Integrated Vector Management: Policy and Implementation under National Vector Borne Disease Control Programme, India


Abstract

One of the major Public Health Programmes in India for control of malaria is now covering six vector borne diseases viz., Malaria, Dengue, Chikungunya, Japanese encephalitis, Visceral leishmaniasis and Lymphatic Filariasis. The programme is therefore renamed as National Vector Borne Disease Control Programme (NVBDCP). The prevention and control of vector borne diseases are based on parasite control and vector management. Vector control strategies under NVBDCP were proved to be a successful tool in interrupting disease transmission with high coverage but later they showed their weaknesses, especially related to technology and management issues. It is well known that the development of insecticide resistance played a role in the breakdown of the malaria eradication campaign of the 1960s. This necessitated to reduce over-reliance on a single intervention and to adopt synchronization of different tools in an integrated manner with flexible approach to the control of vector-borne diseases. Policies and programme activities of vector control, in an integrated manner, have been detailed in the article.

Introduction

The National Vector Borne Diseases Control Programme (NVBDCP) under Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India is the nodal agency for implementation of activities for prevention and control of Vector Borne Diseases in India. The programme is subsumed under National Health Mission. NVBDCP deals with six vector borne diseases viz., Malaria, Dengue, Chikungunya, Japanese Encephalitis, Lymphatic Filariasis and Visceral Leishmaniasis (Kala-azar). The transmission of vector borne diseases is dependent on the frequency of man-vector contact, which is further influenced by various factors including vector density, vector bionomics and climatic factors etc.

Three pronged strategy is recommended under the programme for prevention and control of VBDs viz., (i) Disease Management (ii) integrated Vector Management and (iii) supportive intervention including capacity building, IEC/BCC, monitoring and evaluation. Healthy Public Policy is an integrated approach to improving health and reducing health disparities in policy, program, and project decisions made in both public and private sectors. World Health Organization (WHO) has played a leading role in developing and endorsing the concepts and practices that support Healthy Public Policy. Community involvement has been part and parcel of any successful public health programme and it has been elaborated and guidelines have been made available. Chemical control is the most important element in the integrated approach to control of vectors and pests of public health importance. It includes the use of vector control, household and professional pest management pesticides. Insecticides play an important role in the prevention and control of vector borne diseases. Since public health pesticides are used in close proximity to human beings, as well as in sensitive ecological areas, their proper management is critical. Integrated vector management (IVM) is a rational decision-making process to optimize the use of resources for vector control. Though initially in malaria control programme, maximum reliance was on DDT for

*Directorate of National Vector Borne Disease Control Programme, Delhi-110054

Correspondence to: Dr. P. K. Srivastava, Joint Director, NVBDCP, 22-Sham Nath Marg, Delhi-110054. E-mail: pkmalaria@yahoo.co.in

residual spray, currently different vector management strategies are adopted based on entomological inputs and programme feasibility. The main tools being used under the programme are insecticides (DDT, Malathion and Synthetic Pyrethroids etc) for residual spray; insecticide treated nets or Long Lasting Insecticidal Nets (LLIN) in high risk areas; larvicides mainly in urban and peri-urban areas; biological control through larvivorous fish; elimination of vector breeding sources and sanitation etc.

Entomological monitoring supports in assessing impact of ongoing vector control interventions and decision making for selection of appropriate insecticide and formulating policies.

For implementation of programme activities, every state has a Vector Borne Disease Control Unit headed by a State Programme Officer, who is supported by district level officers. Besides, each state has State Health Society at state level and District Health Society at district level through which the funds are released. They also play a crucial role in district planning and in monitoring of programme activities.

Policy and Guidelines

Effectiveness of vector control has been well recognised in prevention & control of vector borne diseases. During sixties, many programmes succeeded in reducing vector borne diseases, however, the gains could not be sustained due to various technical & administrative factors. Different tools of Vector Control & its judicious use with collaborative approach has been felt which led to new approach to vector control as Integrated Vector Management which is now being endorsed as recommended strategy. In India, pre- DDT era was based on use of larvicides but after DDT discovery, vector control depended mainly on DDT and it paid dividends. The resurgence of malaria, gradual decline of adequate coverage during IRS in rural areas and increasing malaria in urban areas necessitated for combination of tools with selective vector control. During 1971, Urban Malaria Scheme (UMS) was launched with anti- larval measures being a main component. After 1977, the policy was revised under “Modified Plan of Operation” which guided for prevention and control of malaria in both rural and urban areas. Besides, National Filaria Control Programme, which was focussing on the control of Culex – the filaria vector, was merged with the programme and integration of use of larvicides started. The present vector control strategy is a mix of various components under umbrella of Integrated Vector Management (IVM) including adulticides for adult control based on the principle of reducing longevity and human- vector contact. LLIN/ ITN is included where Indoor Residual Spraying (IRS) is not feasible or cannot be improved with the desired level of coverage in remote and inaccessible areas. Larvicides are used in urban areas, as IRS is not acceptable by and large, however, slums are covered with IRS. IEC and social mobilization for community involvement is integrated as a major component under IVM.

Indoor Residual Spraying (IRS) is implemented selectively only in high risk pockets and the unit is sub- centre for malaria whereas it is village for Kala azar. The spraying is scheduled in such a way so that the peak transmission period is covered. Over the years, there is a paradigm shift and minimum use of chemicals, use of eco- friendly insecticides, use of alternative methods like personal protection, bio- larvicides and biological control agents besides source reduction have been envisaged. The change of insecticide is considered by Technical Advisory Committee (TAC) based on resistance status among vectors and epidemiological data. DDT use for vector control under NVBDCP is mandated every year by a Mandate Committee chaired by Union Health Secretary. The criteria used are vector susceptibility and epidemiological impact in areas with DDT spray.

Fogging- outdoor spray with Technical Malathion is recommended to combat the outbreaks of arboviral diseases like Japanese Encephalitis by killing the infective mosquitoes. It is not recommended as a routine vector control measure.

Indoor Space Spray with pyrethrum extract 2% is recommended in the houses reporting dengue, and chikungunya cases and its surrounding houses in the radius of 200 mtrs (usually 50 houses).

Larval control is done using Temephos for non-polluted, and Biolarvicides for polluted water. It was confined to 131 towns covered under UMS and 206 towns covered under NFCP. However, in recent years, anti- larval measures have been extended to dengue and chikungunya affected areas. Introduction of new compounds are considered based on World Health Organization Pesticide Evaluation Scheme (WHOPES) criteria and requisite field trials in the country by research organization as per common protocol and
registration under Central Insecticide Board (CIB) for use in Public Health Programme.\textsuperscript{11-12}

**Component of Vector Control Activities**

The major tools being used under NVBDCP for prevention and control of six vector borne diseases are described in detail.

**Indoor Residual Spray in selected high risk areas:** Under integrated vector management initiative, IRS is implemented selectively only in high risk pockets as per district-wise micro plans. Depending on the Annual Parasite Incidence (API), different areas are covered with appropriate insecticide. About 80 millions population is covered with IRS annually. To ensure quality spray, supervision and safety precautions are advocated. Spraying usually starts to coincide with the build-up of vector population and before peak malaria transmission. Two rounds of spray are done for DDT and Synthetic pyrethroids whereas three rounds are done with malathion considering its residual efficacy to provide protection during the entire transmission season. DDT is used for malaria and Visceral Leishmaniasis control in India. The use of DDT in agriculture is banned. However, WHO Expert committee on malaria in 2000 recommended that DDT may be used for Indoor Residual Spray. A Mandate Committee under the chairpersonship of Secretary Health, Ministry of Health & Family Welfare, Govt. Of India regularly reviews the use of DDT and approves the quantity of DDT to be used annually for IRS in the identified states.

**Insecticide Treated Nets (ITN)/ Long Lasting Insecticidal Nets (LLIN)** have been introduced in the program as personal protection tool and to interrupt transmission. The upscaling of LLINs is on priority and about 11.8 million LLINs have been distributed by GoI to various states.

**Larvicides** used under the programme are Temephos and bio-larvicides. However, new molecules like insect growth regulators (IGR) are now being considered to be used under the programme.

**Source Reduction using minor engineering methods:** Control of larval breeding is done to limit the transmission of the Vector Borne Diseases (VBDs). Clearing the margins of the water bodies, de-weeding to ensure proper flow of water, filling of small temporary water collections will be done to limit the breeding. However, for large excavations and water bodies, the technical guidance for prevention of mosquito breeding is provided to the concerned agencies that are responsible to create mosquitogenic conditions.

**Biological control using larvivorous fish:** The larval control using larvivorous fish is feasible in certain ecotypes and settings; as such this method is propagated as a supportive intervention to control the breeding.

**Legislative measures** are to enforce such activities, which do not allow creation/proliferation of vector breeding. Such civic by-laws for prevention and control of mosquitogenic conditions already existed in few states/towns. The model by-laws were again circulated in 1995 to be implemented in towns. The law empowers the health personnel to visit, check breeding of vectors in and around the premises and issue notification of warning and penalize the defaulters. The state governments are regularly emphasized to extend these by-laws in other towns/cities and implement them effectively.

**Supportive Interventions** include Behaviour Change Communication, using print and electronic media, Public Private Partnership (PPP) & Inter-sectoral convergence with Non-Governmental Organizations (NGOs), Faith Based Organizations (FBOs), Community Based Organizations (CBOs), Local self-government (Panchayat) and various Ministries like Agriculture, Urban Development, Education, Information and broadcasting, Tribal and Social welfare, Railway, Surface transport, civil aviation, Port Health Authorities, Defence and Textiles etc to ensure support and incorporation of Health Impact Assessment component in the projects under respective ministries. Capacity building to develop skilled human resource is another major component of supportive intervention. Training at various level is done regularly especially before the spray for spray workers. The training on entomology and IVM are structured for four weeks, however, for spray workers, it is sensitization with practical demonstration.

**Central Monitoring** is done to improve the quality of IRS operations especially high endemic districts are selected for intensive Central Monitoring. Teams with representatives from NVBDCP, ICMR institutes, and Regional Offices of Health & Family Welfare and States offices are deputed to closely monitor IRS activities. The Dte. of NVBDCP has one Central Cross Checking Organisation at Delhi which has been monitoring
the implementation of vector control activities in National Capital Region (NCR) and National Capital Territory (NCT) of Delhi as a special intervention initiative. Based upon the rising trend of entomological indices (House Index, Container Index & Container Pupal Index), the Municipal Corporation of Delhi and New Delhi Municipal Council are advised to take anti-larval measures and source reduction for control of vector breeding in reference to Aedes aegypti, the vector of dengue and Anopheles stephensi, the vector of Urban Malaria.

Discussion

There is ample evidence that no single method is likely to provide a solution in all situations. The present trend is to adopt Integrated Vector management (IVM) approach by utilizing all appropriate technology and management techniques to bring out effective degree of vector suppression in a cost effective manner. Insect repellents can provide protection against malaria. In areas where vectors feed in the early evening, effectiveness of treated nets can be significantly increased by using repellent between dusk and bedtime. This has important implications in malaria vector control programmes. It has also been observed that vector control with microbial larvicides enhanced the malaria control achieved with ITNs alone. Anti-larval measures are a promising complement to ITN distribution in the economically important highland areas and similar transmission settings in Africa.

The Integrated Vector Management being promoted under NVBDCP needs strengthening and the opportunities available under the programme should be availed by implementing agencies after thorough analysis of the situation in their respective areas. This will make an important contribution to achieve the desired impact and also in achieving the millennium development goals by reducing morbidity and mortality. The cooperation from all stakeholders will benefit the programme, society and the country. On a global scale, there is a need for continued research to identify and evaluate new tools for vector control that can be integrated with existing biomedical strategies within national malaria control programmes.

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