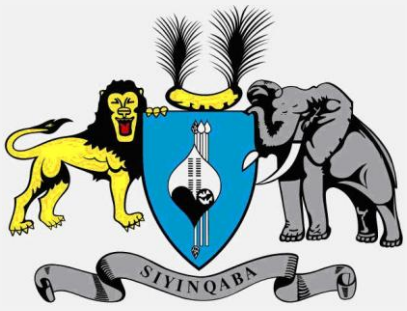
THE KINGDOM OF SWAZILAND

Malaria Elimination Strategy
2008-2015



Foreword

The Ministry of Health in the Kingdom of Swaziland is proud to present this Malaria Elimination Strategy for the country. We were very honoured to have been chosen by the African Union and SADC as being among those countries selected for malaria elimination. We in Swaziland, together with support from our partners, have made significant achievements in terms of reducing malaria morbidity and mortality in our country. We have seen this positive impact due to the robust implementation of our malaria intervention strategies detailed in the country's 2003-2007 Roll Back Malaria Strategy. In addition, our success has been largely attributed to the implementation of the cross-border malaria project in the Lubombo Spatial Development Initiative, a joint collaboration with Mozambique and Swaziland.

The Ministry of Health in Swaziland is ready to undertake the new challenge of eliminating malaria in the country and through the development and launch of this strategy, we demonstrate our commitment to achieving the goal of Malaria Elimination in Swaziland, by 2015. Whilst we fully acknowledge that this is a colossal task, we believe that malaria elimination can be achieved, through the support of our government officials and partners. We will make every effort to implement each of the interventions detailed in this document and to continue working on cross border malaria initiatives with our neighbours: South Africa and Mozambique, as this will be pivotal to eliminating malaria and preventing its re-introduction, in our country.

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Acknowledgements

Transitioning from malaria control to elimination goes beyond the rhetoric of committing to the goal; it involves a systematic process of developing strategies and ensuring their robust implementation. The first phase commences with the development of key documents, including an elimination strategy, an implementation plan, a monitoring and evaluation plan, and a business plan. The second phase will involve the robust implementation of the strategic interventions detailed in the strategic plan and monitoring its progress towards achieving the goal of malaria elimination.

Swaziland has taken the first step in transitioning from malaria control to malaria elimination through development of this malaria elimination strategy. The development of this elimination strategy has been made possible through the technical support from the organisations listed below. The Ministry of Health hereby expresses it sincere appreciation for their contributions to ensuring the fruition of this malaria elimination strategy for Swaziland.

Ministry of Health Partners

- National Malaria Control Programme
- Pharmacy unit
- Central Laboratory Services Unit
- Health Promotion Unit
- Department of Environmental Health

Other Partners

- Ministry of Works, Meteorological Services, Swaziland
- WHO Country Office, Swaziland
- UNICEF Country Office, Swaziland
- National Emergency Response Council for HIV/AIDS, Swaziland
- Medical Research Council, South Africa
- Clinton Foundation and Global Health Group, United States

We are committed to delivering on the key interventions outlined in this strategic plan and are confident through the support of our partners we will achieve the goal of malaria elimination.

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Dr. C. Mabuza
Director of Health Services
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Acronyms

Acronym	Name
ACT	Artemisinin-based Combination Therapy
AU	African Union
DHS	District Health System
GIS	Geographical Information System
IEC	Information Education and Communication
IHR	International Health Regulation
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Nets
IVM	Integrated Vector Management
LLIN	Long Lasting Insecticide Nets
MICS	Malaria Indicator Community Survey
MIS	Malaria Information System
QA	Quality Assurance
QC	Quality Control
RDT	Rapid Diagnostic Test
SADC	Southern African Development Community
WHO	World Health Organization

Executive Summary

Swaziland has made significant progress on malaria control over the past 5 years. There has been a reduction in clinical malaria cases from 49.5 to 18 per 1000 of the population at risk in 2007 compared to 2002. The country has made huge strides in achieving coverage targets for Indoor Residual Spraying (IRS) and case management using the current malaria control policies. Based on Swaziland's malaria control achievements, the country was chosen by the African Union and SADC as one of a few countries in Southern Africa for malaria elimination. This intention to transition towards malaria elimination was endorsed by the Ministry of Health in Swaziland. This strategic plan aims to define the key goals, objectives and strategies for malaria elimination in Swaziland and follows the WHO's continuum of the key programmatic phases for malaria elimination (i.e., control, pre-elimination, elimination and prevention of re-introduction).

The goal of Swaziland's malaria elimination strategy is to achieve malaria elimination by 2015 in the country. The key objectives of the strategy are to:

- Reduce and sustain the locally acquired malaria cases to zero by 2015;
- Reduce and sustain malaria deaths seen at health facilities to zero by 2015 and
- Maintain zero locally acquired malaria cases by prevention of reintroduction for all years following 2015.

The key intervention strategies for achieving the malaria elimination goal for Swaziland are: case management; vector control; surveillance and epidemic preparedness and response (EPR); and health promotion and information, education, and communication (IEC). The key targets for implementation of the strategies are as follows:

- All malaria cases are diagnosed by Rapid Diagnostic Tests (RDTs) and confirmed by slide microscopy by 2015; sustainment of these targets from 2015 onwards;
- All of the diagnosed malaria cases are treated with ACTs by 2015 and subsequent years;
- All of the malaria affected population are protected by IRS;
- Insecticide-Treated Nets (ITS) are distributed to all households (1 per every 2 persons) targeted in the malaria transmission areas;
- All malaria epidemics are identified and responded to within 2 weeks of onset and sustained beyond 2015; and
- The total population of the country is reached by IEC by 2015.

To ensure successful implementation of the key interventions for this elimination strategy, health system and programmatic support for malaria elimination should be strengthened. These activities include:

- Recruiting and training human resources at all levels;
- Procuring appropriate equipment;

- Developing and strengthening infrastructure;
- Creating and strengthening partnerships to scale up implementation and
- Setting up and strengthening monitoring & evaluation systems to track progress on Swaziland Malaria Elimination Strategy.

Swaziland will use this elimination strategy to guide the development of detailed operational / business plans to measure its progress towards achieving its malaria elimination goal.

1. Introduction

Swaziland is a low malaria transmission country and therefore has been identified for malaria elimination by the Africa Union (AU), Southern Africa Development Community (SADC), and the Ministry of Health in Swaziland. This document has been drafted to guide the malaria elimination efforts in Swaziland, highlighting the key interventions required for achieving the goal of Malaria Elimination targeted for 2015. This document is aligned to the SADC malaria elimination strategic framework and the WHO's malaria elimination manual.[1;2]

This document details the background and rationale for malaria elimination in Swaziland, the goal, objectives, the key strategies and monitoring and evaluation components. The National Malaria Control Programme (NMCP) in Swaziland will use this document to draft detailed implementation / business plans to achieving elimination, subsequent to a detailed gap analysis exercise.

[1] World Health Organisation, Malaria Elimination a field manual for low and moderate endemic countries; WC765.
[2] Southern African Development Community, SADC Malaria Elimination Framework, 2007.

2. Background

2.1. Policy Context

In 2000, African Heads of States, including the Southern African Development Community (SADC), committed themselves to providing resources to reduce the malaria burden in Africa. In this regard, the African heads of state signed the Abuja declaration whose long term goal is to halve malaria morbidity and mortality by 2010.

In 2006, the heads of state and governments met again to review the progress that countries had made in achieving the targets set in 2000. Although some progress has been made with regard to access to effective anti-malarial prevention and treatment services, the scale and progress is unlikely to produce impact by 2010 in most African countries. However, in some countries, including Swaziland, the Abuja goals have been met and malaria interventions have been successfully implemented. Hence a call was made at the Heads of State meeting for these countries to accelerate malaria control with the ultimate goal of eliminating the disease.

At a meeting of the African Union of Health Ministers in Johannesburg in April 2007, the Health Ministers therefore launched a campaign to eliminate malaria in four countries by 2010. These were Botswana, Namibia, Swaziland and South Africa. SADC subsequently developed a malaria elimination strategic framework to guide countries reach malaria elimination by 2015.[3] This framework was approved by SADC Health Ministers in November 2007 and has been used as a guide to develop this malaria elimination strategy for Swaziland.

2.2. Phases of Malaria Elimination

According to the WHO, malaria elimination evolves from a successful country-wide malaria control effort.[4] There are four programme phases in this continuum: control, pre-elimination, elimination, certification and prevention of re-introduction (Figure 1).

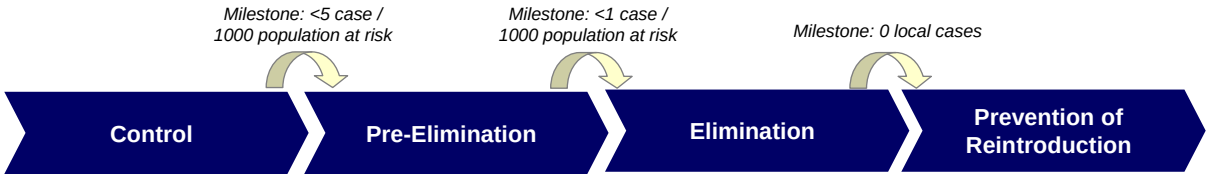


Figure 1. Malaria Elimination Continuum

2.2.1. Control

For this phase of the malaria elimination continuum, both preventative and curative strategies for malaria elimination need to be optimally implemented. The preventative components will involve implementation of vector control, whereby

[3] SADC Malaria Elimination Framework, 2007.
[4] WHO, Malaria Elimination: A field manual for low and moderate endemic countries, 2007

>85% of the targeted households are covered with Indoor Residual Spraying (IRS) and at least 60% of pregnant women and children sleep under insecticide-treated nets (ITNs). For the curative component of the strategy, prompt and effective case management through definitive diagnosis using rapid diagnostic tests (RDTs) and Microscopy) and treatment using Artemesinin Combination Therapy (ACT) need to be implemented in the country.

2.2.2. Pre-Elimination

In this phase, the incidence of malaria needs to be reduced to 5 cases per 1000 population at risk. The key elements of this phase will involve the strengthening of the Health Information System and improving the effective coverage of health intervention in all transmission areas. Coverage should be for the whole population including nationals and foreigners so that they are accessing and using private and/ public health care facilities. During this phase public and private health staff is re-orientated to the new goals of malaria elimination.

2.2.3. Elimination

The full transition to an elimination programme occurs when malaria incidence is less than 1 laboratory-confirmed case per 1000 population at risk per year. To move towards malaria elimination, malaria programmes need to diagnose and treat all malaria cases with ACTs and by reducing human-vector contact through comprehensive vector control, personal protection, and environmental management methods, including strengthening surveillance systems.

2.2.4. Prevention of Re-introduction

This is the advanced stage of the programme and occurs when complete interruption of malaria transmission has been achieved. Activities need to focus on preventing re-establishment of malaria in previous transmission areas. The key activities should include continuous reduction of vulnerability to the whole population including visitors to diagnostic and treatment facilities. Vector control should be targeted at vulnerable and receptive sites. The key milestones for transition to each stage of the continuum are defined in Table 1.

Stage in Continuum	**Malaria Incidence** Thresholds per 1000 at risk to transition to the next stage of the continuum
Control	< 5
Pre-elimination	<1
Elimination*	0
Prevention of Re-introduction*	0

Table 1. Key Milestones within the Malaria Elimination Continuum
* All confirmed by RDT or microscopy

SADC and the WHO assessed Southern African countries malaria epidemiological profiles and have projected that Botswana, Namibia, South Africa and Swaziland, are expected to be in the pre-elimination phase of the malaria elimination continuum by 2008, see Figure 2.

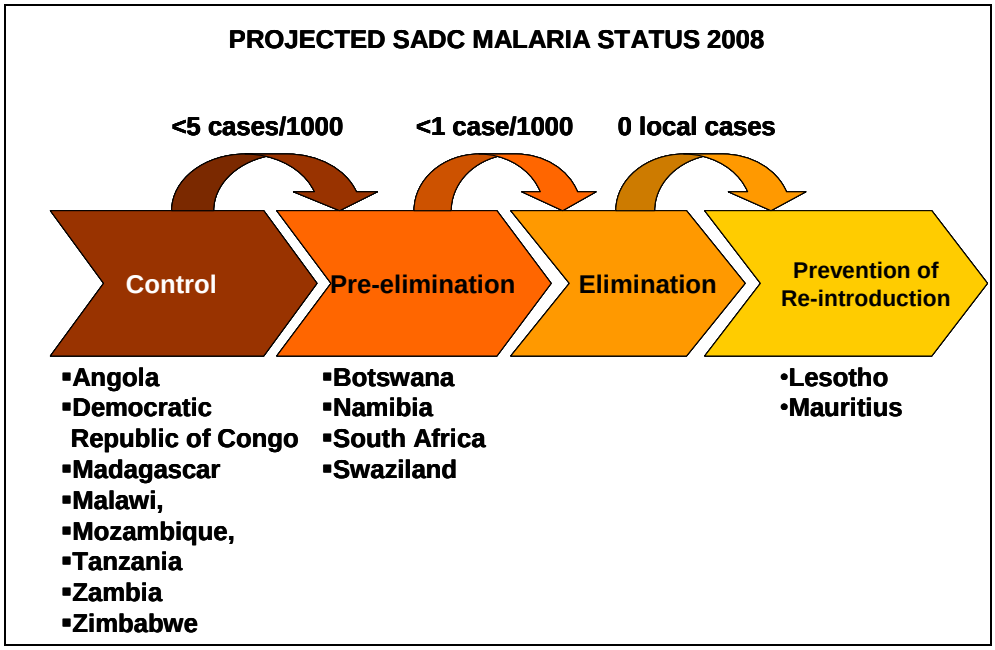


Figure 2. Projected Malaria Elimination Framework among Southern African Countries, 2008
Note: The projected malaria status in Swaziland for 2008 by SADC does not currently reflect Swaziland's current elimination status, this is due to the malaria clinical incidence data being >5 cases per 1000 population at risk.

In keeping with the SADC malaria elimination framework and advice from leading experts on malaria elimination from the Malaria Elimination Group, transitioning to each phase in the continuum from malaria control to elimination will require the following supporting factors.

- A strong and effective malaria control programme
- A well developed health care infrastructure throughout the operational area
- Successful implementation of full coverage by epidemiological surveillance
- Availability of an efficient technical infrastructure for all parts of the operations
- Relatively modest migration between areas of high and low malaria endemicity
- Political and financial stability
- Clearly articulated political will to embark on an elimination programme

2.3. Malaria Epidemiology: Global and SADC

2.3.1. Global Burden of Malaria

At least 3.2 billion people are still at risk of contracting malaria in the world, with present estimates of about 350-500 million clinical malaria cases, occurring annually. Around 60% of these clinical cases and about 80% of the deaths occur in Africa south of the Sahara. More than 1 million deaths occur in Africa and most are children under 5 years of age. Malaria also contributes to anaemia in children and pregnant women, adverse birth outcomes such as spontaneous abortion, stillbirth, premature delivery and low birth weight.

2.3.2. SADC Burden of Malaria

Malaria is a major problem throughout the SADC region. About 74% of the people in this region live in malarious areas of which 18 million (18%) are children under five and 4 million (4%) are pregnant women, who are at risk for contracting the disease either seasonally or throughout the year. Malaria remains a major contributor to morbidity and mortality. On average, there are 300,000 to 400,000 estimated malaria related-deaths annually. Malaria constitutes a major barrier to social and economic development in the region.

2.4. Malaria Epidemiology in Swaziland and Neighbouring Countries

2.4.1. Malaria in Swaziland

Malaria transmission is most prevalent along the eastern, northern and southern borders of Swaziland (see Figure 2). Malaria transmission in Swaziland occurs in the rainy season between November and May with a peak in February and March and occurs mainly in the Lowveld region of the country. Transmission is most intense in the Lubombo region and less intense in Hhohho, Manzini and Shiselweni regions. There is significant variation within each region.

Plasmodium falciparum is responsible for over 99% of malaria cases. Historical data suggest that the main vector is *Anopheles arabiensis.* It is estimated that 30% of the population live in malarious areas. There were approximately 6 523 clinical episodes of malaria (unconfirmed cases) and 13 deaths in Swaziland in 2007. The estimated population at risk for malaria is approximately 366 900, making the 2007 incidence of the disease to be approximately 18 per 1000 population at risk, compared to the 2002 malaria incidence of 49.5 per 1000 of the population at risk.

Because malaria incidence in Swaziland is based on clinical diagnosis, the actual burden of the disease is expected to be lower than the current levels. It is therefore imperative that the malaria clinical diagnosis policy transitions to definitive diagnosis in keeping with the WHO recommendation and the SADC malaria elimination framework.

Malaria transmission is unstable in Swaziland, and closely related to the level of rainfall, which varies considerably each year. Therefore, there is significant variation in the degree of transmission from year to year, and major epidemics may occur in years of heavy rainfall, such as in 1984, 1993, 1996, 1997, and 2000. Malaria cases were recorded as 675 with 60 deaths in the year 2000, at Good Shepherd's Hospital, the main malaria referral hospital in Swaziland (accountable for more than 80% of all hospital admissions). This was considered to be the highest number of cases and deaths in Swaziland in recent years.

The unstable and highly seasonal nature of malaria transmission in Swaziland indicates that acquired immunity by populations at risk to malaria is negligible and all age groups are therefore at risk of contracting diseases.

According to the Swaziland Tourism Authority's Annual Report for 2006, the country has about 1,199,858 travellers passing across its borders every year. This presents

a huge challenge for malaria control, especially from those persons going to and coming from malaria-endemic countries. Movement of malaria affected person across borders will need to be addressed in the prevention of re-introduction phase of the malaria elimination continuum.

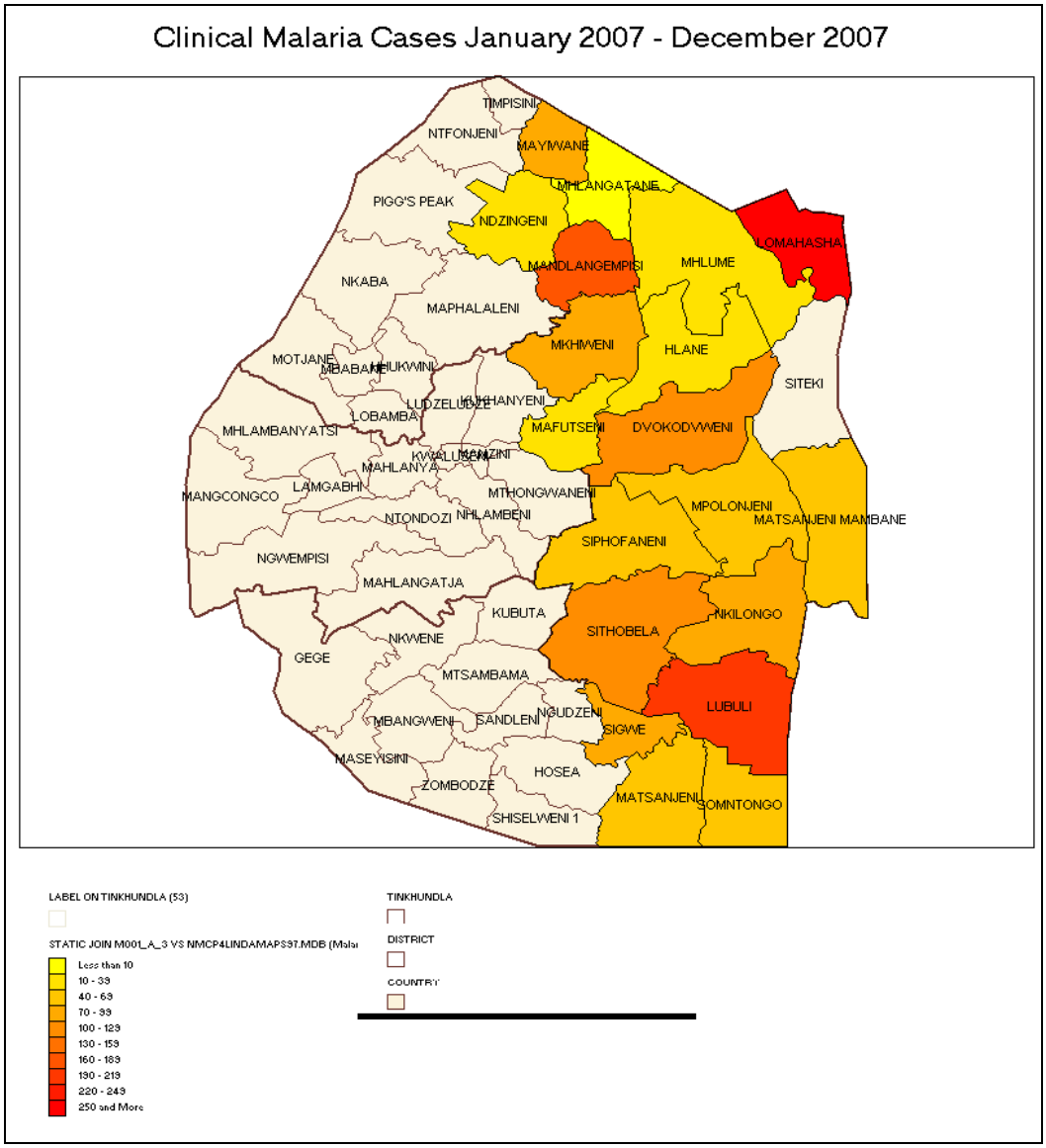


Figure 3. Malaria Distribution Map for Swaziland, January-December 2007

2.4.2. Malaria Epidemiology in Neighbouring Countries

Swaziland is bordered by South Africa's Mpumalanga Province in the North, South Africa's Mpumalanga Province in the West, South Africa's KwaZulu-Natal Province in the South, and Mozambique's Maputo Province in the east. Malaria transmission in Mpumalanga Province and in the KwaZulu-Natal provinces have been significantly reduced in recent years due to effective malaria control – with current estimates of malaria transmission in these 2 provinces to be less than 5 per 1000 population at risk. The current malaria prevalence rates in Maputo province is approximately 5.2 per 1000 population at risk due to an effective malaria control programme. South Africa, Swaziland, and Mozambique benefit additionally from engaging in the malaria

project of the Lubombo Spatial Development Initiative (LSDI), a project that is spearheaded by the South African Medical Research Council (MRC) and receives considerable financial resources from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM). The LSDI malaria control strategies are complementary to those of each country; i.e., Case Management; Vector Control, Disease and Vector Surveillance and Health Promotion and IEC. See Figure 4 for malaria incidence and prevalence data in the LSDI areas, whereby the 2003 data is compared to the 2000 baseline.

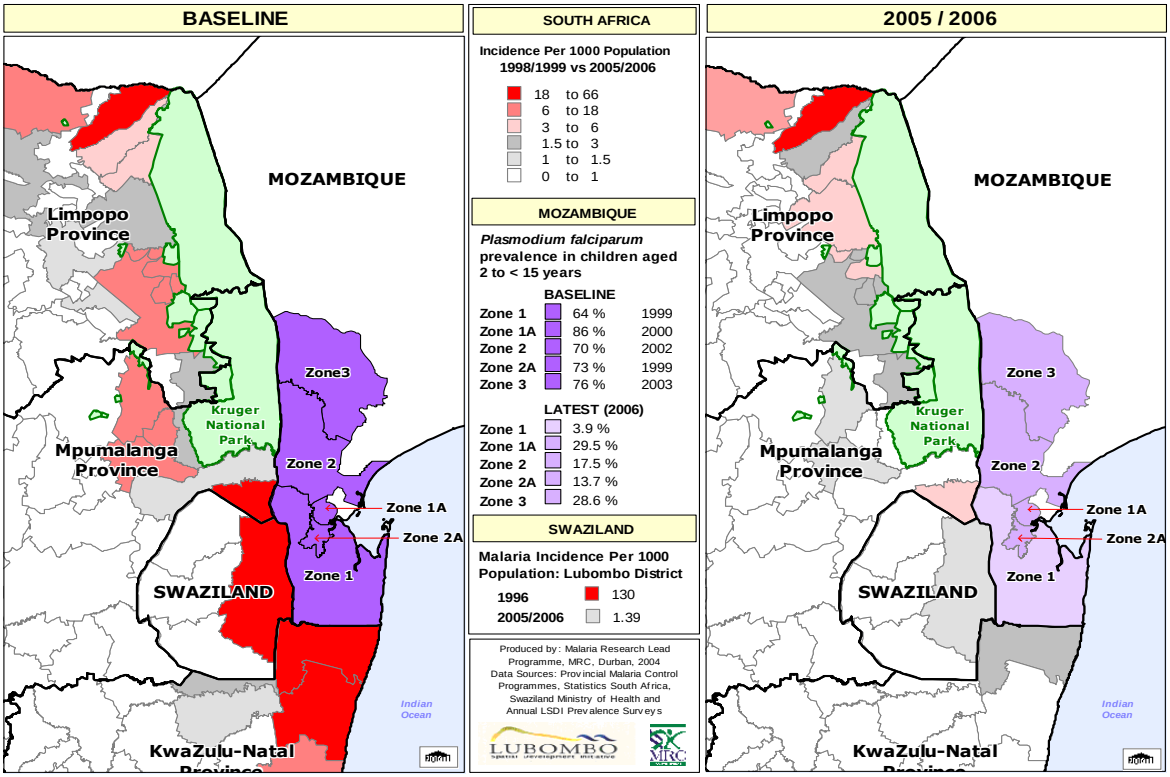


Figure 4. Malaria incidence and prevalence data in the LSDI Areas

2.5. Rationale for Malaria Elimination in Swaziland

Swaziland is well-positioned to pursue the goal of malaria elimination. This is evidenced mainly from the approximately 64% reduction in malaria incidence in 2007 compared to that of 2002. In addition, the programme has managed to achieve a significant reduction in admissions and deaths due to malaria. Good Shepherd's Hospital had 50 malaria related patient admissions and no deaths, compared 250 malaria related admissions and 8 deaths in 2002. As the malaria incidence of 18 / 1000 population at risk is based on clinical diagnosis, actual incidence as determined by definitive diagnosis is expected to be much lower. It would therefore be imperative for the malaria programme to address definitive diagnosis with effective treatment as a key step for transitioning from malaria control towards malaria elimination.

The government of Swaziland is very committed to malaria control, as evidenced by its financial support for malaria interventions, which is more than 55% of the recurrent and capital expenditure for malaria control in the country. The malaria control programme in Swaziland has good leadership and key staff for coordination of routine malaria control activities. However, transitioning from malaria control to

elimination would require a significant financial and human resource investment on the part of government and partners for scaling up implementation of the identified strategies.

Swaziland has a relatively small population with the total number of persons in the country being 953 524, according to the 2007 census data. Eliminating malaria in this population is therefore possible through optimisation of the existing and introduction of new tools. The threat however of re-introduction of malaria into the country will always pose a huge challenge, due to regular movement of persons to and from malaria endemic areas across the borders in neighbouring countries and other malaria endemic countries. For this reason, cross-border collaboration such as the malaria project of the LSDI with South Africa and Mozambique needs to be sustained and scaled up. In addition, active surveillance of vectors and cases and information education and communication will play a pivotal role in prevention of re-introduction of malaria into malaria-free zones in the country. These strategies will therefore need to be further developed and strengthened.

3. Goal and Objectives of Malaria Elimination

3.1. The Goal of the Elimination Strategy

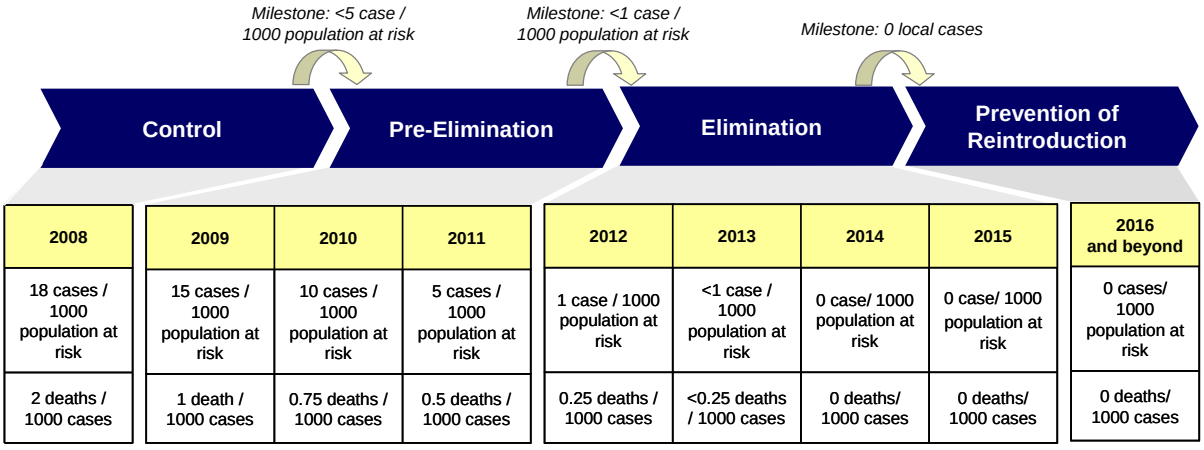
The goal of Swaziland's Elimination Strategy is to eliminate malaria in the country by 2015 and prevent reintroduction in subsequent years.

3.2. The Objectives of the Elimination Strategy

The objectives of the malaria elimination strategy for Swaziland are to:

- Reduce indigenous malaria cases in Swaziland to 1 per 1000 population at risk by 2011; the pre-elimination stage of the continuum;
- Reduce the indigenous malaria cases to 0 per 1000 population at risk in Swaziland by 2015; the elimination stage of the continuum;
- Maintain zero indigenous malaria cases in Swaziland by prevention of reintroduction for all years following 2015;
- Reduce indigenous malaria deaths seen at health facilities to zero for total population in Swaziland by 2015 and sustain it to this level in subsequent years; and
- Prevent resurgence of malaria transmission by limiting reintroduction of parasites into the country and rapidly eliminating new sources of local transmission.

See Figure 5 for key targets at each stage of the elimination continuum.



2008	2009	2010	2011	2012	2013	2014	2015	2016 and beyond
18 cases / 1000 population at risk	15 cases / 1000 population at risk	10 cases / 1000 population at risk	5 cases / 1000 population at risk	1 case / 1000 population at risk	<1 case / 1000 population at risk	0 case/ 1000 population at risk	0 case/ 1000 population at risk	0 cases/ 1000 population at risk
2 deaths / 1000 cases	1 death / 1000 cases	0.75 deaths / 1000 cases	0.5 deaths / 1000 cases	0.25 deaths / 1000 cases	<0.25 deaths / 1000 cases	0 deaths/ 1000 cases	0 deaths/ 1000 cases	0 deaths/ 1000 cases

Figure 5. Key Milestones for Malaria Elimination in Swaziland

4. Intervention Strategies for Malaria Elimination

The WHO's Malaria Manual on Elimination states that for malaria elimination programme to be effective, it must be built on an intensive malaria control program with universal coverage of intensified, efficacious interventions for case management and vector control. These interventions will develop from targeting the wider population to transmission foci and to individual malaria cases. As Swaziland has not optimised implementation of the WHO recommended strategies for malaria control (e.g use of ACT with definitive diagnosis), the elimination strategy will be focus on all the programmatic stages of the malaria elimination continuum.

The required malaria intervention strategies by programme type are case management; Vector Control; Surveillance and Epidemic Preparedness and Response; Health Promotion and IEC and Health Systems Strengthening and programme management and coordination. Each of these interventions and targets for achieving them are detailed below:

4.1. Case Management

Case management is one of the key strategic interventions for malaria control programmes, as it is able to significantly reduce morbidity and mortality due to malaria. It involves implementation of prompt accurate diagnosis and effective treatment. Accurate diagnosis of malaria is achieved through the use of rapid diagnostic tests and slide microscopy. Effective treatment of malaria comprises of the appropriate use of an effective anti-malarial drug according to the WHO recommended and national treatment guidelines.

4.1.1. Diagnosis

The key target for malaria diagnosis will be to ensure that 100% of malaria cases are diagnosed by RDTs and confirmed by slide microscopy, by 2015 and to sustain these targets from then onwards.

RDTs should be used as a screening test as it is easy to use, requires less sophisticated technology and produces results within 15 minutes, however it has the limitation of not being 100% accurate. The key factors associated with RDT accuracy includes: manufacturing quality of the RDTs, end-user proficiency and maintenance of an stable temperate environment (below 30^0C) during transport and storage.

Microscopy will need to be performed on all positive RDTs for patient management: this is required for speciation and determining the baseline parasitaemia prior to patient treatment. A cohort of randomly chosen negative tests should also be quality controlled. Training, quality checks and supervision should be ongoing for of end-users, to ensure that end-users are proficient at conducting RDTs.

The key activities to support the malaria diagnosis target include:

- Development of a new diagnostic guideline and distribution to all health facilities, this is important as diagnostic practices at the clinics will change

from clinical to that of using malaria rapid diagnostic tests;

- Roll-out of RDTs to all health facilities both within the private and public sectors to ensure standardisation of diagnosis throughout the country;
- Quality assurance for malaria rapid diagnostic tests; and
- Training of healthcare workers will be important to ensure high level of diagnostic accuracy.

Table 2 outlines the key activities for implementing definitive diagnosis and table 3 outlines the key indicators for tracking the outcome and output diagnostic indicators that would be required for each stage of the malaria elimination continuum, respectively.

Control	Pre-Elimination	Elimination	Prevention of Reintroduction
• Develop a new diagnostic guideline and distribution to all health facilities • Ensure roll-out of RDTs to all health facilities (both private and public) • Develop a quality assurance system to monitor the accuracy of malaria diagnostics (microscopy and RDTs) through: – Monitoring RDT quality assurance throughout the supply chain management process including usage at health facility level – Quality control of slide microscopy • Training of appropriate healthcare workers using the new diagnostic guidelines	• Continue to use RDTs at all health clinics. • Monitor RDT and microscopy quality	• Continue to use RDTs at all health clinics • Monitor RDT and microscopy quality	• Continue to use RDTs at all health clinics • Monitor RDT and microscopy quality
All Phases			
• Develop a quality assurance system to monitor the accuracy of diagnostics (microscopy and RDTs) through: – Monitoring RDT quality assurance throughout the supply chain management process including usage at health facility level – Quality control of slide microscopy • Training of appropriate healthcare workers using the new diagnostic guidelines			

Table 2. Activities for Malaria Diagnosis

Intervention and Activities	Key Indicators	Baseline (2007)	Pre-Elimination Target (2008-2011)	Elimination Target (2011-2015)	Prevention of Reintroduction Target (>2015)
Accurate Confirmed Diagnosis	% of suspected malaria cases confirmed by RDT/Microscopy	0	95%	100%	100%
RDT Stocks	% of clinics with no RDT stock outs	0	100%	100%	100%
Quality control	Percentage of RDTs confirmed by slide microscopy (every positive and 10% of negatives being tested)	0	100%	100%	100%

Table 3. Key Outcome and Output indicators for Tracking RDT Implementation

4.1.2. Treatment

Although chloroquine resistance data is sparse in Swaziland, high levels of resistance has been recorded in neighbouring South Africa and Mozambique.[5;6] This places Swaziland at increased risk chloroquine resistance. ACTs are therefore recommended by the WHO for treatment of uncomplicated *Plasmodium falciparum* malaria. ACTs are recommended by the WHO[7] as they produce a very rapid therapeutic response (reduction of the parasite biomass and resolution of symptoms), are active against multidrug resistant *P. falciparum*, are well tolerated by the patients and reduce gametocyte carriage (and thus have the potential to reduce transmission of malaria). To date, no resistance to artemisinin or artemisinin derivatives has been reported, although some decrease in sensitivity in vitro has been detected in China and Vietnam. If used alone, artemisinin will cure *falciparum malaria* in 7 days, but studies have shown that in combination with certain synthetic drugs they produce high cure rates in 3 days with higher adherence to treatment. Furthermore, there is some evidence that use of such combinations in areas with low to moderate transmission can retard the development of resistance to the partner drug.

The treatment target for malaria elimination is to ensure that 100% of all confirmed cases are treated with effective ACTs by 2015 and subsequent years.

The key activities to support this intervention include the development and distribution of treatment guidelines to all public and private health facilities, the procurement and distribution of ACTs to all health facilities, ACT resistance monitoring, and inventory management of diagnostics and drug. When the number of malaria cases in the country starts to reach very low levels, there must be treatment of all positive malaria cases at ports of entry into the country.

[5] Deacon et al., 1999. Drug-resistant *Plasmodium falciparum* malaria in the Eastern Transvaal. South African Medical Journal.84(7).394

[6] Abacasso *et al*., 2004. Efficacy of chloroquine, amodiaquine, sulphadoxine-pyrimethamine and combination therapy with artesunate in Mozambican children with non-complicated malaria. Tropical Medicine and International Health.9.200-208.

[7] http://www.rbm.who.int/cmc_upload/0/000/015/364/RBMInfosheet_9.htm

Tables 4 and 5 outline the key activities and indicators for tracking treatment indicators required for each stage of the malaria elimination continuum, respectively.

Control	Pre-Elimination	Elimination	Prevention of Reintroduction
• Development of treatment guidelines and distribution to all health care facilities and Hospitals • Training of all health care workers on treatment guidelines • Procurement and distribution of ACTs to all health facilities in Swaziland	• Monitoring of ACT resistance at key sentinel sites • Monitoring of drug stock outs at all health facilities	• Monitoring of ACT resistance at key sentinel sites • Monitoring of drug stock outs at all health facilities	• Treating all patients infected whilst travelling into the country at ports of entry
All Phases			
• Monitoring of ACT resistance at key sentinel sites • Monitoring of drug stock outs at all health facilities			

Table 4. Activities for Malaria Treatment

Intervention / Activities	Key Indicators	Baseline (2007)	Pre-Elimination Target (2008-2011)	Elimination Target (2011 -2015)	Prevention of Reintroduction Target (>2015)
Prompt effective treatment with ACTs	% of confirmed cases treated with ACTs	0%	95%	100%	100%
Training of Health care workers o new treatment guidelines	% of Health care workers trained on new treatment guidelines	0%	95%	100%	100%
ACT stocks at all health facilities	% of Health facilities with no stock outs of ACTs	0	100%	100%	100%
Monitoring drug resistance	Number of studies conducted in accordance with WHO protocol*	0	2	2	2

Table 5. Key Outcome and Output Indicators to Track ACT Implementation
* One every 2 years

4.1.3. Vector Control and Personal Protection

The principal objective of vector control is to suppress vector activity to a point where malaria transmission can be fully interrupted resulting in a decrease in malaria morbidity and mortality. Vector control in Swaziland is aligned to the WHO-recommended systematic approach to vector control, based on evidence and knowledge of the local situation. This approach is called Integrated Vector Management (IVM).[8] The key intervention strategies for IVM in Swaziland will include IRS, LLIN, and larviciding. Swaziland has used IRS very successfully in the past few years, achieving over 90% of targeted households in the malaria transmission areas. However, LLIN coverage has been low in the targeted malaria areas, whereby only 5% of households were using effective nets. Ineffective delivery

[8] http://www.who.int/malaria/docs/WHO-TRS-936s.pdf

mechanisms were the reason for not being able to optimally deliver the nets.[9] Alternative delivery mechanisms of using spray-operators to deliver the LLINs should be implemented. Winter larviciding needs targeted at vector breeding sites.

Geographic information has proved valuable in monitoring and surveillance of public health interventions. The implementation of the IVM strategies should therefore be guided by GPS and GIS technology, which will facilitate the geographical mapping of vector breeding and resting sites. This will ensure appropriate identification of transmission foci and effective implementation of IVM interventions at these sites.

The key interventions and activities to be achieved for vector control and personal protection by 2015 are to ensure that:

- All vector breeding and resting sites are mapped using GPS/GIS technology and these maps are regularly updated in keeping with the changing transmission foci in the country;
- 100% of the malaria affected population is covered by IRS;
- 100% of at least 2 persons per household in the malaria affected areas are sleeping under an insecticide treated net;[10]
- 100% of targeted breeding sites are sprayed with larvicides;
- 100% of the population are protected with personal protection measures including prophylaxis; and
- Regular insecticide resistance monitoring of IRS, LLINs and larvicides.

See Tables 6 and 7 for an outline of the implementation of vector control activities and M&E indicators respectively for tracking progress towards malaria elimination.

Control	Pre-Elimination	Elimination	Prevention of Reintroduction
• Scaling-up of IRS to achieve more than 85% for targeted population protected • Scaling-up of LLIN coverage of 1 net per 2 persons, to achieve 30% of the at risk population protected	• Geographical reconnaissance and mapping of all vector breeding and resting sites. • Scaling-up of IRS coverage of targeted households to 100% • Scaling-up of LLIN coverage so that 100% of at risk population has 1 net per 2 persons. • Introduction of larvicides to 30% of identified water bodies	• Review transmission foci and update maps • Sustaining IRS coverage at 100% in targeted areas • Sustaining LLIN coverage of 1 net per 2 persons among at risk populations • Apply larvicides to 100% of targeted water bodies • Make prophylaxis available and personal protection available for travellers to malaria areas	• Review transmission foci and update maps • Sustaining IRS coverage at 100% in targeted areas (as defined by NMCP-areas targeted for IRS will need to be adjusted in accordance with epidemiological findings). • Sustaining LLIN coverage of 1 net per 2 persons among 100% at risk populations • Applying larvicide to 100% of targeted breeding sites • Sustaining personal protection measures including prophylaxis for travellers to malaria

[9] Knowledge Attitutes and Practies (KAP) survey results in Swaziland, 2007.
[10] From the 2007 KAP survey results it is estimated that there are an average of 6 persons be household and that 2 persons share a common sleeping space, hence at minimum the LLIN target needs to be 3 per household.

			areas
All Phases			
• Conducting entomological surveillance for both adult and larval forms of the vector. • Conducting insecticide resistance monitoring for IRS; LLINS and larvicides			

Table 6. Activities for Vector Control and Personal Protection

Intervention/ Activities	Key Indicators	Baseline (2007)	Pre-Elimination Target (2008-2011)	Elimination Target (2011 -2015)	Prevention of Reintroduction Target (>2015)
Indoor residual spraying coverage	% of targeted houses sprayed with Insecticides	93%	100%	100%	100%
LLINs usage	% of households with 1 net per 2 individuals	23%	30%	100%	100%
Vector Surveillance	# of identified vector breeding sites	0%	100%	150%	200%
Larviciding application	% of anopheline larval affected waterbodies treated with larvicides	0%	30%	100%	100%
Insecticide resistance monitoring	Number of functional sites for Insecticide resistance monitoring	0	2	2	2
Prophylaxis for travellers	Percentage of travellers receiving prophylaxis according the national prophylaxis guidelines	0%	50%	70%	100%

Table 7. Key Outcome and Output Indicators for Vector Control and Personal Protection

4.1.4. Surveillance and Epidemic Preparedness and Response (EPR)

In order to accurately estimate the burden of disease and measure the trends in Malaria, the WHO recommends that robust surveillance systems needs to be implemented.[11] Malaria data will be collected through both passive and active surveillance systems.

Passive surveillance will involve the reporting of all confirmed malaria cases from all health facilities to the appropriate health authorities. Both public and private sector health facilities should be regularly reporting malaria data to health authorities. Prompt reporting of malaria cases will become more important as malaria cases start to decline, this will allow the malaria programme to identify remaining transmission foci[12] and implement targeted interventions such as integrated vector control, case management and IEC. All positive malaria cases should be investigated to prevent localised spread of the disease. Regular training would need to be provided to

[11] http://www.who.int/malaria/monitoringandevaluation.html

[12] Foci is defined by the WHO as a defined locality situated in a currently or former malarious area and containing the continous or intermittent epidemiological factors necessary for malaria transmission. Foci can be classified as residual non active, cleared up, new potential, new active, endemic or pseudo-foci.

appropriate personnel to ensure that case notification and reporting is optimal.

Active surveillance will involve the screening of high risk populations to identify malaria carriers. All malaria cases should be followed up to gather information about their potential source of infection. Screening should take place of persons with malaria symptoms using RDTs and all positive malaria cases should be treated with appropriate anti-malaria treatment. Dedicated staff (i.e., Malaria Surveillance Officers) from the malaria control programme should follow up each case with a home visit to determine patient demographics, transmission source, and other key information.

Malaria Surveillance Officers should conduct RDT screening tests for all individuals residing within the surrounding communities of the confirmed case (approximately within a 1-kilometer radius). Active surveillance will be key to the prevention of emerging outbreaks and asymptomatic parasite carriers, thereby helping to interrupt local transmission. Active case detection should occur regularly within areas of transmission foci and hotspots such as on farms where immigrant workers are employed. Screening of immigrant workers should occur subsequent to their return from their travel from malaria-endemic countries.

The malaria control programme should have efficient malaria information systems for data capture and analysis of trends to ultimately track malaria transmission foci. Malaria information systems should be comprehensive to capture all relevant malaria related data for tracking key indicators for malaria elimination which should ultimately flow into a centralised health monitoring information system within the Ministry of Health.

Epidemics can occur when malaria attacks vulnerable populations with little or no immunity.[13] In such situations, people of all age groups are at risk of death or severe disease. Epidemics of *Plasmodium falciparum* malaria, the most severe form of the disease, can be devastating if not controlled in a timely manner. Malaria notifications from both public and private sectors will need to be timely so that authorities can institute necessary response.

Intervention strategies for achieving malaria elimination by 2015 are to ensure that:

- 100% of malaria cases and are notified within 7 days of diagnosis;
- 100% of malaria cases are fully investigated within 7 days of confirmed diagnosis; and
- 100% of the malaria epidemics have been identified and responded to within 2 weeks of onset.

The key activities to ensure effective implementation of the surveillance and epidemic preparedness and response include:

- Setting up mechanisms for notification and investigation of all confirmed malaria cases;
- Establishing Early Warning Systems to forecast epidemics;

[13] www.who.int/malaria/docs/ecr20_7.htm

- Scaling up EPR systems; and
- Setting up Elimination GIS-based database on malaria cases and vectors.

See tables 8 and 9 for key activities and monitoring and evaluation indicators for achieving the surveillance and EPR intervention targets, respectively.

Control	Pre-Elimination	Elimination	Prevention of Reintroduction
• Setting up mechanism for notification and investigation of all confirmed malaria cases • Setting up of Early warning systems- EWS (including meterological monitoring) to forecast malaria epidemics • Setting up of epidemic preparedness and response systems	• Roll out notification mechanisms to all health facilities in the country • Implement Malaria Early warning and detection systems • Implement EPR • Ensuring immediate notification of all malaria cases confirmed by diagnosis • Setting up Elimination GIS-based database on malaria cases and vectors	• Sustaining high performance of malaria Early warning and detection systems • Sustaining EPR • Implementing active (both public and private) case investigation and classification (indigenous or imported) • Implementing foci investigation and classification • Sustaining immediate notification of confirmed malaria cases.	• Ensuring mechanisms are in place to for timely response to local transmission • Sustaining active case investigation • Sustain foci investigation and classification

Table 8. Activities for Surveillance and EPR

Intervention	Key Indicators	Baseline (2007)	Pre-Elimination Target (2008-2011)	Elimination Target (2011 -2015)	Prevention of Reintroduction Target (>2015)
Regular reporting of cases	% of Health facilities (public and private) reporting cases in a timely manner	50%	80%	100%?	100%
Parasite Surveillance	% of all confirmed malaria cases that are fully investigated within 7 days of diagnosis	0%	50%	100%	100%
Epidemic Forecasting	% of local malaria epidemics that have been identified within 2 weeks on onset	95%	95%	95%	95%
Epidemic Preparedness and Response	% of local malaria epidemics that have been responded to effectively within 2 weeks on onset	0	60	95	100

Table 9. Key Outcome and Output indicators for Surveillance and EPR

4.1.5. Malaria Health Promotion and IEC

As malaria cases start to decrease in Swaziland, several sectors of the population and stakeholders, including certain government departments, may lose interest in malaria preventative measures. Health promotion and IEC will therefore be crucial for prevention of re-introduction of the disease. Malaria IEC using tailored messages and a variety of communication channels will therefore need to be used to ensure that communities and travellers travelling to and from malaria endemic areas should take the necessary precautions and actions needed to prevent being infected with malaria and onward transmissions.

The health promotion intervention strategy will involve increasing advocacy for malaria through the use of IEC to increase awareness of malaria, and actively mobilising communities to become engaged in malaria control and elimination. The malaria health promotion and IEC strategy will be important for ensuring that the key strategies for malaria elimination are understood by communities. This involves:

- Early treatment seeking behaviour;
- Compliance with Indoor residual spray teams for vector control;
- Ensuring that communities sleep under Insecticide treated nets; and
- Cleaning up their surrounding environment- to prevent vector breeding sites.

The target for this intervention strategy is to ensure that the total population of the country is reached by IEC by 2015 and subsequent years.

The key activities for achieving the Health Promotion and IEC target is to develop a communication strategy for Malaria IEC, see table 10 and 11 for key activities and M&E indicators for achieving this intervention strategy, respectively.

Control	Pre-Elimination	Elimination	Prevention of Reintroduction
• Develop a communication strategy for malaria IEC			
All Phases			
• Operationalise IEC communication strategy through mass media and community outreach campaigns • Monitor and evaluate the effectives of community outreach campaigns through KAP surveys.			

Table 10. Activities for the Health Promotion and IEC

Intervention	Key Indicators	Baseline (2007)	Pre-Elimination Target (2008-2011)	Elimination Target (2011 - 2015)	Prevention of Reintroduction Target (>2015)
To provide the total population and travellers with malaria IEC	% of total population reached by malaria IEC	0	60%	95%	100%
Mass media campaigns	% of population reached by IEC	30%	60%	95%	100%
All Phases					
Monitor and evaluation effectiveness of IEC through KAP surveys					

Table 11. Key Outcome and Output Indicators for Health Promotion and IEC

4.2. Health System Strengthening

Health system strengthening for infrastructural and technical support and ensuring access by both public and private sectors to malaria services are important precursors to ensure effective delivery of the strategic interventions for malaria elimination. Health system strengthening and its maintenance will be important to ensuring that the implementation of malaria elimination strategies are sustained at all stages of the malaria elimination continuum and can jeopardise the goal of malaria elimination if not adequately addressed. The current health systems challenges in Swaziland include:

- Limited laboratory infrastructural capacity for malaria diagnosis;
- Inadequate Health Management Information System (HMIS) for collecting, documenting and reporting health information;
- Lack of quality assurance processes for pharmaceutical and health products; and
- Inadequate Human resources for co-ordination and implementation all strategic interventions for malaria elimination.

Strengthening laboratory infrastructure and capacity should ensure that all health facilities (clinics, health centres, and hospitals) are able to diagnose malaria. At the clinical level, diagnosis should be achieved through the use of RDTs whilst at the health centre level diagnosis should be achieved through the use of slide microscopy. Training of incumbent health care providers to ensure quality diagnosis should be ongoing. Developing and strengthening laboratory infrastructure for slide microscopy, will be important for quality controlling RDTs and ensuring malaria case management.

Data management system should be strengthened to ensure capture of appropriate data for tracking malaria elimination indicators. Databases at the malaria control programme should ensure that data transfer to the HMIS is possible.

The effectiveness of the procurement, distribution and reporting system, as well as the quality of the drug need to be constantly monitored to ensure that there is no drug resistance and that there are no fatalities due to a lack of organization, timely reporting system, or ineffective drugs. This system will benefit malaria outcomes by assuring proper treatment through availability of high quality ACTs. It will also benefit all other disease-areas.

Human resources capacity both skills and numbers should be addressed. The key Human resources required for malaria elimination include:

- Epidemiologists;
- Entomologists;
- GIS mapping technicians;
- Clinical and laboratory services personnel;
- Management personnel for co-ordination and oversight of malaria interventions; and

- Large trained workforce at the implementation level to ensure to ensure coverage of interventions.

Table 12 outlines the key activities for health systems strengthening for each phase of the malaria elimination continuum.

Control	Pre-Elimination	Elimination	Prevention of Reintroduction
• Ensuring that all public and private sector patients has access to diagnosis and treatment at affordable costs	• Ensuring that adequate qualified staff are available for all phases of the elimination continuum	• Ensuring that adequate human resources, equipment and infrastructure exists for active case detection • Ensuring that that malaria diagnosis and treatment is accessible at affordable cots in both public and private sectors.	• Integration of malaria programme staff into other health programmes, whilst maintaining flexibility to revert back to the malaria control programme should there be a need.*

Table 12. Activities for Health Systems Strengthening

*The roles and responsibilities of malaria control programme staff should be redefined within the malaria control and other priority programmes as required. Staff postings should always remain flexible for redeployment to the MCP should the need arise (during epidemics and emergencies).

4.3. Programmatic Support

A series of programmatic interventions will need to be implemented at the malaria control programme transitions from control to elimination. Programme management at the central levels within the Ministry of Health will need to be assessed and strengthen as required. Technical capacity to support implementation of the key interventions should also exist at the central levels.

A legislative policy should be developed at this stage to deal will all aspects of malaria elimination, including:

- Mandatory compliance of malaria affected and suspected persons with case investigators;
- Mandatory notification of malaria cases by health facilities- both private and public; and
- Mandatory compliance of communities in malaria affected areas on environmental management for prevention of vector breeding sites.

The NMCP should embark on a series of key activities as the programme transitions from malaria control to elimination. These include:

- Setting up malaria elimination and prevention of re-introduction of malaria committees to decide on steps to be taken and to monitor/report on progress made on malaria elimination;
- Ensure that resources (financial, human and commodities) are mobilised to implement elimination interventions;
- Establish partnerships (financial and logistical sectors in government community organisations, NGOs, UN agencies and private sector) to support

malaria elimination in the Swaziland and ensure partners are aligned to the national strategy for malaria elimination;

- Ensure adequate supply and monitoring quality of malaria commodities (drugs, insecticides, and RDTs);
- Ensure cross border malaria initiatives, such as the LSDI and developing mechanisms for screening of malaria travellers returning to Swaziland from malaria endemic countries; and
- Monitor and evaluate all the targets for malaria elimination.

See Table 13 for the key programmatic supportive activities for each phase of the continuum needs that would need to be addressed.

Control	Pre-Elimination	Elimination	Prevention of Reintroduction
• Partnership strengthening needs to take place and their roles and responsibilities needs to be aligned to the business/operational plan for malaria elimination and to the 3 1's principle should prevail at all times. • Appropriate resources (Human, financial and commodities) needs to be mobilised for each step of the malaria elimination continuum from both domestic and external funding sources • Regional and cross border malaria initiatives needs to be initiated and strengthened where it exists (e.g. LSDI)	• development of a malaria legislative policy • Regional malaria initiatives should be sustained • A malaria elimination committee should be established with persons representing the technical financial and logistical sectors in government with key partners and stakeholders, ie. Community organisation representatives, NGOs, UN agencies and private sector.	• The malaria elimination committee should be fully functional and monitoring key indicators and targets in the strategic and business plans for malaria elimination • Health staff will need to be re-orientated towards malaria elimination activities	• A prevention of reintroduction Committee should be established after elimination goals are achieved. The key responsibility of this committee will be to provide an oversight for prevention of re-introduction of malaria into the country.

Table 13. Key Programmatic Activities for Malaria Elimination Programme Implementation

4. Monitoring and Evaluation

Monitoring and evaluation must be regarded as an integral part of malaria control and elimination programmes. Key requirements for monitoring are that data are regularly analyzed and fed back to all staff involved, particularly those at facilities that collect data. Monitoring and evaluation should be conducted through data collection and analysis from malaria indicator surveys (MIS, MICS, and DHS).

A detailed monitoring and evaluation plan should be developed, with the key monitoring and evaluation data information components for each phase of the elimination continuum as outlined below.

4.1. Control Programme

Information must be collected on malaria vector populations, parasites, at risk human populations, malaria cases, and programme output and usage. Case detection and reporting must be strengthened during the preparation for pre-elimination. The following key data should be collected.

- Reported malaria cases and deaths
- Proportion of population at risk targeted for ITNs and IRS
- Drug efficacy: in vivo and in vitro parasite sensitivity to anti-malarial drugs
- Case data from patient registers: type of diagnosis, treatment given, age incidence of severe and uncomplicated malaria, malaria-attributable deaths
- QA of laboratory services
- Proportion of uncomplicated malaria cases receiving timely and effective treatment

4.2. Pre-elimination Programme

During the pre-elimination phase the focus of monitoring and evaluation will shift towards comprehensive and accurate case detection and reporting, the following data should be collected.

- Enhanced case information system: geo-location and immediate notification of cases, centralised reporting, genotyping of parasites, investigation of source, active detection and treatment of cases, where a case is a person testing positive for plasmodial infection
- Geo-referenced entomological data: insecticide resistance (using molecular techniques) and location of breeding sites
- Drug efficacy by post-treatment follow up of cases
- QA of laboratory services
- Verification of reliability of case information system
- Proportion of population at risk targeted for, and covered by, IRS/ITN (spray coverage of approximately 100%)
- Epidemic preparedness and response

4.3. Elimination Programme

During the elimination phase it will be important that each case is notified and investigated, to assess whether there is local transmission. The following data should be collected.

- Immediate individual case notification, investigation and classification
- Foci investigation including active case detection and treatment
- Routine genotyping of parasites
- Meteorological monitoring and epidemic early warning.
- Entomological surveillance
- Monitoring of drug response
- Regular QA of laboratory diagnosis

Annex 1. Glossary

Case, imported: a case, the origin of which can be traced to a known malarious area outside the country in which the case was diagnosed.
Case, indigenous: a case, the origin of which from local transmission cannot be disproved. It includes delayed first attacks of *P. vivax* due to locally acquired parasites with a long incubation period.
Case, induced: a case, the origin of which can be traced to a blood transfusion or other form of parenteral inoculation, but not to normal transmission by a mosquito.
Case, introduced: a case in which it can be proved that the infection is a first step (first generation) of local transmission subsequent to a proved imported case, i.e. in which the mosquito was infected from an imported case.
Case investigation: gathering enough information to allow classification of a malaria case by origin of infection. It includes, but is not limited to, administration of a standardized questionnaire to a person diagnosed with a malaria infection.
Case, malaria (as defined in elimination programmes): a person in whom, regardless of the presence or absence of clinical symptoms, malaria parasites have been confirmed by quality-controlled laboratory diagnosis.
Case management: diagnosis, treatment, clinical care and follow-up of malaria cases.
Case notification (compulsory): reporting of detected cases of malaria by all medical units and medical practitioners, to either the health department or the malaria elimination service (as laid down by law or regulation).
Endemic: applied to malaria when there is a constant measurable incidence of cases and mosquito-borne transmission in an area over a succession of years.
Epidemic: occurrence of cases in excess of the number expected in a given place and time period.
Evaluation: a process that attempts to determine as systematically and objectively as possible the relevance, effectiveness and impact of activities in relation to their objectives.
Focus: a defined and circumscribed locality situated in a currently or former malarious area and containing the continuous or intermittent epidemiological factors necessary for malaria transmission. Foci can be classified as residual active, residual non-active, cleared up, new potential, new active, endemic or pseudo-foci.
Gametocytes, person carrying: person who has malaria gametocytes in the peripheral blood, making him or her a potential source of infection.
Geographical reconnaissance: the operation that provides the basis for the choice of field centres and depots, for detailed schedules and itineraries of spraying and surveillance personnel, for the final deployment of transport, and for the numerical control of the completeness of the work accomplished or reported. It includes collection of information on the number, type, location and means of access to all houses and field shelters, as well as on communications, health units, vehicle repair facilities, population movements and other relevant factors.
Health services coverage: use of the health services by those who need it.
Incubation period: the time between infection (by inoculation or otherwise) and the first appearance of clinical signs, of which fever is the most common.
Intensity of transmission: rate at which people in a given area are inoculated with malaria parasites by mosquitoes (usually expressed by the annual entomological inoculation rate).
Local mosquito-borne malaria transmission: occurrence of human malaria cases that are acquired in a given area through the bite of infected *Anopheles* mosquitoes.
Malaria elimination: a reduction to zero of the incidence of infection caused by human malaria parasites in a defined geographical area as a result of deliberate efforts. Continued measures to prevent re-establishment of transmission are required.
Malaria-free: an area where there is no continuing local mosquito-borne malaria transmission, and the risk of acquiring malaria is limited to introduced cases only.

Malaria incidence: the number of newly diagnosed malaria cases during a specified time period in a specified population.

Malaria prevalence: the number of malaria cases existing at any given time in a specified population, measured by positive laboratory test results.

Monitoring (of programmes):

- Episodic measurement of the effect of an intervention on the health status of a population or the environment; not to be confused with surveillance, although surveillance techniques may be used in monitoring;
- The process of collecting and analysing information about the implementation of a programme for the purpose of identifying problems, such as non-compliance, and taking corrective action;
- in management, this refers to the episodic review of the implementation of an activity, seeking to ensure that inputs, deliveries, work schedules, targeted outputs and other required actions are proceeding according to plan.

National foci register: centralized computerized database of all malaria foci in a country.

National malaria case register: centralized computerized database of all malaria cases registered in a country, irrespective of where and how they were diagnosed and treated. It allows detailed analysis and synthesis of epidemiological information and trends, to guide the malaria elimination programme.

Parasite strain: subtype of parasites with similar properties. Properties that are strain-specific include immune response in the human host, infectiousness for a given species of vectors and antimalarial drug resistance.

Passive case detection: detection of malaria cases among patients who on their own initiative went to a health post to get treatment, usually for a febrile disease.

Population at risk: population living in a geographical area where locally acquired malaria cases occurred in the current and/or previous year. The measurement unit for elimination milestones among populations at risk is a political unit corresponding to approximately 75 000–150 000 people (e.g. a district).

Population-based blood survey: survey in which a blood slide is prepared for every individual in a given population (i.e. irrespective of history of fever) once or more, for the thorough assessment of the prevailing conditions in the area, to provide additional proof of the interruption of transmission. The goal is to detect asymptomatic infections usually associated with low parasite densities.

Rapid diagnostic test (RDT) positivity rate: the proportion of RDTs found positive among RDTs performed.

Receptivity: the abundant presence of anopheline vectors and the existence of other ecological and climatic factors favouring malaria transmission.

Re-establishment of transmission: renewed presence of a constant measurable incidence of cases and mosquito-borne transmission in an area over a succession of years. An indication of the possible re-establishment of transmission would be the occurrence of three or more introduced and/or indigenous malaria infections in the same geographical focus, for two consecutive years for *P. falciparum* and for three consecutive years for *P. vivax*.

Relapse: renewed manifestation (of clinical symptoms and/or parasitaemia) of malaria infection separated from previous manifestations of the same infection by an interval greater than that related to the normal periodicity of the paroxysms. The term is used mainly for renewed manifestation due to the survival of hypnozoites (exo-erythrocytic forms) of *P. vivax* or *P. ovale*.

Sensitivity (of a test): the proportion of true positives among all the positives it detects.

Slide positivity rate: the proportion of slides found positive among the slides examined.

Surveillance: that part of the programme aimed at the discovery, investigation and elimination of continuing transmission, the prevention and cure of infections, and the final substantiation of claimed elimination.

Transmission season: period of the year during which mosquito-borne transmission of malaria infection can normally take place.

Vector control: measures of any kind directed against a vector of disease and intended to limit its ability to transmit the disease.
Vigilance: a function of the public health service during the programme for prevention of re-introduction of transmission, consisting of watchfulness for any occurrence of malaria in an area in which it had not existed or from which it had been eliminated, and the application of necessary measures against it.
Vulnerability: either proximity to malarious areas or resulting from the frequent influx of infected individuals or groups and/or infective anophelines.

Annex 2. Source Documents

WHO Malaria Elimination Manual; Global Malaria Programme, WHO 2007
SADC Malaria Strategic Plan 2007-2015
National Malaria Control Policy/strategy for Swaziland
KAP Survey Swaziland 2007
SADC Malaria Framework 2007
African Union Launch of the Africa Malaria Elimination Campaign