



## Health Workers Adjustment for Elimination of Malaria in a Low Endemic Area

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### ABSTRACT

**Background:** Malaria elimination efforts face with substantial challenges and the role of health workers in address this challenge, particularly advocates and mobilizes communities. The aim of the study was to explore perceptions of health workers in relation to eliminating malaria in order to better understand the level their involvement in malaria elimination efforts. A qualitative approach was adopted based on key informant interviews with 26 health workers who working at community-level in malaria low endemic areas, southern Iran.

**Methods:** Data were collected through key informant interviews. Data were analyzed using thematic content analysis.

**Results:** Findings reveal that the majority of participants concerned with the imported malaria cases, without to address an effective solution to the issue. Health workers had positive perceptions on their basic knowledge and opinions in relation to their field work with emphases to integrate methods. Participants expressed willingness to contribute to malaria elimination effort. They also emphasized on continuous training, resource mobilization, and support. In addition, their perceptions on malaria elimination policy such as sustained financial investment to achieve elimination and integrated management of vector control were rather negative.

**Conclusions:** A mechanism should be considered that allow the health workers to feedback positively on their quality of their practice to health providers.

**Keywords:** Health worker, individual adjustment, Iran, malaria elimination, qualitative


## INTRODUCTION

In recent years, many malaria endemic countries around

the world have made substantial progress in reducing their burden of the disease and 34 of 97 countries are in progress of malaria elimination and eight of them are as being in the malaria elimination phase.<sup>[1-3]</sup>

Effective malaria elimination efforts prevent malaria transmission by promoting personal protection and providing appropriate case management with early diagnosis and effective treatment.<sup>[4,5]</sup>

As recommended by World Health Organization (WHO), to control and eliminate malaria successfully sustained

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political commitment, integration of evidence-based malaria research into health systems, intersectional collaboration, coordination with relevant sectors community participation, and mobilization of adequate national and international human and financial resources have been acknowledged.<sup>[4,6]</sup>

Previous review studies reported that as a result of the availability of efficacious interventions including long-lasting insecticide-treated nets (LLINs) and indoor residual spraying (IRS) and effective anti-malarial therapy major advances have been made in malaria control and elimination.<sup>[7-9]</sup> In spite of key interventions, control efforts remain inadequate. Reviews of the literature on malaria control and prevention have revealed the important role of the health workers in the study of behaviors related to the diagnosis, treatment, and prevention of malaria.<sup>[8,9]</sup>

In general, health workers have been an important element of many programs and provides an opportunity for consolidation of skills, expression of concerns, and provision of epidemiologic feedback to maintain motivation.<sup>[10-12]</sup> Patronage by respected health workers has also had the effect of increasing volunteer credibility and acceptability in the community.<sup>[13-15]</sup>

Among the WHO Eastern Mediterranean Regional Office countries, Iran is successful in terms of malaria prevention and control with a considerable reduction in local malaria cases. Iran reduces its malaria burden from 13,278 cases in 2007 to 4477 cases in 2009. To address the malaria problem, the national malaria strategic plan has set goals and developed technical and supportive strategies to reduce local malaria transmission. Through interventions on epidemic management and surveillance systems; case management; and vector control, Iran is aiming to eliminate *Plasmodium falciparum* by 2015, and to become malaria-free by 2025.<sup>[16]</sup>

Health workers provide health information, preventative, diagnostic, curative, and rehabilitative services. Furthermore, besides clinical presentation, the only factor significantly associated with malaria case management quality was health workers in Iran.<sup>[17,18]</sup> Therefore, adjustment of health worker should be highly consider.

Adjustment means the reactions to the demands and pressure of social environment imposed upon the individual. On the other word, it means how an individual can do his duties under different circumstances (Ref Dr. Vibasi). This paper emphasis on the process by which health workers in malaria elimination programs adjust to their external environment.

Since the role of health workers in many malarious countries is crucially important, this qualitative study was performed to describe the spectrum of knowledge and perception of health worker in the malarious area of

Iran, country. However, this paper presents findings from an assessment of the quality of health workers in malaria control and elimination programs.

## METHODS

The study used qualitative methodology. A semi-structure interview schedules was developed and used to interview health workers who had completed a master level on malaria and were in current employment in health authority in south of Iran. Data collection took place between January to March 2014."

### Selection of the study population

In general, medical entomologies are involved in malaria elimination efforts. Therefore, participants who qualified in Master of Science in Medical Entomology. Interviews were purposefully conducted among health workers whose activities can directly or indirectly impact on malaria elimination. The selection criteria ensured interviewees were willing to participate in the study, work in the district Health Authorities, with at least 3 years' experience in the Global Malaria Program.

A total of 26 key informant interviews were conducted with those health workers who consent verbally. All of the participants worked in government departments including the national malaria program.

Purposive sampling techniques were used based on specific purposes associated with the study's questions. An initial interview schedule was drawn up following piloting with three health workers. The interview schedule covered the following sections, each targeted at a different aspect of malaria:

The first section examined general malaria knowledge through questions about knowledge on bionomic of mosquito vectors ecology, epidemiology of the disease, and socioeconomic determinants of malaria.

The second section focused on different methods of malaria control and elimination, including participants' familiarity with and importance rankings of the various methods currently available.

The third section assessed the participants' basic knowledge and opinions in relation to malaria control and elimination policy in Iran, including questions about the deficiencies and successes of malaria control policies, as well as how policies could be improved.

The fourth and final section explored the integrated management of vector control programs.

An informed consent letter was presented to each person participating in the interviews to inform them about the nature of the study and how the information they provided would be used. Written informed consent

was sought from all participants before the start of all interviews (semi-structured), including permission to use anonymous quotes. During the transcription of recorded key informant interviews, any names were replaced with codes to ensure anonymity and digital recordings were deleted once transcription was completed and quality approved. All participants accepted the conditions and signed the consent form. Participants were interviewed privately and individually.

### Data handling and analysis

All interviews led by the investigator and lasted about 40–70 min. With permission from participants, each interview was audio-recorded for the accuracy of transcription and analysis. Data collection was continued until no new themes were emerging. At the end of each interview, a summary of results was read back to the participants to enable participants to confirm and revise emerged concerns. Data were evaluated by thematic content analysis. Coding was used to identify key themes and issues in the transcripts. Broad categories were then developed, based on themes related directly to questions asked in the interview schedule, as well as those emerged during the analysis. Transcripts were read and analyzed by two researchers of the project team who identified the main categories. A consensus approach was used to finalize.

## RESULTS

Totally, 26 key informants were interviewed. They were health authority staff with more than 3 years of experience in malaria elimination program and also they had Master of Science degree in Medical Entomology.

Following data analysis, four main themes areas were emerged from the data: Knowledge gap in practice, activities to move toward malaria elimination, malaria elimination policy, and integrated vector management (IVM).

### Knowledge gap in practice

All participants showed positive perception on malaria parasites, transmission, population movement, case

detection system, when responding to the questions about their basic understanding of the malaria elimination.

However, gaps regarding to questions are briefly shown in Table 1.

They reported that most malaria infections are imported to the area from east neighboring countries, Afghanistan, and Pakistan. Because of the geographical, natural, and climatic features prevailing throughout Iran's external borders, there is a potential danger that local transmission of malaria may begin again. Although the participants were aware of imported malaria by foreign immigrants, they did not know how to communicate and convince the immigrants for involving in malaria elimination intervention.

Though, all participants pointed out spring and autumn epidemic peaks of malaria, a few of them however felt that malaria transmission in endemic areas should be considered as a problem throughout the year. The most reason stated by these participants was suitability of climate conditions for mosquitoes' breeding during 9 months. One participant also mentioned that, due to climate change, the number of mosquito breeding places had decreased in south region of country. The participant also had good knowledge about malaria transmission foci.

To reply to a question about high-risk groups to malaria illness and death, the majority of participants mentioned children, pregnant women, and older people but they did not reply how specifically prevent them against disease.

As regards malaria interventions, majority of participants felt that a combination of drug therapy and vector control was the best approach of reducing the incidence of malaria infections while few of them were only in favor of vector control. When asked why participants thought that a combination of both methods should be used, many of them replied that to efficiently reduce malaria infections. One participant preferred drug therapy alone as the best method, giving the reason that drugs are readily available. Those who agreed with vector control activities believed that the national malaria plan has been successfully reduced malaria cases through scale-up of malaria prevention and control efforts.

**Table 1: Gaps of knowledge emerged from key informant interviews**

Question	Summary of responses	Gaps
Imported malaria	East neighboring countries	Not know how deal with them. Fostering partnership for elimination malaria
When malaria is the most serious	Spring and autumn	Lack of enough knowledge about reasons
High risk groups	Children, pregnant women and old people	Need to know how to prevent high risk peoples
Malaria elimination interventions	Both combination of drug therapy and vector control Only vector control Only drug therapy	Need to know how much each method is effective for eliminating malaria Practical capacity building activities
Interaction and communication	Unlikely to be effective Need to learn new skills Challenges in adjusting to unfamiliar communities	Insufficient skill to face with immigrants and unfamiliar communities. Community engagement in malaria elimination. Encourage Immigrant population

Some participants discussed that their current practice are unlikely to be effective to improve public health and requires fostering partnership for elimination malaria. A few of them also argued that they need to learn new skills for changing their practice, strengthening communications skills, improve their ability to apply innovative communications tools.

Almost all of participants thought in practice they face challenges in adjusting to unfamiliar communities such as minorities and immigrant population and they were mainly concerned about how to communicate with them.

### Activities to move toward malaria elimination

All persons participating had positive perception about activities in malaria elimination program in the study felt that major advances have been made in malaria elimination as a result of the availability of key interventions, including LLINs, rapid diagnosis test (RDT), IRS, and effective anti-malarial therapy. Summary of participant's feedback to questions about activities and policy toward malaria elimination is briefly illustrated in Table 2.

When they were asked to arrange all the current methods of malaria eliminations effort in order of their perceived effectiveness, participants only ranked those methods with which they were competent to perform. The descending order of perceived effectiveness was as follows: IRS; RDT; LLINs; environmental management; mosquito larviciding operation; use of mosquito repellents in the house, and biological control of the mosquitoes.

Participants were also asked what skills or training could have better equipped them to work in the field and to describe their perception of the quality of training. Many of participants felt they had adequate skills and training

to work, but highlighted greater knowledge of integrated vector control would have been beneficial. Some of them were concerned about quality and quantity of their training which might effect on their future career path.

"Many of our best-trained staff are getting older and nearing retirement, and no measures have been taken to ensure that they will be replaced."

When asked to indicate the methods they thought could cause more harm than benefit. IRS was ranked highest in this regard, followed by larviciding, biological control, environmental management, and LLINs. All participants gave reasons why they thought any of the above-mentioned methods may be damaging, indicating some of the following perceived effects for the different methods: IRS insecticides, e.g. DDT, are toxic and often inadvertently lead to development of vector resistance; contamination; people are easily exposed to the toxic chemical; people don't follow proper guidelines and get overexposed; ecosystem damage can harm environment; can affect biodiversity. LLINs may contaminate people, with long lasting effects. Larviciding may cause contamination of environment if concentrations used incorrectly. Incorrect formulations can lead to vectors resistance; persistent insecticides; long biodegradation time; can contaminate water sources. Biological control can contribute to the disruption of ecosystems. Environmental management may affect other species; can create more breeding sites.

### Malaria elimination policy

Understanding of all the participants about malaria elimination policies including both vector control policy and anti-malarial treatment policy were relatively well. In contrary, they had negative perceptions on the complexity of social factors.

**Table 2: Summary of responses and feedback to activities and policies related to malaria elimination**

Question	Summary of responses	Feedback
<b>Activities</b>		
Effective methods to use in malaria elimination	IRS, RDT, LLINs, Environmental management, Larviciding, mosquito repellents, biological control	Competent to perform
The skills or training they need and perceptions of training quality	They have adequate skills but need more for IVM	Quality and quantity for training of young staff
Harmful methods for vector control	IRS followed by larviciding	Environmental management is less harmful than others
<b>Policy</b>		
Elimination policy	Familiar with vector control and anti-malarial treatment policies Education and communication campaigns to increase the awareness of malaria	Negative perceptions on complexity of social factors and lack of sustained support Community awareness campaigns "Malaria Day"
Policy: Free distribution LLINs	Discomfort, low disease incidence and climate conditions	Low usage rate
Achievability of malaria elimination policies	Optimistic and pessimistic	Lack of support, limited staff, ineffective interventions, drug resistance, weak inter-sectoral collaboration Diagnosis RDT/Microscopy Identification of transmission foci

LLINs: Long-lasting insecticide-treated nets, IRS: Indoor residual spraying, RDT: Rapid diagnosis test



Participants mentioned the net usage rate was low and the main reasons were discomfort and low disease incidence, while the mass distribution of free LLINs was performed to encourage the inhabitants use bed nets.

One participant stated that "...even when bed nets were given for free, approximately many of them unused because of the heat or small size of bed net".

Many of participants were concerned about environmental conditions. They mentioned that the nature and characteristics of the climate had a significant impact on implementing policies.

Another main reason given for their negative perceptions were east neighboring countries. Some of participants felt that our current approach to control malaria was better than our neighboring countries citing good results from programs that have been implemented, and that a combination of insecticide-treated nets and IRS has been shown to be effective.

One of the health workers suggested "Most countries have some policies and regulations, but they are not properly applied. If we work together with our east neighboring countries to apply the same methods of control, current methods are effective."

When participants were asked whether they thought the goals and objectives of malaria elimination will be achievable through current malaria elimination policies. Most of the participants were optimistic, while some of them were concerned about constraints. Lack of support for operational activities, limited staff capacity, ineffective interventions and coverage, drug resistance, weak inter-sectoral collaboration between health sector and other sectors, and financial constraints were some of the obstacles identified by some of participants. As one participant cited, "reporting systems should be kept as simple as possible."

### **Integrated vector management**

All participants felt that IVM was main strategy for successful malaria vector control. They also recognized the key elements which supported the implementation of IVM including: Legislation; inter-sectoral collaboration; capacity building; social mobilization and research for evidence-based decision-making. When participants were asked to rank them, the results in order of most important were divers. Overall, inter-sectoral collaboration, capacity building, and social mobilization were ranked as more important by majority of participants.

When asked whether there was inter-sectoral collaboration in relation to IVM in an endemic area, majority of the participants said that they thought so, but they pointed that collaboration with other sectors were inadequate. The reasons given for this were: Financial constraints; difficulties in involving all possible sectors; political differences; lack of facilities; weak planning

and communication; poor report sharing and lack of monitoring and evaluation.

Some of the participants clearly stated they need skills to facilitate community engagement and readiness in implementing mosquito control interventions. Where little was done by health facility to inform the population about benefits of IVM, there is resistance from the communities. Participants pointed out that, the more the effort regarding sensitizing and educating a community, the more readily the community will cooperate in the interventions. Few participants suggested that for IVM to be effective some community organizations should become involved in order to strengthen community mobilization.

The final question asked participants to express a current capacity for malaria elimination. Almost all of them highlighted the current capacity for malaria elimination with regard to health system infrastructure, financial resources and training facilities should improve, and requires skilled staff to develop evaluation approach.

### **DISCUSSION**

In general, the current study found that participants who involved in malaria elimination programs had a good quality of knowledge about the epidemiology of malaria and vector ecology. There is no doubt that their accumulated experiences and gaining knowledge through practice could be a key to successfully malaria control and prevention interventions. As the results revealed that inadequate mechanism to obtain the health workers' feedback on performance was challenged. In general, to build confidence of health workers in the face of malaria elimination challenges, their experiences allow them to feedback positively on their quality of their practice to health providers. Therefore, promoting feedback system should be highly considered by Health Authority. However, the mechanism for this approach should be provided by malaria program managers in the Ministry of Health. As approved by previous studies, in which qualities of health worker service could be improved by feedback system for control and prevent malaria.<sup>[19,20]</sup>

We also released that the health workers limited their activities according to their institutional tasks while their useful individual role such as sharing their knowledge and experiences with others team members have been ignored. Therefore, any problems due to the mismatch between the institutional tasks and individual role performance should be feedback into the health system and adjustment should be made. Overall, mismatch between individual and the institutional tasks could be a barrier to implementation of best-practices and may influence on the behavior of individual health workers.<sup>[21,22]</sup>

The participants also mentioned on the problem of population movement especially immigrants from east neighboring countries. Usually, the majority of these population are illegal immigrants and job seekers. Therefore, border traffic, lack of education, mistrust of health services among the immigrant, and finally infection importation became a key challenge to malaria elimination in south and South-eastern Iran.<sup>[23,24]</sup>

Another important finding of this study was reply of participants about malaria elimination activities. They believed that prevention and vector methods as well as early diagnosis and treatment were main interventions fulfilled. Several studies have stressed the LLINs and IRS as an effective intervention for reducing malaria transmission.<sup>[25-27]</sup> Some previous studies have demonstrated the cost-effectiveness of mosquito net distribution.<sup>[25,28,29]</sup> Our finding revealed that while the use of LLINs is one of the cost-effective interventions against malaria, but insufficient attention has been paid to inform communities of the importance of mosquito net. Fortunately, the Health Authority in Iran distributes free mosquito net among people who live in areas with high risk of malaria transmission (personal communication). Participants also felt that RDTs can be cost-effective for health system when compared with the cost of treatment or other interventions. Several previous studies also approved the cost-effectiveness of RDTs.<sup>[30-33]</sup>

The results, however, indicated that the majority of the participants aware of the policy in malaria elimination, but they faced a number of challenging in implication of the policy. This finding is consistent with previous studies<sup>[34-37]</sup> that reported some policies and regulations are not properly applied, regarding to coordination problems, such as unclear responsibility, insufficient information, and overlapping of activities which lead to waste of resources.

However, it is important to point out that the results of the study are context-based and cannot be generalized. In addition, we have attempted to outline the "reality" of malaria elimination efforts from the perspective of health workers. It is obvious that the enactment of malaria is different from the perspective of patients and those involved in public health enterprises.<sup>[38,39]</sup> We therefore only present our partial interpretation, and these other perspectives will also be important to explore when considering the malaria control intervention. The study could have been strengthened further with the use of observational methods such as ethnography.

## CONCLUSION

Any problems due to the mismatch between the institutional tasks and individual role performance should be feedback into the health system and the health works'

role and task be adjusted. Based on health workers adjustment, collaboration between the health system and other sectors will be crucial for sustain and accelerate progress toward elimination. Furthermore, simultaneous research on the key elements of malaria elimination will also be necessary to help health workers adjustment in order to overcome the technical, policy, and community participation challenges.

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## Conflicts of interest

There are no conflicts of interest.

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## REFERENCES

1. WHO. Global Technical Strategic for Malaria and Control Elimination for the 2016-2025 Period; 2014. Available from: [http://www.who.int/malaria/areas/global\\_technical\\_strategy/en/](http://www.who.int/malaria/areas/global_technical_strategy/en/). [Last cited on 2014 Mar].
2. Narasimhan V, Attaran A. Roll back malaria? The scarcity of international aid for malaria control. *Malar J* 2003;2:8.
3. WHO. Global Strategy Plan: Roll Back Malaria, 2005-2015. Geneva: Roll Back Malaria Partnership; 2005.
4. WHO. Malaria Control in Complex Emergencies: An Inter-agency Field Handbook. Conference Publication Edition. Switzerland, Geneva: WHO; 2005.
5. Banek K, Nankabirwa J, Maiteki-Sebuguzi C, DiLiberto D, Taaka L, Chandler CI, et al. Community case management of malaria: Exploring support, capacity and motivation of community medicine distributors in Uganda. *Health Policy Plan* 2015;30:451-61.
6. Breman JG, Alilio MS, Mills A. Conquering the intolerable burden of malaria: What's new, what's needed: A summary. *Am J Trop Med Hyg* 2004;71:1-15.
7. Williams HA, Jones CO. A critical review of behavioral issues related to malaria control in sub-Saharan Africa: What contributions have social scientists made? *Soc Sci Med* 2004;59:501-23.
8. Mwenesi HA. Social science research in malaria prevention, management and control in the last two decades: An overview. *Acta Trop* 2005;95:292-7.
9. Maslove DM, Mnyusiwalla A, Mills EJ, McGowan J, Attaran A, Wilson K. Barriers to the effective treatment and prevention of malaria in Africa: A systematic review of qualitative studies. *BMC Int Health Hum Rights* 2009;9:26.
10. Azhar M, Lubis AS, Siregar ES, Alders RG, Brum E, McGrane J, et al. Participatory disease surveillance and response in Indonesia: Strengthening veterinary services and empowering communities to prevent and control highly pathogenic avian influenza. *Avian Dis* 2010;54:749-53.
11. Mutalemwa P, Kisinza WN, Kisoka WJ, Kilima S, Njau J, Tenu F, et al. Community directed approach beyond ivermectin in Tanzania: A promising mechanism for the delivery of complex health interventions. *Tanzan J Health Res* 2009;11:116-25.
12. Okanurak K, Sornmani S. Community participation in the malaria control program in Thailand: A review. *Southeast Asian J Trop Med Public Health* 1992;23 Suppl 1:36-43.
13. Brenner JL, Kabakyenga J, Kyomuhangi T, Wotton KA, Pim C, Ntaro M,

- et al.* Can volunteer community health workers decrease child morbidity and mortality in Southwestern Uganda? An impact evaluation. *PLoS One* 2011;6:e27997.
14. Harvey SA, Jennings L, Chinyama M, Masaninga F, Mulholland K, Bell DR. Improving community health worker use of malaria rapid diagnostic tests in Zambia: Package instructions, job aid and job aid-plus-training. *Malar J* 2008;7:160.
15. Walt G, Perera M, Heggenhougen K. Are large-scale volunteer community health worker programmes feasible? The case of Sri Lanka. *Soc Sci Med* 1989;29:599-608.
16. Raeisi A, Gouya MM, Nadim A, Ranjbar M, Hasanzehi A, Fallahnezhad M, *et al.* Determination of malaria epidemiological status in Iran's malarious areas as baseline information for implementation of malaria elimination program in Iran. *Iran J Public Health* 2013;42:326-33.
17. Akbari H, Majdzadeh R, Rahimi Foroushani A, Raeisi A. Timeliness of malaria surveillance system in Iran. *Iran J Public Health* 2013;42:39-47.
18. Raiesi A, Nikpour F, Ansari-Moghaddam A, Ranjbar M, Rakhshani F, Mohammadi M, *et al.* Baseline results of the first malaria indicator survey in Iran at the health facility level. *Malar J* 2011;10:319.
19. Yasuoka J, Poudel KC, Poudel-Tandukar K, Nguon C, Ly P, Socheat D, *et al.* Assessing the quality of service of village malaria workers to strengthen community-based malaria control in Cambodia. *Malar J* 2010;9:109.
20. Chandler CI, Whitty CJ, Ansah EK. How can malaria rapid diagnostic tests achieve their potential? A qualitative study of a trial at health facilities in Ghana. *Malar J* 2010;9:95.
21. Irimu GW, Greene A, Gathara D, Kihara H, Maina C, Mbori-Ngacha D, *et al.* Factors influencing performance of health workers in the management of seriously sick children at a Kenyan tertiary hospital – Participatory action research. *BMC Health Serv Res* 2014;14:59.
22. Hart PE. Types of structural unemployment in the United Kingdom. *Int Labour Rev* 1990;129:213-28.
23. Basseri HR, Abai MR, Raeisi A, Shahandeh K. Community sleeping pattern and anopheline biting in southeastern Iran: A country earmarked for malaria elimination. *Am J Trop Med Hyg* 2012;87:499-503.
24. Basseri HR, Raeisi A, Holakouie K, Shanadeh K. Malaria prevention among Afghani refugees in a malarious area, southeastern Iran. *Bull Soc Pathol Exot* 2010;103:340-5.
25. Lengeler C. Insecticide-treated bednets and curtains for preventing malaria. *Cochrane Database Syst Rev* 2000;2:CD000363.
26. Mungumbe K, Pool R, Montgomery C, Bavo C, Nhacolo A, Fiosse L, *et al.* What drives community adherence to indoor residual spraying (IRS) against malaria in Manhiça district, rural Mozambique: A qualitative study. *Malar J* 2011;10:344.
27. Trocchio J. Reporting community benefit: A guideline for navigating the IRS Form 990, Schedule H. *J Healthc Manag* 2009;54:301-6.
28. Yukich JO, Lengeler C, Tediosi F, Brown N, Mulligan JA, Chavasse D, *et al.* Costs and consequences of large-scale vector control for malaria. *Malar J* 2008;7:258.
29. Yukich JO, Zerom M, Ghebremeskel T, Tediosi F, Lengeler C. Costs and cost-effectiveness of vector control in Eritrea using insecticide-treated bed nets. *Malar J* 2009;8:51.
30. Lubell Y, Hopkins H, Whitty CJ, Staedke SG, Mills A. An interactive model for the assessment of the economic costs and benefits of different rapid diagnostic tests for malaria. *Malar J* 2008;7:21.
31. Nankabirwa J, Zurovac D, Njogu JN, Rwakimari JB, Counihan H, Snow RW, *et al.* Malaria misdiagnosis in Uganda – Implications for policy change. *Malar J* 2009;8:66.
32. Zikusooka CM, McIntyre D, Barnes KI. Should countries implementing an artemisinin-based combination malaria treatment policy also introduce rapid diagnostic tests? *Malar J* 2008;7:176.
33. Zurovac D, Njogu J, Akhwale V, Hamer DH, Larson BA, Snow RW. Effects of revised diagnostic recommendations on malaria treatment practices across age groups in Kenya. *Trop Med Int Health* 2008;13:784-7.
34. WHO Malaria Policy Advisory Committee and Secretariat. Malaria Policy Advisory Committee to the WHO: Conclusions and recommendations of March 2013 meeting. *Malar J* 2013;12:213.
35. Woyessa A, Hadis M, Kebede A. Human resource capacity to effectively implement malaria elimination: A policy brief for Ethiopia. *Int J Technol Assess Health Care* 2013;29:212-7.
36. Kusriastuti R, Surya A. New treatment policy of malaria as a part of malaria control program in Indonesia. *Acta Med Indones* 2012;44:265-9.
37. D'Souza BJ, Newman RD. Strengthening the policy setting process for global malaria control and elimination. *Malar J* 2012;11:28.
38. Mangham-Jefferies L, Wiseman V, Achonduh OA, Drake TL, Cundill B, Onwujekwe O, *et al.* Economic evaluation of a cluster randomized trial of interventions to improve health workers' practice in diagnosing and treating uncomplicated malaria in Cameroon. *Value Health* 2014;17:783-91.
39. Wiseman V, Mangham LJ, Cundill B, Achonduh OA, Nji AM, Njei AN, *et al.* A cost-effectiveness analysis of provider interventions to improve health worker practice in providing treatment for uncomplicated malaria in Cameroon: A study protocol for a randomized controlled trial. *Trials* 2012;13:4.