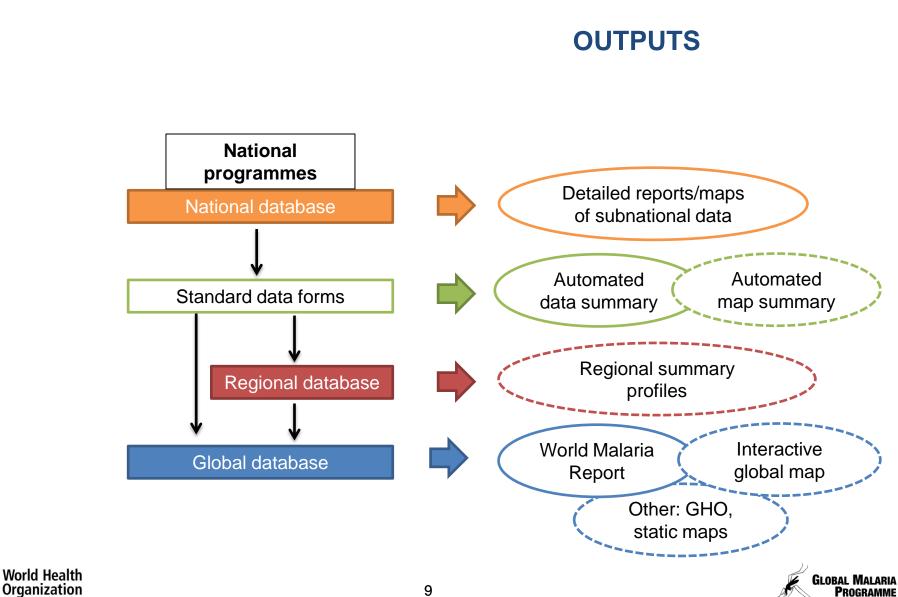
FEEDBACK





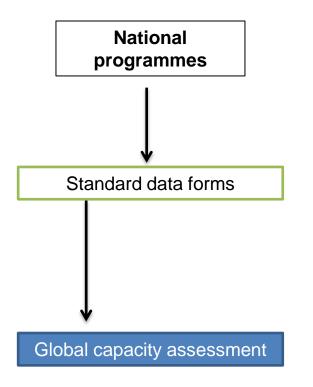


Insecticide resistance data: Reporting



Entomological Capacity: Reporting

PARALLEL PROCESS







Insecticide resistance data*: Reporting status

	Africa	E. Mediterranean	Europe	Americas	South East Asia	Western Pacific
Algeria	Liberia	Afghanistan	Azerbaijan	Argentina	Bangladesh	Cambodia
Angola	Madagascar	Djibouti	Georgia	Belize	Bhutan	China
Benin	Malawi	Iran	Kyrgyzstan	Bolivia	DPR of Korea	Lao PDR
Botswana	Mali	Pakistan	Tajikistan	Brazil	India	Malaysia
Burkina Faso	Mauritania	Saudi Arabia	Turkey	Colombia	Indonesia	Papua New Guinea
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CAR	Niger					Vanuatu
Chad	Nigeria					Viet Nam
Comoros	Rwanda	Verificati	on nra	ncass on	gning	
Congo	Sao Ton	vermeati			Some	
Côte d'Ivoire	Senegal			Haiti		
DRC	Sierra Leone			Honduras	No data r	eceived
Eq.Guinea	South Africa			Mexico		d that there are no data
Eritrea	South Sudan			Nicaragua		(2000-2013) d that there are no data
Ethiopia	Swaziland			Panama		(2011-2013)
Gabon	Тодо			Paraguay		<pre></pre> <pre></pre> <pre></pre>
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Ghana	UR Tanzania (M)			Suriname	Data fina	lised
Guinea	UR Tanzania (Z)			Venezuela		
Guinea-Bissau	Zambia					
Kenya	Zimbabwe			*WHO susceptil	nility tests and CD	C hottle higgses

*WHO susceptibility tests and CDC bottle bioassays

Entomological Capacity: Reporting status

	Africa		E. Mediterranean	Europe	Americas	South East Asia	Western Pacific
Algeria	Liberia		Afghanistan	Azerbaijan	Argentina	Bangladesh	Cambodia
Angola	Madagaso	ar	Djibouti	Georgia	Belize	Bhutan	China
Benin	Malawi		Iran	Kyrgyzstan	Bolivia	DPR of Korea	Lao PDR
Botswana	Mali		Pakistan	Tajikistan	Brazil	India	Malaysia
Burkina Faso	Mauritania	1	Saudi Arabia	Turkey	Colombia	Indonesia	Papua New Guinea
Burundi	Mayotte				\mathbf{C}		Philippines
Cameroon	Mozamł	Dat	ta repoi	rted fo	or 63 cou	untries	Republic of Korea
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Guinea	UR Tanza	nia (Z)			Venezuela		
Guinea-Bissau	Zambia						
Kenya	Zimbabwe	;					

Global Insecticide Resistance Database: overview

	REPORTED DATA	FILTERED DATA (STANDARD INSECT. + DOSE)
Years	1947 - 2014	1947 - 2014
Countries	81	80
Localities	2090	1988
Vector species names	105	91
Insecticides + doses	189	31
TOTAL BIOASSAY DATA	13,533	11,932
POINTS	(95.4% tube tests, 4.6% bottle bioassays)	(96.1% tube tests, 3.9% bottle bioassays)
Mechanism types	6	
TOTAL MECHANISMS DATA POINTS	768	



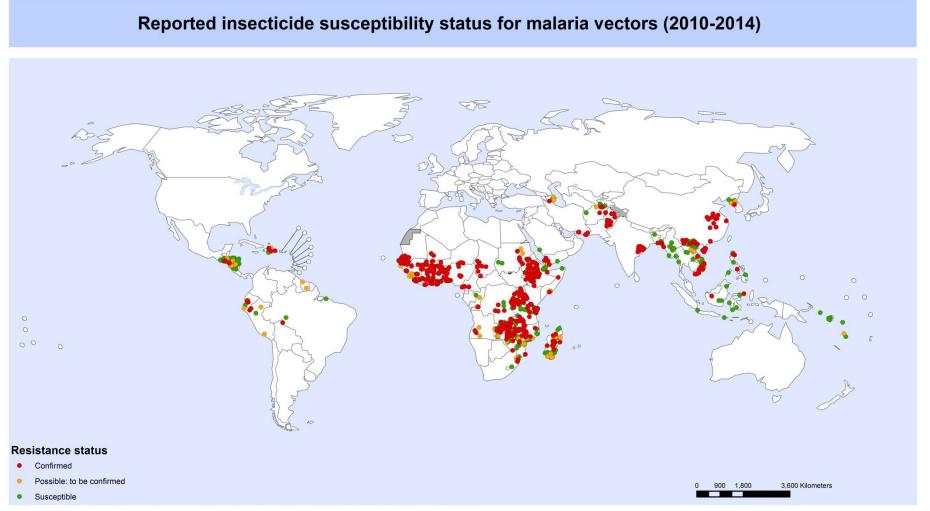


Global Status Update





Insecticide resistance: data reported for 64 countries since 2010



Where multiple insecticide classes or types, mosquito species or time points were tested, the highest resistance status is shown.

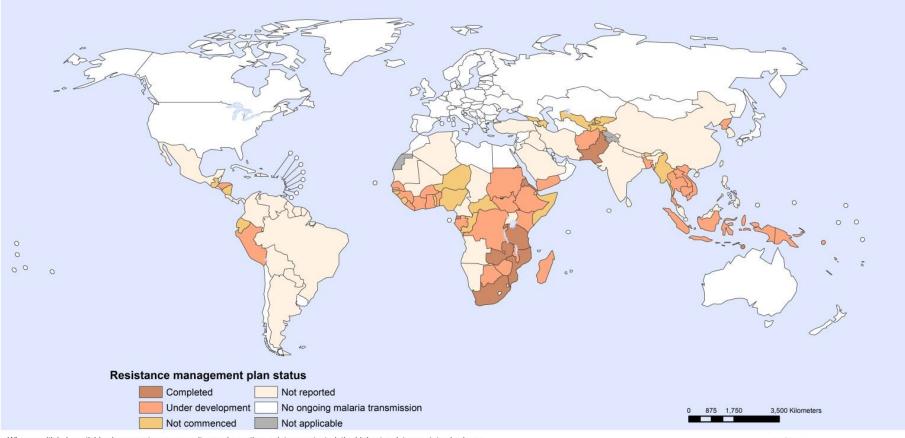
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Malaria Report 2014 Map Production: Global Malaria Programme World Health Organization



National IR monitoring & management plans: completed for 10 countries

Status of national insecticide resistance monitoring and management plan (2014)



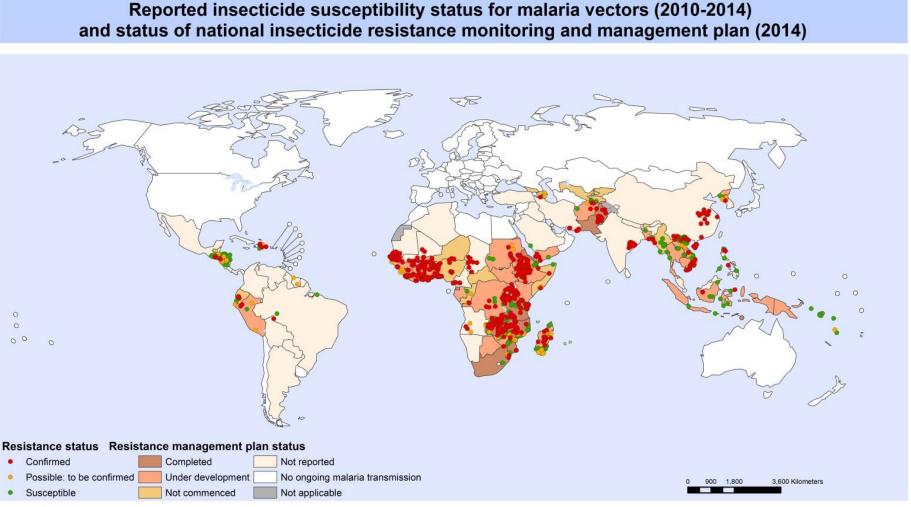
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Many countries with resistance do not yet have IRM plans – especially outside of Africa



Where multiple insecticide classes or types, mosquito species or time points were tested, the highest resistance status is shown.

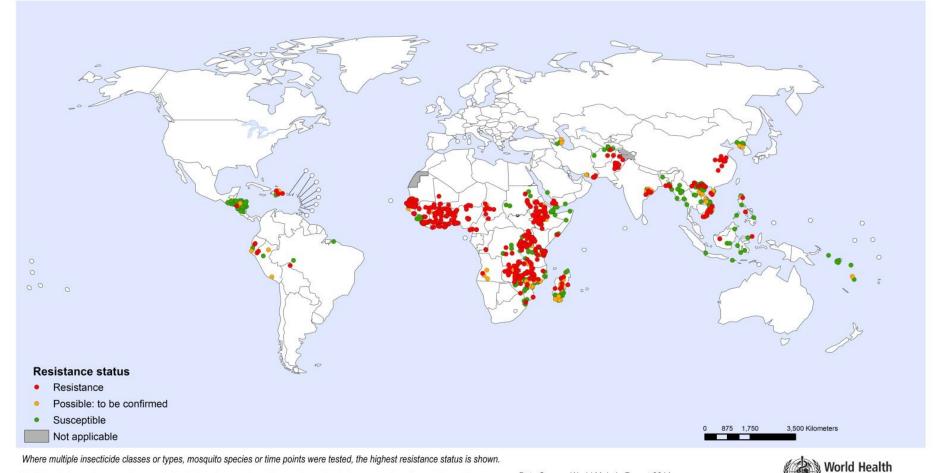
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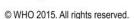
Pyrethroid resistance: 45 countries and 58% of surveyed sites

Reported pyrethroid susceptibility status for malaria vectors (2010-2014)



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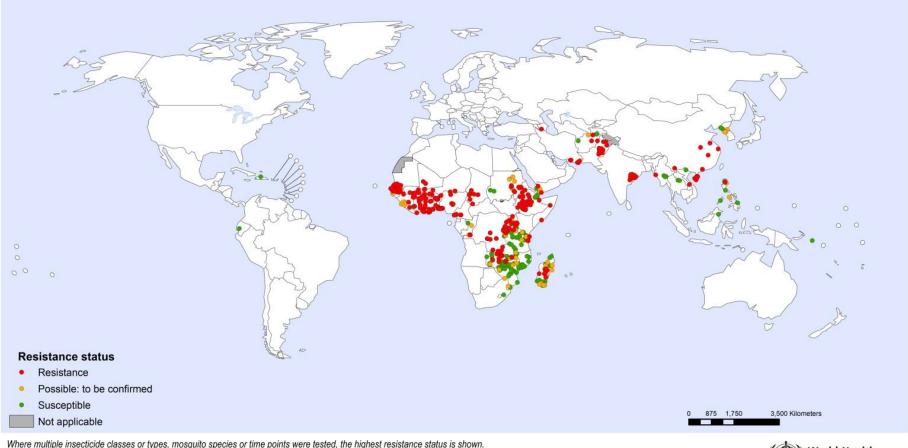
Data Source: World Malaria Report 2014 Map Production: Global Malaria Programme World Health Organization



Organization

Organochlorine resistance: 36 countries and 60% of surveyed sites

Reported organochlorine susceptibility status for malaria vectors (2010-2014)

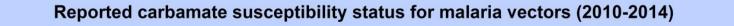


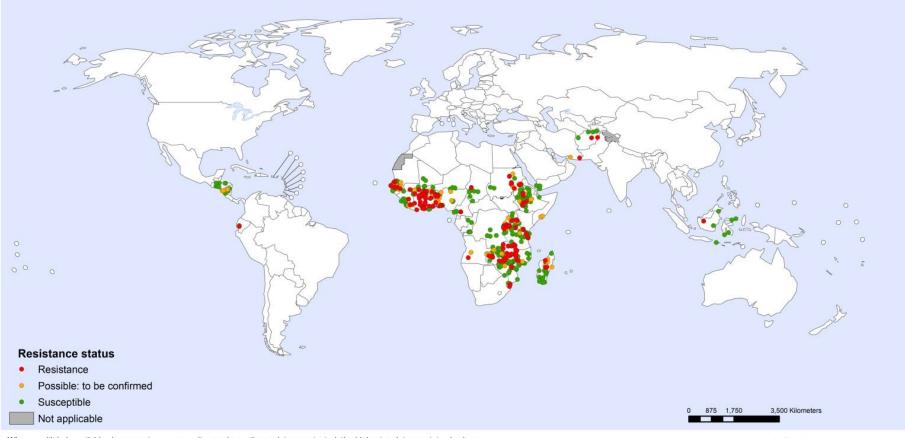
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Data Source: World Malaria Report 2014 Map Production: Global Malaria Programme World Health Organization



Carbamate resistance: 29 countries and 29% of surveyed sites





Where multiple insecticide classes or types, mosquito species or time points were tested, the highest resistance status is shown.

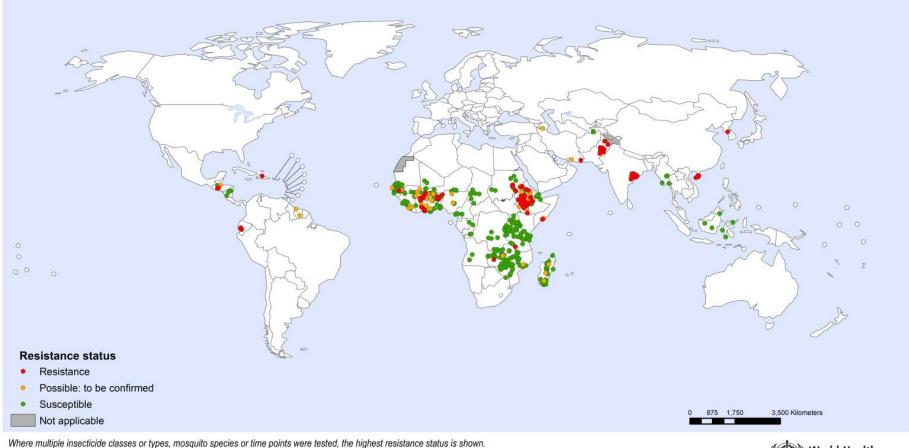
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Data Source: World Malaria Report 2014 Map Production: Global Malaria Programme World Health Organization



Organophosphate resistance: 18 countries and 22% of surveyed sites

Reported organophosphate susceptibility status for malaria vectors (2010-2014)

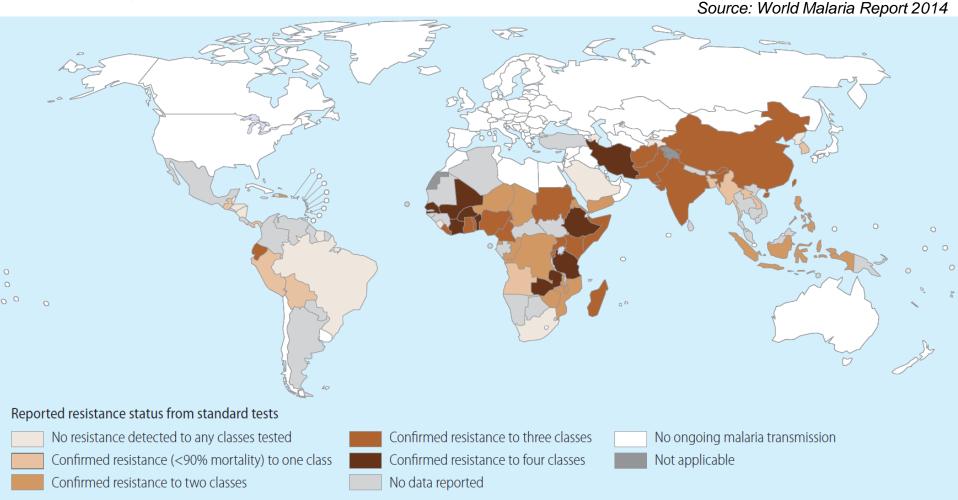


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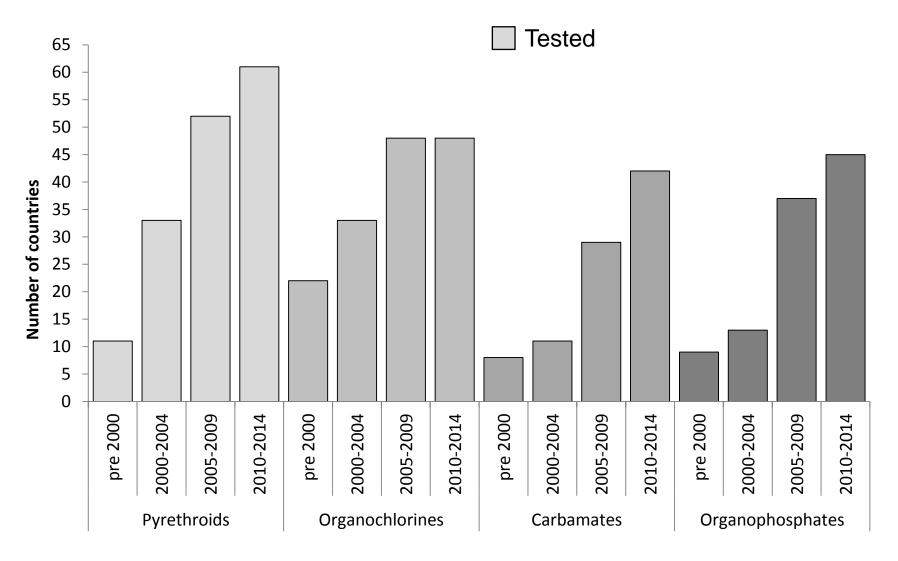
Resistance to multiple insecticide classes: 40 countries and 33% of surveyed sites

Countries reporting resistance since 2010, by number of insecticide classes (as of October 2014)



Source: National malaria control programme reports, African Network for Vector Resistance, Malaria Atlas Project, President's Malaria Initiative, published literature

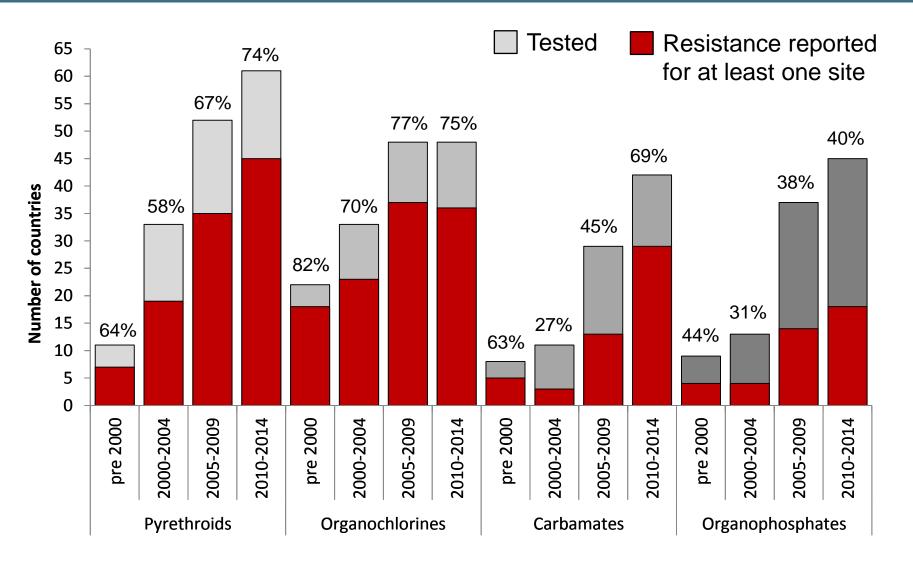
Preliminary trends analyses: resistance testing has increased for all four classes







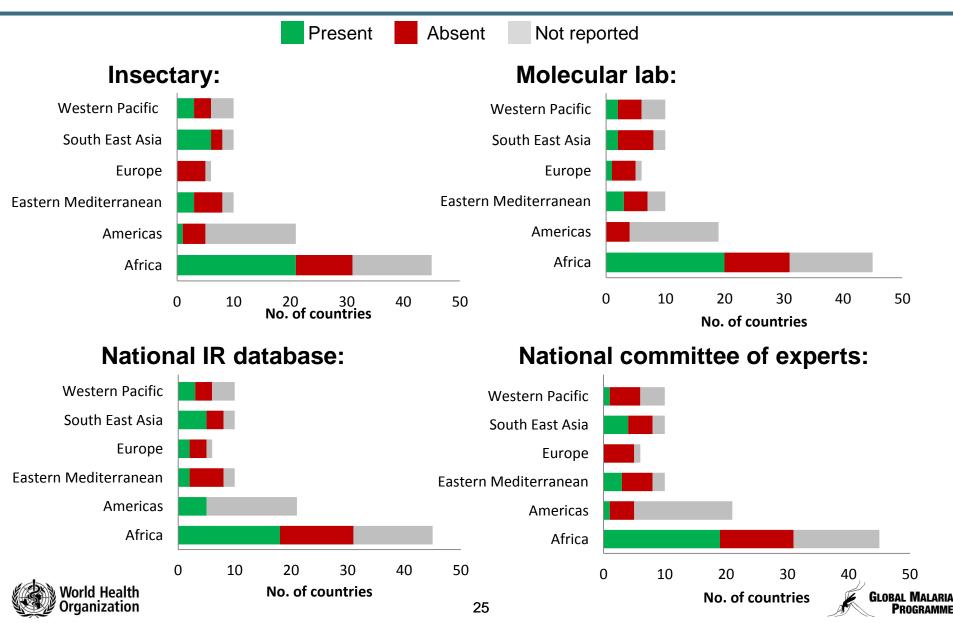
Preliminary trends analyses: resistance frequency increasing?







Entomological Capacity: requires enhancement



Reporting and Mapping: Challenges

- Data quality
 - No established comprehensive national IR monitoring plan
 - Low vector densities so tests often conducted with <100 Anopheles
 - Limited expertise to support data collection especially for mechanisms
 - Incomplete or inaccurate data recording or entry
 - Inconsistencies in test procedures
- Data management
 - Lack of an established national insecticide resistance database
 - Limited personnel to manage available information
 - Complicated and overlapping data that are not easy to summarize
 - Sparse or incomplete data precludes identification of trends
- Data sharing
 - No efficient mechanism for sharing up-to-date information between partners
 - Misconception that sharing of data will limit publication opportunities
 - $_{\circ}$ Late or incomplete reporting to WHO





Planning for IRM: Framework for Development of National Resistance Monitoring and Management Plans

- Outlines the content and key considerations when developing and documenting national IRM plans
- Includes guidance on situation analysis and implementation framework, plus annual workplans
- Not intended to be rigid and prescriptive but designed to offer countries a framework while ensuring:
 - adherence to GPIRM objectives
 - a degree of standardisation across countries in the structure and content of plans

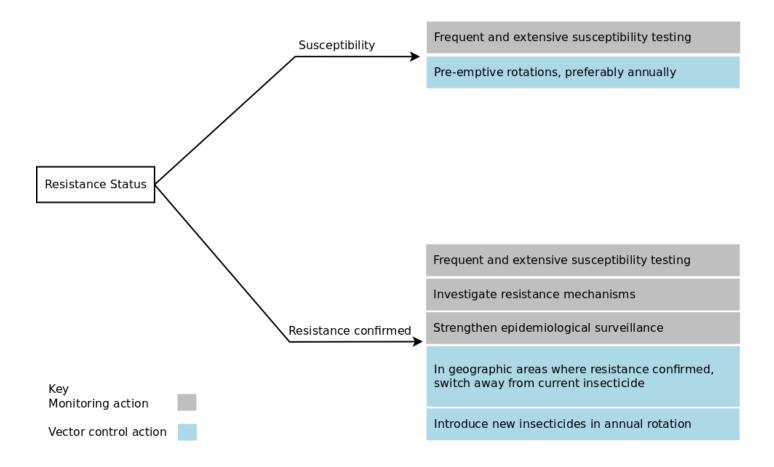
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Annex 1 - Example responses in areas in which LLINs are the primary intervention		
Annex 2 – Example responses in areas in which IRS is the primary intervention	Anne	(2 – Example responses in areas in which IRS is the primary intervention



27

Planning for IRM: Framework for Development of National Resistance Monitoring and Management Plans

• Example response tree: Areas in which IRS is the primary intervention







Future WHO plans for addressing insecticide resistance and entomological capacity

- Support to countries for development of national insecticide resistance monitoring and management plans
- Inclusion of additional mechanisms data in global database
- Development of insecticide resistance data management tools:
 - Online interactive platform for mapping country-level resistance data
 - Excel add-on tool to support mapping of national resistance data
- *Ad hoc* review of resistance monitoring procedures and related issues
- Bi-regional training on entomology/vector control including insecticide resistance
- Development of a global insecticide resistance response plan
- Advocacy for action and resource mobilization to propel implementation of GPIRM





Thank you!



