Rolling back malaria in Africa

Malaria is a preventable and treatable disease that affects hundreds of millions of people, contributing to a vicious cycle of poverty and causing over 1 million deaths each year, with the biggest toll in sub-Saharan Africa. The economic burden of malaria has been estimated to be US$12 billion annually, slowing economic growth by 1.3% each year.[1] Addressing this burden has recently received increasing prominence on the political agenda of endemic countries and their development partners. The historic Abuja Declaration on Malaria in April 2000 committed to reduce malaria mortality by 50% by 2010.[2] The Millennium Development Goals, intended to resolve the most important structural constraints impeding sustainable economic growth and hence social progress in developing countries, include a global plan for scaling up country-level malaria activities and propose a target to reduce malaria morbidity and mortality by 75% by 2015 from the 2005 baseline level.[3] These declarations follow decades of oscillation between calls for 'frontal attack in an all-out campaign' and for 'sustainable gains, even if slow'.[4]

A range of effective tools to achieve these ambitious Abuja and Millennium Development goals are available. These malaria control interventions are generally considered highly cost effective.[5] Both indoor residual insecticide spraying (IRS)[6] and insecticide-treated bednets (ITNs)[7] have been shown to be highly effective for control of the anopheles mosquito vector. Early definitive diagnosis can be made using rapid diagnostic card tests where access to reliable microscopy is not readily available. Artemisinin-based combination therapies (ACTs) are generally considered the current best treatment for uncomplicated falciparum malaria.[8] This led the sixth African Malaria Day to be observed this year with the theme 'Get your act together' and the slogan 'Universal access to effective malaria treatment is a human right'.[9] Mortality from severe malaria is reduced by 34% with intravenous artesunate when compared with intravenous quinine.[10]

Despite clear evidence of the effectiveness of the available tools and massively increased international funding to support their widespread deployment, there have been relatively few success stories to date. In this edition of the *SAMJ*, Jacob Mufunda and colleagues describe their experiences in successfully rolling back malaria in Eritrea. Using data from their Health Management Information System they report a reduction in malaria morbidity of over 80% between 1998 and 2003.[11] This was achieved through the targeted implementation of improved vector control using both IRS and ITNs and improved case management with a treatment policy change from chloroquine to chloroquine plus sulfadoxine-pyrimethamine (SP). Further reductions in malaria morbidity and mortality might have been achieved if an ACT had been widely deployed, given the ability of ACTs to decrease the carriage of gametocytes (the stage of the *Plasmodium* lifecycle responsible for malaria transmission), in addition to generally higher cure rates.[12,13] The Eritrean case study published here does not specify the cure rate achieved with the non-artemisinin-based combination of chloroquine plus SP, so it is not clear whether it meets the World Health Organization target that treatment of uncomplicated malaria should cure over 90% of patients, with patient follow-up of at least 28 days.[7]

KwaZulu-Natal's Department of Health was the first in Africa to implement an artemisinin-based combination as first-line malaria treatment policy. The drug- and insecticide-resistant malaria epidemic that peaked in 2000 was successfully controlled following strengthened vector control in that province and neighbouring southern Mozambique and the change in treatment policy from sulfadoxine-pyrimethamine to the ACT, artemether-lumefantrine. As a result, malaria cases, admissions and deaths decreased by at least 97%, with these benefits being sustained for the past 6 years.[14] The implementation of this combination of interventions in KwaZulu-Natal was found to be cost effective, and resulted in substantial cost savings.[15] Malaria control success has been described recently elsewhere in Africa including in the rest of South Africa, Bioko,[16] Madagascar,[17] southern Mozambique[18] and Zambia.[19] These follow notable successes on the north-western border of Thailand,[20] Vietnam[21] and Brazil.[22]

Are there similarities between countries that have achieved this success? In each there has been a multi-pronged approach balancing malaria prevention with case management, which is essential given the complexity of the interactions between the mosquito vector, human host and malaria parasite. Community involvement ensured the high levels of coverage with IRS, ITNs and early treatment seeking and adherence with treatment. Effective malaria control policies require high-level and sustained political commitment to decentralised implementation of these policies and strengthening of the health care infrastructure to expand the availability of effective case management. Success has occurred most readily in areas on the fringes of malaria transmission, where the lower intensity of transmission facilitates malaria control. Furthermore, since the malaria burden in these areas is carried to a larger extent by potentially economically active adults, governments may be more strongly motivated to prioritise malaria control.[22] Active leadership, sufficient and sustained funding, broadening partnerships and operational research have also been identified as key drivers of success in malaria control.[23] There have been strong links between the malaria control managers and malaria researchers. Operational

research is needed to develop evidence-based policies and to target interventions appropriately. Monitoring the impact of these policy changes is essential both for confirming their effectiveness and for motivating for donor funding to be sustained. This requires reliable baseline data and monitoring of key outcome indicators.[24]

Why are there not yet more malaria control success stories? Insecticide and drug resistance and lack of resources have, until recently, been the major obstacles facing malaria control programmes in Africa. Previously unheard of levels of political, technical and financial support have facilitated the change in malaria treatment policy to artemisinin-based combination therapy in at least 38 African countries.[25] Similarly, many countries have committed to improving mosquito vector control through IRS and/or ITNs. However, the extent to which these changes in policy lead to improvements in malaria control depend entirely on how well they are implemented at a community level ('doing things right'). Process and health impact (outcome) indicators need to be defined early to monitor whether things are effectively implemented. Although an adequate health workforce is widely recognised to be one of the key ingredients in achieving improved health outcomes, global health initiatives are faced with human resource issues as a major system-wide constraint.[26] Impediments to proper use of human resources include shortage of skilled workers (particularly in rural areas), misuse of time, poor mentoring and lack of focus.[24] Vertical disease-specific control programmes are seldom able to overcome this bottleneck in the health care system. The high HIV prevalence in sub-Saharan Africa exacerbates human resource constraints by increasing the patient caseload while decreasing the workforce. Areas in which malaria control has been highly successful, such as South Africa, now face the additional risk that once malaria is no longer perceived to be a major health problem, communities may become less receptive to IRS of their homes or sleeping under and re-impregnating ITNs. In addition, as malaria incidence decreases, the high index of suspicion essential for early malaria diagnosis (and thus treatment) becomes more difficult to sustain among both patients and health care workers.

The public health, social end economic benefits of improved malaria control are great. The remarkable successes that have been achieved recently should be used as a foundation on which malaria control in these countries can be strengthened and sustained and from which these programmes can be extended regionally. The costs of not taking advantage of the window of opportunity created by the current levels of financial, technical and political support would be unconscionable, as this could result in the pendulum swinging back to the disillusionment and neglect of malaria control that followed the failure of the malaria eradication campaigns in Africa in the 1960s and 1970s.

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