

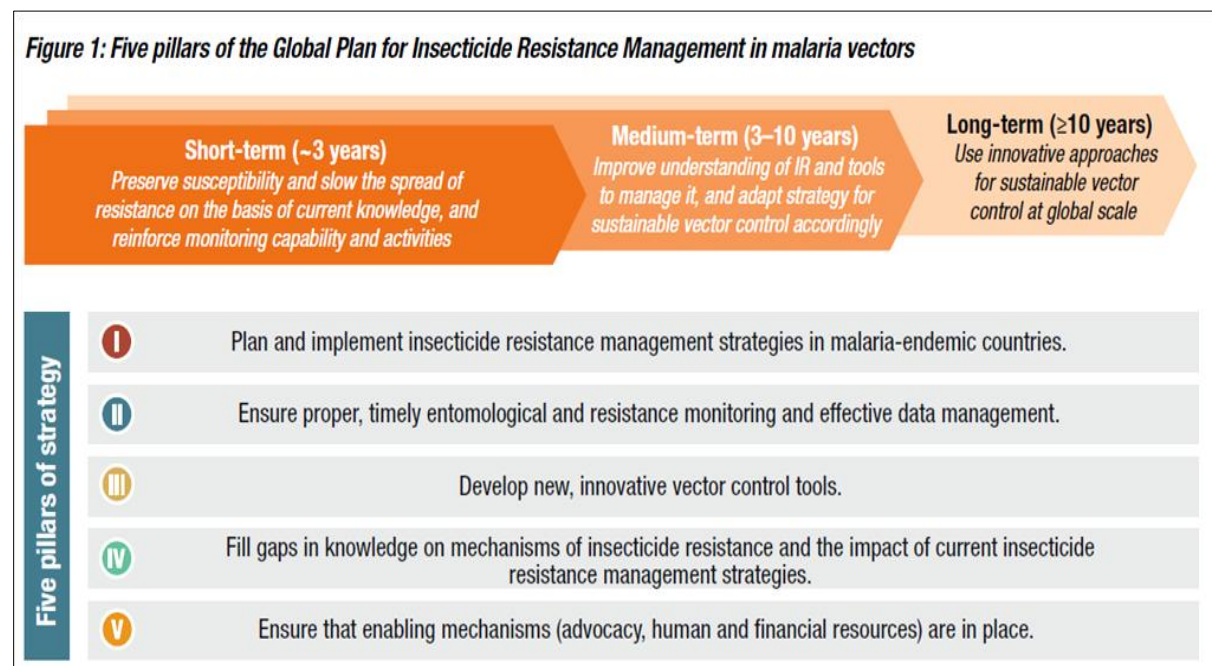
National Insecticides Resistance Management Plan (NIRMP)

Insecticide resistance is the term used to explain the situation in which the vectors are no longer killed by the standard dose of insecticide and they are no longer susceptible to the insecticide or manage to avoid coming into contact with the insecticide. The emergence of insecticide resistance in a vector population is an evolutionary phenomenon.

Development of resistance against insecticide is the major threat to any vector control program around the globe which relies on use of chemicals.

WHO has recently developed a robust *Global Plan for Insecticide Resistance Management* (GPIRM) in consultation of members of Roll Back Malaria Partnership which provides technical foundations and guidelines for any national vector control program using chemicals, mainly for IRS. Overall, GPIRM describes a framework for decision and policy-making to handle insecticide resistance, depending on the in-use vector control interventions. To make this strategy successful, WHO emphasizes that the insecticide resistance management should be a collective responsibility of all partners and stakeholders at both global and country levels. In this regards, GPIRM explains the roles and responsibilities of each partner and stakeholder and also enlists very essential activities that should be undertaken to implement the strategy.

There are five well defined pillars of GPIRM which have been described in figure 1. Some activities particularly pillar I and II must be country driven, however requires a very solid support from international partners. Although all countries are important for successful implementation of global strategy to manage insecticide resistance at local level, however the action should be prioritized for with respect of endemicity of disease.



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The primary objective of this plan is the *capacity building* and *system development* for basic entomological and epidemiological monitoring, including bioassays for insecticide susceptibility of local vector population. These informations along with other information on local transmission ecology and epidemiology (length of malaria transmission season and level of transmission) will help the malaria control program to;

- Preserve the insecticides susceptibility of local vector species
- Slow down the process of further development of resistance against in-use insecticides
- Change the insecticide (ideally group) immediately when resistance reported
- Prolong the efficacy of currently used chemical-based vector control interventions.

According to GPIRM it is also very important to determine the origin of selection pressure, whether it is from public health sector alone or also related to agriculture sector, domestic pest control or a combination of all three. If resistance pressure appears to be resulting from agriculture or from domestic pest control, immediate steps need to be taken to develop an effective and functional inter-sectoral coordination with these relevant ministries/departments/divisions (Ministry of Agriculture, Ministry of Environment etc). This approach further highlights the need of development and implementation of IVM strategy in the country.

As mentioned earlier that Pakistan since WHO's global eradication era of 1960's exclusively depending upon the use of chemicals for the control of vectors of public health importance. Therefore regular monitoring of susceptibility level of local vector species to all four classes of insecticides has been an integral part of national vector control strategy and guidelines in Pakistan. However due to withdrawal of external support and less supports from government side, vector control efforts have gradually been declined particularly since late 1980's and there has been very little effort to promote this tool in the country due to human and logistic constrains. Since the beginning of 2000, Directorate of Malaria Control (DoMC) through consensus and coordination of provincial counter partners re-aligned the program at all levels in light of WHO's RBM initiative by;

- Resource mobilization
- Recruiting required human resource
- Capacity building initiatives
- Development of national guidelines, strategies and policy
- Development of technical bodies
- Partnership building

In 2013/14, Directorate of Malaria Control (DoMC), Ministry of National Health Services, Regulations and Coordination (NHS, R&C) revised its national plan for insecticides resistance management in light of 5 pillars of WHO's GPIRM (Figure 1).

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Following are the salient features of National Insecticides Resistance Management Strategy/plan (NIRMP);

- Directorate of Malaria Control (DoMC) will act as Central Unit (Focal Point) for Integrated Vector Management (IVM) and develop a appropriate national Insecticides Resistance Management (IRM) Decision-Making body involving all stakeholders and partners. The overall objective of this body will be coordination for all activities to ensure the appropriate prioritization, sharing of information, resource mobilization and utilization and to provide mechanism for evidence-based decision making for rationale use and management of public health pesticides. Specific Terms of References (ToRs) of this central IRM decision-making body will be;
 - Review the data on insecticides used (quantity, classes/groups and strength etc)
 - Review the current vector control interventions
 - Review the current status of susceptibility level in local vector species
 - Provide technical assistance and guidance for;
 - ❖ development of annual workplan for implementation of NIRM plan
 - ❖ development/realignment of strategies, policies and guidelines for vector control
 - ❖ development of sentinel sites under different epidemiological and geo-environmental conditions of the country
 - ❖ development/up gradation of entomological surveillance tools
 - Development of liaison and linkages with other potential partners including academia and prime research institutions
 - Meeting with key decision/ policy makers, health planners, implementers for;
 - ❖ advocacy and sensitization
 - ❖ political commitment
 - ❖ human and other resource requirements for implementation
 - Facilitate the registration process for insecticides

Frequency of meeting: Committee will meet “**Bi-annually**”. However, meeting of committee can be called upon any time on priority or urgent matters.

Membership

National IRM Decision-Making body will have following composition ;

| Organization/Designation | Status |
|---|--------------------------|
| Secretary/Director General (M/o NHS, R&C) | Chairperson |
| Director, DoMC Islamabad | Convener |
| National Entomologist | Coordinator/Focal Person |
| Drug Regulatory Authority-Pakistan (DRAP), M/o NHS, R&C | Member |

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|--|--|---------------|
| | Provincial MCPs managers including FATA, GB, AJK | Member |
| | Technical team of DoMC-PMU (Epidemiologist, SPO, Managers M&E, PSM, Entomologist) | Member |
| | Representative from National Agriculture Research Council (NARC) | Member |
| | Representative from Pakistan Medical Research Council (PMRC) | Member |
| | Dean Faculty, MEDVC, Health Services Academy (HSA) | Member |
| | National Institute of Health (NIH) Islamabad | Member |
| | Ministry of Agriculture and Livestock | Member |
| | Ministry of Environment/Climate Change | Member |
| | World Health Organization (WHO)-Pakistan | Member |
| | Representative of USAID | Member |
| | Representative of FAO | Member |
| | Representative of provincial Institute of Public Health (IPH) | Member |
| | Representative from Co-PR (Save The children-International) | Member |
| | Representatives from local manufacturers, importers and distributors of insecticides/LLINs etc | Coptic Member |

Note: In view the composition of committee, the same will also act as National Steering Committee for implementation of IVM strategy in country.

- Directorate of Malaria Control (DoMC), M/o NHS, R&C as central unit will conduct Vector Control Need Assessment (VCNA) involving all stakeholders and partners
- Only World Health Organization Pesticides Evaluation Scheme (WHOPES) recommended insecticides (technical material and formulation of recommended manufacturer(s)/source) will be used and promote in the country
- Development of sentinel sites under different ecological, geographical zones of the country
- Regular (annual basis) conduction of insecticides susceptibility test at sentinel sites and also at randomly selected sites/villages. *Note: Ideally such tests will be conducted before the start of annual IRS operation*
- All four groups of insecticides will be monitored simultaneously against all major anophelines generally and against potential malaria vectors particularly using;
 - F1 generation (insectory reared)
 - wild caught blood fed (if laboratory reared F1 generation is not available).

Table 1. Discriminating concentrations of insecticides commonly use for determining the resistance level in malaria vectors in Pakistan

| | Insecticides Class | Insecticides | Dis. concentrations |
|---|----------------------|----------------------------------|---------------------|
| 1 | Organochlorines (OC) | <u>DDT</u> Dieldrin | <u>4.0%</u> 0.4% |
| 2 | Organophosphate (OP) | <u>Malathion</u> Fenitrothion | <u>5%</u> 1% |
| 3 | Carbamates (C). | <u>Bendiocarb</u> Propoxur | <u>0.1%</u> 0.1% |
| 4 | Pyrethroids (P) | <u>Deltamethrin</u> | <u>0.05%</u> |

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|--|--|--------------------|--------------|
| | | Permethrin | 0.75% |
| | | Lambda cyhalothrin | 0.05% |
| | | Cyfluthrin | 0.15% |
| | | Etofenprox | 0.5% |

- Directorate of Malaria Control (DoMC) through its provincial counter partners and other stakeholders will **discourage** the;
 - indiscriminate use of insecticides through careful planning of targeted interventions in target areas
 - use of non-recommended insecticides (technical material and formulation and source) of/by WHOPEs in the country
 - use of same insecticides (class) against adults and larvae at the same time
 - use of same class or related insecticides for IRS and LLINs in the same implementing areas
 - unnecessary and irrational use of IRS operation i.e. inappropriate selection of target areas based on political influence etc
- Directorate of Malaria Control (DoMC) through its provincial counter partners and other stakeholders will **promote** the;
 - proper and timely entomological and resistance monitoring and effective data management
 - data management units (DMUs) at all levels
 - close and efficient coordination among all stakeholders and partners
 - development and management of sentinel sites in all epidemiological stratum
 - filling the knowledge gap and capacity building for studying the mechanisms of insecticide resistance and the impact of current insecticide resistance management strategies
 - *rotation of insecticides*: Two or more (preferably) insecticides with different mode of action will be rotated from one year to next. *Note: Note: Insecticide will be changed immediately when there will be report of development of resistance in a particular area. However, the same insecticide will be continued to be used in other areas where no resistance has been reported. In view the available data in country, insecticide of carbamates group should be included on rotational basis with pyrethroids*
 - *combination of interventions*: Two or more insecticide-based vector control interventions will be used in a house (e.g. pyrethroids origin insecticides on nets and insecticides of other class, preferably carbamates on walls) resultantly the same vector species is likely to come in contact with 2nd insecticide if it survives after exposure to 1st one. *Note: Operational cost should also be considered in this regards*
 - development of functional coordination unit (IRM-Decision Making Body) with other relevant departments like agriculture, environment, municipalities etc involve in use of insecticides

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- entomological reference laboratories network at provincial headquarters
- district level entomological laboratories and insectories
- Development/up-gradation of entomological surveillance tools and overall reporting mechanism for monitoring of insecticides resistance
- Regular capacity building of malaria staff for such sensitive studies
- Ensures the safe and secured handling of public health pesticides. This includes;
 - development/strengthening of storage and disposal facilities at all levels
 - transportation
 - appointment of designated focal persons for all above mentioned activities.