Editorial

Importance of Integrated Vector Management (IVM) for the Control of Vector Borne Diseases

Uddin ANMM[1], Jewel MH[2]

DOI: https://doi.org/10.3329/jafmc.v20i1.73845

Vector borne diseases are the major illnesses of humans and animals caused by pathogens and parasites every year. More than one billion vector-borne diseases develop globally with a cause for the fatality of one million lives. Universally important vector-borne diseases include Dengue, Malaria, Leishmaniasis, Elephantiasis, Schistosomiasis, Trypanosomiasis, Chagas disease, Yellow Fever, Japanese Encephalitis, Nipah Virus, Onchocerciasis etc. According to the report of World Health Organization (WHO), one sixth of the illness and disability is due to vector-borne diseases, with more than half the world's population currently estimated to be at risk of these diseases.[1,2] Vector borne diseases affect urban, peri-urban and rural communities but thrive predominantly among communities with poor living conditions particularly lack of access to adequate housing, safe drinking water and sanitation. Malnourished people and those with weakened immunity are vulnerable to vector borne diseases. Illness and disability reduce working capability and supporting ability to their family and community. For many vector-borne diseases, there are no vaccines, and drug resistance is also a threatening factor. Control of vector-borne diseases therefore play an important role in health and wellbeing.[3]

The control of vector-borne diseases represents one of the greatest global public health challenges of the 21st century. Malaria, Dengue and other vector-borne diseases contribute substantially to the global burden of diseases and disproportionately affect poor and under-served populations living in tropical and sub-tropical regions. Vector control serves as an important cross-cutting activity that aims to enhance the impact of other strategic interventions with specific focus on prevention of selected neglected tropical diseases (NTDs) whose transmission cycle relies on vectors or intermediate hosts. Proven, cost-effective vector control tools and interventions include long-lasting insecticidal nets, indoor residual spraying, space sprays, larvicides, molluscicides and environmental management for specific target vectors. WHO recommends a coordinated approach to vector control which entails a rational decision-making process to optimize the use of available resources for this strategic intervention. In 2004, the WHO adopted IVM globally for the control of all vector-borne diseases.[4,5]

Integrated Vector Management (IVM) is a rational decision-making process that utilizes public education, surveillance, source reduction and different control methods to reduce mosquito populations and protect public health. IVM is a combination of different intersectoral interventions aimed at improving the efficiency, ecological soundness and sustainability of disease control measures against several vector-borne neglected tropical diseases (NTDs), including the sound management of public health pesticides.[6] This process is used for managing vector populations in a way that reduces or interrupts the transmission of disease. The Global Vector Control Response 2017-2030 builds on the IVM approach with renewed focus on human capacity at national and subnational levels, as well as strengthened surveillance, infrastructure and management systems. It includes reorienting relevant government programmes around proactive strategies to control new and emerging threats. The Integrated Vector Management strategy has five key elements: advocacy; social mobilization and legislation; collaboration within the health sector and with other sectors; integrated approach; evidence-based decision-making and capacity building.[5]

An IVM-based process should be cost-effective, have indicators for monitoring efficacy (impact on vector populations and disease transmission) and employ sustainable approaches compatible with local health systems. It should also allow effective planning and decision-making to take place at the lowest possible administrative levels. Cooperation between government and non-government officials, regulatory agencies, stakeholders and the general public is essential for successful implementation of IVM practices. At the same time, it's essential that mosquito and vector control authorities have adequate funding to implement all of the various IVM tools needed to protect public health. With the changing habit of mosquito species and increased potential for mosquito-borne disease transmission, mosquito and vector control operations are facing new challenges with limited resources to implement IVM.[5,7]

1. **Brig Gen Abu Noman Mohammed Mosleh Uddin**, MBBS, MPH, MPhil, Professor & Head, Department of Community Medicine, Armed Forces Medical College, Dhaka Cantonment (*E-mail:* noman_cmh@yahoo.com) 2. **Mehedi Hasan Jewel**, BSc (Hons), MS, Entomologist, Department of Communutity Medicine, Armed Forces Medical College, Dhaka Cantonment.

Figure: Key elements for IVM[8]

Integrated vector management uses a range of tools and strategies to tackle vector-borne diseases. Each tool plays a role within the integrated vector management framework, addressing different stages of the vector life cycle and targeting various points of disease transmission.[8,9]

These include:

a) Indoor Residual Spraying (IRS) is the application of insecticides to indoor surfaces where disease-transmitting mosquitoes' rest.

b) Larval Source Management (LSM) prevents larvae from developing into adults at mosquito breeding sites.

c) Social Behaviour Change Communication (SBCC) strategies promote behaviour change, encourage the use of preventive measures and adoption of vector control interventions.

d) Entomological Surveillance involves monitoring mosquito populations, their behaviour and insecticide resistance patterns. This helps inform decision-making and improves targeted interventions.

e) Long-Lasting Insecticide-treated Nets (LLINs) nets provide physical protection against mosquito bites and kill mosquitoes resting on net surface reducing the risk of vector-borne diseases.

Using these tools within the integrated vector management framework has many benefits:

a) By combining different strategies, we can target vectors at multiple stages of their life cycle, interrupting disease transmission more effectively.

b) Integrated approaches are shown to have a greater impact on reducing diseases compared to using a single intervention in isolation. For example, combining spraying with net distribution has shown to significantly decrease malaria transmission in various settings.

c) Using different tools also allows for synergistic effects, where the combined impact is greater than an individual intervention.

d) It promotes sustainable vector control by addressing all vector populations and minimising the risk of insecticide resistance.

There are challenges for establishing a viable IVM strategy. Mounting a formidable offensive against an array of chronic and debilitating vector-borne diseases is highly compromised by various reasons: environmental, socio-cultural, socio-economic, technical and programmatic; a weak health system; limited access to health services; lack of accurate entomological and epidemiological data to guide vector control planning and response; pesticide management and the threat of insecticide resistance development; weak planning and coordination amongst disease control programmes; a severely constrained skilled human resource base to drive the vector control agenda forward.[6]

Implementing Integrated Vector Management (IVM) has had a significant impact in many countries throughout the world. IVM is a shared responsibility. Through partnerships with WHO, USAID, FCDO, UNICEF and other donors, this strategy has significantly reduced the burden of vector-borne diseases. By working together to strengthen collaboration, promoting community participation and education, and ensuring adequate resources and funding for mosquito and other vector control activities, we can minimize the risk vectors pose to human health and wellbeing.

References

1. Handbook for Integrated Vector Management. World Health Organization, 2012.

2. Khan MAHNA. Important vector-borne diseases with their zoonotic potential: Present situation and future perspective. Bangl J Vet Med. 2015; 13:1-14.

3. Grepin KA, Reich MR. Conceptualizing integration: A framework for analysis applied to neglected tropical disease control partnerships. PLoS Negl Trop Dis. 2008, 2:e174 (1-4).

4. WHO. Global Strategic Framework for Integrated Vector Management. World Health Organization, 2004:1-15.

5. WHO. A global brief on vector-borne diseases. World Health Organization, 2014:1-56.

6. Chanda E, Govere JM, Macdonald MB, Lako RL, Haque U, Baba SP, Mnzava A. Integrated vector management: A critical strategy for combating vector-borne diseases in South Sudan. Malaria Journal. 2013; 12:369 (1-9).

7. Upadhyay AK, Maansi, Parmar T, Singh P, Pathak AP. Vector-borne zoonotic diseases. J Anim Health Behav Sci. 2018; 2:1–6.

8. Integrated Vector Management reduces and prevents disease by targeting multiple vectors and integrating various control strategies. Available from: https://mentor-initiative.org/activity/integrated-vector- management

9. Kumari R, Sharma R, Raina V, Chauhan L. Role of Integrated Vector Management for Prevention and Control of Japanese Encephalitis/ Acute Encephalitis Syndrome (JE/AES)- A Review. The Journal of Communicable Diseases. 2014; 46:93-108.