Malaria Control & Elimination

ISSN: 2470-6965

Mulenga et al., Malaria Contr Elimination 2016, 5:1
DOI: 10.4172/2470-6965/1000139

Short Commentary Open Access

Emerging Challenges of Efforts towards Malaria Elimination in Africa

Modest Mulenga*, Christine Manyando, Mike Chaponda and Mbanga Muleba

Tropical Diseases Research Centre, Broadway/ Nkana Road Junction, Ndola Central Hospital Building, Ndola, Copperbelt 10101, Zambia

***Corresponding author:** Modest Mulenga, Tropical Diseases Research Centre, Public Health, Broadway/ Nkana Road Junction, Ndola Central Hospital Building, Ndola, Copperbelt 10101, Zambia, Tel: 0977 787416; E-mail: mulengam@tdrc.org.zm

Rec date: Jan 15, 2016; **Acc date:** Mar 9, 2016; **Pub date:** Mar 16, 2016

Abstract

In the past decade there has been a significant reduction in malaria incidence globally. In some places continuous surveillance has indicated that the reduction in malaria cases has been sustained to the point of near elimination. The drastic reduction in malaria cases may be attributed to the unprecedented financial support to national malaria control programmes by several donors. The use of interventions such as insecticide treated nets, indoor residual insecticide spraying and to some extent environmental manipulation aimed at eliminating mosquito breeding sites have been responsible for the gains achieved. Application of a combination of these measures has brought about heterogeneity of malaria transmission within some countries. Some areas have recorded drastic reduction in the malaria burden, whereas in other parts of the same country transmission has remained relatively unchanged. This situation implicitly indicates that different approaches to malaria prevention and control or elimination are required in different parts of the same country. Changing malaria epidemiological patterns should also dictate the methods of malaria surveillance that are not only robust but also cost effective. Techniques for malaria diagnosis to support surveillance have to be sensitive and specific enough to pick up the lingering infections especially in low malaria transmission areas. In many malaria endemic countries application of such methods also require deployment of resources differentially in various parts of the same country, and that is a challenge. Chemoprophylaxis has been used in various ways to prevent malaria or avoid its complications in vulnerable populations. When transmission becomes low, new criteria are needed to identify populations that become more vulnerable to the adverse effects of malaria and qualify for chemoprophylaxis. The dynamic malaria epidemiological patterns emerging within countries are presenting unprecedented challenges that will need novel and cost effective ways of managing resources to sustain the reduction or elimination of malaria.

Keywords: Malaria control and elimination; Continuous surveillance; Use of combination of interventions: Insecticide treated nets; Indoor residual spraying and environmental manipulation; Heterogeneity of malaria transmission; Changing malaria epidemiological patterns; Malaria diagnosis to support surveillance; Chemoprophylaxis

Introduction

In the past decade there has been a significant reduction in malaria incidence globally. The WHO estimates that the number of malaria cases globally fell from an estimated 262 million in 2000 (range: 205–316 million), to 214 million in 2015, a decline of 18%. Most cases in 2015 are estimated to have occurred in the WHO African Region (88%) [1]. In some places continuous surveillance has indicated that the reduction in malaria cases has been sustained to the point of near elimination.

The drastic reduction in malaria cases may be attributed to the unprecedented financial support to national malaria control programmes by donors such as the Global Fund for AIDS, Malaria and TB, the Bill and Melinda Gates Foundation and other governmental and non-governmental well-wishers. Encouraged by these gains, malaria endemic countries have committed themselves to meeting the target of reducing malaria incidence and mortality rates by 90% by 2030 [1]. However, this is a major challenge requiring political-will, workable partnerships at all levels, strategic mobilisation and allocation of resources. In addition, scientific and technological advances are available to support appropriate surveillance and application of measures to reduce vector populations and parasite burdens in communities [2].

Changing Epidemiological Patterns

In Many African countries the successful reduction of malaria burden has occurred largely as a result of using relatively simple interventions aimed at breaking the transmission cycle of the disease. These include the use of insecticide treated nets, indoor residual insecticide spraying and to some extent environmental manipulation aimed at eliminating mosquito breeding sites. Application of a combination of these measures in countries such as Zambia has brought about heterogeneity of malaria transmission within the country (Figure 1). Some areas have recorded drastic reduction in the malaria burden, whereas in other parts of the same country transmission has remained relatively unchanged [3,4]. This situation implicitly indicates that different approaches to malaria prevention and control or elimination are required in different parts of the same country. Areas with a drastic fall in malaria prevalence should maintain or improve upon the existing measures, whereas where transmission has remained unchanged, targeted research is required to determine the best modalities of breaking the transmission cycle.

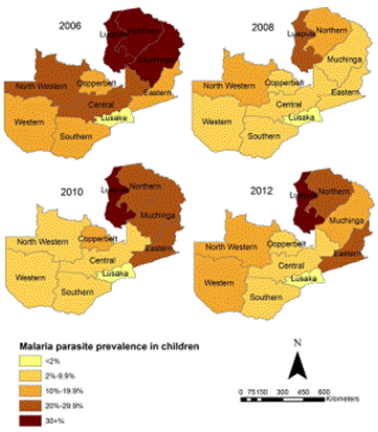

Figure 1: Shows the changing malaria transmission burden in Zambia from 2006 to 2012. Courtesy of the National Malaria Control Programme of Zambia.

Malaria elimination has become a possibility in malaria endemic countries and much effort has gone into the development of modalities to sustain measures that have proved to be effective. It is hoped that sustained use of effective interventions would lead to the elimination of circulating parasites capable maintaining the transmission cycle. It is also becoming apparent that although other natural or human factors cannot be ruled out as contributors to the decrease in malaria, the use of antimalarial drugs to reduce the parasite burden is important. Therefore, mass drug administration with safe and effective drugs is being considered as an effective tool to reduce the sexual and asexual parasites that sustain transmission.

Malaria Survey Control or Elimination Methods

Surveillance methods and strategies for determining the prevalence of malaria in highly endemic areas are designed to detect changes at population level [5]. Surveillance methods to determine the magnitude of malaria burden where the transmission has drastically decreased to extremely low levels has become a major subject for discussion. Changing malaria epidemiological patterns should also dictate the methods of malaria surveillance that are not only robust but also cost effective [5]. Techniques for malaria diagnosis to support surveillance have to be sensitive and specific enough to pick up the lingering infections especially in low malaria transmission areas. In many malaria endemic countries application of such methods also require deployment of resources differentially in various parts of the same country, and that is a challenge.

In areas with high malaria prevalence, the control measures are usually aimed at reducing morbidity and mortality [2]. In such situations it is cheaper to apply uniform malaria control methods across different parts of the country regardless the epidemiological and socio-economic dynamics. However, heterogeneity of transmission in the same country brings about formidable challenges regarding the choice of measures and strategies to use in different parts of the same country. Therefore, in such situations control programmes need to adopt strategies such as antimalarial drugs and insecticides according to sensitivities of parasites and vectors respectively.

Chemoprophylaxis

Chemoprophylaxis has been used in various ways to prevent malaria or avoid its complications in vulnerable populations. For example, intermitted presumptive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine is a well-known intervention for prevention of malaria and its adverse outcomes in pregnancy particularly in highly endemic areas of Africa [6,7].

Nonetheless, deciding whether to continue or not the use of IPTp in places where malaria is disappearing remains problematic. Difficult decisions have to be made concerning the most cost effective way of utilising this strategy in the same country with different malaria epidemiological patterns. It may be suggested that, selective use of drugs in those presenting with infection as indicated by simple at-point-of-care rapid diagnostic tests will increasingly become the norm rather than the exception.

Similarly, when transmission becomes low new criteria are needed to identify populations that become more vulnerable to the complications of malaria and qualify for chemoprophylaxis. For example patients with sickle cell diseases are required to take chemoprophylaxis to prevent sickle cell crisis that can occur when attacked by malaria [8,9]. The heterogeneity of malaria transmission is also presenting challenges of protecting people moving from extremely low to highly endemic areas. In those cases chemoprophylaxis may become necessary particularly in such groups as young children, non-immune immigrant populations and people living with HIV [10].

For the first time in many parts of Africa, chemoprophylaxis will have to be introduced on a large scale in new population categories. When chemoprophylaxis becomes imperative for such purposes, difficult decisions have to be made on the choice of the best existing or new antimalarial drugs to use. In such situations drug treatment should be specific and well-focussed as guided by appropriate diagnostic techniques with high specificity to avoid misuse of drugs [11,12].

Conclusion

The dynamic malaria epidemiological patterns emerging within countries are presenting unprecedented challenges that will need novel and cost effective ways of managing resources to sustain the reduction or elimination of malaria. The malaria control or elimination systems will need to adopt mechanisms to respond to unusual malaria epidemiological trends .In many resource-constrained countries of Africa this is easier said than done.

However, the goal of eliminating malaria in many parts of Africa has elaborated in a new paradigm of measures to reduce or eliminate malaria. These measures involve the use of novel scientific methods and technologies to be applied in different settings depending on the malaria epidemiology, climatic and socio-economic conditions. The application of these methods requires precise information about human and vector behaviours that influence malaria transmission, and knowledge about vector and parasite genomics. Special knowledge about the sensitivity of the parasites to antimalarial drugs, and availability of suitable vectors for parasite sustenance are needed to inform well-focussed interventions in different settings.

There are also a number of factors that threaten to reverse these gains and efforts to sustain the break in the transmission cycle that could make the goal of eliminating malaria become unattainable. These include the ever changing patterns or emergence of mosquitoes

resistant to affordable insecticides, persistence of parasite resistance to affordable and safe antimalarial drugs and changes in the environmental and climatic conditions, and human behaviours that promote breeding of mosquitoes and ultimately the spread of malaria.

References

1. (2015) WHO: World Malaria Report.
2. (2016) WHO: Global technical strategy for malaria 2016-2030.
3. Mukonka V, Chanda E, Haque U, Kamuliwo M, Mushinge G, et al. (2014) High burden of malaria following scale-up of control interventions in Nchelenge District, Luapula Province, Zambia. Malar J 13: 153.
4. Pinchoff J, Chaponda M, Shields T, Lupiya J, Kobayashi T, et al. (2015) Predictive Malaria Risk and Uncertainty Mapping in Nchelenge District, Zambia: Evidence of Widespread, Persistent Risk and Implications for Targeted Interventions. Am J Trop Med Hyg 93: 1260-12607.
5. Richard EC (2012) Malaria surveillance systems: from control to elimination. Global Malaria Programme, World Health Organization, Geneva, Switzerland. Malaria J 11: O1.
6. (2012) WHO Intermittent Preventive Treatment of malaria in pregnancy using Sulfadoxine-Pyrimethamine (IPTp-SP).
7. Ter Kuile FO, Van Eijk AM, Filler SJ (2007) Effect of sulfadoxine-pyrimethamine resistance on the efficacy of intermittent preventive therapy for malaria control during pregnancy: a systematic review. JAMA 297: 2603-2616.
8. Nwokolo C, Wamebe C, Akinyanju O, Raji AA, Audu BS, et al. (2001) Mefloquine versus proguanil in short-term malaria chemoprophylaxis in sickle cell anaemia. Clinical Drug Investigation 21: 537-544.
9. Okuonghae HO, Nwankwo MU, Offor E (1992) Malarial parasitaemia in febrile children with sickle cell anaemia. J Trop Pediatr 38: 83-85.
10. Van geertruyden JP, Eijk EV, Yosaatmadja F, Kasongo W, Mulenga M,et al. (2009) The relationship of Plasmodium falciparum humoral immunity with HIV-1 immunosuppression and treatment efficacy in Zambia. Malaria J 8: 258.
11. (2010) WHO: Guidelines for the Treatment of malaria (2ndedn), Geneva: World Health Organization.
12. Manyando C, Njunju EM, Chileshe J, Siziya S, Shiff C (2014) Rapid diagnostic tests for malaria and health workers' adherence to test results at health facilities in Zambia. Malar J 13: 166.