



CASES IN GLOBAL HEALTH DELIVERY

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CONDENSED VERSION

Malaria Control in Zambia

Dr. Elizabeth Chizema, coordinator of Zambia's National Malaria Control Centre (NMCC), reviewed the results of the newly released 2008 Malaria Indicator Survey (MIS), a national household survey. Zambia's new malaria control strategy seemed to be producing positive results. The MIS reported dramatic increases in the number of households participating in indoor residual spraying (IRS) campaigns and accessing insecticide-treated bednets (ITNs) and a significant decline in the incidence of malaria since 2006. However, difficulties in the delivery and appropriate use of malaria interventions, including antimalarial drugs and bednets, continued. With the 2009 annual budgeting and planning process approaching, Chizema considered how the NMCC and its partners could address the lingering challenges.

Zambia

Zambia is a landlocked country in southern Africa with more than 70 ethnic groups and a population density of 16 people per square kilometer; rural areas were sparsely populated (see **Exhibit 1** for map).^{1,2} Upon independence from Great Britain in 1964, Zambia was one of the most affluent countries in sub-Saharan Africa.³ Over the next decade, however, the declining price of copper and periods of prolonged drought severely strained the economy. The government borrowed money, accumulating a significant debt by 1981,³ and soon diverted revenue from development and social services to loan repayments. Per capita income declined from more than USD 700 at independence to USD 358 in 2003.³ In 2005, debt payments still accounted for 31% of Zambia's GDP (see **Exhibit 2** for socioeconomic and demographic indicators and **Exhibit 3** for health indicators).⁴

Health System

In the early 1990s the size and scope of the Ministry of Health's (MOH) responsibilities were significantly reduced and limited to allocating public health budgets, interacting with donors, setting national policies, and performing other legislative and administrative tasks.⁵ The country's 72 districts became the main administrative units in the health sector.⁶ District Health Management Teams (DHMT) were established to plan, implement, and monitor health activities and to supervise health centers. Provincial health offices managed, coordinated, and supervised districts. Neighborhood health committees,

Vanessa Redditt, Kileken ole-MoiYoi, William Rodriguez, Julie Rosenberg, and Rebecca Weintraub prepared this case for the purposes of classroom discussion rather than to illustrate either effective or ineffective health care delivery practice.

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composed of both locally elected and volunteer representatives, were established to enhance community participation. Community health workers (CHWs) and community leaders were also involved in care delivery through health centers.

Health facilities were responsible for providing a package of essential services, called the Basic Health Care Package, that prioritized the 11 diseases and conditions with the highest levels of morbidity and mortality.⁵ The government removed user fees from all public rural health facilities on April 1, 2006.

Zambia's Medical Stores Limited (MSL) managed the storage and distribution of drugs for the national supply chain. The MOH contracted an international supply and logistics company to manage the MSL to improve the drug supply chain. Each month, MSL received orders from the health facilities via the districts, then packaged the drugs by facility and delivered them to the districts. The biggest challenge to maintaining a reliable supply of drugs was the long, often-unpredictable lead time for procurement. While maintaining a higher buffer stock could prevent stockouts, the additional staff and warehouse space required to maintain the extra stock was considered too costly.⁷

Malaria in Zambia

In 2004 malaria infection accounted for 45% of hospitalizations and outpatient visits in Zambia.⁸ About one-fifth of children under five, mostly among the rural poor, were positive for malaria parasites in 2006, and 13% suffered from severe anemia.⁹ By 2007 there were 4.4 million cases of malaria, and it was the leading cause of morbidity and second leading cause of mortality in the country.¹⁰ It was endemic in all nine provinces of Zambia.¹¹

The National Malaria Control Centre (NMCC) was established in 1997, under the directorate of the Public Health and Research division in the MOH, to coordinate malaria control across the country. In April 2000 the Minister of Health signed the Abuja Declaration,⁶ marking a turning point for malaria control in Zambia. The country adopted its first national malaria strategic plan to achieve the Abuja Declaration targets, and the NMCC encouraged individual provinces and districts to prioritize malaria in planning and budgeting.⁶ With increasing global interest in malaria, largely facilitated by the Roll Back Malaria (RBM) Partnership, new partners approached Zambia to become involved in malaria control and existing partners increased their contributions. Informal monthly partner meetings evolved into a National Malaria Working Group to enhance partner coordination.

When 2002 drug efficacy studies in Zambia revealed 60% malaria parasite resistance to the antimalarial chloroquine, a multidisciplinary Drug Technical Advisory Group reviewed alternatives for treating malaria. It recommended artemisinin-lumefantrine, an artemisinin-based combination therapy (ACT) that had proven therapeutic efficacy in Zambia and was the only ACT available as a fixed-dose combination at the time.¹² The chosen artemisinin-lumefantrine formulation—Coartem[®], manufactured by Novartis—was 40 times more costly than chloroquine.¹² The MOH's decision to offer Coartem[®] despite the cost made Zambia the first African country to provide ACTs as first-line treatment available for free in the public sector.¹² Chizema recalled, "There were no funds . . . but the government just said 'we'll go for it.'"

In 2003 the NMCC received Round 1 Global Fund funding to purchase quinine for treating severe malaria, diagnostic tests, and ACTs; it sprayed five urban areas; trained health workers in the administration of ACTs and intermittent preventive treatment for malaria in pregnancy (IPTp); and hired

* Child health; nutrition; environmental health; control and management of communicable disease, including malaria, tuberculosis, sexually transmitted infections, and HIV/AIDS; mental health; control and management of noncommunicable disease; epidemic and disaster prevention, preparedness, and response; school health; and oral health.⁵

additional NMCC staff. The government also increased malaria control funding and eliminated taxation on malaria control commodities, including nets, insecticides, and antimalarials.¹¹

The New Malaria Strategic Plan

When Zambia was falling short of the Abuja target to cover 60% of the population with malaria interventions in 2005, the NMCC resolved to intensify its efforts. It transitioned to the RBM-recommended “scale-up for impact” approach (see **Exhibits 4a and 4b** for more information on the approach) guided by the “three ones”: one national plan, one coordination mechanism for implementation, and one monitoring and evaluation system.¹³ It called for rapid national dissemination of comprehensive, evidence-based malaria prevention, control, and treatment. The MOH estimated 6.5% of total health finances would be needed for malaria control from 2006 to 2010.⁵

The NMCC and its partners, including provincial and district representatives, developed a joint strategic plan. The NMCC sought to surpass the targets set forth by the Abuja Declaration by reaching 80% coverage of key interventions, reducing malaria incidence by 75%, and reducing deaths attributable to malaria significantly by the end of 2011 (see **Exhibit 5** for the evolution of malaria targets in Zambia).¹⁴ Chizema began as the NMCC coordinator in 2006, bringing valuable insight and experience as a former district director.

Financing

Zambia’s progress and commitment to improve malaria control by 2005 attracted the attention of donors, NGOs, and the private sector. It received financial commitments from the World Bank Malaria Booster Program, the Malaria Control and Evaluation Partnership in Africa which brought funding from the Bill & Melinda Gates Foundation, and the United States Agency for International Development (USAID) via the President’s Malaria Initiative.⁸ Other partners, such as UNICEF, the Global Fund, the Japanese International Cooperation Agency, and the World Health Organization (WHO), remained involved with steady or increased resources (see **Exhibits 6 and 7** for NMCC’s resource allocation and budget and **Exhibit 8** for partners’ roles in malaria control).

Implementation

Technical working groups for each intervention (ITNs, IRS, etc.), consisting of NMCC officials and representatives of other malaria service providers, met quarterly to report progress and challenges, plan future activities, and develop guidelines to support the program. The technical working groups also contributed to the annual action plans, which incorporated the roles of domestic partners and were intended to support provincial and district teams in developing malaria control plans. They were different from previous plans, which had sidestepped provincial authorities, “so when the action plan was developed for 2007, it really had everyone’s input,” Chizema explained (see **Exhibit 9** for the national planning process). Provincial teams acted as an extension of the NMCC; by monitoring and coordinating the districts, they effectively gave the NMCC “legs on the ground.”

The NMCC housed some international partners directly in its headquarters to enhance integration and communication, and the Zambia Malaria Foundation brought together domestic organizations and advocates to support the program. Chizema and her team at the NMCC retained ultimate control of policy decisions while the global and African malaria control objectives—the Abuja targets, the RBM Partnership goals, and the Millennium Development Goals—also helped align the groups involved.

Key Interventions

Insecticide-Treated Nets

With increased funds in 2005, the NMCC began mass ITN distribution campaigns. Initially, the NMCC allocated nets to districts based on the government's population estimates. Households that were not initially reached by IRS received three nets each through regional free net distribution campaigns, antenatal clinics, equity programs providing free nets to vulnerable populations, or commercial sales. The NMCC mandated that only the WHO-recommended Long-Lasting Insecticidal Nets (LLINs), such as Permanet® and Olyset®, be procured and distributed in Zambia from 2006 onward; at the time LLINs cost about USD 7.40 per net.

Many communities received an inadequate supply of nets, however. The NMCC developed ITN distribution guidelines and standardized reporting forms to try to coordinate distribution. It continuously updated a central ITN database to track coverage and needs. The NMCC also instructed partners to link with the DHMTs in their distribution efforts. In 2006 the DHMTs partnered with neighborhood health committees to survey individual households about ITN needs and distribute the required nets directly. The NMCC and DHMTs also coordinated mass ITN distribution with vaccination campaigns, Child Health Week activities, and primary schools. Health facility staff stamped standard antenatal and under-five patient record cards to track free LLIN distribution. The NMCC and its partners increased net distribution from 4 million nets between 2003 and 2006 to 3 million free nets in 2007 alone (see **Exhibit 10** for ITN partner contributions).¹⁰

To circumvent storage shortages, suppliers delivered ITNs directly to districts starting in 2007, saving both time and delivery costs. According to some estimates, distribution directly to districts saved USD 250,000 for every 300,000 ITNs delivered.¹⁵ DHMTs recruited partners, such as the World Food Program, to assist with local storage and transport of ITNs. One partner commented:

Before, we operated sort of like “cowboys.” We took everything on our own. There was less reporting on what we were doing. You reported towards the end of the year on what we did. But, now we have quarterly meetings. There's an ITN technical working group . . . All the partners come in and talk about the challenges with ITNs, the bottlenecks, and so on. That has really improved the working relationship.

In 2008 Chizema and the NMCC decided to raise the bednet target to 100% household coverage, an increase from the 80% target established in the initial 2006–2011 strategic plan. According to the 2008 MIS, 62% of households had a least one ITN,¹⁶ compared with 13.6% in 2002.¹⁷ While ITN coverage had increased dramatically nationwide, utilization—those who actually slept under the nets—was only 41.1% among children under five and 43.2% among pregnant women.¹⁶ This was still a significant improvement over the 2002 figures, which showed that only 6.5% of young children and 8% of pregnant women slept under a net.¹⁷

Indoor Residual Spraying

The NMCC reincorporated IRS into national malaria control efforts in 2003 and continued increasing the number of districts receiving IRS in a phased approach, from 5 in 2003, to 15 in 2007, to 36 in 2008. The NMCC prioritized IRS in densely populated, high-burden areas and in economically important locales. Districts had to have sufficient human resources available and the capacity to handle IRS operations.¹⁴ Spray operators used different formulations for mud, grass, plastered, or painted walls to improve the effectiveness of the spraying. Prior to 2007 the NMCC provided a given district with either IRS or ITNs, but with continued success and demands for IRS, some districts became eligible for both. During the first quarter of 2007, the NMCC, with partners and the DHMTs, conducted needs assessments to estimate the

number of structures in eligible districts, the number of spray operators required, and needed supplies. The MOH Procurement Unit then procured pumps and insecticides.

The DHMTs and neighborhood health committees recruited spray operators. In a 21-day training course, district supervisors taught the new operators practical spraying drills and oriented them in the basic science of IRS. Spray operators received small stipends for their work and covered about 12 to 15 houses per day over 20 to 60 days, depending on the size of the district. Using local community members enhanced households' acceptance of spraying.

In 2007 the NMCC, with the help of the Malaria Control and Evaluation Partnership in Africa and neighborhood health committees, introduced geo-coding to improve IRS accuracy. After a three-day training, select community members with at least a high school education geo-coded using a personal digital assistant (PDA) and door-to-door surveys. They recorded the geographical location, number of rooms, number of household members, type of wall surface, net ownership, and history of previous spraying to refine procurement details and enhance IRS logistics.

The NMCC convened meetings immediately post-spraying to evaluate the implementation of the program and to capture key challenges and successes to inform the following year's activities. The program was able to reduce the cost of IRS each year by improving the accuracy of commodity procurement, encouraging higher performance from spray operators, and increasing household acceptance rates to reduce wasted supplies and improve overall efficiency.

Malaria in Pregnancy Campaign

The NMCC worked closely with the MOH's Reproductive Health Unit to strengthen the malaria component of antenatal care, which was offered for free in health facilities using midwives and nurse-midwives across Zambia. Only 0.5% of women took IPTp during pregnancy in 2002¹⁷; the MOH aimed to provide at least 80% of pregnant women with a malaria intervention package by 2008. The package included three full courses of IPTp and an LLIN. Nearly every Zambian woman made at least one antenatal visit during her pregnancy,¹⁴ but many women did not return for follow-up visits or presented too late to receive all three IPTp doses, taking only one dose. With the new strategic plan, by 2008, more than 80% of pregnant women received at least one dose of IPTp and more than 60% received two or more doses.¹⁶

Vector Management

Before 2007 the NMCC received little donor support for mosquito-larval control and environmental management. In 2008 the NMCC procured 5,000 liters of larvicides that community-based workers applied to mosquito breeding grounds in select districts. In urban areas, districts and neighborhood health committees promoted environmental modifications such as digging drainage ditches and filling land to eliminate stagnant water.

Diagnosis

The gold standard in Zambia for malaria diagnosis was microscopy, but inadequate human and financial resources had limited its availability. In 2006, 38% of malaria patients had access to laboratory diagnostics.⁸ That year the NMCC collaborated with the National Tuberculosis Program to train 279 lab staff in microscopy,⁸ and the NMCC used donor funds to equip more health facilities with microscopes.

Also in response to human resource shortages, the NMCC introduced rapid diagnostic tests (RDTs) to provide alternate means of malaria diagnosis if microscopy was unavailable. Using a phased approach, the NMCC gradually expanded RDT coverage from pilot sites to national coverage. The NMCC first introduced RDTs in 2004 in facilities that lacked microscopy. Teams of NMCC staff and partner representatives

conducted RDT trainings with DHMTs, who then trained and supervised district health workers, including nurses, clinical officers, doctors, midwives, and auxiliary health workers. In 2006 the NMCC distributed 400,000 Global Fund–supported RDTs to rural health centers that lacked microscopy.⁸ In 2008 the NMCC had distributed 2 million RDTs.¹⁰

Many clinicians were reluctant to use RDTs. They had been taught that “fever equals malaria” and were often distrustful of negative RDT results; they presumptively treated patients for malaria based on their clinical symptoms. Patients with fever also expected antimalarials and often pressured clinicians to prescribe them. Faced with time constraints and long patient queues, clinicians often skipped RDTs. Although RDTs were significantly faster than microscopy for diagnosing malaria, in areas with no history of diagnosis, RDTs were viewed as an added step that required health workers to spend more time with each patient. In 2008, only 10.9% of febrile children under five received a finger or heel stick for diagnosis.¹⁶

Chizema stressed the need to change diagnostic practices, saying, “We really want health care workers to understand that diagnosis is important. We can no longer continue treating fever as malaria.” She observed that implementing RDTs during the high-transmission season led to greater acceptance among clinicians. In addition, the DHMTs’ enforcement of a policy requiring positive diagnostic results prior to prescription of antimalarials led to improvements in clinical practice.

Treatment

In 2005 the ACT Coartem[®] cost roughly USD 1.33 per course, and overall treatment of an uncomplicated case of malaria with ACTs, including diagnosis, drugs, and personnel, cost an estimated USD 7.34.¹⁸ Despite the increased cost of treating malaria, the drug policy change to ACTs drastically improved the treatment of uncomplicated malaria, leading to reductions in malaria mortality (see **Exhibit 11** for trends in malaria mortality).

The NMCC’s aim was that by 2008 at least 80% of malaria patients would receive ACTs within 24 hours of symptom onset. In sparsely populated rural areas, access to health care remained limited, however. Health facilities were long distances from households, and transport was a significant obstacle. Many rural patients with malaria did not present to a health facility in time for treatment, if at all. The NMCC decided to involve CHWs in “home management” of malaria. In 2007 the NMCC conducted a feasibility study and determined that volunteer CHWs meeting educational and literacy requirements were capable of administering RDTs and ACT for uncomplicated malaria. In 2008 CHWs in 11 districts received training and had Coartem[®] and RDTs added to their home management kits.

By 2008, 64% of children under five with fever were brought for treatment within 24 hours of symptom onset,¹⁶ an increase from 4.5% in 2006.⁹ The percentage of children with fever who received ACTs within 24 hours rose from 8.3% in 2006⁹ to 12.7% in 2008.¹⁶

Beyond reaching patients, Zambia struggled to ensure adequate supplies of ACTs were consistently available at the district level. Although national supplies of Coartem[®] at Medical Stores Limited were generally adequate and MSL’s delivery of drugs to the district pharmacies was efficient, poor transport, stocking, and ordering at the district level resulted in frequent ACT stockouts at health centers. In 2007, 40% of health facilities had ACT stockouts for one to two weeks, and some reported monthly stockouts.¹⁹ At times, patients were referred to private pharmacies where Coartem[®] cost USD 5 to 10. The NMCC and its partners implemented district-level inventory management trainings and developed a study to investigate how district-level transport and human resource interventions could affect distal supply chain issues.

Information, Education and Communication and Behavior Change Communication

The NMCC recognized that, although the average Zambian's knowledge of malaria was high and despite its effort to increase the availability of malaria commodities, utilization of interventions remained insufficient. In 2005 the NMCC began supplementing isolated, event-driven campaigns, such as World Malaria Day, with more routine education lasting throughout the year. In 2006 Chizema and her team intensified their information, education and communication (IEC) and behavior change communication (BCC) efforts to encourage communities to adopt positive malaria control behavior and aimed to generate political will and mobilize resources needed for control efforts. The IEC technical working group assisted all NMCC units with their communication needs, such as IRS acceptance, prompt care-seeking behavior, and adherence to RDT results by health workers. The NMCC engaged high-level politicians and popular musicians to raise the profile of malaria control across the country through television, community radio, community theater performances, posters and educational materials, and door-to-door campaigns. In 2007 the NMCC and its partners conducted a BCC workshop with select DHMTs that provided training in analyzing community needs and generating effective malaria education messages through appropriate communication channels.

Recognizing that local leaders were highly influential in their communities, in 2007 the NMCC engaged the national House of Chiefs—30 chiefs from all nine provinces who governed chiefs across the country—in malaria control. The 30 chiefs responded favorably to NMCC recommendations, such as promoting mass ITN distribution campaigns and encouraging IRS acceptance, and requested further participation from all chiefs.

Monitoring and Evaluation

In 2003 the NMCC established the Malaria Information System in 10 sentinel districts to improve data tracking, analysis, and dissemination. The NMCC also developed a database and activity reports for ITN distribution, IRS coverage, and other interventions and extracted malaria-specific data from the national Health Management Information System.

In 2006, in accordance with the new strategic plan, the NMCC made revisions to the health management information system's malaria indicators to better assess program performance and the burden of malaria.²⁰ It also advocated for monthly rather than quarterly reports from the health management information system to produce more actionable data. Finally, with the help of partners, the NMCC augmented facility data with the Demographic and Health Survey's household data to assess disease incidence and program performance (see **Exhibit 12** for progress in malaria control).

Incomplete reporting caused by a shortage of health workers was a key impediment to effective monitoring of key health indicators. Because of high clinical demands, few clinicians kept adequate records. Increased supervision of health facilities was required to enhance the reliability of malaria and other disease indicators. The operational research branch of the NMCC had the mandate of assessing the effectiveness of malaria control interventions and responding to challenges in implementation. It conducted drug efficacy studies to continually monitor resistance and addressed specific questions NMCC technical working groups presented. To build research capacity, the branch assembled multidisciplinary research groups and included university students and district staff on research teams.

In addition to informing program development, the NMCC's monitoring and evaluation activities demonstrated progress and contributed to reports the NMCC could share with the government, donors, and implementers. Demonstrating progress was key to maintaining partner attention. As one NMCC officer put it, "Everyone wants to be associated with winners."

Looking to the Future

Malaria parasite prevalence in children had declined from 21.8% in 2006⁹ to 10.2% in 2008,¹⁶ and severe anemia dropped from 13.3% in 2006⁹ to 4.3% in 2008.¹⁶ In 2007 in-patient malaria cases and deaths were lower by 33% and 24%, respectively, as compared with the average from 2001 to 2003.²¹ When the 2008 MIS was released, Minister of Health Dr. Brian Chituwo commented:

These are remarkable figures -- something all of us should be proud of. These achievements have been possible because of the strong partnership that the Ministry enjoys with partners. But, at this moment we cannot pat ourselves on the back and say we're done. No. We must maintain what we have achieved and with this momentum, galvanize our efforts and press for even greater successes.²²

Like the Minister, Chizema feared that the positive press and the progress reports the NMCC had generated could have a paradoxical effect of making donors consider the job done. Preparing for the 2009 annual action plan meetings, Chizema reflected on the persistent gaps in malaria control in Zambia—effective bed net utilization, ACT stockouts, case management, and incomplete reporting—and how the NMCC would sustain the progress made and ensure the continued support of its partners.

Appendix *List of Abbreviations*

ACT	artemisinin-based combination therapy
BCC	behavior change communication
CHW	community health worker
DHMT	District Health Management Team
IEC	information, education, communication
IPTp	intermittent preventive treatment for malaria in pregnancy
IRS	indoor residual spraying
ITN	insecticide-treated net
LLIN	long-lasting insecticide-treated net
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MSL	Medical Stores Limited
NMCC	National Malaria Control Centre
RBM	Roll Back Malaria
RDT	rapid diagnostic test
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States dollars
WHO	World Health Organization

Exhibit 1 *Map of Zambia*



Source: United Nations.

Exhibit 2 *Basic Socioeconomic and Demographic Indicators*

INDICATOR		YEAR
UN Human Development Index ranking	165 out of 177	2007
Population (thousands)	12,620	2008
Fertility rate (total births per woman)	5.8	2008
Urban population (%)	35	2008
Drinking water coverage (%)	58	2006
Poverty rate (% living under USD 1.25 per day)	64	2008
Gini index	50.7	2004
GDP per capita in PPP (constant 2005 international dollars)	1,251	2008
GDP per capita (constant 2000 USD)	387	2008
Adult literacy (%)	70.7	2008

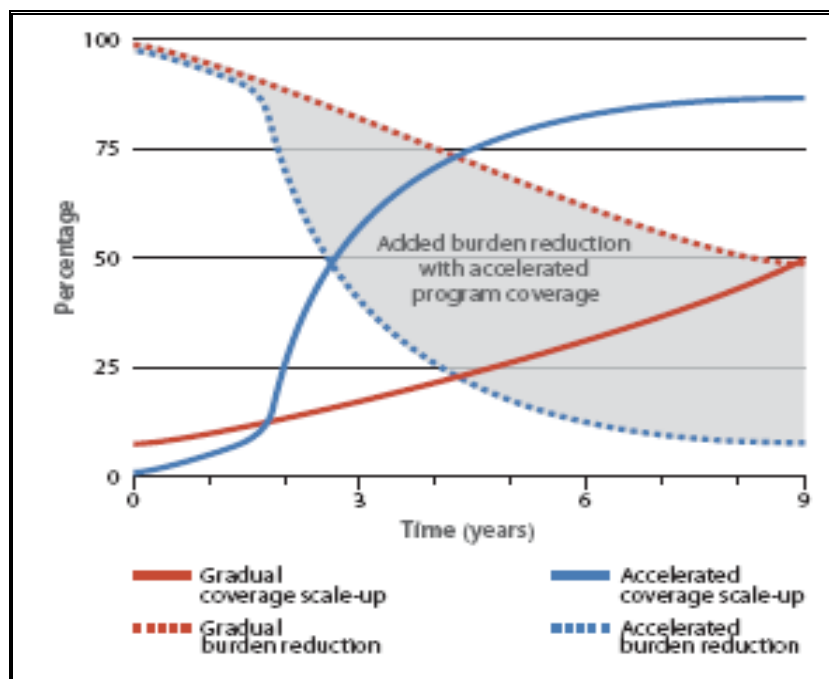
Sources: United Nations agencies and the World Bank.

Exhibit 3 *Health System and Epidemiologic Indicators*

INDICATOR		YEAR
Average life expectancy at birth (total/female/male)	45/46/45	2008
Maternal mortality ratio (per 100,000 live births)	470	2008
Under-five mortality rate (per 1,000 live births)	145	2008
Infant mortality rate (per 1,000 live births)	88	2008
Vaccination rates (% of DTP3 coverage)	81	2008
Undernourished (%)	43	2007
HIV prevalence (% of population ages 15–49)	14	2008
HIV antiretroviral therapy coverage (%)	51	2007
Tuberculosis incidence (per 100,000)	468	2008
Tuberculosis treatment success rate (% of registered cases)	88	2008
Malaria cases (per 1,000)	358	2007
Government expenditure on health (% of total government expenditure)	11	2008
Government expenditure on health per capita (international dollars, USD)	26	2006
Total health expenditure per capita (constant 2005 international dollar, USD)	80	2008
Out-of-pocket health expenditure (% of private expenditure on health)	75	2008
External resources for health (% of total expenditure on health)	50	2008
Physician density (per 10,000)	1	2006
Number of hospital beds (per 10,000)	2	2008

Sources: World Bank and National Health Strategic Plan 2006–2010.

Exhibit 4a *Malaria Program Scale-Up: Coverage and Burden Reduction*



Source: Malaria Control and Evaluation Partnership in Africa. Scaling Up for Impact through Comprehensive Program Improvement. Seattle; 2007.

Exhibit 4b *Scale-up for Impact: Principle of the “Three Ones”*

<p>One national plan</p>	<ul style="list-style-type: none"> o Multiyear strategic plan o Three-year implementation plan o Annual action plan o Business plan for human resources, supply chain management, etc.
<p>One coordination mechanism for implementation</p>	<ul style="list-style-type: none"> o Financial and human resource support o System support for administration, partnering, etc. o Intervention support
<p>One monitoring and evaluation system</p>	<ul style="list-style-type: none"> o Monitor coverage and use o Document action o Track impact on illness, anemia, death o Identify gaps for next planning cycle

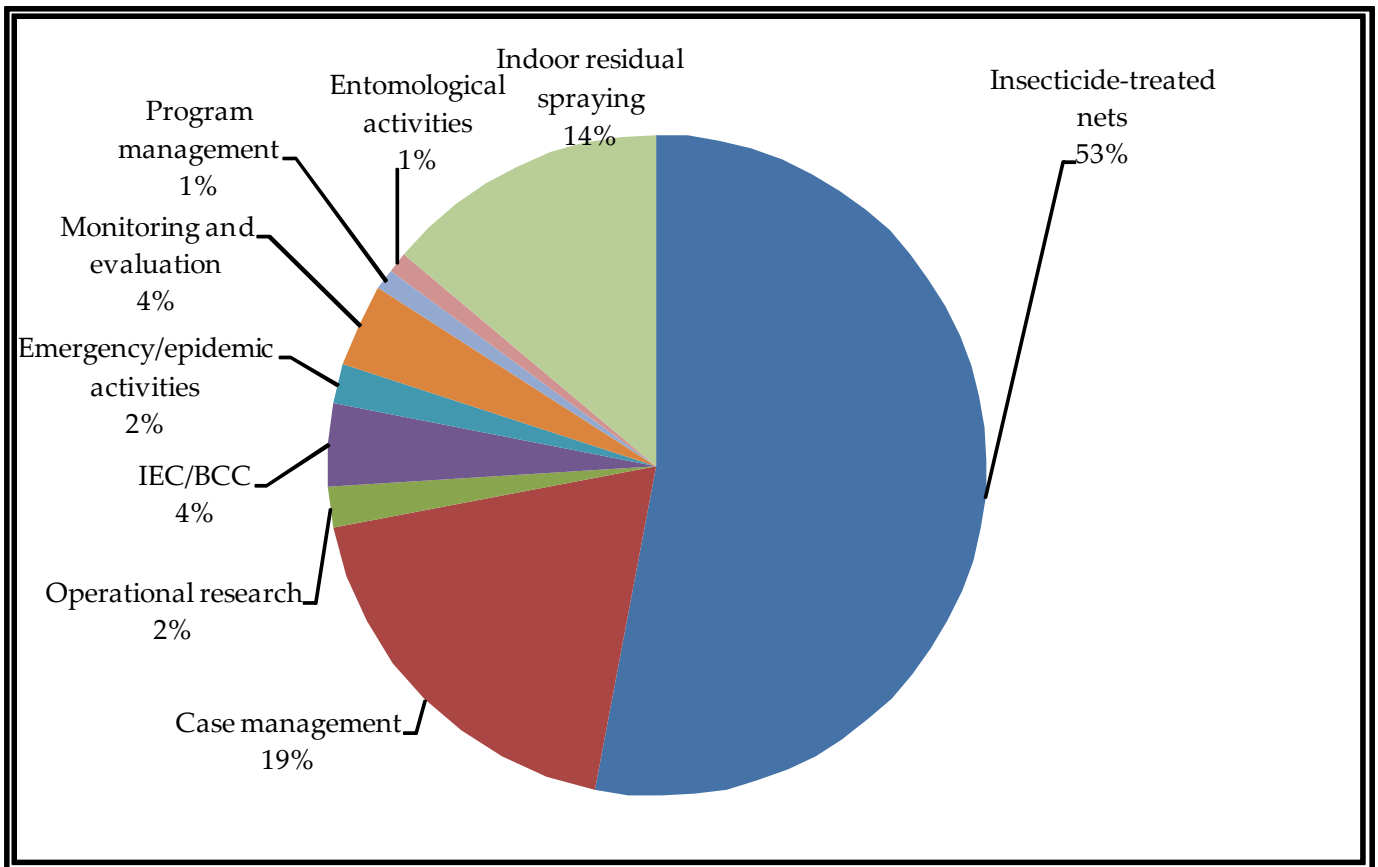
Source: Malaria Control and Evaluation Partnership in Africa. Scaling up for Impact through Comprehensive Program Improvement. Seattle; 2007.

Exhibit 5 *Evolution of National Malaria Control Strategic Plan Targets in Zambia*

Parameter	National Malaria Control Strategic Plan 2000–2005	National Malaria Control Strategic Plan 2006–2011
Guiding principles	RBM principles	RBM principles and scale-up for impact concept
ITN coverage target	60% of households with ³ 1 ITN	>80% of households with average of 3 ITN/households
IRS coverage target	Not defined	>85% coverage of eligible households in 15 districts
IPTp coverage target	90% of pregnant women using IPTp	>80% of pregnant women receiving 2 doses IPTp
Target for ITN use in pregnant women	50% of pregnant women sleeping under ITN	>80% of pregnant women sleeping under ITN or in a house sprayed with IRS
Target for ITN use in children <5 years of age	60% of children <5 years of age sleeping under ITN	>80% of children <5 years of age sleeping under ITN or in a house with IRS
Target of PECM (prompt and effective clinical management)	60% of sick persons have access to PECM	>80% of sick person treated with effective antimalarial within 24 hours of onset

Source: Adapted from: Steketee, RW, Sipilanyamb, N, Chimumbw, J, et al. National Malaria Control and Scaling Up for Impact: The Zambia Experience through 2006. *American Journal of Tropical Medicine and Hygiene*. 2008; 79(1):45–52.

Exhibit 6 NMCC Resource Allocation in 2008 (Estimated/Budgeted Values)



Source: Adapted from Ministry of Health Zambia. 2008 National Malaria Control Action Plan: Actions for Scale-Up for Impact on Malaria in Zambia. Lusaka; 2007.

Exhibit 7 *National Malaria Control Program Estimated 2008 Budget: Part 1*

Activity	Budget
Insecticide Treated Nets	\$32,061,426
Mass distribution (incl. 3.5 million LLINs)	\$26,101,723
Malaria in Pregnancy Campaign (incl. 490,000 LLINs)	\$4,009,059
Equity Programme (vulnerable populations)	\$270,628
Retreatment of nets	\$1,339,503
Technical meetings and seminars	\$23,776
Zambia Business Coalition against Malaria workshops/meetings	\$16,568
Support for Provincial Health Offices	\$4,893
Community Malaria Booster Response strengthening	\$295,276
Indoor Residual Spraying	\$8,583,000
National-level IRS coordination	\$74,000
Implement IRS in 36 districts (incl. 1245 spray pumps, 32,500 insecticides, 2,500 sets of personal protective equipment)	\$7,827,000
Geocoding and mapping houses	\$30,000
IRS IEC/BCC Materials	\$152,000
Environmental safeguards	\$500,000
Entomology	\$800,400
Conduct entomological surveys	\$61,200
Vector susceptibility and resistance surveys	\$54,000
Evaluation of new insecticides/larvicides as alternatives to DDT	\$54,000
Operationalise Malaria Decision Support System	\$120,000
Larval source management	\$336,000
Environmental safeguards	\$125,000
Meetings and supervision	\$50,200
Prompt and Effective Case Management (PECM)	\$11,137,502
Malaria diagnosis for all health facilities (incl. 2 million RDTs and training 30 new microscopists)	\$2,554,720
Drug logistics management (incl. 3.8 million doses of Coartem®, 400,000 x 3 doses SP)	\$6,213,490
Home management for malaria (w/ ACTs and RDTs)	\$391,000
Improvement of case management with ACTs in private sector	\$24,000
FANC (for malaria in pregnancy)	\$1,737,500
Severe malaria management	\$167,262
Monitoring and supervision	\$49,530

Note: DDT refers to dichloro-diphenyl-trichloroethane.

Exhibit 7 (cont'd) *National Malaria Control Program Estimated 2008 Budget: Part 2*

Activity	Budget
Operations Research	\$986,178
Conferences / research (incl. drug efficacy trials)	
IEC/BCC Advocacy Plan (Large funding)	\$2,219,000
Launch communication strategy	\$30,000
BCC capacity building	\$386,500
IEC materials	\$230,000
BCC proposals	\$272,000
Advocacy and coordination meetings	\$138,000
Community mobilization (incl. radio and television shows)	\$437,000
Media and radio efforts	\$169,500
Promotional events	\$390,000
Engage traditional healers	\$64,000
Engage private sector	\$102,000
Monitoring and Evaluation Activities (Big funding gaps)	\$2,183,500
National M&E coordination	\$57,000
Programmatic and district performance monitoring (incl. support to sentinel districts)	\$885,500
Evaluation and reporting (incl. 2008 MIS)	\$1,177,000
M&E capacity development (incl. staff trainings)	\$64,000
Program Management	\$877,507
Organization, alignment, coordination (incl. meetings with provinces, districts, partners, other ministries)	\$32,738
Policy, program planning, and design	\$30,973
Human resource management (incl. some NMCC salaries)	\$130,778
Financial management	\$285,857
Program implementation	\$38,005
Infrastructure and equipment	\$262,915
Commemoration of national days	\$10,715
Institutional capacity development	\$85,526
Emergency Planning Activities	\$982,000
Emergency and malaria epidemic preparedness plan	\$497,000
Malaria early warning systems plan	\$275,000
Establish emergency fund	\$210,000
TOTAL ESTIMATED COST	\$59,830,513

Source: Adapted from Ministry of Health Zambia. 2008 National Malaria Control Action Plan: Actions for Scale-Up for Impact on Malaria in Zambia. Lusaka: 2007.

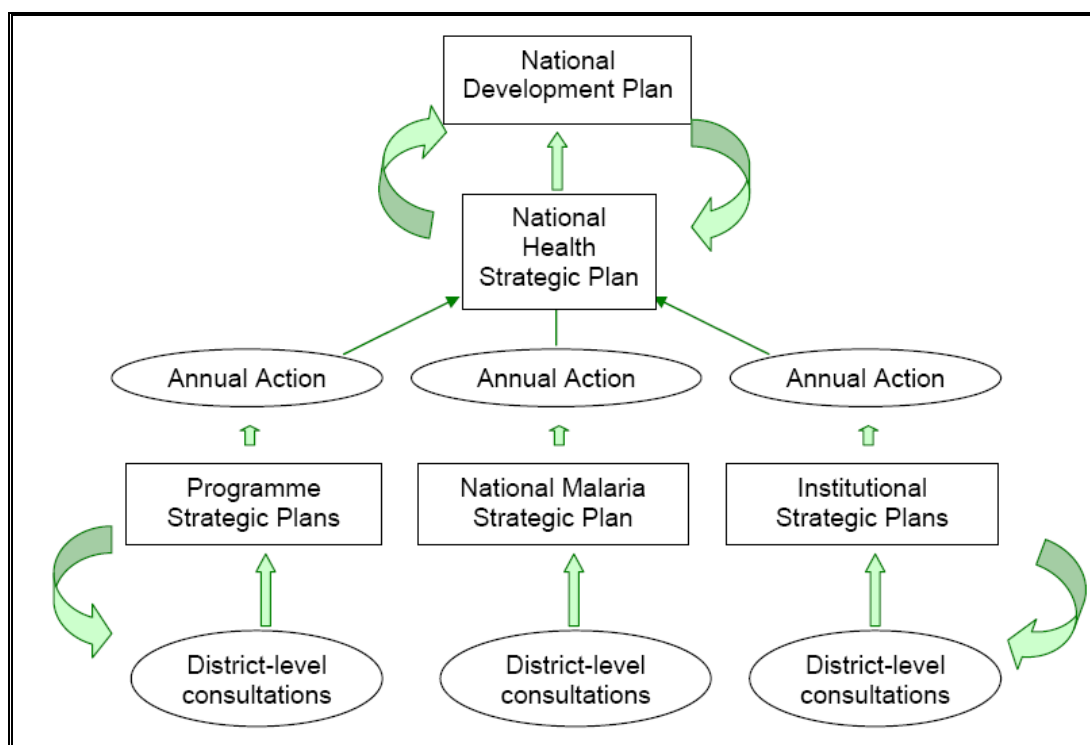
Exhibit 8 *National Malaria Control Program Partners and Key Involvement*

Partner	Type	Main Role/Involvement
Japanese International Cooperation Agency	Bilateral	ITN distribution
President's Malaria Initiative	Bilateral	Funds, technical support
Zambia Malaria Foundation	Community based organization	IEC, ITN distribution
John Snow International	Consulting	Supply chain management improvement
Global Fund	Donor	Funds (ACTs, diagnostics, IEC, IRS, ITN distribution, M&E health systems strengthening)
Child Health Unit	Government	ITN distribution, case management, IEC
Ministry of Defense	Government	ITN distribution (transport)
Ministry of Education	Government	IEC, ITN distribution
Reproductive Health Unit	Government	Malaria in Pregnancy, ITN distribution
ZANIS	Government	IEC
Health Communication Partnership	Implementing (funded by PMI)	IEC
Health Systems Strengthening Partnership	Implementing (funded by PMI)	IRS
Society for Family Health	Implementing (funded by PMI)	ITN distribution (antenatal, <5)
JIPHEGO	International NGO	Malaria in Pregnancy
Malaria Consortium	International NGO	IEC, M&E
Malaria Control and Evaluation Partnership in Africa	International NGO	Funds, IEC, ITNs, M&E, advocacy, technical support
RAPIDS	International NGO	ITN distribution (equity channel)
House of Chiefs	Local authority	IEC, ITN distribution
Zambia Business Coalition Against Malaria	Local collaboration	IEC
Roll Back Malaria	Multilateral	Advocacy, technical support
UNICEF	Multilateral	Funds, ACTs, IEC, ITN distribution, technical support
WHO	Multilateral	Technical support, M&E
World Bank	Multilateral	Funds (IEC, ITN distribution, IRS, health systems strengthening)
Barclay's Bank	Private	ITN distribution (mass distribution)
Konkola Copper Mines	Private	IRS, ITN distribution
Churches Health Association of Zambia	Religious organization	ITN distribution, case management, Malaria in Pregnancy
Research Triangle Institute	Research Center	Operational research
Tropical Diseases Research Centre (TDRC)	Research Center	Operational research
University of Zambia (UNZA)	Research Center	Operational research

Note: List of partners and main involvement is not fully comprehensive.

Source: Compiled by case writers from program documents and interviews.

Exhibit 9 National Planning Process

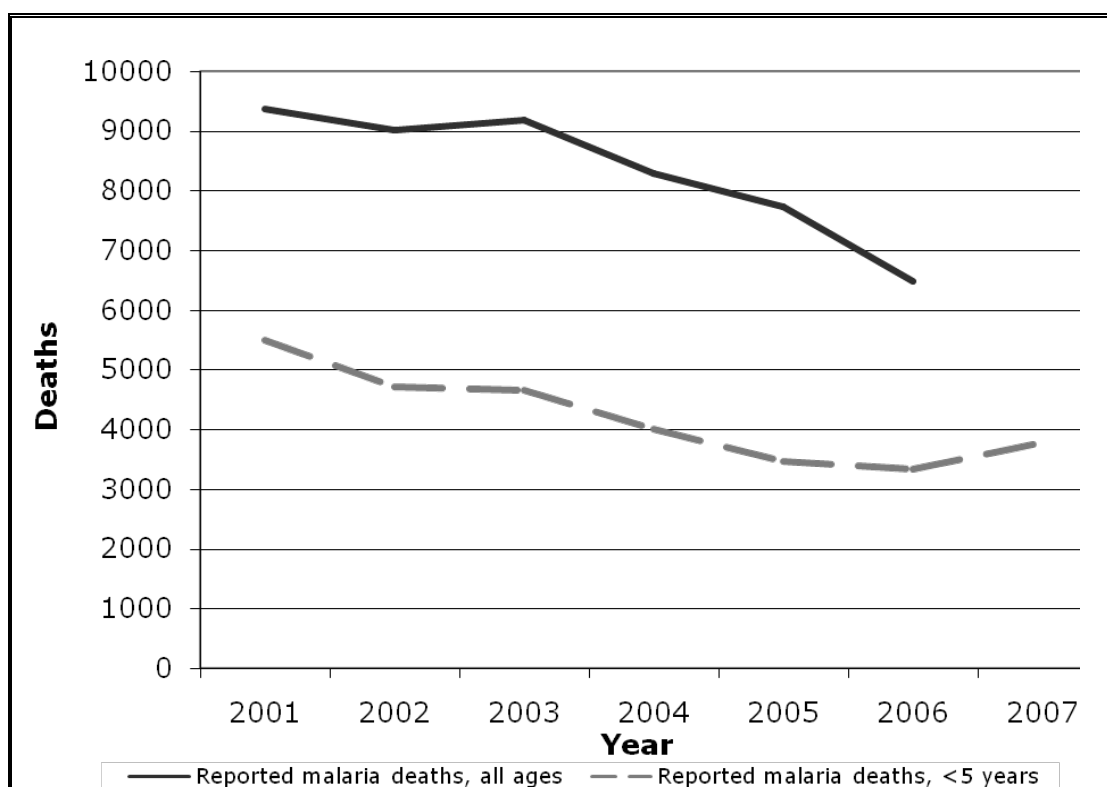


Source: Ministry of Health Zambia. 2008 National Malaria Control Action Plan: Actions for Scale-Up for Impact on Malaria in Zambia. Lusaka; 2007.

Exhibit 10 Main Sources of ITNs in 2007

Source	Quantity of Nets Procured
Global Fund	1,082,000
World Bank	1,080,000
President’s Malaria Initiative /PEPFAR/RAPIDS	505,000
Japanese International Cooperation Agency	392,500
USAID/ Society for Family Health	322,348
UNICEF	16,500
Malaria Control and Evaluation Partnership in Africa	18,000
TOTAL	3,416,348

Source: Ministry of Health Zambia. 2008 National Malaria Control Action Plan: Actions for Scale-Up for Impact on Malaria in Zambia. Lusaka: 2007.

Exhibit 11 Trends in Malaria Mortality in Zambia, 2001–2007**Reported Malaria Deaths, 2001–2007****Reported Malaria Deaths and All-cause Deaths, 2001–2007**

Year	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	9369	9021	9178	8289	7737	6484	NA
Reported malaria deaths, <5 years	5498	4717	4653	4008	3470	3342	3783
All-cause deaths, all ages	35,358	39,482	39,117	38,466	38,740	35,541	NA
All-cause deaths, <5 years	16,680	16,377	15,459	13,569	12,796	12,469	13,842

Source: Adapted from World Health Organization. World Malaria Report 2008. Geneva: 2008.

Exhibit 12 *Progress in Malaria Control Interventions*

Indicator	DHS 2002 (%)	MIS 2006 (%)	MIS 2008 (%)
Mosquito Net Coverage and Use			
Households with at least 1 net	27.2	50.1	71.5
Households with at least 1 ITN	13.6	44.4	62.3
Children <5 years who slept under net	16.3	26.6	47.5
Children <5 years who slept under ITN	6.5	22.8	41.1
Malaria in Pregnancy Campaign			
Pregnant women who slept under net	17.4	23.9	45.5
Pregnant women who slept under ITN	7.9	21.1	43.3
Pregnant women who took any antimalarial drug	35.8	76.9	88.1
Pregnant women who took at least 2 doses of IPT	NA	61.9	66.1
Prompt, Effective Case Management for Fever/Malaria Among Children <5 years			
Children who reported fever in 2 weeks preceding survey	43.3	29.2	28.1
Febrile children who took any antimalarial drug	51.9	57.3	43.3
Febrile children who took any antimalarial drug in 24 hours	36.8	37	28.9
Febrile children who took ACT in 24 hours	NA	12.7	8.2
Febrile children who sought treatment from facility/provider in 24 hours	NA	4.5	64.0
Malaria Parasite Prevalence and Anemia in Children <5 years			
Children with malaria parasites	NA	21.8	10.2
Children with severe anemia (hemoglobin <8g/dL)	NA	13.3	4.3

Sources: Chipimo M, Banda R. Demographic Health Survey, Chapter 10: Malaria. 2002.

Ministry of Health Zambia; Zambia National Malaria Indicator Survey 2006. Lusaka: MOH; 2006.

Ministry of Health Zambia; Zambia National Malaria Indicator Survey 2008. Lusaka: MOH; 2008.

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