World Health Day is celebrated on 7 April every year to mark the anniversary of the founding of WHO in 1948. Each year a theme is selected that highlights a priority area of public health. The focus of this year’s World Health Day is Vector Borne Diseases (VBD’s). Mosquitoes, flies, ticks and bugs may be a threat to your health – and that of your family - at home and when travelling. This is the message of this year’s World Health Day, which highlights actions we can all take to protect ourselves from the serious diseases that these “vectors” can cause.

Vector borne diseases (VBD’s): A public health priority

Vector borne diseases are one of the important causes for huge morbidity and mortality especially in developing countries. The most debilitating of these diseases are malaria, dengue, lymphatic filariasis, Japanese encephalitis, and leishmaniasis. VBD’s accounts for 16 % of the estimated global burden of communicable diseases. The most deadly vector-borne disease, malaria, caused an estimated 6,60,000 deaths globally in 2010. Most of these were African children. However, the world’s fastest growing vector-borne disease is dengue, with a 30-fold increase in disease incidence over the last 50 years. Globalization of trade and travel and environmental challenges such as climate change and urbanization are having an impact on transmission of vector-borne diseases, and causing their appearance in countries where they were previously unknown. Besides the direct human suffering, they cause significant obstacle to socioeconomic development. Since no effective medication or vaccine is available for number of these diseases, vector control is the only effective measure available to tackle the problem. Vector control reduces or interrupts disease transmission, because without the host - vector contact, these diseases cannot thrive. Vector control reduces illness and saves lives. In this regard, Integrated Vector Management (IVM) is the preferred approach in improving vector control.

World Health Day 2014 will spotlight some of the most commonly known vectors – such as mosquitoes, sand flies, bugs, ticks, and snails – responsible for transmitting a wide range of parasites and pathogens that attack humans or animals.

Goal: Better protection from vector-borne diseases

The campaign aims to raise awareness about the threat posed by vectors and vector-borne diseases and to stimulate families and communities to take action to protect themselves

Through campaign, WHO is aiming for the following:

• Families living in areas where diseases are transmitted by vectors know how to protect themselves;
• Travellers know how to protect themselves from vectors and vector-borne diseases when travelling to countries where these pose a health threat;
• In countries where vector-borne diseases are a public health problem, ministries of health put in place measures to improve the protection of their populations; and
• In countries where vector-borne diseases are an emerging threat, health authorities work with environmental and relevant authorities locally and in neighbouring countries to improve integrated surveillance of vectors and to take measures to prevent their proliferation

World Health Organization has highlighted the importance of Integrated Vector Management (IVM) through its recent publications. In this occasion, it is timely to discuss some of the highlights of IVM as advocated by WHO.

Integrated Vector management (IVM)

Integrated vector management (IVM) is a rational decision-making process to optimize the use of resources for vector control & making vector control more efficient, cost effective, ecologically sound, and sustainable. IVM is a
step towards an integrated disease management approach that incorporates all components of disease control including vector control, prevention, treatment, and human vulnerability. IVM will reduce the pressure imposed by insecticides to select for insecticide resistance.

Key elements of an IVM strategy

- Advocacy, social mobilization, and legislation: Promotion & embedding of IVM principles in designing policies, Community empowerment.
- Collaboration within the health sector and with other sectors.
- Integrated approach: Rational use of resources, integrating chemical & non-chemical vector control methods.
- Evidence-based decision making.

Steps in planning and Implementation of IVM

Past field observations, surveillance and situation analyses form the basis for a plan of action. Because almost every situation is distinct and complex, it is impossible to prescribe standard actions and strategies. (Figure 1)

**Initial technical assessment**

The first step towards vector control is the analysis of disease situation by epidemiological assessment (active & passive data collection) to determine the incidence, prevalence, & mortality of all vector-borne diseases, which is fundamental for designing and evaluating strategies. **Vector assessment** (ecosystem, role in disease transmission, habitat and seasonality, behaviour and their susceptibility to insecticides) should be done to determine the main vector species and their characteristics and stratification (classification of disease endemic areas by their epidemiological and ecological characteristics) to classify geographical areas according to the burden of vector-borne diseases in order to guide the allocation of resources to the appropriate areas.

**Operational steps**

Initial assessment should be followed by Analysis of local determinants of vector-borne disease like

- Parasite-related determinants: Characteristics of parasites/pathogens, status of insecticide resistance
- Vector-related determinants: Main vectors, breeding characteristics, vector density, & fluctuation.
- Human-related determinants: Population distribution & structure, high risk population, population movement, attitude towards disease, treatment accessibility, & effectiveness of the treatment in that population.
- Environment-related determinants: Rainfall pattern, local ecosystem, aquatic breeding habitat.

This helps to understand in detail where and when the risks for vector-borne disease occur. This would provide a basis for identifying the options for reducing the risks. Most determinants can be influenced by human intervention but risk factors such as rainfall patterns obviously cannot be controlled. Many determinants of disease are outside the scope of conventional programmes for vector-borne disease control, such as irrigation systems, urban development, sanitation, and housing. These call for the involvement of other health divisions, other sectors, and local communities.

**Mapping the determinants** is valuable for determining those locations in which there are risks for vector-borne disease and those in which they are greatest. This will allow selection that is more precise and targeting of vector control.

---

**Figure 1:** Process of decision making in IVM, indicating a technical component and operational steps. The cycle suggests a continuous process of decision making in response to changes in local conditions of disease.
 Selection of vector control methods: Vector control methods and their applicability to each vector-borne disease methods must also be assessed locally. The four general categories of vector control are: Biological (Natural enemy conservation, Biological larvicides, Fungi, Botanicals), Chemical (Indoor residual spraying, Insecticidal treatment of habitat, Chemical repellents), Environmental (Source reduction, Habitat manipulation, Irrigation management, & design, Proximity of livestock, Waste management) and Mechanical (House improvement, Removal trapping). The most appropriate ones for the local context need to be derived.

Requirements and resources: An inventory should be made of the financial, human, and technical resources available for vector-borne disease control at local level.

Implementation strategy: A local strategy for implementing and maintaining vector control should be formulated, which might be composed of targets, activities, roles and responsibilities (When to implement, Where to implement, who should implement). Participation of stakeholders in devising the strategy is essential.

Monitoring & evaluation: Planning, implementation and maintaining IVM must be monitored and evaluated in order to ascertain progress and impacts and to identify areas for further attention specifying the indicators to be observed, the methods to be used, the roles assigned and the timetable to be followed.

Challenges in vector control
The environmental and social determinants of health change constantly because of decision making that takes place outside the health sector. For instance, irrigation schemes change the environmental receptivity for vectors, new transport infrastructure allows parasites and vectors to travel greater distances, and population resettlement may introduce parasite carriers to receptive areas or to those who are not immune to pathogens transmitted by vectors.

Others challenges being capacity building, applied research, within-sector coordination, inter-sectoral collaboration, decentralization, community empowerment and vector surveillance.

Role & Responsibility
Prevention and management of VBD’s is not the responsibility of the health sector alone but requires integrated, multi-sectoral, multi-disciplinary approaches. As most of the major determinants of the disease burden lie outside the health sector, we need to ensure that the strategy for prevention and control of VBD’s cuts across all sectors and involves collaboration with many stakeholders. Other relevant sectors such as agriculture, environment, mining, industry, public works, local government, and housing should incorporate vector control into their own activities to prevent vector proliferation and disease transmission.

Problems that might be encountered without IVM:
- Suboptimal choice or timing of interventions, lack of monitoring and waste of resources.
- Vector control programme with a single-disease focus, not integrated into the existing health system.
- Vector control programme not optimally adapted to ecological and environmental conditions.
- Other sectors and communities insufficiently aware of the consequences of their activities on vector-borne diseases.
- Early resistance to insecticides.

Conclusion
 Appropriately & wisely planned Integrated Vector Management is the only effective option for the control of VBD’s which has to be communicated & implemented at all levels.

This helps in reducing the:
- Density & infection rate of vectors.
- Intensity & duration of transmission.
- Parasite incidence & prevalence.
- Disease morbidity & mortality.

Thereby giving right meaning for the WHO's commitment for controlling vector borne diseases.

References