Conducting mosquito entomology and vector control training courses in the Eastern Mediterranean Region of World Health Organization for capacity building

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Malaria represents major health problems globally. Vector control measures are among the key interventions used to control and eliminate malaria. Strengthening the competence and skills of the health workers engaged in malaria control programme is critical. Different methods of education and training, including teaching as lecture, face to face, laboratory practice and field works was carried out during the course. The training manual of Malaria Entomology ad Vector Control published by WHO was taught. The manual of WHO was used for training. Vector control is the main activity for control of arthropod-borne diseases. Capacity building is the main components for the mosquito-borne diseases control in different countries. Global organizations with local agencies should facilitate these type of capacity building.

Keywords: Iran, Vector control, Mosquito Entomology

INTRODUCTION

Malaria and other mosquito-borne disease are the major problems worldwide. Malaria presents a major health problem globally. It is estimated that globally 243 million cases of malaria led to 863,000 deaths in 2008 (WHO, 2015). Currently there are proven and effective tools to fight against malaria including vector control measures (WHO, 2015). As these tools are scaled up, malaria endemic countries need to continually update the skills and competence of the health workers engaged in malaria control and elimination.

Malaria is one of the most important communicable diseases transmitted by anopheline mosquitoes (Diptera: Culicidae) to humans. In 2013, there are 97 countries and territories with ongoing malaria transmission, and 7 countries in the prevention of reintroduction phase, making a total of 104 countries and territories in which malaria is presently considered endemic. Based on WHO estimate, 207 million cases of malaria occurred globally in 2012 resulted to 627 000 deaths (WHO, 2015).
Malaria is one of the important infectious diseases in Iran with an average of about 15,000 annual cases in the last decade, while total recorded cases has dropped to less than 500 locally transmitted cases in 2013. More than 80% of malaria cases in Iran are reported from three provinces of Sistan and Baluchistan, Hormozgan, and Kerman in southern and southeastern areas of the country. The most routes of malaria cases are immigration from Afghanistan and Pakistan to southern and southeastern areas of the country (Ministry of Health, annual reports).

Over the last 20 years there has been a dramatic reduction of the malaria burden in I.R. Iran. While in 1991, nearly 100,000 cases were reported, in 2014, only 246 autochthonous cases were reported. All observations indicate that the data reflect the real situation and that the overwhelming majority of cases, which occur, are included in the national system, although there is room for improvement in the surveillance system. The spectacular progress can be ascribed to effective implementation of appropriate curative and preventive control interventions through a strong health care infrastructure. Social and economic development allowing better housing, use of air-conditioning etc. has also played a role.

Locally transmitted cases are now concentrated in the south-eastern part of the country, which are affected by extensive population movement across the border with Pakistan, where malaria control faces serious difficulties. In 2009, I.R. Iran set time-bound elimination objectives for its malaria program. There has been excellent progress since, but the continued risk of importation of malaria cases from Pakistan poses a huge challenge, politically, socially, operationally and technically, to malaria elimination in Iran. The situation in the next decade will be absolute elimination or one where a few small short-lived foci emerge from time to time as a result of importation. The latest number of autochthonous cases in the whole country is 42 including 23 local malaria patients, 7 relapsed cases, 12 imported from the other districts by end of July 2016.

School of Public Health, Tehran University of Medical Sciences with long history of work on malaria and publication of several papers on different aspects of malaria including insecticide resistance monitoring (Vatandoost et al., 2004; Vatandoost et al., 2005; Davari et al., 2006; Hanafi-Bojd et al., 2006; Davari et al.; 2007; Abai et al., 2008; Hasasan and Hossein, 2010; Vatandoost and Hanafi-Bojd, 2012; Soltani et al., 2013; Lak et al., 2002; Enayati et al., 2003), sibling species, molecular study, new record (Naddaf et al., 2003; Oshaghi et al., 2003; Sedaghat et al., 2003; Azari-Hamidian et al., 2006; Oshaghi et al., 2007; Mehrvaran et al., 2011; Naddaf et al., 2012; Dezfuli et al., 2003), novel methods for vector control (Soltani et al., 2008; Omrani et al., 2010 A; Omrani et al., 2010 B; Omrani et al., 2012; Chavshin et al., 2012; Soltani et al., 2012), faunestic study (Moosa-Kazemi et al., 2009; Oshaghi et al., 2011), use of plants for larval control (Hadjikakhooedi et al., 2000; Hadjiakhoondi et al., 2003; Oshaghi et al., 2003; Vatandoost and Vaziri, 2004; Hadjiakhoondi et al., 2005; Hadjiakhoondi et al., 2006; Sadat et al., 2005; Shahi et al., 2010; Khanavi et al., 2011; Sedaghat et al., 2011A; Sedaghat et al., 2011B; Khanavi et al., 2013; Vatandoost et al., 2012) using bednets and long lasting impregnated nets (Vatandoost et al., 2006; Moosa-Kazemi et al., 2007; Rafinejad et al., 2008; Soleimani-Ahmdi et al., 2012A; Soleimani-Ahmdi et al., 2012B; Vatandoost et al., 2013; Vatandoost et al., 2009), morphological studies (Emami et al., 2007; Doosti et al., 2006; Doosti et al., 2007), malaria epidemiology (Vatandoost et al., 2003; Hanafi-Bojd et al., 2010; Hanafi-Bojd et al., 2011; Hemami et al., 2013), ecology of malaria vectors (Vatandoost et al., 2006; Vatandoost et al., 2007; Hanafi-Bojd et al., 2011; Hanafi-Bojd et al., 2012A; Hanafi-Bojd et al., 2012B; Mehrvaran et al., 2012; Soleimani-Ahmdi et al., 2013; Soleimani-Ahmdi et al., 2012C; Vatandoost et al., 2011), biodiversity (Oshaghi et al., 2006; Nikookar et al., 2010), community participation (Soleimani-Ahmdi et al., 2012A; Hanafi-Bojd et al., 2011), vector control (Vatandoost et al., 2009), repellent evaluation (Vatandoost and Hanafi-Bojd, 2008), anthropophilic index of malaria vectors (Oshaghi et al., 2006A; Oshaghi et al., 2006B), training (Vatandoost et al., 2004) is designated as malaria training center by WHO. There are several reports on different aspects of malaria vectors recently (Khoshdel-Nezamiha et al., 2014; Chavshin et al., 2014A; Chavshin et al., 2014B; Karimian et al., 2014; Chavshin et al., 2015; Khoshdel-Nezamiha et al., 2016; Shayeghi et al., 2014; Gezelbash et al., 2014; Anjomruz et al., 2014A; Anjomruz et al., 2014B; Soleimani-Ahmdai et al., 2014A; Soleimani-Ahmdai et al., 2014B; Vatandoost et al., 2014B; Soleimani-Ahmdai et al., 2015; Ateie et al., 2015; Fathian et al., 2015; Soltani et al., 2015; Golfakhrahabi et al., 2015; Nikookar et al., 2015A; Nikookar et al., 2015B; Chavshin et al., 2015; Shayeghi et al., 2015; Pirmohammadi et al., 2016; Gorouhi et al., 2015; Abai et al., 2015; Sanei-Dehkordi et al., 2016).

**METHODS**

The training course was held in Bandar Abbas, Iran and had the overall goal of introducing to the participants basic entomology and vector control techniques as well as practical skills that will enable them to contribute to malaria control and elimination in their respective countries. The module consists 7 learning units including: introduction to malaria entomology, identification of malaria vectors, sampling malaria vectors, vector incrimination and malaria control, malaria vector control, monitoring and management of insecticide resistance, vector control in different malaria epidemiological strata,
protocol for mosquito rearing, treatment of insecticide treated nets, geographical reconnaissance, protocol for determining the susceptibility of adult mosquitoes to insecticides: WHO bioassay test Protocol for determining the susceptibility of mosquito larvae to insecticides, test procedures for determining the residual efficacy of insecticides on wall surfaces, test procedures for determining the residual efficacy of insecticides on treated mosquito nets. The course structure generally covered lectures group discussions, practical (field) and laboratory work were used. The course was participatory and interactive. Participants took pre- and post-course examinations. A total of 23 participants selected across different counties of EMR region took part in the course (Figure 1).

The training course commenced on the 26th of December 2012 with the introduction of participants and facilitators. Thereafter, the participants took pre-assessment test to assess their understanding of basic entomology. During the week the participants were taken through lectures. The topics included: Biology and ecology of Anopheline mosquitoes, malaria entomology: Different methods of mosquito collection (adults, larvae) and equipment required, identification of major malaria vectors (egg, larvae and adult stages), laboratory demonstration of mosquito age determination, Identification of major malaria vectors (egg, larvae and adult stages), study and identification of adult anopheline mosquitoes and larvae collected from the field, Epidemiological Principles (vectorial capacity) of malaria transmission in relation to vector control, vector control: classification of pesticides, formulation of pesticides, different methods of vector control, novel approaches to vector control, how to identify mosquitoes from the African region and on vectorial capacity in relation to malaria transmission.

Fieldwork
The participants were taken to the field to practice how to collect mosquitoes using landing, pyrethrum spray, light trap and exit trap techniques. The participants also did assessment of mosquito breeding sites and larval collections.

The rest of the week was devoted to some lectures and to laboratory work. The topics included mosquito identification, dissections of salivary glands for sporozoites and parity, insecticide susceptibility test on larvae and adult mosquitoes. This was done with supervision from the facilitators.

Practical Demonstrations
The participants practiced how to do human landing and pyrethrum spray collections as well as indoor residual spraying and fogging (Figure 2).

Mosquito identification and processing
Participants were taken through sorting and identification techniques using pictorial diagrams and how to process the mosquito samples for laboratory analysis (Figure3). The participants were also given a recap on the various entomological techniques.
Training facilities

There were adequate facilities for the delivery of lectures. These include a well-furnished spacious room for lectures with adequate audio-visual equipment, a white board, a slide projector and screen and a dedicated computer for the training. Each participant was provided with a copy of the entomology and vector control module (http://www.who.int/malaria/publications/atoz/9789241505819/en/). The laboratory was well equipped with over 23 dissecting and compound microscopes which made it possible for each participant to individually and independently do the laboratory work. There was enough reference collection of mosquitoes available for practical work.
Evaluation of the course and participants

Almost all the participants through verbal communication rated the entire course as very good, delivery of lectures as excellent and practical demonstrations and fieldwork as good. However, they were of the view that the duration of the entomology module was too short to properly accommodate all the 7 units and 6 annex especially the practical sessions. The onsite accommodation for participants enabled all the activities to be organized on time.

CONCLUSIONS AND RECOMMENDATIONS

In general, based on the assessments and interviews, the entomology and vector control module of the training was well executed within the short time allocated. Also considering the fact that most of the participants were programme managers and medical health professionals who have had very little knowledge on malaria entomology, the course achieved its purpose of providing them with basic information needed for decision making in malaria vector control activities in their respective countries. The participants and facilitators for the first time shared experiences with regard to malaria vector control activities between Africa and Mediterranean continents. Some aspects of the module that needed modification had earlier been discussed with tutors and this has been incorporated into the new version of the module. I will recommend that all the participants should be monitored and given the necessary support to enable them contribute to malaria control and elimination activities in their respective countries.

EVALUATION OF THE PARTICIPANTS

Participants was evaluated by results of post-tests, including all aspects of training. The minimum achievement was 14 of 20. The participant who achieved this score certificate of achievement was provided.

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REFERENCES


