

5th Larval Source Management Work Stream Meeting
13.00-15.00, Friday 21st February 2014
Auditorium, IFRC, Geneva

Chair: Steve Lindsay
Rapporteur: Lucy Tusting

Steve Lindsay opened the meeting and welcomed participants.

Review of progress in 2013 – Lucy Tusting, London School of Hygiene & Tropical Medicine, UK

Lucy Tusting briefed participants on the main developments in larval source management (LSM) in the past year. The Cochrane Review of LSM was published in September 2013 (Tusting LS, Thwing J, Sinclair D, Fillinger U, Gimnig J, Bonner KE, Bottomley C, Lindsay SW., 2013. Mosquito larval source management for controlling malaria. *Cochrane Database Syst Rev*, **8**). In 13 included studies, LSM was associated with substantial reductions in malaria incidence and prevalence in appropriate settings. The review concluded that In Africa and Asia, LSM is an option in both urban and rural areas alongside LLINs and IRS, where sufficient larval habitats can be targeted. Further research was recommended to evaluate whether LSM is appropriate or feasible in rural Africa where larval habitats are more extensive. The LSM manual, which had input from many Work Stream members, was launched in July 2013 (WHO, 2013. Larval Source Management: A Supplementary Measure for Malaria Vector Control. An Operational Manual. Available: <http://www.who.int/malaria/publications/>). At the MIM conference in Durban in October 2013, Roll Back Malaria (RBM) sponsored a symposium on LSM. The United Nations Development Program (UNDP)/RBM 'Multisectoral Action Framework for Malaria Control' was published in September 2013 and advocates that LSM can be integrated into sectors outside health including agriculture, water and sanitation management and planning and construction.

Draft 2014 Work Plan

Steve Lindsay outlined a draft 2014 work plan: (1) update the environmental management handbook, (2) develop manuals for LSM in SE Asia and S America, (3) finalise a list of WHOPEs-recommended larvicides, (4) increase advocacy to funders/donors and (5) support national malaria control programs (NMCPs) doing LSM.

Discussion

- *LSM manuals*: It was decided that updating the environmental management handbook was not necessary at this stage. However a manual on mosquito control in urban tropical environments could be valuable, with the inclusion of dengue and chikungunya vectors and a focus on reducing nuisance biting in the context of broader mosquito control. It would be important to check this would not duplicate existing guides; the WHO Southeast Asia Regional Office (WHO-SEARO) for example has produced documents on dengue control.
- *Supporting NMCPs*: the importance of building local capacity for LSM (including for surveillance) was highlighted with the caveat that it is not yet clear how best to do so. One solution would be to have regional training centres for LSM, LLINs, IRS and insecticide resistance management in southern, eastern and western Africa. Additionally, the Work Stream could provide consultant expertise to LSM programmes by first outlining what is

needed for capacity strengthening at the country level and then identifying those best placed to provide support. Nigeria for example has budgeted for LSM and would like a consultant.

Increasing advocacy to funders and donors – Shiva Murugasampillay, World Health Organization, Switzerland

Advocacy is active support for a cause and in the context of LSM requires consensus among all parties, from field workers through to policy makers. The RAM-II project is a good example of advocacy for eliminating the malaria parasite in the Southern African Development Region. The potential of LSM was demonstrated in the past by the elimination of *An. gambiae* in Brazil and Israel and *An. arabiensis* in Egypt. Today, LSM is underway in many countries and leadership already exists. World Health Organization (WHO) policy on LSM has also evolved over recent years and, for the first time, information on LSM was collected for the 2013 World Malaria Report. In advocating for LSM it is important to consider the requirements of funders. For example, the new Global Funding Model board will look to WHO for guidance so it is important to present harmonised recommendations across all groups including the Vector Control Advisory Group (VCAG) and Vector Control Technical Expert Group (VCTEG). Others such as the World Bank and African Development Bank may be more independent in their thinking however united opinion on LSM should remain the endpoint. Other organisations to consider include the African Union, African Leaders against Malaria, European Mosquito Control Association and ECOWAS. In conclusion, advocacy for LSM could communicate that (1) LSM has potential as a tertiary and supplementary vector control intervention, (2) LSM is applicable wherever larval habitats can be adequately targeted and (3) LSM can evolve into general nuisance mosquito control.

Discussion

It is important also to consider the Malaria Advocacy Working Group, which is next meeting the week beginning 24th February 2014 in Geneva.

Supporting NMCPs doing LSM – Silas Majambere, Liverpool School of Tropical Medicine, UK

There is an urgent need to support NMCPs because many countries are currently implementing LSM in Africa including Angola, Zambia, Ghana, Tanzania, Nigeria, Burkina Faso, Malawi, Guinea Bissau, Equatorial Guinea, Benin, Mauritius, Mauritania and Gabon. However most have not followed the recommendations of the LSM Operational Manual, particularly in planning, choosing larvicides and monitoring and evaluation (M&E). The challenge is that some countries do not have a strong entomological monitoring system (and this is a cross-cutting emergency), although this can be quickly set up, and there is often no LSM officer at NMCP level. Countries could be supported by (1) listing those countries where LSM is being carried out or planned, (2) forming a body of experts who can give WHO-backed technical assistance and (3) linking up with a local research institute for M&E wherever possible (e.g. the Tanzanian NMCP and Ifakara Health Institute). Technical assistance could specifically help in training LSM officers and teams in (1) deciding where and when to larvicide, (2) writing local standard operating procedures and (3) testing and choosing larvicides; and in training field staff on (1) mapping and knowing habitats and (2) technical application of larvicides. In conclusion, the areas in which consensus is needed are: (1) whether or not NMCPs are the best sector to do LSM, (2) how a multisectoral approach can be achieved and (3) whether LSM should be community based or vertically managed.

Discussion

- The role of NMCPs in conducting LSM was discussed. It was suggested that NMCPs may not be the best sector to carry out LSM since other diseases and vectors can also be targeted. However it may not be possible to generalise across countries in this respect. Where there is a strong community input then the NMCP may take a lead role in conducting LSM and there may be an opportunity for NMCPs to provide leadership for LSM in coordinating different sectors. In 2004-2005 in Zambia, the NMCP helped install a three year environmental health course for technicians outside the NMCP to carry out LSM; this could be a good model for other countries.
- The importance of ensuring that resources for LLINs and IRS are not shifted to LSM in situations where LSM cannot be effective was stressed.
- Political support for LSM is crucial. Experience in Burkina Faso indicates that it is possible to make a large impact in urban settings however it is imperative that local politicians and communities see it as a priority.
- A system of sending experts to countries could be useful if not a duplication of WHO services; and if it could be funded. It is important to remember that countries may not specifically lack knowledge or technical skills, but NMCPs may simply be understaffed.

Urban Malaria Control Scheme in India – Ranjander Sharma, Ministry of Health, India

Vector-borne disease has historically been a major public health problem in India with a high prevalence of malaria, visceral leishmaniasis, dengue, chikungunya, lymphatic filariasis and Japanese Encephalitis. The Indian National Malaria Control Programme was launched in 1958 and as urban malaria became more problematic (for example malaria increased in Mumbai in the 1970s and 1980s alongside increased construction activities and labour migration from endemic areas), the Urban Malaria Control Scheme was sanctioned in 1971. 23 towns were selected for initial implementation and the scheme has subsequently been extended to 131 towns in 19 states, covering a population of 116 million. *Anopheles stephensi* is the primary vector. Interventions include channelization of rivers, larviciding and civic bye-laws to reduce larval habitats in construction sites and around buildings. Data on malaria cases and deaths in 19 states conducting LSM was presented for 2005 to 2013. Fifty-year trends in malaria incidence were also presented for Mumbai, Delhi and Mangalore. Ongoing challenges to the program include urbanisation and population growth, the increase in *An. culicifacies* in peri-urban areas, the intermittent drinking water supply (which encourages water storage), development projects without health impact assessments, inadequate health infrastructure, immigration and poor disease surveillance.

Larval Source Management for the control of vector borne disease in Pakistan – Muhammad Mukhtar, National Malaria Control Program, Pakistan

Malaria and dengue are the major vector-borne diseases in Pakistan. Dengue has increased from 4 endemic districts, 699 confirmed cases and 7 deaths in 1994-2003, to 119 endemic districts, 63,234 confirmed cases and 554 deaths in 2005-2011. The national vector-borne disease control program follows an annual cycle of planning (January to May), larviciding (May to June, which is the dry season) and IRS (July to August) in preparation for the peak transmission season (August to December). Malaria vector larval habitats are typically fish ponds, water tanks and water courses which are fixed and easy to target. The main vectors are *An. culicifacies* and *An. stephensi*. Dengue

vectors mainly breed in peri-domestic man-made containers which are an ideal target for LSM. LSM is carried out through larviciding, specifically comprising Breeding Site Assessment Surveys (BSAS) and mapping, evaluation of resistance to larvicides and repeat application (temephos and fenthion) at 7-10 days and 3-4 cycles per month. Habitat manipulation and modification are also done, for example water reservoirs are cleared of vegetation at their peripheries, their concrete edges are repaired and the flow rate is maintained, achieving good control of larvae (Ensink JH, Mukhtar M, van der Hoek W, 2007. Simple intervention to reduce mosquito breeding in waste stabilisation ponds. *Trans R Soc Trop Med Hyg*, **101**:1143-1146). Malaria and dengue control in the Punjab is based on Integrated Vector Management (IVM) and 'The Punjab Prevention and Control of Dengue Regulations, 2011'. This legislation bans old tyre businesses from storing tyres in outdoor areas, bans all containers that are potential larval habitats and discourages domestic water storage. In conclusion, while larviciding remains the priority intervention in Pakistan, particularly for malaria control, environmental management and IVM have also demonstrated their potential for sustainably controlling vector-borne disease.

Discussion

- The examples of LSM in India and Pakistan illustrate that there may be two scenarios where LSM can work: (1) 'opportunistic' LSM, where there are many uniform larval habitats (as in the Tennessee Valley Authority or Sri Lankan gem mine pits) and (2) 'intensive' LSM, which requires intensive discipline, management and organisation. It was clarified that although some examples of LSM in Pakistan may be described as opportunistic, the intervention has also been successful in areas not characterised by numerous uniform habitats.
- Given the man-made nature of urban larval habitats in Asia there is an opportunity to improve the design of buildings and towns to reduce breeding.

Discussion and AOB

New Global Fund Model:

- LSM clearly has a major role to play in malaria control and we must consider whether this is a suitable juncture for countries to request funds from the Global Fund. The RBM Harmonization Working Group is currently advising countries on their Global Fund applications and will insert a paragraph into their guidance making it clear that in planned programs (1) larvicide products used should be WHOPES approved and (2) a very strong monitoring and evaluation component is required. Since a poorly proposed LSM component could jeopardise entire applications, countries need to be advised to proceed with caution. NMCPs must also provide evidence for the specific settings in which LSM can work. The publication of the Cochrane Review will provide some reassurance to the Global Fund board.
- Many opportunistic possibilities for LSM may exist and be easily missed. In order to encourage countries to find these, it may be helpful to collate stories of opportunistic success.
- Funding has been sought from RBM for the LSM Work Stream to convene ECOWAS workshops and to give technical assistance for LSM in 10 countries.

Steve Lindsay closed the meeting and thanked participants.