

Doubling National Efforts to Control and Eliminate Malaria in Zambia

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BACKGROUND

In 2009, Zambia received accolades of praise from the World Health Organization (WHO) for demonstrating 66% decline in malaria deaths and there was clear indication, then, that the country had reached the 2010 Roll Back Malaria target of a more than 50% reduction in malaria mortality compared to the 2000 baselines of malaria morbidity and mortality (1,2). As a result of this achievement, during that year's World Malaria Day commemoration held on 25th April 2009, Zambia's efforts and achievement were celebrated and promoted as a model for other countries to follow. This remarkable achievement was attributed to the country's multi-front approach to control and case management of malaria involving mass use of long-lasting insecticide treated mosquito nets (LLITNs), scale up of indoor residue spraying (IRS) and effective case management of malaria by introduction of artemisinin-based combination therapy (ACT) for the treatment of uncomplicated malaria. However, barely four years down the line, these achievements seem to be slipping away. What has gone wrong? Can this seeming slump in national malaria control activities be corrected and if so how? This editorial of the current issue of JABS attempts to address these vexing questions by giving a snap review of the national and world-wide scored successes in malaria control activities, lessons learnt and thereby charting an evidence-based way forward.

achieve the outright program goal of complete global malaria eradication (3-8). Understandably, appreciation of these successful achievements and failures of the 1955-1969 GMEP demands clear definitions of the terms disease 'eradication' and 'elimination'. For a long time, the definitions have been debatable and unclear among epidemiologists leaving the public confused on one hand, and worse on the other hand, misleading national policy makers as to how to set realistic targets with regard to national malaria control and elimination activities. The current generally accepted definitions (8-10) of these terminologies are as paraphrased and summarized in figure 1. With the understanding of these explicit definitions of malaria eradication, elimination and control, it must be appreciated that no single country can successfully eradicate the disease. Indeed, eradication of malaria may remain a pipe dream for any individual nation unless there are collated and sustained efforts by all nations towards elimination activities of the disease. While individual countries can eliminate malaria through sustained and well planned evidence-based control measures, eradication of the disease is only achievable at a global level needing concerted and sustained efforts by all countries.

Figure 1. Narrative and statistical description of Malaria control, elimination and eradication

Factors attributable to success in malaria Control in Zambia and worldwide

The first attempt by the World Health Organization (WHO) to eradicate malaria through a robust program, the Global Malaria Eradication Program (GMEP) of 1955-1969, yielded some remarkable successes despite failing to

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Malaria Intervention Phase	Control Phase	Pre-elimination Phase	Elimination Phase	Eradication Phase
Narrative Description	Malaria Prevalence levels are in proportions of public health concern necessitating continuous and sustained interventions/control measures	Reduction of malaria prevalence, in a defined area as a result of deliberate intervention measures, to remarkably low levels but the disease still poses to be a public health problem	Reduction to zero prevalence of malaria in a defined area, as a result of deliberate efforts, such that the disease is no longer considered a public health problem in the area despite still needing sustenance of interventional measures	Permanent reduction to zero of the worldwide prevalence of malaria necessitating no need of any intervention or control measures
Statistical Description	5% Malaria Prevalence	Malaria Prevalence of between 0 and 5% with zero or near zero mortality rates.	Localized and Sustained 0% Prevalence of malaria with zero percent morbidity and mortality.	Global 0% prevalence of malaria with zero % morbidity and mortality

It is worth noting here the factors that contributed to both the successes and failures of the 1955-1969 GMEP. Inherent in these factors are the key lessons learnt for effective planning of successful individual countries' national malaria control and elimination activities that can herald the global eradication of the disease. Box 1 summarizes these factors as reviewed by current literature (8, 11). The listed factors of success and failure for the GMEP need no further explanation. They are self-explanatory. A point of emphasis here, though, is the observation that by 1969, countries that vigorously embraced the cited factors of success with sound economies and relative political stabilities, North America and most of Europe, managed to eliminate malaria by the time the GMEP collapsed in 1969 (7-9). Meanwhile countries with no or limited resources, the whole of Tropical Africa, Asia and Latin America, that could not embrace the factors of GMEP success were also conspicuously rampant with the program failure features listed in box 1. The reader must not be left wondering why this enormous inequality in the geographical distribution of the GMEP successes. It has little to do with the biological factors of the vectors' (*Anopheles*) nor the virulent malaria parasites'(e.g. *Plasmodium falciparum*) perceived better biological fitness in the Tropics such as sub-Saharan Africa . No, not at all. A short glimpse into history (6-8) will show the reader that by the end of the 19th century when the mechanism of malaria transmission were finally elucidated by the 1902 Nobel laureate, Ronald Ross, malaria was ravaging the whole world more so in Europe such that at the end of the first world war a number of malaria intervention initiatives led by various expert groups were taken (8-13). One such expert group was led by Ross, Gorgas and Watson (8) who advocated for large-scale vector control campaigns with mass drug administrations while the other expert group was the League of Nations Malaria commission together with the Italian and Dutch schools of thought (8) who favored locally designed programs of controlling the disease by sustained development of case management facilities and effective management of the environment/sanitation (public health) in the background of sustained progressive improvement of socio-economic status of targeted communities. This was the genesis and solid background of the global malaria eradication efforts that heralded the successes of the 1955-1969 GMEP resulting into malaria elimination in Europe with cascade similar successes in North America. These successes achieved by the initial malaria eradication activities not only underscored the importance of embracing current scientific knowledge for effective management of the disease but also, and more importantly, signified the necessity of political and socio-economic stability as critical pre-requisites for the success of national malaria control and elimination activities. Boyd, in 1939, probably best summarized this public health point of view (14) when he said, "Malaria control should not be a campaign, it should be a policy, a long term program. It cannot

Box 1: Factors contributing to success and failure of the 1955-1969 Global Malaria Eradication Program (GMEP)

Factors attributable to Successful activities of the GMEP

- Discovery and development of dichlorodiphenyltrichloroethane (DDT), the first residual-long lasting and highly effective insecticide (in its early days before resurgence of resistance)
- Political commitment
- Robust global resource mobilisation from both public and private partners with establishment of dedicated GMEP funding mechanism-the malaria eradication special account.
- Creation of expert technical groups with spelt out eradication strategies
- Concurrent socio-economic growths

Factors attributable to failures of the GMEP

- Dependence on a single intervention/control tool, the Indoor Residual Spraying (IRS) with DDT with abandonment of previously well-known and evidence-based control tools.
- Inadequate GMEP access to remote areas such as tropical Africa
- Inadequate human resource and weak infrastructure
- Failure to maintain technical standards of complex field operations
- Failure to establish sustained surveillance systems concurrent with the GMEP activities
- Ineptness of the program to embrace as well as utilize existing and evolving research evidence
- Complacency in the Program
- Political instability

Key lessons Learnt from the GMEP

- The need to understand the epidemiology and transmission of the disease
- The necessity of consistently having and utilising effective (evidence-based) tools for diagnosis, treatment and prevention.
- Knowledge of the social, cultural and political factors of the target populations
- The need for broad coalition and partnerships (both at the political and community levels) towards resource mobilisations and execution of targeted control/intervention activities

be accomplished or maintained by spasmodic effort. It requires the adoption of a practicable program, the reasonable continuity of which will be sustained for a long term of years". Now, the reader should be alerted to the fact that at this time of the First World War up to the Second World War and throughout the period of the GMEP the whole of Africa, most

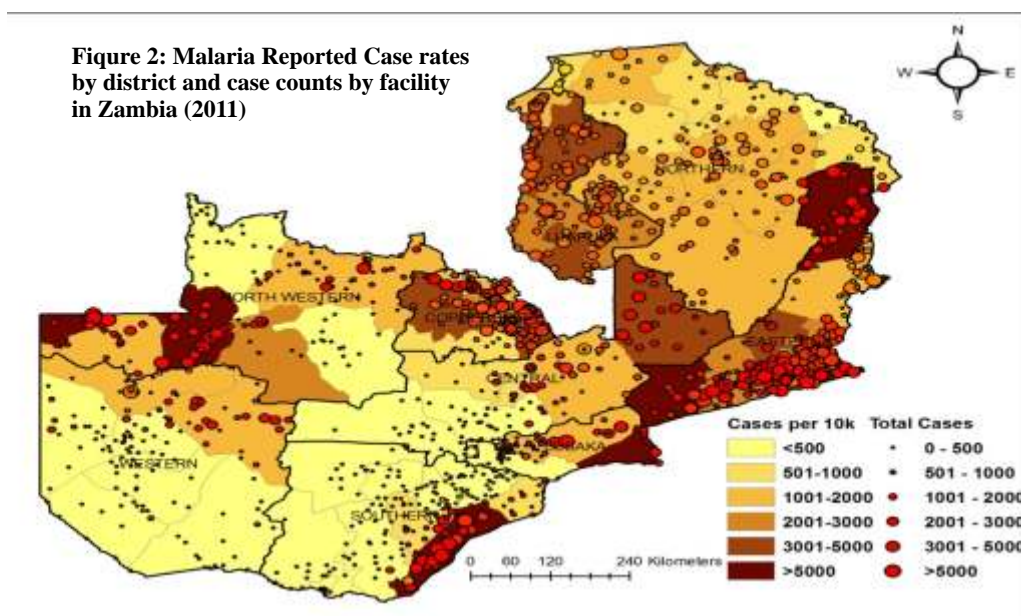
of Asia and Latin America were either under siege as European colonies or in turmoil of liberation and civil wars with political instabilities everywhere. The critical factors to ensure GMEP success could not be adhered to nor assured in these countries. There were no governments of the peoples of these malaria endemic regions and thus political commitments were elusive towards the GMEP in these geographical locations. In sub-Saharan Africa, and elsewhere, political instabilities (in form of military coup d'états, liberation and civil wars) persisted even during the post-colonial period of the 1960s till even as late as the 1980s with poor and unstable national economies. This thus, in part, explains the unequal distribution of the 1955-1969 GMEP outcomes with remarkable successes of malaria elimination being achieved almost exclusively in Europe and North America only and the program failures predominantly registered in the Tropics (Africa, Asia and Latin America).

Another point of emphasis with regard to key lessons learnt from the GMEP successes and failures is the critical necessity of having adequate and sustained program funds. The GMEP malaria special account largely (85%) depended on the generous contributions by the United States of America (USA) and thus there was a sudden huge financial constraints incurred by the program when in 1963 the USA cut off this contribution (15). This dramatically reduced the capacity of the WHO to provide technical assistance to the program. An additional point of emphasis besides the aforementioned necessity of political, socioeconomic and financial stability to ensure success of national malaria control and elimination activities is the ability and consistence for the program to embrace as well as utilize existing and evolving research evidence. Ineptness or complacency in this area results into ineffective programs. The best example of this observed from the GMEP experience was Sri Lanka, Ceylon as it was then known (11). Sri Lanka was the GMEP model country with regard to the training of malariologists. Now, Sri Lanka during its GMEP activities somewhat ignored and not utilized the 30 years accumulated knowledge of the periodicity of the malaria epidemic in the country and worse the program failed to react to the surveillance data showing 4 years deterioration of the disease morbidity and mortality. Hence during the period 1968-1969 there was resurgence of malaria in Sri Lanka after some remarkable GMEP successes. It was this experience, in part, that made

the WHO, at its 22nd World Health Assembly in 1969, to admit and declare that the GMEP main goal of global eradication of malaria, in short term, was not feasible but reaffirmed malaria eradication to remain the ultimate objective in the long term (16).

It is an opportune time here to mention similar observations with our national malaria control program trends over the time. However, due to the complexities of the whole scenario, it is beyond the scope of this editorial to go into the details and intricacies of our national malaria control program activities from the time of independence in 1964 to date or even the period prior to independence, the colonial era. However, for the sake of the focus of this editorial, it is worth mentioning that during the early years after independence (1964-1975), the period coinciding with the latter part of the GMEP, in Zambia malaria at national level was more seasonal than perennial and more of a rural disease than urban. There were robust control activities throughout the country with prominent involvement of the copper mining companies (17). During the period 1975-2000, the country experienced extreme economic recession with some relative political instability due to the liberation and civil wars of its neighbors. This period recorded the worst of the national malaria disease situation with the transmission becoming more perennial than seasonal and endemic throughout the country with somehow no rural preponderance. At national malaria program perspective, there were poor malaria disease control activities with probably prominence of features synonymous with program failure than with successes in reference with the GMEP key lessons learnt. The period from 2000 to date has shown steady improvement in national malaria control activities in background of somehow stable positive growth in the national economy (2). This improvement by 2009 culminated into remarkable achievements of success in national malaria control earlier mentioned to a point where

Figure 2: Malaria Reported Case rates by district and case counts by facility in Zambia (2011)



some regions of the country such as Lusaka Province and parts of Southern Province have pre-elimination malaria prevalence levels (Figure 2). However, as a matter of concern, the last two national malaria indicator surveys (MIS-2010 and MIS 2012) and data from the Zambian health management information system are showing some early resurgence of high malaria incidence in areas where prevalence had gone down.

Prospects of malaria elimination in Zambia and the foreseeable challenges

The vexing questions earlier asked at the beginning of this editorial with regard to our national malaria control program are worth repeating here now in a more informed manner. What has gone wrong in the last four-five years after world acclaimed national malaria control achievements recorded in 2009? Is it that our national malaria control program, like Sri-Lanka in the 1960s, has become complacent and hence this seemingly slump in disease control? Do we, as a nation, have prospects to eliminate malaria? With the reviewed literature and especially the afore-stipulated key lessons learnt from the GMEP (Box 1), these questions are probably no longer not as vexing.

It must be noted that the prospects of infectious disease eradication were enhanced and rekindled in May 1980 when the world was declared free of small pox by the World Health Assembly. This was after several years of concerted global efforts targeted to eradicate this disease and, indeed, several other infectious diseases have been targeted for eradication. Such other global infectious disease eradication programs include the yaws eradication program declared by WHO in 1954, Guinea worm eradication launched in 1986, the polio eradication launch in 1988 and the 2010 WHO launch of measles eradication by 2015(8). The question of focus is, "what was behind the success of the small pox global eradication?" The answer to this question has already been, probably, already well-articulated by our afore discussed factors contributing to the success of the GMEP. Dr. Bill Foege, the celebrated American public health specialist and perhaps the champion behind the success in the small pox eradication program, probably summarized this success quite well and explicitly when he said, "Small pox eradication did not happen by chance, but it was due to well-conceived plan and implementation by a committed set of public health individuals" (18). By agreeing with Dr. Foege to have well-conceived plans for successful disease eradications we subscribe that such programs must have clearly spelt strategies that are scientifically sound or evidence-based. This coupled with clear implementation plans and committed competent workforce signals success. This was demonstrated by the GMEP successes where malaria was eliminated in the past and even more recently in some countries such as Kazakhstan (Last case in 2001), Georgia (2009), Mauritius and Seychelles where

malaria has been declared eliminated while Cape Verde and Algeria are in the elimination phase (7,11). The question is, are there prospects to eliminate malaria in Zambia as it has occurred elsewhere? The answer from this editorial is a resounding, yes. The fact that in some regions of our country malaria prevalence has been scaled down to pre-elimination levels is a sure signal that Zambia with its well spelt malaria control program can eliminate the scourge from the country. All we need is to double the efforts we have employed during the recent recorded successes.

Lastly what are the foreseeable hurdles that could lead us to failing to achieve this noble national goal? Box 1 has already summed up these by listing out the factors attributable to failure of the GMEP and the key lessons learnt. We need to embrace those factors of success while we, at all cost, avoid the factors of failure. By doing this and doubling our efforts in carrying out our well-conceived strategies for elimination as spelt in the current national malaria 2011-2016 strategic plan we should be sure to control and eliminate malaria in Zambia and thereby contribute towards the long term global goal of eradicating this scourge from planet Earth.

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