Partnering to Eliminate Malaria in Zambia

In February 2015, several technical staff sat together to review the results from a jointly conducted study on malaria control (details provided in Appendix). Some of the scientists were from Zambia’s National Malaria Control Centre (NMCC) and others worked at a non-governmental organization, PATH, through its Malaria Control and Elimination Partnership in Africa (MACEPA). Everyone at the table agreed: these data were remarkable. The more the scientists discussed the results, the more excited they became. This study had major implications for malaria in Zambia—and elsewhere.

The preliminary analysis strongly suggested that the study’s Mass Drug Administration (MDA) strategy was reducing the incidence of malaria disease. In addition, MDA seemed to be driving down the infection reservoir among asymptomatic people in the study area of the Southern Province of Zambia. Further analysis with mathematical models indicated that if the intervention was sustained so current trends continued, then the MDA strategy would make it possible to eliminate malaria in the Southern Province.

The discussion became heated. If malaria could be eliminated in one region of Zambia, that would provide new evidence and motivation to work towards elimination throughout the country, an ambitious goal.

The technical experts around the table appreciated that it would not be easy to move from conducting one technical study in a single region to creating a national strategy for malaria elimination. The scientists realized that their new data and analyses—of malaria infections, mosquito populations, and community health worker activities—were not enough. A national malaria elimination effort would require mobilizing many partners, national and local leaders, and community members, and convincing them to get on board with this new approach.

How could NMCC and MACEPA get all the necessary partners behind the malaria elimination agenda? The technical staff agreed that they needed to better understand what the malaria stakeholders in Zambia thought about elimination. Then they would need to develop strategies on how to share the news of the successful trial and on how to move different stakeholders towards national elimination of malaria. The partnership between NMCC and MACEPA provided the foundation for this effort, but it was only the first step in creating a new malaria policy for Zambia.
Malaria in Zambia

Zambia is a landlocked country in southern Africa that shares borders with eight countries. While malaria was present in most areas of the country, the incidence, prevalence, and seasonality of the disease varied widely due to Zambia’s diverse geography and climate. In 2015, the World Bank categorized Zambia as a “lower middle income” country (17, see Exhibit A for additional data). The country was divided into ten provinces and sub-divided into 103 districts; governance had been undergoing decentralization for several years, in a process that gave local government structures more authority and control over resource allocation.

Health policies were developed at the national level and then communicated to the provinces and districts. District-level government authorities such as the District Health Offices were responsible for defining and then implementing local priorities that aligned with the national policies. Thus district-level government health structures were responsible for implementing malaria control efforts.

The National Malaria Control Centre (NMCC) was responsible for coordinating Zambia’s response to malaria. As a department in the Ministry of Health’s directorate of Disease Control, Surveillance and Research, NMCC developed national malaria control priorities and strategies that were periodically published in a National Malaria Strategic Plan. NMCC’s initial malaria control plan covered 2000–2005 (12). A second plan for 2006–2010 focused on “scaling up for impact” (10). And the plan for 2011–2016, entitled “Consolidating Malaria Gains for Impact,” sought to sustain the reductions achieved over the past decade (11).

Thanks to strong efforts from NMCC, and the commitment of many stakeholders, by 2013 Zambia had achieved significant gains in reducing the burden of malaria. The 2012 Zambia National Malaria Indicator Survey report found “consistent progress across all major indicators at improving malaria intervention coverage and reducing malaria burden” (13). By 2013, about 5.9 million insecticide-treated nets had been distributed. Between 2006 and 2008, malaria parasite prevalence in children under 5 years old had dropped by 53% and the prevalence of severe anemia had decreased by 69%. The NMCC had also found a 67% reduction in parasite prevalence among infants in the first 12 months of life, and overall delays in first infection (5). The efforts showed improved equity in access to malaria control interventions, progressively extending coverage to poor, remote, rural and malarious areas (see Exhibit B).

One goal of Zambia’s 2011–2016 National Malaria Strategic Plan (the third plan) was to eliminate malaria in five districts by 2016 (11). This was a preliminary step to test out the feasibility of setting an elimination agenda. Technical experts agreed that moving from malaria control towards elimination required an “accelerator,” something that would dramatically diminish the parasite reservoir for long enough to disrupt malaria transmission.

When NMCC and MACEPA were planning for the MDA trial in 2013, they realized that Zambia’s positive results in malaria control had resulted from combining multiple interventions: preventing transmission through insecticide-treated nets (ITNs) and indoor residual spraying (IRS) of insecticide; expanding access to intermittent preventive treatment in pregnancy (IPTp); promoting greater use of rapid diagnostic tests; and increasing the availability of artemisinin-combination therapies (ACTs) at health facilities and from
community health workers. These interventions were carried out with the efforts and resources of many different stakeholder groups in Zambia’s malaria community.

**NMCC & MACEPA**

The National Malaria Control Centre, under the leadership of the Minister and Permanent Secretary of the Ministry of Health, provided overall direction for the country’s response to malaria. One key partner to NMCC was MACEPA, which was established in 2004 by the international non-governmental organization PATH with a grant of US$35 million for nine years from the Bill & Melinda Gates Foundation. MACEPA’s partnership with the Government of Zambia began in 2005 to rigorously “evaluate the impact of implementing at national scale multiple effective malaria control interventions,” including ITNs, IPTp, and IRS (3). The initial goals of the partnership were to support the Government of Zambia’s efforts and to provide a model for other malaria endemic countries.

To facilitate the partnership, NMCC had provided MACEPA with office space within its own facilities. As both NMCC and MACEPA grew over time, MACEPA agreed to help construct an additional office structure in the NMCC compound. The parent organization PATH meanwhile added a country office and additional health programs in Zambia over the years, but MACEPA remained firmly based inside the NMCC. By 2013, the MACEPA team had grown to about 25 people based in the office in Lusaka.

All malaria control activities implemented in the districts—whether ITN distribution, community health worker training, malaria indicator surveys, or the MDA trial—were conducted by local implementers under the authority of NMCC and with MACEPA’s technical and material support.

NMCC organized multi-sectoral Technical Working Groups (TWGs), which received support from MACEPA as well as other partners. The TWGs brought together local experts and partners to consult on malaria policy with NMCC. TWG themes included: case management; vector management; information, education, and communication; and monitoring, evaluation, and operations research (including surveillance).

Between 2005 and 2015, NMCC and MACEPA had collaborated intensively, and the country had made great strides in the fight against malaria. The participants in the 2015 meeting to review the MDA study were a group of people who knew each other well and worked well together. They understood the challenges the country faced in fighting malaria in Zambia.

**The Policy Environment for Malaria Elimination**

Zambia played a special role in the global malaria community’s discussions about elimination of the disease. In 2007, Bill and Melinda Gates had issued a startling new global challenge. At the launch event, Melinda Gates said the time had come “not just to treat malaria or to control it—but to chart a long-term course to eradicate it” (9). Bill Gates noted that in the previous five years, a host of new partners and new resources had joined anti-malaria efforts, producing scientific advances in medicines, vaccines, vector-control methods, and diagnostics. In his remarks, he specifically mentioned Zambia’s achievements in malaria control, saying, “No single approach will work alone, but several partially effective approaches can have a huge impact. Zambia is an inspiring example of a nationally-coordinated effort” (8).
Around the same time, regional organizations in Africa were also beginning to call for malaria elimination. Earlier in 2007, the African Union’s Conference of Ministers of Health had launched an Africa Malaria Elimination Campaign, moving beyond previous commitments to improve malaria control efforts. Then the Southern African Development Community reiterated the commitment and began working on elimination frameworks. In 2009, a coalition of 49 African heads of state joined together in the African Leaders Malaria Alliance to work towards malaria elimination on the continent by 2030.

These challenges—from Seattle, South Africa, Abuja, and Addis Ababa—had resonated strongly in Lusaka. However, they needed to figure out how it could be done. This was the question that had led to the 2013 MDA trial.

**Moving Towards Elimination**

Implementation of malaria control occurred mostly through district-level implementers in Zambia. Their strategies were coordinated at district level by the District Health Office and public health facilities. Each district also had its own Malaria Task Force (MATF). The MATF was a multi-sectoral body comprised of local representatives of key implementers in the district to ensure coverage of services and avoid duplication of efforts. Government employees participated in the district-level malaria activities as part of their jobs. MACEPA or another partner organization funded daily lunch allowances of 50 kwacha (about US$5) for community health workers on the days when they worked for malaria campaigns.

Transforming malaria control into elimination would require an expanded workforce at the district and community levels. In addition, it would require increased budgets for human resources and for malaria commodities, with different interventions for each district, depending on the particular malaria circumstances in the district. This would all be overseen by the MATF. District-level implementers worried that the supply chain was not delivering effectively in 2015, and would be difficult to expand substantially. Some of NMCC’s staff were concerned about the repercussions they would face if they were committed to ambitious targets that they could not manage to meet.

Domestic financial contributions to malaria control activities had increased in recent years, as Zambia’s economy grew. The government was planning to provide about 28% of the malaria commodities budget from 2015–2017. The government was also investing in malaria indirectly through the Ministry of Health’s financing of staff salaries and operating expenses. But the amount of direct costs (about US$85 million) was still dwarfed by what the country would need for all costs, particularly if Zambia were to move beyond control towards malaria elimination. Senior policy makers in health and finance worried that Zambia did not have sufficient domestic resources and would thus need increased donor support for elimination. What would happen to the effort when donor funds receded again?

Various development partners had been supporting Zambia’s malaria interventions over time (see Exhibit C). The US President’s Malaria Initiative, for example, by 2010 was providing an increasing portion of Zambia’s expenditures on malaria control, with a goal of working towards reducing child mortality. The Global Fund for AIDS, Tuberculosis and Malaria was also a major donor to control efforts in Zambia in support of national and regional strategies.

The World Bank’s contributions to Zambia’s malaria control had declined in recent years. The World Bank had provided about US$20 million between 2005 and 2013 to a “Malaria
Booster Project” aimed at increasing coverage of malaria prevention and treatment (19). When that project concluded, however, World Bank funding for malaria had fallen off, shifting to focus more on health systems and nutrition (18). It was unclear whether the World Bank would support major efforts at elimination. Many other donors (such as UK’s Department for International Development, as well as others that had been contributing mainly through a basket-funding approach) had also decreased their malaria control funding for Zambia due to competing priorities.

Technical agencies, like the WHO, provided guidance on best practices and new technologies in public health. While many individuals at WHO headquarters were excited about the possibility of regional malaria elimination and the increased global attention to malaria eradication, many others were skeptical about the massive efforts and resources that would be required. Historical experiences with failed malaria eradication campaigns in the 1950s and 1960s had undermined the agency’s reputation in this field.

Zambia’s faith-based organizations had wide reach in the communities, often providing health services and community education. The Churches Health Association of Zambia, for example, was one of the largest health providers in the country and served as the chair of the Country Coordinating Mechanism for the Global Fund. Church and community groups that had committed resources to community education around bednet distribution, however, might not endorse the ambitious elimination goal with its more complex set of interventions.

Several private sector businesses in Zambia provided malaria prevention and case management to their employees. Some—such as Zambia Sugar or the Chibuluma, Konkola, and Mopani Mines—had also begun extending their malaria prevention services to nearby communities. NMCC would need to find ways to involve these private sector companies in malaria elimination, beyond their own employees and beyond financial contributions. Malaria elimination would also require the participation of other government agencies, beyond the Ministry of Health. These would include: the Ministries of Local Government and Housing, infrastructure and environmental agencies, and the Ministry of Finance and budgeting agencies. Members of Parliament could also be approached to support the broadened malaria campaign for elimination.

Finally, local communities across Zambia would need to be mobilized for malaria elimination. Some people still resisted the consistent use of bednets; others did not trust the results of rapid diagnostic tests. Access to ACTs remained difficult in many remote areas, and community members ended up turning to herbal or traditional treatments. Moving towards elimination would require effective interventions to change the thinking, behaviors, and access to health care of people at the local level.

Preparing for the Policy Change

The malaria scientists around the table in 2015 understood that transforming Zambia’s malaria policy to elimination would affect many stakeholders in the national malaria community. The scientists were concerned that some individuals or groups would not support this “zambitious” and difficult goal. Others, they knew, would want to see clear targets and timeframes. The MDA strategy required a concerted, well-timed effort that would require human, financial, and other resources.
The staff at the meeting in 2015 began listing the stakeholders they would need to talk to and persuade. The list grew longer. How should they approach them? Which ones first? What should they say to win their support?

Someone around the table suggested that they needed a “stakeholder analysis for policy change.” This process would allow them to systematically assess the political landscape on malaria elimination policy and consider strategies for change that would help create a more supportive environment for national adoption of this policy.

The participants agreed that NMCC and MACEPA would collaborate closely on planning and conducting the analysis and interpreting its results; NMCC’s role was especially important, since they would be responsible for moving this policy change forward in Zambia. A consensus began to emerge in the group.
**Exhibit A** – Selected statistics for Zambia

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2005</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>12,043,591</td>
<td>15,246,086</td>
</tr>
<tr>
<td>GNI per capita, PPP (current international $)</td>
<td>$2050</td>
<td>$3580</td>
</tr>
<tr>
<td>Life expectancy at birth</td>
<td>49.4 years</td>
<td>59.2 years</td>
</tr>
<tr>
<td>Under-5 mortality rate (per 1000 under-5 years)</td>
<td>111.7</td>
<td>70.2</td>
</tr>
<tr>
<td>Mobile cellular subscriptions (per 100 people)</td>
<td>8.3</td>
<td>71.5</td>
</tr>
</tbody>
</table>


**Exhibit B** – Key Malaria Indicators in Zambia, 2006–2015

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2006 MIS&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2008 MIS&lt;sup&gt;b&lt;/sup&gt;</th>
<th>2010 MIS&lt;sup&gt;c&lt;/sup&gt;</th>
<th>2012 MIS&lt;sup&gt;d&lt;/sup&gt;</th>
<th>2014 DHS&lt;sup&gt;e&lt;/sup&gt;</th>
<th>2015 MIS&lt;sup&gt;f&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Households with at least one ITN</td>
<td>38</td>
<td>62</td>
<td>64</td>
<td>68</td>
<td>73</td>
<td>77</td>
</tr>
<tr>
<td>% Households with at least one ITN per sleeping space</td>
<td>NA</td>
<td>33</td>
<td>34</td>
<td>55</td>
<td>27</td>
<td>63.9</td>
</tr>
<tr>
<td>% Children under five who slept under an ITN the previous night</td>
<td>24</td>
<td>41</td>
<td>50</td>
<td>57</td>
<td>41</td>
<td>58.9</td>
</tr>
<tr>
<td>% Pregnant women who slept under an ITN the previous night</td>
<td>25</td>
<td>43</td>
<td>46</td>
<td>58</td>
<td>41</td>
<td>NA</td>
</tr>
<tr>
<td>% Households in targeted districts protected by IRS</td>
<td>26</td>
<td>43</td>
<td>23</td>
<td>25</td>
<td>28</td>
<td>28.9</td>
</tr>
<tr>
<td>% Children under five years old with fever in the last two weeks for whom advice or treatment was sought</td>
<td>60</td>
<td>64</td>
<td>31</td>
<td>25</td>
<td>75</td>
<td>NA</td>
</tr>
<tr>
<td>% Children under five with fever in the last two weeks who had a finger or heel stick</td>
<td>NA</td>
<td>11</td>
<td>17</td>
<td>32</td>
<td>49</td>
<td>35.5</td>
</tr>
<tr>
<td>% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs</td>
<td>18</td>
<td>30</td>
<td>76</td>
<td>85</td>
<td>91</td>
<td>92.3</td>
</tr>
<tr>
<td>% Women who received two or more doses of IPTp during their last pregnancy in the last two years</td>
<td>59</td>
<td>66</td>
<td>70</td>
<td>72</td>
<td>73</td>
<td>78.8</td>
</tr>
</tbody>
</table>

Source: Table E in Reference #17

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Exhibit C – External funding (in millions, US$) for the Zambia Malaria Control Programme, 2003–2010

Source: Based on Figure 2 in Reference #4.
**Appendix: Accelerating to Elimination: Mass Drug Administration (MDA)**

NMCC and MACEPA had agreed on defining a target elimination district in Zambia’s Southern Province. Southern Province served as a “natural laboratory” because of its varied geography and epidemiology: an escarpment area on one side had low levels of malaria, while the lower areas along Lake Kariba and the Zambezi River had higher levels of malaria transmission.

**Map of the study area, divided into 60 health facility catchment areas that serve as the unit of randomization**

Source: Figure 1 in Reference 6

In 2011, they had rolled out a mass test and treat (MTAT) project, hoping it would serve as an accelerator to elimination. In addition to the district and national partners in Zambia, MACEPA designed and implemented MTAT with academic collaborators including researchers from Tulane University in the USA. Ultimately, the MTAT approach reduced malaria. However, the modelers’ analyses and projections revealed that the reductions would not affect the parasite reservoir sufficiently to reach elimination. The models showed that a more intensive approach was required (16). In order to interrupt transmission sufficiently to move towards elimination, a package of interventions was needed to support a community-based treatment accelerator to sustain gains over the long term.

In 2014, NMCC and MACEPA decided to test a new accelerator strategy: mass drug administration (MDA). The team posited that administering antimalarials to everyone in endemic areas, regardless of whether a rapid diagnostic test registered parasitemia, could be the accelerator. They also recognized that they would need to demonstrate any impact with robust scientific evidence. They initiated a community randomized controlled trial in 60 health facility catchment areas, stratified by level of malaria transmission, to test the effectiveness of MDA (6). Of the catchment areas, 40 were randomized into treatment groups (testing two versions of MDA) and 20 into a control group. The primary outcome measures tracked were:

- Parasite prevalence during the high transmission season in children under six years
- *P. falciparum* infection incidence rate among people aged three-months and older
- Total out-patient and in-patient malaria case incidence
- Proportion of individuals testing positive using rapid diagnostic tests at each round
In 2015, preliminary analysis of the MDA’s impacts suggested strongly that transmission was reduced enough to make elimination possible. The intervention was estimated to cost about US$4.75 per person treated per round (compared with US$5.50 per household for indoor-residual spraying, US$5.40 per long-lasting insecticide treated net, and US$2.50 per treatment for clinical malaria). (15)
## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACT</td>
<td>Artemisinin-based Combination Therapy</td>
</tr>
<tr>
<td>IPTp</td>
<td>Intermittent preventive therapy in pregnancy</td>
</tr>
<tr>
<td>IRS</td>
<td>Indoor residual spraying</td>
</tr>
<tr>
<td>ITN</td>
<td>Insecticide-treated net</td>
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<tr>
<td>MACEPA</td>
<td>Malaria Control and Elimination Partnership in Africa</td>
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<tr>
<td>MATF</td>
<td>Malaria Task Force</td>
</tr>
<tr>
<td>MDA</td>
<td>Mass Drug Administration</td>
</tr>
<tr>
<td>MTAT</td>
<td>Mass test and treat</td>
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<tr>
<td>NMCC</td>
<td>National Malaria Control Centre</td>
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References


