MINISTRY OF HEALTH
DEPARTMENT OF HEALTH

Towards Malaria Elimination

Botswana Malaria Program Performance Review Report

2009

Preface and **Acknowledgements**

This report summarizes the preparatory and review processes as well as the findings of the Malaria Programme Review (MPR) conducted by the National Malaria Control Programme (NMCP) of the Ministry of Health in August 2009, under the technical guidance of the World Health Organization.

The entire review exercise was mainly funded by the Government of Botswana and the Roll Back Malaria – Southern Africa Regional Network through SADC. This support is greatly appreciated. The report was compiled by the NMCP in collaboration with the lead consultant and WHO.

MPR is of critical importance if the ultimate goal of elimination is to be achieved. Botswana has been targeted to eliminate malaria by 2015. Through the MPR our current performance level will be known and in turn identify our strengths and weaknesses. Therefore the MPR will help in defining the steps required by the programme to shift focus towards malaria elimination.

I would like to thank the members of the Malaria Reference Group and the Malaria Epidemic Preparedness and Response Committee, who comprised the technical working group, for leading the malaria programme review process. This group comprised of members from Ministry of Health, Department of Primary Health Care Services in the Ministry of Local Government, Nyangabgwe and Princess Marina Referral hospitals, district and primary hospitals, District Health Teams, Botswana Defence Force, University of Botswana, World Health Organization (WHO) and United Nations Children's Fund (UNICEF). A considerable amount of time was spent reviewing various documents and coming up with the thematic reports and presentations. I commend the participants for their commitment, dedication and endurance throughout the entire review process.

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Director, Department of Public Health

Acronyms/Abbreviations

ACTs	Artemisinin based Combination Therapy
AMD	Africa Malaria Day
ANC	Ante Natal Care
CBO	Community Based Organisation
CFR	Case Fatality Rate
CMS	Central Medical Stores
CQ	Chloroquine
DCP	District Contingency Plan
DDMC	District Disaster Management Committee
DHT	District Health Team
EPI	Expanded Programme for Immunisation
EPR	Epidemic Preparedness and Response
FEW	Family Welfare Educators
HCP	Health Care Provider
HEPD	Health Education and Promotion Division
HIV	Human Immuno Deficiency Virus
HMIS	Health Management Information System
IEC	Information Education Communication
IMCI	Integrated Management of Childhood Illnesses
IRS	Indoor Residual Spraying
ITM	Insecticide Treated Materials
ITNs	Insecticide-Treated Mosquito Nets
KAP	Knowledge, Attitudes and Practices
MALOF	Malaria Outlook Forum
MIP	Malaria in Pregnancy
MLG	Ministry of Local Government
MoH	Ministry of Health
MPS	Making Pregnancy Safer
MRC	Medical Research Council

MSP	Malaria Strategic Plan
NCP	National Contingency Plan
NGO	Non-governmental organisation
NHLS	National Health Laboratory Services
NMCP	National Malaria Control Programme
NRH	Nyangabgwe Referral Hospital
OPD	Out Patients Department
PSI	Population Services International
RBM	Roll Back Malaria
SADC	Southern Africa Development Community
SAIMR	South Africa Institute for Medical Research
SAMC	Southern Africa Malaria Control
SARCOF	Southern Africa Regional Climate Outlook Forum
S-P	Sulphadoxine-pyrimethamine
UN	United Nations
UNICEF	United Nations Children's Fund
VHC	Village Health committee
WHO	World Health Organization

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Executive Summary

In the past ten years remarkable efforts on malaria control and elimination have been observed in Botswana. The implementation of proven quality and effective interventions has led to the reduction of the burden of malaria. The conception of the 1997 Accelerated Malaria Control Program, Roll Back Malaria Partnership (RBM) in 1998, and the Millennium Development Goals in 2000, and the development and dissemination of improved tools, all have made significant reductions in malaria transmission in Botswana.

In April 2008 NMCP with its partners decided to undertake a mid term review of the Malaria strategic plan (2006 - 2011) and the program further decided to do in-depth performance review of the malaria control (MPR) with a view to redesign and refocus the program towards malaria elimination. WHO guidelines, tools and questionnaires on malaria programme review were adapted and used for this review. Preparatory phase (Phase1) was initiated in November 2008 and the phase II field review was undertaken from the 8th to 21st August 2009

The main thrust of the review was to meet the following objectives

1. To review the malaria epidemiology situation
2. To review the policy and programming framework within the context of the health system and the national development agenda
3. To assess the progress towards achievement of the global, regional and national targets
4. To review the current program services delivery system, their performance and challenges
5. To define the next steps to improve program performance and/or redefine the strategic direction, approaches and focus including revision of the 2006-2011strategic plan
6. To assess and suggest solutions for Epidemic Preparedness and Response (EPR) in view of the malaria epidemiological zones of Botswana.

The review focused on thematic areas as follows:1) Program management; 2) Malaria epidemiology, Surveillance, Monitoring and Evaluation and Operational Research; 3) Malaria parasite control including diagnosis, treatment and prevention of malaria in

pregnancy; 4) Malaria vector control 5) epidemic preparedness and response (EPR); 6)Malaria advocacy, communication and social mobilization;7) Procurement and supplies management (PSM).

Key Review Findings

The key review findings from each thematic area are as follows:

1. Malaria Epidemiology

Most of the malaria infection in Botswana (98%) is caused by *P falciparum* and *A. arabiensis* is the only vector. The health districts are currently classified into three transmission zones Zone A: Malaria endemic districts which include 5 northern western districts that have substantial local transmission and have high risk of epidemics, Zone B: Malaria focal transmission districts which includes 7 districts in the north central zone that have focal local transmission and has high risk of outbreaks and Zone C: Malaria free districts that include the remaining 11 districts in the south.

The analysis of the transmission intensity in the districts was based on the trend in the confirmed cases of malaria and malaria deaths from 2000 to 2008. Data on laboratory slide positivity rate, annual parasite incidence and age specific parasite prevalence rate were not all available at the time of this review which could also be used to comprehensively classify the transmission intensity in the country.

There has been near zero local transmission in the districts in zone C since 2003. The number of confirmed malaria cases reported annually ranged from 0 – 120 and the incidence of confirmed malaria ranged from 0 to 2/1000 person / year in these districts. There were very few localized outbreaks of malaria (3 outbreaks since 2003) and one malaria death since 2003. Local malaria transmission has been close to zero since 2003 in these districts. Thus the policies in this zone should be oriented towards sustaining the zero transmission and averting outbreaks.

In the 7 districts in the focal transmission zone (zone B), the confirmed malaria cases ranged from 0-160 per year with exception of Bobirwa district that had 350 cases in 2008. The incidence of confirmed malaria cases ranged from 0 to 2.6 /1000 person/ year. Most districts in this zone report malaria deaths annually ranging from 1-6. There is local but focal transmission of malaria in these districts and there is a high risk of outbreaks. Since there is a consistent trend in the reduction of confirmed cases of malaria since 2003, polices in this zone should be oriented towards elimination of malaria.

In the malaria endemic zone (zone A) also there is a declining trend in cases of confirmed malaria. However, the number of cases is relatively high (ranged from 50 to 1750 since 2003) and the incidence of confirmed malaria cases ranged from 0.2 to 39 / 1000 person/ year. There were malaria deaths in all districts (ranged from 1-10 with the exception Okavango that had 17 deaths in 2006). Thus in these districts the policies should be oriented to pre-elimination with an aim to move towards elimination.

2. Malaria Programme Management

A five-year strategic plan for 2006 – 2011exist and it was developed with the view to reduce malaria disease burden and with the following key targets: (1) maintain number of malaria deaths <15/year; (2) reduce case fatality rate <0.5%; (3) reduce incidence of confirmed cases of malaria <10/1000 population. (3) reduce the number of malaria endemic districts from 5 to 3; (4) increase the coverage of IRS >80% and ITN >60% in malaria endemic districts; (5) increase effective management of malaria cases using artemisinin combination therapy (AL) to 100%; (6) increase malaria chemoprophylaxis among pregnant women to 100% in malaria endemic districts.

There is existence of the Malaria Reference Group (MRG) which serves as advisory body for NMCP. It has been noted that there is strong partnership with WHO and UNICEF however; building more partnerships for malaria control and elimination is still at an early stage. And as a result there is very minimal resource input from external partners for malaria control and elimination in Botswana. There has been inadequate collaboration between NMCP and academic and research institutions

There is an effective procurement and supply chain management system for most malaria commodities except for LLIN. However the review pointed out that the quantification, stock rotation and control of drugs and RDTs at the health facility level was not adequate. Inventory management system, storage and distribution capacity of malaria commodities at facility level were also inadequate

Currently there is inadequate human resource within National Malaria Control Program and there are no designated malaria focal persons at district level to coordinate malaria activities. This has a potential of hindering the achievement of the vision of malaria elimination in Botswana by 2015. There is lack of a comprehensive malaria policy document to guide the implementation of interventions.

3. Malaria Diagnosis and Treatment

There is adequate communication and transport at all health post and health centres to transfer severe malaria cases. The country has successfully adopted and is implementing combination therapy (ACT) using Artemeter Lumefantrine (AL), which is a key step in effective case management and malaria elimination. The current policy is to confirm malaria diagnosis using both RDT and microscopy and treat uncomplicated cases with AL. However, most treatment for malaria is based on clinical diagnosis and the Rapid Diagnostic Test (RDT) results are rarely used for treatment decision. The ratio of confirmed versus unconfirmed cases of malaria is 1:9. The diagnostic algorithm for malaria is not updated to be relevant for the current context of low malaria incidence. National guidelines on laboratory diagnosis and case management were not available in most health facilities. Chemoprophylaxis (chloroquine and proguanil) for pregnant women who took at least two doses in the malaria endemic zones was 43.5 % (1).

Case fatality rate among hospital admissions appears to be relatively high in some districts. The quality control and assurance of microscopy and RDT is not in place.

The private sector is not fully involved in training and some private practitioners continue to prescribe monotherapy.

4. Vector Control and Personal Protection

A national IRS program is in place which has been decentralized to MLG and the districts for implementation. The coverage of IRS has remained around 70% over the last decade which below the 80% (23) coverage recommended by WHO. One of the key reasons for this sustained suboptimal coverage of IRS is probably the community's acceptance of IRS which is waning over time. The funding of LLINs to reach universal coverage is not sufficient. In addition, ownership of at least one ITN was 9.4% in the endemic districts in 2007(MIS 2007) however, the ownership of ITN has increase to 91% (1) in Okavango after the ITN mass campaign in February 2009. In general the coverage of LLIN is below the WHO recommended targets (> 80%)

There are guidelines for Integrated Vector Management (IVM) however, the monitoring of the quality of IRS and susceptibility of vectors to insecticides is done *ad hoc basis*. There are no fixed field sentinel sites to support monitoring of malaria vector sensitivity and behaviour. Maps on vector distribution in the country are not available. There is an insectary in Francistown is well staffed but lacks appropriate equipment.

5. Epidemic Preparedness and Response (EPR)

All districts in Botswana are at risk for malaria outbreaks. Malaria early warning system (MEWS) is still at developmental stages in collaboration with regional and national climate forecasting institutions (Met. Services, DMC). There is a strong weekly surveillance system which is linked to a functional IDSR which provides data used to monitor disease trends.

In 2008 malaria epidemic thresholds were established for national and district levels, however, thresholds at the health facility level need to be established. The current malaria epidemic preparedness plan with containers for emergency supplies is integrated with the communicable disease epidemic preparedness plan.

As the Botswana moves towards elimination of malaria, the potential for malaria outbreaks and resurgence and re-invasion of malaria free areas will increase. The existing capacity within the malaria program and the disease control unit to forecast, detect and respond to frequent outbreaks is not adequate.

There is limited documentation of post-mortem assessments of epidemics. Private health sector participation in surveillance, training and preparedness is also inadequate.

6. .Advocacy, Information, Education, Communication, Behaviour Change and Community Mobilisation

There is strong political commitment for controlling and eliminating malaria. At time of review the IEC / Communication strategy was at the draft stage, near printing and dissemination. The use of radio, TV, drama, and malaria bill boards is inadequate. The distribution and availability of IEC/advocacy materials in health facilities (public and private) and DHTs is insufficient.

The current health education messages have very little input from local formative and operational research. There is significant population movement across the border and this requires intense IEC focused on travellers and migrants. Malaria promotion and IEC is currently a low priority area with inadequate budget within the national malaria program.

7. Surveillance, Monitoring and Evaluation and Operational Research

Integrated disease surveillance system is functional, but there is no mapping of the cases of malaria to identify malaria transmission hotspots in any district. The surveillance data are not analysed at the health facility level to trigger action to detect potential outbreaks and rapid response.

The last malaria indicator survey was conducted in 2007. However this survey did not have all essential indicators to assess progress and performance of the programme. There is lack of comprehensive monitoring and evaluation plan.

Sentinel surveillance of drug efficacy is conducted annually and monitoring of insecticide resistance is done on *ad hoc* basis. Entomological and epidemiological stratification of malaria in Botswana is outdated.

Collaboration between Health Statistics Unit and IDSR is inadequate and data from Health Statistics Unit is untimely for decision-making. There is no operational research sponsored or conducted by the programme.

Best practices, success stories and enablers

1. There is strong political commitment for controlling and eliminating malaria in Botswana
2. The existence of a strong weekly surveillance system which is linked to a functional IDSR which provides data used to monitor disease trend
3. The existence of contingency containers that are regularly checked for the EPR stocks and contingency funds for procuring commodities.
4. Availability of a five-year strategic plan for 2006 – 2011 developed to reduce malaria disease burden with well articulated key targets
5. The country has successfully adopted and is implementing Artemisinin combination therapy (ACT) using Artemeter Lumefantrine (AL) for the treatment of uncomplicated malaria.
6. The ability to increase net ownership of at least one ITN through campaigns. Ownership of at least one ITN for Okavango district was increased from 12 % to 91% in Okavango after the ITN campaign in February 2009(12)
7. There is adequate communication and transport at all levels of health a facility that were reviewed that is health post, clinics and hospitals which makes it a lot easier to refer and transfer severe malaria cases.
8. There is an effective procurement and supply chain management system for antimalarials with no stock outs and malaria commodities except for LLIN.
9. Existence of the Malaria Reference Group which serves as advisory body to the NMCP
10. A national IRS program is in place and is decentralized to Ministry of Local Government and is being implemented by the districts for free to residents.

Major Problems and challenges

Program Management

1. Inadequate human resource to achieve the vision of malaria elimination as evidenced by lack of designated malaria focal persons at district level to coordinate malaria activities
2. Lack of an overall malaria policy document
3. Very few partnerships for malaria control and elimination. Building partnerships for malaria is still at an early stage

Vector control and Personal protection

1. There are no fixed field sentinel sites to support monitoring of malaria vector sensitivity and behaviour.
2. There are no maps on vector distribution in the country.
3. There is inadequate and inappropriate equipment for the insectary in Francistown.
4. Waning of community acceptance to IRS leading to low IRS coverages below 70% over the past ten years

Surveillance, Monitoring and Evaluation and Operational Research

1. Lack of mapping of the malaria cases to identify malaria transmission hotspots with districts.
2. The surveillance data are not analysed at the health facility level to trigger action to detect potential outbreaks and respond timely

Epidemic Preparedness and Response

1. The existing capacity within the malaria program and the Disease Control unit to forecast, detect and respond to frequent outbreaks is not adequate
2. There is limited documentation of post-mortem assessments of epidemics
3. Private health sector participation in surveillance, training and preparedness is currently inadequate

Malaria Diagnosis and Treatment

1. Treatment for malaria is mostly based on clinical diagnosis and the RDT results are rarely used for treatment decision.
2. The diagnostic algorithm for malaria is not updated to be relevant for the current low malaria incidence.
3. Guidelines on laboratory diagnosis and case management were not available in most health facilities.
4. Chemoprophylaxis (chloroquine and proguanil) for pregnant women who took at least two doses in the malaria endemic zones is low, was 43.5 %(1).

Key Review Recommendations

Malaria Epidemiology

1. Redefine the stratification of districts by incorporating the slide positivity rate and annual parasite incidence data that is available in the districts.
2. In districts that are classified as malaria free (Zone C), implement strategies /interventions to sustain zero transmission.
3. In districts that are classified as focal malaria transmission districts (Zone B), implement strategies/interventions to reduce transmission to zero rapidly in transmission hotspots and sustain zero transmission in the rest of the district by 2011.
4. In districts that are classified as malaria endemic with substantial local transmission (Zone A), implement strategies/interventions to reduce transmission to zero in the entire districts by 2013.

Vector Control and Personal Protection

1. The MOH/MLG need to establish a budget as well as mobilize external resources for LLIN to achieve universal coverage by 2010 in districts in Zone A and B. (450,000 LLIN)
2. Achieve universal IRS coverage using long lasting residual insecticide in zone A and in hot spots of zone B by 2010.

3. Provide **free** LLIN through the existing health facility based distribution system and supplement it by mass campaign every 3-5 years. (Zone A & hot spots B)
4. Establish a vector surveillance system at selected fixed sentinel sites for monitoring vector control program performance.

Advocacy, Information Education Communication/ Behaviour Change and Community mobilization

1. Increase production and dissemination of malaria IEC materials based on local information.
2. Commission KAP studies on community perception on malaria interventions, treatment seeking behavior and adherence to develop appropriate IEC materials needed to increase uptake of interventions.
3. Increase resource mobilisation for malaria advocacy and IEC to support malaria elimination.

Malaria Prevention: Epidemic Preparedness and Response

1. Designate a malaria EPR focal person within the NMCP.
2. Develop a malaria EPR policy and guidelines.

Malaria diagnosis and treatment

1. Adopt RDT as the primary malaria diagnostic tools in all health facilities.
2. Establish a national malaria reference laboratory with capacity for molecular and serological analyses, and to conduct quality control and assurance for malaria diagnostics at all level.
3. Provide Non-Radical (ACT) treatment for confirmed cases in Zone A
4. Provide Radical treatment (ACT+primaquine) for confirmed cases in Zone B and C
5. Pregnant women and other resident high risk group to be put on chemoprophylaxis (chloroquine and proguanil) in Zone A
6. Travellers to zone A to be put on chemoprophylaxis (chloroquine and proguanil) or to malaria endemic countries (mefloquine)

Surveillance, Monitoring and Evaluation and operational research

1. Map malaria cases by health facilities to update the classification of malaria transmission intensity at district and sub-district level, and to target interventions to malaria hotspots
2. Develop guidelines for case based notification and follow up investigation of each confirmed malaria cases and for contact tracing to eliminate the parasite in Zone B and C.
3. Priorities operational research areas and strengthen the partnership for research with University of Botswana and other research institutions.

Program Policies, Strategies, and Management

1. Increase the staff of the national malaria elimination program (NMEP) for the coordination of case management, epidemic preparedness and response, entomology and administration & logistics.
2. Reconstitute the malaria reference group to provide guidance towards malaria elimination by 2013.
3. Develop a comprehensive policy document for malaria elimination that is aligned with the new national health policy.
4. Develop guidelines to involve the private sector in the malaria elimination activities.
5. MOLG/MLG should designate district malaria elimination coordinators in Zone A.
6. Establish a Malaria Elimination field centre in Maun.
7. Develop a costed malaria elimination strategic plan that is linked to NDP 10 (2010-2016).
8. Establish a malaria elimination partnership for advocacy and resource mobilisation.
9. In Zone C, implement strategies/interventions to sustain zero transmission.

10. In Zone B, implement strategies/interventions to rapidly reduce transmission to zero in transmission hotspots and sustain zero transmission in the rest of the district by 2011.
11. In Zone A , implement strategies/interventions to reduce transmission to zero in the entire district by 2013

1 Background

1.1 Introduction

Botswana is a landlocked country situated in the centre of Southern Africa with a total surface area of 582,000 square kilometres and a population estimated for 2008 at 1,755,246(2) for 2008. The population is unevenly distributed with the northwestern region comprising Kgalagadi, Ngamiland and Chobe accounting for 61% of Botswana's surface area but only 13% of the population. Most of the population lives along the eastern part of the country which has better rains and more fertile soils. About 34% of the population is under the age of 15 years and 6% is over the age of 65 years.

Botswana is classified by the World Bank as a middle income country. The national literacy rate in 2003/04 was 81.2%(3) with similar rates for females and males. There is universal primary education. One of the major social ills is high number of orphans largely due to the HIV/AIDS pandemic. There were at least 48,997 orphans recorded as of July 2008 (24) .

Malaria transmission in Botswana is highly seasonal with significant variations over the years mainly related to rainfall to the amount of rainfall. This situation confers negligible acquired immunity leaving all age groups at risk of malaria. It is estimated that 28%(3)of the population live in high malaria transmission areas in the northern parts of the country.

1.1.1 Provision of Health Services

The public sector through the Ministry of Health (MOH) and Ministry of Local Government (MLG) is responsible for provision of most of health services in the country. Services from the public sector are with clients only paying a nominal fee and clients will access health services even when they are unable to pay. The MOH is responsible for health policy development as well as the provision of hospital level services. The provision of primary health care is the responsibility of the MLG. However, the role of the private sector is growing significantly, especially in the urban centres. Many Batswana still consult and use traditional medicine.

Under the MOH there are 3 referral hospitals, 7 district hospitals and 17 primary hospitals. There are 28 health districts under MLG which are responsible for the provision of primary health care through a variety of health facilities as shown in Table 1.

Table 1: MLG Health Facilities(22)

Facility Type	Number
Health clinics with beds	106
Health clinics without beds	171
Health posts	338
Mobile posts	844

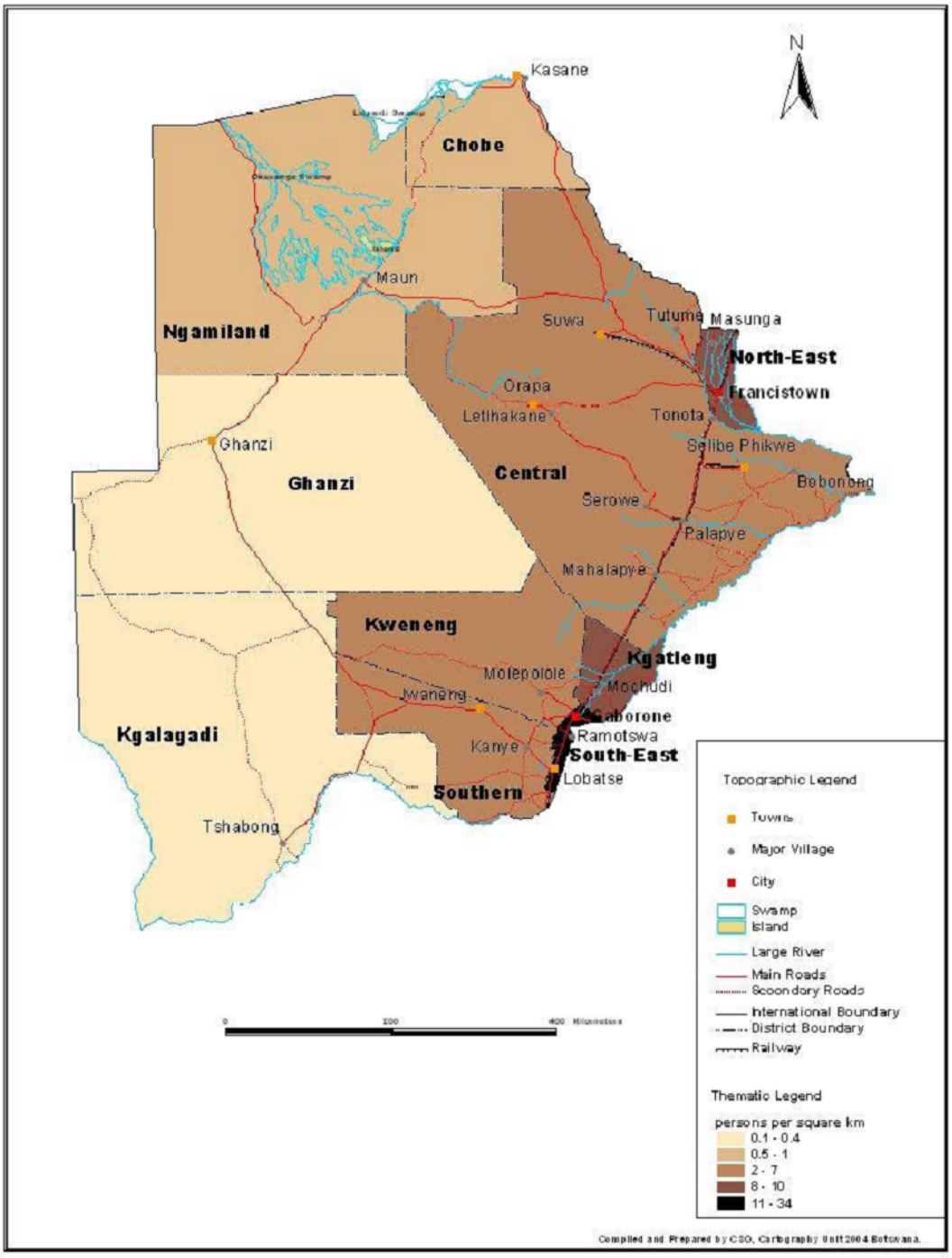
Malaria Control in Botswana started in the 1950s whose focus was mainly Vector Control during the malaria eradication era. A comprehensive National Malaria Control Programme (NMCP) was launched in 1974 and was initially run as vertical programme, but later decentralized to the district level.

1.1.2 Socioeconomic Impact of Malaria

The overall socio-economic burden of malaria in Botswana still remains difficult to ascertain but it is likely that the disease exerts a significant burden on individuals, households and communities in malaria endemic districts. The direct economic costs of malaria are prevention and treatment costs with indirect economic costs being absenteeism from work or school, neglect of domestic jobs, reduced income and poor scholastic performance. Social costs include emotional distress, bereavement, sickness and death.

Botswana government uses significant resources for its prevention and control. During years of high malaria transmission, an increase in the number of malaria patients may result in health facilities being overwhelmed, thus leading to the reduction in the quality and standard of care. In addition, it exerts a major burden on education, tourism, and agriculture, contributing to reduced productivity and performance. Ultimately, the economic burden of malaria negatively affects the economic performance of Botswana, particularly in the main malarious districts.

2001 POPULATION DENSITY BY ADMINISTRATIVE DISTRICTS



1.2 Objective of the Malaria Programme Review

The overall objective of the malaria programme performance review (MPR) was to document progress made in malaria control in Botswana, to identify priority issues, and to propose the way forward in order to achieve malaria elimination in Botswana.

The specific objectives of the MPR were:

1) To review the malaria epidemiology situation in Botswana.
2) To review the policy and programming framework within the context of the health system and the national development agenda.
3) To assess the progress towards achievement of the global, regional and national targets.
4) To review the current program services delivery system, their performance and challenges.
5) To define the next steps to improve program performance and redefine the strategic direction, approaches and focus including revision of the strategic plan and operational plan.

1.3 Methodology

Botswana adapted the WHO draft guidelines for conducting a Malaria Programme Performance Review (MPR) consisting of three phases.

1.3.1 Phase I: Planning and Consensus Building of the MPR

This phase consisted of four items:

1.3.1.1 Defining the need for an MPR

In response to the request of the Government of Botswana to WHO to provide technical assistance for the mid-term review of the malaria control strategic plan, 2006-2011, WHO proposed that an MPR be undertaken as a step towards the revision and updating of the strategic plan. This proposal was based on the observed changes in the epidemiology of malaria in the country. In response to this proposal, a task force was created in November 2008 which comprised of members of the Malaria Reference Group (MRG) and members of the Malaria Epidemic Preparedness and Response Committee to spearhead the MPR process. The MRG and malaria epidemic preparedness committee were briefed about the

need to conduct MPR. MPR Task Force reviewed and adopted a draft protocol and budget at its inception meeting.

The MPR commenced in November 2008 with monthly meetings of the technical working group and the NMCP Manager has served as the MPR Coordinator with support from NMCP staff. More officers were co-opted into Technical Working Groups (TWG) in April 2009 to review documents and come up with thematic reports. These groups served as the internal review team and the NMCP served as the MPR secretariat.

1.3.1.2 Development of MPR Protocol and Resource Mobilization

As part of the preparations for the MPR, the secretariat drafted a proposal, which was then shared with the task force for input and finalization. A total of USD133780 was budgeted for the MPR and partners were encouraged to contribute financial and technical resources. RBM contributed USD50,000.00 through Southern African Regional Malaria Network (SARN) in support of preparations for the review: recruitment of internal consultants, transport, and other logistics and for the strategic plan review. Other partners contributed technical support. The rest of the funding for the MPR came from the government of Botswana.

1.3.1.3 Thematic Reviews

Specific milestones in the thematic review process started with establishment of thematic working groups, one workshop to review the MPR tools and standards and another workshop to review literature and present and adopt thematic reports. There was an additional meeting to adopt of tools/questionnaires and thematic reports following these workshops. As part of preparations for Phase II, the internal review team held a final meeting on 7 August, 2009, where chairpersons of the various thematic groups presented their final thematic reports before arrival of the external team.

The districts were sensitised in September 2008 during the Annual Malaria Conference and were later requested to prepare for the MPR through the Biannual Health Managers' meeting in May 2009. Participating districts were further briefed and asked to prepare for the MPR.

The MPR Task Force meeting determined that 7 thematic groups be constituted: Program management; Malaria epidemiology, Surveillance, Monitoring and Evaluation and Operational Research; Malaria parasite control including diagnosis, treatment and prevention of malaria in pregnancy; Malaria vector control; Epidemic preparedness and response (EPR); Malaria advocacy, communication and social mobilization; and Malaria procurement and supplies management (PSM).

Two internal consultants were to be recruited at the start of the review, but were only recruited at the beginning of Phase II due to delays in the release of financial support. These consultants served as the facilitators of the review process. They worked with the respective thematic team members to consolidate the thematic reports. The secretariat assembled reference documents, and TWGs undertook literature review, produced thematic reports, and aligned them to the WHO MPR framework,.

1.3.1.4 Planning of Phase II of The MPR

Preparations for field review included the finalization of the field review schedule, recruitment of internal and external review consultants, mobilization of other MPR field review team members from other programs of the Ministry of Health, and follow up with selected districts to confirm field visits and logistical planning.

The districts selected for the review were Kgatleng, Ghanzi, Chobe, Ngami, Okavango and Nyangabgwe Hospital. In each district the teams were to visit the District Health Team (DHT), District Hospital/Primary Hospital, two clinics, one Health Post, one Private Pharmacy, one Private Clinic or hospital. In each hospital the team visited the outpatient/emergency and accidents, ANC, pharmacy, medical ward and the laboratory. Focus group discussions were to be held with members of the public at each clinic to obtain community perspectives on malaria. The teams were to use the questionnaires adopted by both the internal and external reviewers. Internal reviewers were assigned districts for field visits. The review process was to be started with briefing of management DHT/Hospital followed by visits to specific departments.

1.3.2 Phase II, Central and field review

This phase lasted for two weeks, from 9th to 21st August 2009. The schedule of this phase of the review is attached as Annex 3. This phase consisted of four building blocks:

1.3.2.1 Technical Briefings

Activities undertaken in this step included:

a) Pre-commencement planning meeting on 8 August, 2009, between the secretariat and internal and external consultants whose aim was to review and finalize the schedule, logistics, and assignment of responsibilities.

b) On 9 August, 2009, there was a meeting where presentations made by WHO and MPR team on the phases, expected outputs and outcomes of the MPR. This was followed by a presentation by the MOH on the Botswana MPR process, overview of malaria control, and structure and policies of the Ministry of Health.

1.3.2.2 Consolidation of the Thematic Reports

Presentations were made by the chairs of the thematic groups on the findings, conclusions and recommendations of the various thematic reports. This was followed by the setting up of thematic review working groups led by external reviewers to further review the reports focusing on review objectives and methodology, the structure of the report, missing data or information, status, structure and capacity for the NMCP, progress and performance, key issues and the way forward.

1.3.2.3 Preparation for Field Visits

This session focused on the following:

- **Constitution of the teams for the central visits:** All members of the MPR team were sub-divided into 16 central review teams and were to specificically interview top management teams in the ministries of health and local government, key stakeholder departments, academic institutions and partner organisations.
- **Constitution of district teams:** External reviewers were assigned to each of the six teams for field visits. A central team was also constituted which remained compiling the draft report from the thematic reports and central visits.

- **Review of MPR tools:** During this session the tools were reviewed and necessary changes made.

1.3.2.4 Conduct of Field Visits

Central level and district level visits were conducted in this phase:

a) **Central level visits**: Prior appointments were secured for the central teams and the visits and consultations were undertaken on Monday, August 10th 2009. Central visits which could not be done on the 10th of August 2009 were rescheduled and were completed by the central team in subsequent days. Each central team submitted a report based on a template provided (Annex 6).

b) **District visits**: In order to ensure early start of the district reviews on 12th August 2009, district teams departed to the assigned districts from the 11th of August, 2009. Those visiting Chobe, Ngami, Okavango and Francistown team travelled by air, and used transport by the districts. The Kgatleng and Ghanzi teams went by road. The review was undertaken at the three levels of District Health Team, health facility and community as planned and feedback provided to all the levels. Each district team provided a written report based on a template provided (Annex 6).

1.3.2.5 Analysis and Reporting

a) Central Coordinating Team

While the rest of the MPR team was in the field, a small core coordinating team was left behind to begin compiling the final report and plan for the analysis and feedback sessions. Highlights of the work of this team included adoption of the framework for this MPR report; compilation of the final report using the thematic and central visits reports as source documents. They reviewed the schedule for the last week of the MPR and planned specific MPR feedback sessions to the Ministries of Health and Local Government and other technical partners.

b) Data Analysis and Finalization of MPR Report

Based on the reports of the district review and the draft report developed by the central coordinating team, thematic teams reverted to their groups to build consensus on the findings and finalise the thematic reports. The consolidated MPR draft report was reviewed

in plenary, finalized and adopted. The major highlights were preliminary findings, conclusions and recommendations.

c) Development of Feedback Tools

Having finalized the draft MPR report an aide memoire and power point presentations were developed, both tools were used to provide feedback to relevant MoH, MLG, partner organisations and institutions.

1.3.2.6 Feedback

The preliminary findings and recommendations of the draft report was presented on the 19th of August 2009 to stakeholders who included program officers from various departments and units of MoH and MLG, UN agencies and other stakeholders for inputs and comments. .

Feedback to MOH, MLG Senior Management and WHO

The executive summary of the draft MPR report and an Aide Memoire were presented to the MOH and MLG senior officials including WHO on Thursday, 20th August 2009. Among those present were Permanent Secretary, Deputy Permanent Secretary Health Services, Director Public Health and Chief Health Officer, Disease Control Ministry of Health and Director Primary Health Care Services, Local Government and World Health Organisation Representative to Botswana. Inputs were made by those present and the final draft report further strengthened.

Feedback to malaria control stakeholders

A meeting was held on Friday, 21st of August 2009 to give feedback to stakeholders who made inputs on the preliminary findings and recommendations.

High level signing of the Aide Memoire

Present in this meeting held on Friday, 21st August 2009 were high level representatives of MOH, MLG, WHO, UNICEF, UNFPA and the Clinton Foundation. The signatories to the

Aide Memoire were the Permanent Secretaries of the Ministry of Health,Mr.N. Kahiya and the Ministry of Local Government, Mr.T.Y. Raphaka, the World Health Representative to Botswana, Dr,E. Nyarko and the Acting UNICEF Resident Representative, Mr.M. Betts.

1.3.3 Phase 3: Follow-Up of MPR Recommendations

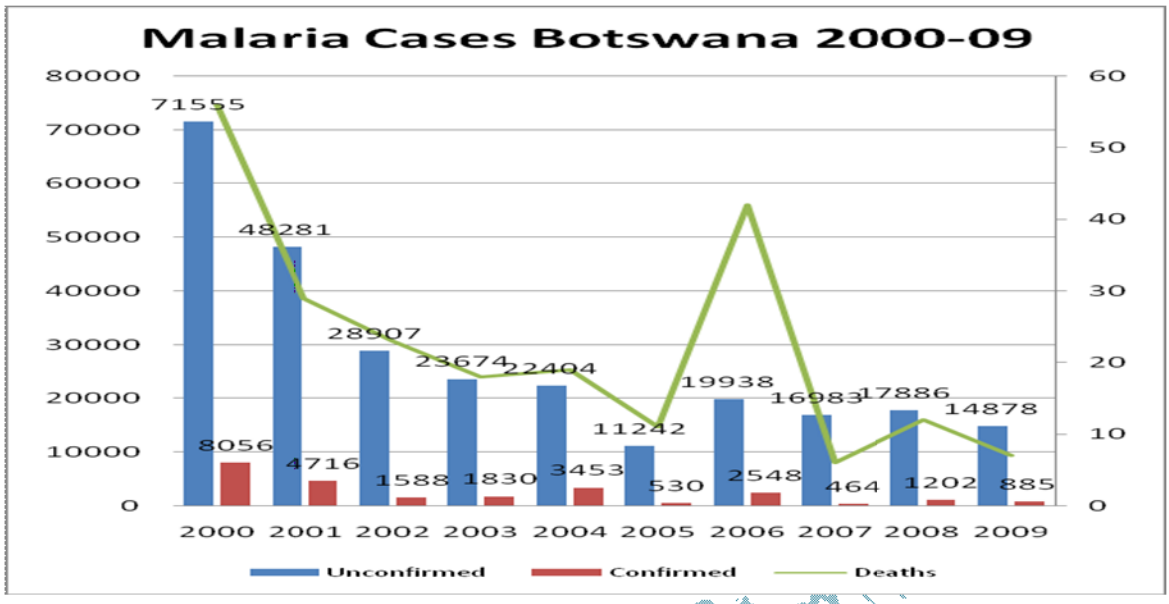
Activities and timelines for this phase were drawn from the key findings and recommendations of this report.

1.4 Malaria Epidemiology in Botswana

1.4.1 Epidemiology

Malaria transmission in Botswana is seasonal and unstable with some epidemics recorded. Transmission is related to the level and distribution of rainfall, which varies considerably each year. Sporadic epidemics have been experienced with the worst being reported in 1996 and 1997. It is estimated that 28% (3) of the population live in malarious areas. Transmission mostly occurs in the rainy season between November and May with a peak from mid-February to April. Transmission levels vary significantly within districts and
is highest in the northern part of the country. In years of heavy rainfall, the malaria transmission belt can move southwards such that malaria outbreaks occur in the central zone (e.g. Ghanzi 1997 epidemic) of the country and sporadic malaria cases can occur in the traditionally non-malarious areas in the south of the country (e.g. Letlhakeng, 2006; Kgatleng, Kweneng, Mabutsane, 2009). The unstable and highly seasonal nature of malaria transmission in Botswana means acquired immunity to malaria is negligible and all age groups are at risk of malaria.

Graph Showing Malaria Cases and Deaths



1.4.2 Malaria Parasite

In Botswana, *Plasmodium falciparum* is responsible for over 98% of malaria cases. *Plasmodium vivax* and *Plasmodium malariae* constitute the other 2% of cases.

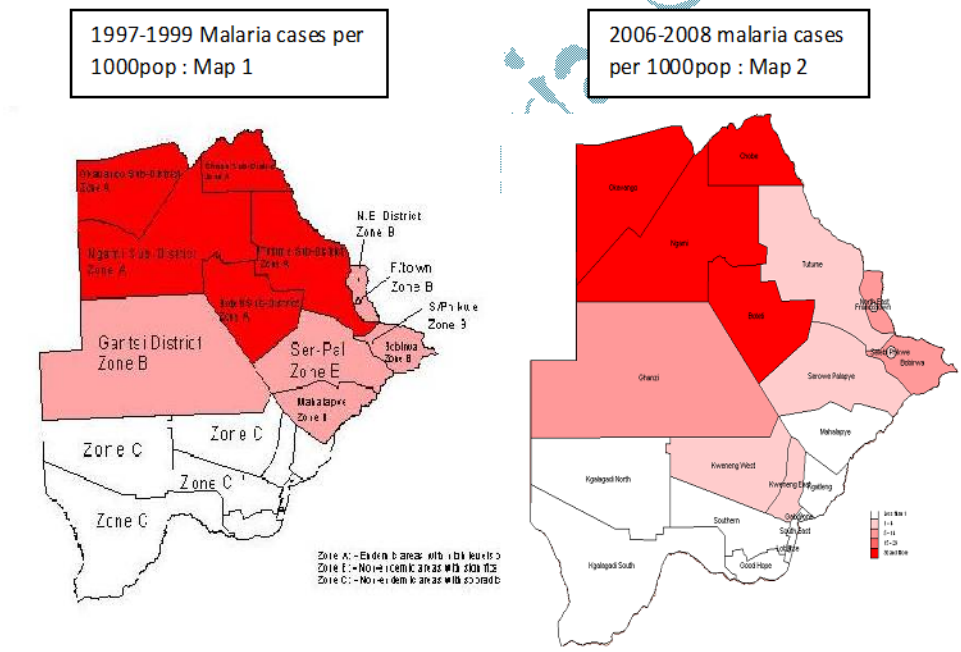
1.4.3 Malaria Vectors

The main vector has been identified as *Anopheles arabiensis.* Historical data suggest that the vectorial system in Botswana consisted of *Anopheles gambiae* s.s., *Anopheles arabiensis* and to a lesser extent *Anopheles funestus.* After years of IRS, two of the species: *An. gambiae s.s.* and *An. funestus* were decimated leaving *An. arabiensis* as the sole malaria vector in the country. *An. arabiensis* breeds in temporary and sunlit freshwater and feeds both indoors and outdoors and rests both indoors and outdoors making it a difficult vector to control with IRS and ITNs. There has not been any routine mosquito surveillance thus there is no data on vector density and distribution maps. The Entomology Laboratory has not assessed the disease transmission capacity of the vector. There are no data on vector biting rates, sporozoite rates and entomological inoculation rates. The Entomology Laboratory of the NMCP is in the process of producing a vector profile and distribution maps.

1.4.4 Stratification and Risk Mapping

In relation to different levels of malaria transmission in the country three epidemiological zones namely A, B and C have been established (See Fig 2 below). About 51%(3) of the population is living in Zone A and B in the northern part of the country. Zone A is endemic with regular and high transmission levels. It includes Ngami, Okavango, Chobe, Tutume, and Boteti districts. Bobirwa district has also shown unstable and increased malaria transmission in recent years. These districts accounts for over 80% of reported malaria cases. Zone B has low transmission with significantly low malaria cases. Zone C experiences sporadic malaria case. This stratification is based on data from 1999 and does not include stratification by parasite species. The stratification map for 2006-08 shows Kwengeng District as having had an increase in malaria cases, this was due to the outbreaks the district experienced in 2008.

Fig 2 Map Showing Malaria Transmission in Botswana



Source Map1: Malaria manual for Health Workers in Botswana 1999

2 Review of the NMCP by Thematic Area

The review set out to review the Botswana Malaria Control Programme by several thematic areas namely: programme management; procurement and supply management, vector control, case management, epidemic preparedness and response, advocacy and behaviour change communication, epidemiology, surveillance, monitoring and evaluation and operational research. The following summarizes the key issues identified by these thematic areas.

2.1 Programme Management

The National Malaria Control Program draws its mission and vision from the overall Department of Public Health mission, which states that '*We shall lead in providing efficient, effective, compassionate and caring public health services which compares with global standards'.* The vision of National Malaria Control Programme is to see *a m*alaria free Botswana as stipulated in the Malaria Strategic Plan 2006-2011. The programme has set a *goal* to effectively control malaria so that it ceases to be a major public health problem in Botswana.

The overall objective of the NMCP is to co-ordinate and support the delivery of effective malaria control interventions that will prevent and greatly reduce morbidity and mortality due to malaria leading to the possible elimination of the disease.

2.1.1 Historical Milestones in Malaria and Malaria Control/ Elimination in the Country

Malaria Control in Botswana started in the 1950s; the focus was mainly vector control during the malaria eradication era. A comprehensive National Malaria Control Programme (NMCP) was launched in 1974 and was initially run as a vertical programme.

In 1978 Botswana adopted the Primary Health Care (PHC) strategy and the NMCP was integrated with other public health programmes. The Vector Control was further decentralized to Local Government to improve access and coverage in 1998 (19). In 1999, the Ministry of Health embraced the Roll Back Malaria (RBM) global strategy as an initiative to scale up malaria control activities in the country. Botswana re-affirmed its commitment to the RBM by appending her signature to the Abuja Heads of State Declaration on RBM in

2000. The 2002-2005 Roll Back Malaria Strategic Plan(20) was evaluated in 2005. The recommendations from the 2005 review guided the development of the Malaria Strategic Plan (MSP) 2006 – 2011. The current review of NMCP comes at a time when the country intends to develop a malaria elimination strategy in line with the SADC Goal of eliminating malaria in four member states by 2015(21)

2.1.2 Malaria Control/ Elimination Within The National Development Agenda

The Government of Botswana is committed to malaria elimination. Further to that, the Ministry of Health issued a joint SADC statement on regional malaria control and elimination. Malaria control has been a priority in both the National Development Plans (NDP) 8 and 9. It is included in the draft NDP10 with clearly stated elimination targets as follows:

Table 2: NDP10 Malaria Elimination Targets (24)

NDP 10 Goal	KPI	Baseline		NDP 10 Period Targets						
		Year	Achievement	Year 1 (2009/2010)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7 (NDP10 Target)
	Reduction in life threatening disease (elimination of malaria)	2007	10/1000 pop	10	9	8	5	3	2	0/1,000

Malaria has been considered as part of national development plan by other governmental and nongovernmental sectors as illustrated by the following examples:

a) The Botswana Defence Force (BDF) is involved in malaria control for its troops providing prophylaxis, vector control (IRS and ITN) and case management in barracks in various parts of the country. The BDF plays a crucial supporting and logistical role during epidemics;

b) The Ministry of Local Government in delivering Primary Health Care services in the country;
c) Environmental Affairs Department is involved in registration of pest control products;
d) Individual schools are involved in malaria control programme through formation of clubs to disseminate malaria messages to the community though there is no focal point to coordinate regularly the school health programme;
e) The Ministry of Environment and Wild Life and Tourism ensures that road barrows and quarries are rehabilitated through the relevant pieces of legislation.
f) UN, other international and local partner organizations provide technical support and logistics.

2.1.3 Organisational Structure for Malaria Control/ Elimination

The NMCP is a unit of the Disease Control Division under the Department of Public Health. The programme has no organogram but a proposed functional structure exists. The Malaria Program Manager reports to the Director of the Department of Public Health through the Chief of the Division of Disease Control. Operationally the programme lacks adequate number of focal points in the major thematic areas and key support staff including dedicated administrative personnel. This deficiency compromises efficiency in the programme. The limited professional and technical staff is inundated with purely mundane and administrative routines such as booking hotels and arranging transport for visitors. This was self evident during the current review. There is no programme specific structure or officers of the NMCP at the district Level. Malaria activities at community and district level are integrated with other health programmes.

Currently the malaria control programme has the following programme staff:

a) Programme Management: 1 Malaria Program Manager, 1 Public Health Specialist (who oversees the following areas: case management and chemoprophylaxis, surveillance, and research), and 1 Chief Technical Assistant (assists with logistics)
b) Entomology and Vector Control: 2 entomologists, 2 assistant health officers, 5 chief technical assistants, 6 field assistants
c) Case Management and Chemoprophylaxis: no one.
d) Malaria Epidemic and Emergency preparedness and response: no one.

e) IEC/advocacy and community mobilization: 1 officer
f) Surveillance and research: 1 officer
g) Support staff: no one

In addition, WHO has a dedicated National Programme Officer for Malaria who provides technical support to the programme. UNICEF provides technical support to the programme as and when requested.

2.1.4 Malaria Policy

There is no malaria control or elimination policy in place. The programme however is guided by the National Health Policy 1995, currently under review to incorporate aspirations of Botswana's Vision 2016 and the MDGs. There are various pieces of legislation to guide implementation of health services in the country including Malaria control. The Public Health Act and the Drugs and Related Substances Act both of which are currently under review, are amongst the key legislative instruments in this regard.

2.1.5 Malaria Guidelines and Manuals

The following policy guidelines have been developed and are aligned toWHO, RBM and regional policies and guidelines exist:

a) National Health Policy 1995, currently under review to incorporate MDGs and malaria targets;
b) Malaria Manual for Health Workers 1999;
c) Guidelines for malaria vector control in Botswana, 2007;
d) National Guidelines for the Diagnosis and Treatment of Malaria in Botswana, 2007;
e) Training guidelines on case management 2007;
f) Malaria Emergency Preparedness and Response (EPR) charts.

The guideline for Advocacy, Communication and Social Mobilisation and Monitoring and Evaluation is under development.

2.1.6 Malaria Advisory Group, Working Groups and Partnerships

The following structures support the NMCP:

1. **The Malaria Reference Group (MRG)** is a team of malaria experts that serves as an advisory body to the programme on technical and professional issues regarding policy development and implementation. The MRG has a representative membership from various thematic malaria intervention areas.. Technical working sub-groups were established initially, but these have not been functional for many years. The MRG meets quarterly but in the last four years the frequency of meetings has been as follows:
    - 2009 - 1 (Chaired by the Programme Manager)
    - 2008 - 0
    - 2007 - 3
    - 2006 - 4
    - 2005 - 1
2. **The Task Force for Roll Back Malaria.** This task force was never formed. The Roll Back Malaria Partnership in Botswana remains a big challenge since very few partners are currently involved in supporting the programme. The partners to date are WHO, UNICEF, Standard Chartered Bank, Clinton Foundation, Botswana Red Cross Society, Gaborone Secondary School Health Club, and the Anglican Diocese of Botswana.
3. **Annual Malaria Conference** offers a platform for districts to review the level of implementation of control strategies, share experiences and technical knowledge as well as to plan for the next malaria season.

2.1.7 Key Strategies for Malaria Control/Elimination

The following strategies guide the implementation of the malaria control programme:

a) Information, education and Communication and Advocacy including Community Mobilization for increased awareness and partner involvement: it includes advocacy for malaria as a public health priority among politicians, partners and civil society; innovative IEC initiatives that raise individual, household and community awareness of malaria and promote positive behavioural change in terms of personal protection, treatment seeking behaviour and community participation; strengthening community-based mechanisms and exploiting entry points that can be used by the communities to take action on malaria issues.

b) Vector control and Personal Protection through the use of Indoor residual house spraying and insecticides treated mosquito nets;

c) Case Management and Prophylaxis for prompt diagnosis and early combination treatment including prophylaxis in pregnant women and other risk groups.
d) Epidemic Preparedness Response and Control to ensure prompt and effective management of epidemics. It includes maintaining existing partnerships and creating new ones within EPR, maintaining the epidemic containers, maintaining malaria contingency plan and providing refresher training in epidemic preparedness and response for health workers.
e) Programme Management and Coordination for effective programme implementation. The key components of this strategy are: coordination of malaria control activities and training; planning, monitoring and supervision of activities; periodic review and evaluation of specific programme areas and overall impact of the NMCP.
f) Monitoring and Evaluation, Surveillance and Research to monitor programme performance and provide evidence for decision making; it includes weekly surveillance system to detect malaria outbreak through the use of thresholds, evidence gathering from routine information sources, surveys and operation research for evidence-based planning.

2.1.8 Evolution of the Malaria Strategic Plan

In 1998, the accelerated malaria control programme was implemented and was based on three main interventions that were case management, vector control, promotion and use of insecticide treated nets.

In 2002, the Roll Back malaria 2002-2005 strategic plan was launched. The plan was based on six main strategies that were:

a) Vector control through IRS and use ITNs,
b) Malaria prevention through community mobilization,
c) Programme management and coordination,
d) Drug efficacy study,
e) Prompt diagnosis and provision of effective treatment,
f) Epidemic preparedness and response.

After the review of the 2002-2005 RBM strategic plan, the malaria control programme developed a five years strategic plan that goes from 2006 to 2011 from which annual

malaria control plans with specific objectives, targets and indicators are derived. The five years strategic plan is based on six main interventions areas:

a) Programme management and coordination,
b) Vector control and personal protection,
c) Case management and prophylaxis,
d) IEC and advocacy including community mobilization,
e) Monitoring and evaluation as well surveillance and research, and
f) Epidemic preparedness and response.

In line with the SADC goal of eliminating malaria by 2015, the malaria control programme is currently working on a draft malaria elimination strategy.

2.1.9 Targets for the Malaria Control Programme(6)

The 2006-2011 Malaria Strategic Plan defined the following outcome indicators:

a) Maintain malaria deaths below 15 per annum;
b) Maintain parasite prevalence rates at below 2%;
c) Reduce incidence of confirmed malaria to below 10 per 1000 population at risk;
d) Decrease malaria endemic district to 3;
e) Increase ITNs coverage of 60 % and above;
f) Increase IRS coverage of 80 % and above;

Process indicators for each strategic area were developed to drive progress towards the above targets. However some of the process indicators were not goal driven, hence difficult to measure and interpret.

2.1.10 Malaria Control/ Elimination Program Reporting

Several methods for reporting on malaria control are available in Botswana:

a) IDSR: This is the main reporting system for the malaria control programme. The reports are received weekly and reporting is considered complete if 95 % of reports are submitted. The program produces reports for internal use from IDSR data. These reports are not published.

b) Annual Malaria Report: The last annual malaria report was produced for the year 2005/06. None has been produced since 2007 due to shortage of staff at the NMCP.

c) Health Statistics Annual Reports: These are produced by the Health Statistics Unit (HSU) for all health conditions including malaria. These reports however have a long delay, the last available report being for 2006.

2.1.11 Malaria Economics and Financing Malaria Control & Elimination

The Government of Botswana is the major financier for malaria control, accounting for more than 90% of total expenditure. Botswana allocates approximately 13% of its annual budget to health as show in the table and graph below.

Table 3: Budgetary allocation to Health and Malaria in Pula (1 USD = 6 Pula)(7)

Year	Total GoB allocation	Total GoB allocation on health	% health budget	Total allocation to malaria	% malaria /health
2006	22,600,000,000	3,069,366,490	13.6%	1,789,859	0.06
2007	27,080,000,000	3,564,381,308	13.2%	1,592,312	0.01
2008	30,540,000,000	3,838,847,164	12.6%	8,363,809	0.14

Figure 3: Budgetary allocation to Health and Malaria in Pula (1 USD = 6 Pula) (7)

The major RBM partners to date are:

a) Clinton foundation: 33,000 LLINs freely distributed as a pilot project in Okavango sub district in March 2009;

b) Japanese grant: P 550,000 was used to purchase 13,000 LLINs through UNICEF in July 2009;

c) Anglican Diocese “Nets for life” project donated 20,500 LLINs to the Ministry of Health in December 2008;

d) Standard Chartered Bank supported the establishment of net-producing CBO in Okavango;
e) WHO and UNICEF have provided invaluable technical and logistical support throughout the years.

Several project proposals have also been made and forwarded to the following organisations and governments in order to support the malaria control programme:

a) Joint GFATM (global fund for AIDS, TB and malaria) for the TZMI (Trans Zambezi initiative).
b) Chinese grant: a sum of P 12,650,000 requested
c) Flemish grant: a sum of P 52,905,064 was requested.
d) Indian government: a sum of P 1,620,000 was requested.

2.1.12 National Malaria Programme Research

The National Malaria Control Programme research priorities focus mainly on drug efficacy and vector susceptibility to different insecticides used in IRS.

a) Drug Susceptibility Studies

The programme continues to monitor and evaluate drug efficacy of anti-malarial drugs periodically for evidence based decision making. Chloroquine in vivo sensitivity studies was conducted in 1997 in Okavango, Ngami and Tutume districts showed combined type B and C parasitological failures at 43% and a total treatment failures at 26% (8).

In 1997 Botswana changed its treatment policy country wide from CQ to SP for uncomplicated malaria. The introduction of SP in all districts was achieved smoothly in 1998. There after the programme has been conducting drug efficacy studies annually. However, due to unstable nature of the transmission and other factors patient recruitment has been a serious challenge.

The 2006 SP study suggested increasing parasite resistance to SP even though the sample size was inadequate (9). However in consideration of other imperatives such desire to move from malaria control to elimination, Botswana changed from SP to Artemisinin Combination Therapy in 2007.

b) Malaria Vectors and Vector Resistance Studies

Historical data suggest that the main malaria vectors in Botswana are *Anopheles arabiensis, A. gambiae s.s.* and to a lesser extent A. *funestus*. However, recent data on the identity, distribution, resting and feeding habits of *Anopheles* vectors in Botswana is lacking. The programme continues to conduct annual vector susceptibility studies to guide implementation of IRS.

In Botswana, DDT is still found to be the most sensitive insecticide with average susceptibility levels of 99.09% and lambda cyhalothrin the lowest at 88.63 %(10) . It is important that the NMCP considers the implications of these results very seriously especially given the low IRS coverage rates currently obtaining in the country.

2.1.13 SWOT Analysis on Malaria Program Management

Strengths	**Weaknesses**
▪ Regular fora for consultation (Annual Malaria Conference) ▪ Supportive Government policy for Primary Health Care strategies. ▪ Strong political support for malaria control. ▪ Availability of health infrastructure. ▪ Decentralisation of malaria control activities to the districts. ▪ Capacity building through annual training. ▪ Functional partnerships with Ministries of Local Government, Agriculture, BDF and Meteorological Services.	▪ Shortage of skilled human resources at all levels. ▪ Inadequate partnerships with research institutions, and NGOs. ▪ Lack of Malaria focal persons at District level. ▪ Lack of programme specific travel budget. ▪ Inadequate programme specific fleet (transport). ▪
Opportunities	**Threats**
▪ Existence of potential partners (Japanese Govt; Clinton Foundation etc).	▪ Staff attrition ▪ Other competing health priorities (e.g.

▪ Existence of Community Based Organisations. ▪ Cross border Malaria Initiatives (Trans Zambezi, Trans Limpopo). ▪ Malaria Elimination campaign in the SADC region.	Emerging conditions such as Influenza A (H1 N1) bird flu etc.) ▪ Economic recession ▪ Climate change ▪ Natural disaster (Floods) ▪ Success of NCMP

2.2 Procurement and Supply Chain Management

The Central Medical Stores (CMS) Annual Procurement Plan (APP) provides for the forecasting, quantification and procurement of malaria medicines. There is no focal point and plan for malaria procurement and supply (PSM) management in the National Malaria Control Programme (NMCP). Malaria medicines and associated commodities such as 50% and 5% dextrose are secured through the central medical stores. Malaria diagnostics is the responsibility of the laboratory department but also procured though the CMS. IRS chemicals, malaria pumps, ITNS, net re-treatment kits and LLIN are quantified by the entomology unit and procured by the NMCP.

2.2.1 Policy

Malaria medicines are classified as vital medicines and therefore financial allocation is always prioritised. Quantification of all medicines except for vector control and laboratory items, procurement, storage, warehousing and distribution of all pharmaceutical, laboratory and related medical supplies is the responsibility of the CMS. Public health facilities in the country are allowed to procure medicines and other supplies outside CMS. Selection of malaria and other essential medicines is done by the National Standing Committee on Essential Drugs (NASCOD) and Botswana Essential Drugs Action Program (BEDAP). The Botswana Government finances all anti-malarial medicines and other malaria commodities. All medicines supplies to the CMS are required to be registered with the National Drug Regulatory Unit (DRU). An exemption is sought in situations where the product is unregistered but needs to be procured. The CMS is responsible for quality assurance to ensure that all medicines meet specified standards.

2.2.2 Registration

The drugs regulatory unit of the Ministry of Health registers all malaria medicines used. The program recommends the malaria medicines for consideration and approval by the National Standing Committee on Drugs (NASCOD).The private sector is expected to comply with the national guidelines on the use of drugs.

The Entomology Unit recommends the insecticides used for malaria indoor residual spraying. The Ministry of Agriculture is responsible for registration of insecticides for IRS.

2.2.3 Guidelines for Selection

The National Standing Committee on Drugs conducts the selection of essential medicines including anti-malarials. In addition, the national treatment guidelines and drug policy framework provides additional guide on the selection/choice of anti-malarials that are to be ordered.

2.2.4 Specifications

National standard specifications of malaria commodities such as insecticides for Indoor Residual Spraying (IRS), malaria spray pumps, ITNS, net re-treatment kits and long Lasting insecticidal treated nets (LLIN) is done according to WHO specifications and is compiled by the Entomology Unit in the NMCP.

Malaria combination treatment drugs specifications is done by the NMCP and reviewed and approved by the NASCOD. The specification of Rapid Diagnostic Kits (RDT) and malaria microscopes is also according to WHO Specifications and is compiled by the National Health Laboratory Paediatric formulation for AL suspension, which was prequalified by WHO in 2008, is not yet available in CMS.

Selected reference documents used include United States Pharmacopoeia (USP); British National Formulary (BNF); British Pharmacopoeia (BP); European Pharmacopoeia (EP) and Botswana Bureau of standards (BOBS).

2.2.5 Quantification

The NMCP has no guidelines or clear defined methods for quantification of all malaria commodities. The current quantification is based mainly on previous consumptions and available budgets. The malaria medicines quantification is by the CMS and is based on past consumption with some adjustments using in-house software. Input from the NMCP regards using target population and morbidity based quantification supports the consumption based quantification. There is a CMS Malaria Focal Person that sits on the Malaria Reference Group and Malaria EPR Committee to facilitate communication between CMS and the NMCP.

The quantification of vector control commodities is performed by the Entomology Unit and procurement is conducted by the NMCP Quantification for IRS is based on past consumption and not based on estimated target population and households. In the past, the quantification of ITNs, re-treatment kits and LLINs has been a low priority as a result of the lack of budget for ITN procurement and distribution was focused on vulnerable groups such pregnant women and under fives. More recently, however, national estimation has been done on LLIN towards universal coverage in 2008/2009.

2.2.6 Procurement, Storage and Distribution

The CSM does bulk procurement of malaria medicines and malaria diagnostics with other medicines and diagnostics. The annual procurement cycles are not well established and bulk tenders are issued according to need. Procurement of all malaria commodities is through competitive bidding/tendering procedures which are guided by Public Procurement and Asset Disposal Board (PPADB). Preference is first for procurement from national suppliers followed by regional and international suppliers. There is provision for emergency procurement to address stock-outs or needs during epidemics.

Warehousing of malaria commodities such as malaria medicines and diagnostics is done centrally for all public health facilities, mission facilities and designated private–public partnership facilities (AFA) by CMS. Distribution of malaria commodities is done from CMS to various public health facilities as above. However, all health facilities also store appropriate quantities of malaria commodities for their patients and the Entomology Unit in

Francistown stores and distribute directly insecticides and malaria pumps to district health teams.

2.2.7 Quality Control

Quality control procedures at national level are implemented by the National Drug Quality Control Laboratory, CMS Quality Assurance Unit, National Health Lab Unit, Drug Regulatory Unit, Botswana Bureau of Standards and Botswana National Environmental Management Agency and Pest Control Products Board. The quality control for all malaria commodities is conducted mainly before procurement. There is no batch quality control after procurement with the use of regional or global quality control centres.

2.2.8 Stock Control and Reporting (Inventory Management)

At the national level, stock control is done by electronic stock control system. At the health facility level manual stock cards are used. There is a policy at all levels on maintaining three months buffer stocks at any one time. At the central level there is adequate reporting on stock levels on malaria medicines to the quarterly meeting of the Malaria Reference Group and monthly meeting of the Malaria Epidemic Preparation and Response Committee.

Stock control and reporting does not include the malaria diagnostics or malaria vector control commodities. At the district level, although there are pharmacists as part of the DHT, there is no monthly commodity reporting system in place to ensure a monthly stock level reporting on status regards monthly consumption and current stock levels of vital medicines such as malaria medicines. However, monthly reports are available in the MOH on essential and vital medicines including malaria medicines.

The Drug Management Guidelines appear to address the issues of management such as procedure regards expired malaria medicines or adverse reactions to drugs. Drugs due to expire are shared with other districts or returned to central medical stores. However due to inadequate quantification procedures and lack of follow up on expiry dates there appears to be Quinine oral and parental at all level due to expire in the near future.

The procedures for stock control on malaria diagnostics and vector control commodities at district level and health facilities are not well established.

Swot Analysis

Strengths	**Weaknesses**
• Policy, Procurement and Quality assurance guidelines are available. • Existing technical staff for PSM • Commitment by Government of Botswana in the support of funding of malaria programme activities and procurement of malaria commodities. • Adequate infrastructure for storage and security of medical commodities along the supply chain	• Not fully functional Logistic Management and Information Systems (LMIS) • Weak Performance standards for enforcement of Procurement contracts • Therapeutic committees are not fully operational • Inadequate skilled health workers in PSM • Poor documentation systems for the PSM process especially at the facility level. • Quality control of malaria commodities in private sector is not fully regulated. • DRU drug exemption/waiver system is not properly monitored to prevent abuse in the private sector-leading to importation of unregistered and counterfeit drugs. • Possibility for stock-out of malaria commodities especially prophylactic drugs and ACTs
Opportunities	**Threats**
• Development partners who are	• Continuing global economic

willing to provide TA and financial support to PSM of malaria commodities ● Formulation of a Malaria Forum to access affordable medicines ● Establishment of a local manufacturing industry ● Pre and post service training of health care workers on PSM ● Review of current Drug and Related Substances Act (2002).	recession ● Increasing freight and logistics (transportation) overhead. ● Supplier unpredictability (Failure to supply). ● Discontinue of product by innovator pharmaceutical companies eg Paludrine-Proguanil) ● Counterfeit medicines (global problem)

2.3 Malaria Vector Control

Vector control is the backbone of malaria control in Botswana. The main interventions include indoor residual house spraying (IRS) and insecticide treated mosquito nets (ITNs). The use of IRS dates back to the 1950s, when DDT was the insecticide of choice until it was replaced by pyrethroids in 1998 due to procurement difficulties and pressure from the environmentalists. Currently, lambdacyhalothrin is the insecticide being used for IRS in Botswana, with plans underway to reintroduce DDT. The once vertical vector control program was decentralized in 1998 to the districts. The district councils now conduct IRS with technical guidance from the NMCP. The Entomology Laboratory, under the NMCP provides technical inputs on insecticides, training and supervision of the spraying programme.

Routine annual IRS is conducted in the most endemic northern region of the country which includes Ngami, Okavango, and Chobe; parts of the Central District (Tutume, Boteti, Tonota and Bobirwa); Ghanzi District including Charleshill and North East District. All households are targeted for spraying in all these districts except Bobirwa where only some parts of the

district are sprayed. Over the past ten years, annual IRS operational coverage ranges from 60-70% (11).

Insecticide treated nets (ITNs) played a relatively minor role in malaria vector control in the country. Formal introduction of ITNs was in Chobe district in 1992 as a pilot project with nets donated by UNICEF. In 1994 the use of ITNs was extended to other districts where malaria was endemic and revolving fund was the access strategy. From 1994 to date ITN ownership in endemic areas has remained very low at <10%(1) except in Okavango sub-District where recently there was a door-to-door free distribution of 33 000 LLINs resulting in 91% of households owning at least 1 ITN(12).

Preliminary surveys have been undertaken to assess the role of the bio-larvicide Bti (*Bacillus thuringiensis israelensis*) in Gweta (Tutume District)[1]. However, larval control has not been conducted on a large scale in Botswana.

2.3.1 Policy and Guidance

There is currently no vector control policy. However, IVM guidelines and IRS training manual are available. The guidelines provide information on the interventions that are currently used and those which could come into use in the future. WHO specifications are used to guide the selection of nets, insecticides and spray pumps. The IRS manual is used to for the annual training of spray operators.

2.3.2 Organization and Human Resources

NMCP has the overall responsibility of malaria control in the country. The programme works in collaboration with Ministry of Local Government and Department of Environmental Health (DEH) to provide policy and technical support to vector control programmes. The Entomology Unit of NMCP advises the districts on vector control matters and also plays a supervisory role. The team is made up of 2 Entomologists, 5 Technical Assistants and 6 Field Assistants. Past consultations have recommended the establishment of Vector Control Sub Committees at district level however that has not been done as a result there are no malaria focal persons at district and community levels. There are no vector control training institutions in the country. Regular annual refresher trainings are run for spraying teams.

NMCP does not have officer/focal points responsible for malaria vector control at community level. However at district level, district public health specialist, environmental health officers are responsible for vector control activities. The supervision of vector control is indirectly done by the Entomology unit while the implementation is done by local authorities

A national malaria vector control sub-committee does not exist; however there is a Malaria Reference Group (MRG) which is a team of malaria experts that advises the programme on technical issues. MRG has a representative membership from most thematic malaria intervention areas including vector control. The MRG meets infrequently as shown under Malaria Programme Management.

2.3.3 National Malaria Vector Control Delivery Structures and Systems

The following are structures and systems in place within vector control in Botswana:

2.3.3.1 Malaria Central Insectary and Field Insectaries

The Entomology Unit has a central malaria insectary situated in Francistown. However, critical equipments (humidifier and a temperature control system) to make it function are lacking. Further, the unit lacks polymerase chain reaction (PCR) machine and real time PCR machine for molecular identification of mosquitoes and conducting insecticide resistance monitoring respectively. The insectary also does not have adequate space. The insectary is situated in Francistown, while most of the malarious areas are far in the northern part of the country. These pose serious challenges of conducting experiments if live insectary reared mosquitoes have to be transported to the malarious district. There is need to consider establishing a field based insectary in malarious regions.

2.3.3.2 Malaria Vector Sentinel Sites for Susceptibility Testing and Bioassays

Although the Entomology Unit is conducting regular vector susceptibility and monitoring, there are no fixed sentinel sites. There is need to establish sentinel sites in areas where malaria epidemics occur for long term monitoring of entomological and parasitological data. Because of non functional insectary, bioassays have not been conducted to monitor quality of spraying and residual effect of treated surfaces against malaria vectors.

2.3.3.3 Financing Malaria Vector Control

Financing of vector control efforts has remained mainly the responsibility of government. Within district budgets, allocation is usually part of a general pest control vote.. At MOH, funding comes from the Disease and Pest Control vote for malaria vector control. Although funding exists, it is difficult to single out how much goes to malaria vector control specifically since all funds for remuneration and administration are pooled. There are no partners involved in financing malaria vector control in the country.

2.3.3.4 Vector Control Interventions Performance

Botswana government has run malaria vector control program successfully for several decades. From the early 1950s to date the program has been fully financed by government. Even though the country is consistently recording coverage below the required WHO targets, the country has seen significant reduction in malaria notification over the years.

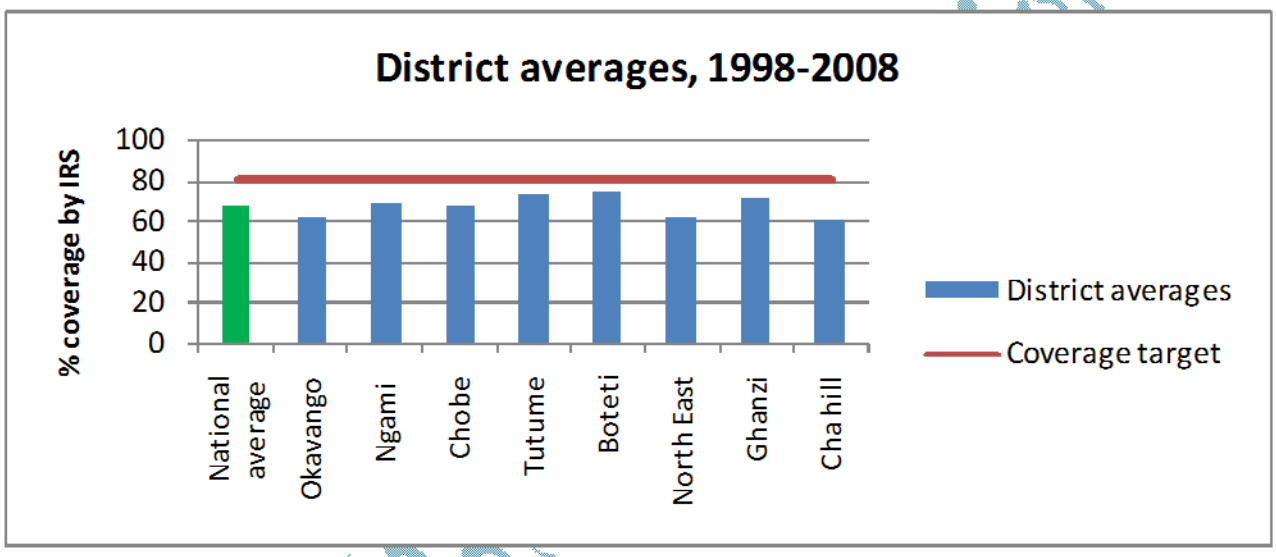
2.3.3.5 Indoor Residual Spraying

The estimated population in high risk districts is 492,864 and is targeted for IRS protection. Spraying is done once a year during months of October to December after training of spray operators. For the past 10 years, the national IRS coverage has remained below the WHO recommended target of above 80%. A number of factors which contribute to this low coverage include: refusals, absence of occupants from their homes during spraying time, locked houses, and other reasons. Those with modern (western type houses) have been reported to refuse spraying with any insecticide because they allege that the chemicals stain the painted walls._A ten year IRS structural coverage is shown below. Despite the program failure to achieve satisfactory coverage over the years, no attempt has been made to investigate the causes with a view to address the issue. In addition, spray operators' forms capture information on some of the reasons why some structures are not sprayed but this data has not been analysed and used. No KAP studies have been conducted to assess community perception about IRS and malaria and its control.

Procurement of insecticide is done at national level. However, the quality of insecticides is not monitored during delivery and use. Equipment is procured and serviced at district level. During the spraying exercise, standard forms are used to capture spraying performance

activities on a daily, weekly and monthly basis. The same is done for the population protected. Because the insectary is not working, bioassays are not being done. Spraying is done once a year during the months of October to December after training of the spray operators.

Table 4: District IRS coverage over 10 years (Source Ministry of Health malaria database)

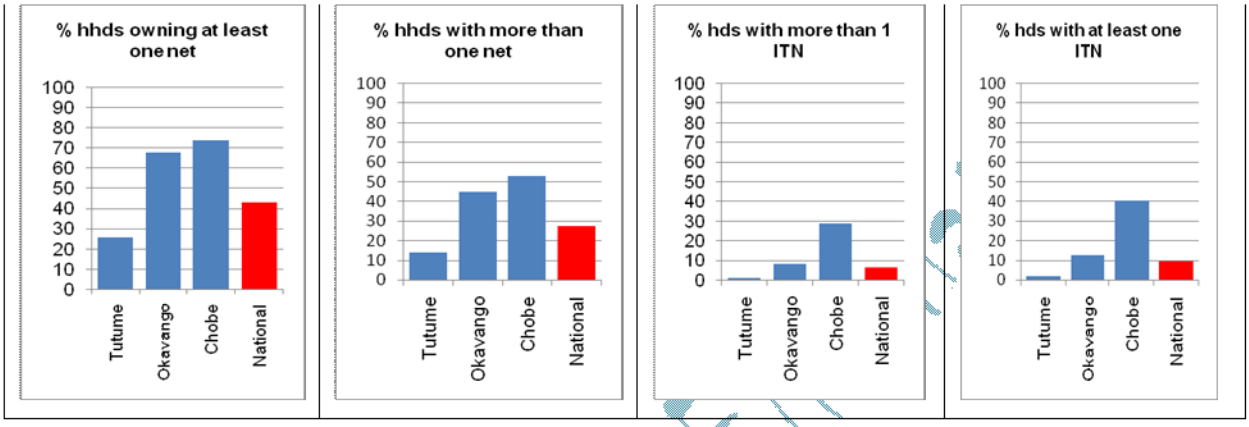


2.3.3.6 Insecticide Treated Nets

The national LLINs coverage is still very low - less than 10%(1). The majority of the nets are conventional as they were distributed before the advent of long lasting insecticide treated nets (LLINs). The low ITN coverage may be due to the methods of distribution, a revolving fund with subsidized sale of ITNs, and few partners are providing support for this intervention. In addition, there is no national system for distributing LLINs in the country that aims to achieve universal coverage. Some nets are made available by various organisations (UNICEF, Clinton Foundation, Red Cross, and Gaborone Secondary School). Lists of beneficiaries are available on the distribution of the donated nets (both conventional nets and LLINs).

Data on households with at least one or more net (treated or untreated), obtained during the MIS in 2007 are shown in the table below.

Table 5: Mosquito Net Coverage Data (Source: MIS 2007)



2.3.3.7 Larval Control

Larval control is currently not conducted in the country. However recently there has been renewed interest in the intervention and feasibility studies are ongoing.

2.3.3.8 Malaria Vectors and Bionomics

Historical data suggest that the vectorial system consisted of *Anopheles gambiae, Anopheles arabiensis* and to a lesser extent *Anopheles funestus.* After years of IRS, two of the species: *An. gambiae s.s. and An. funestus* were decimated leaving *An. arabiensis* as the sole malaria vector in the country. *An. arabiensis* breeds in temporary and sunlit freshwater and feeds both indoors and outdoors and rests both indoors and outdoors making it a difficult vector to control with IRS and ITNs. There has not been any routine mosquito surveillance; therefore there is no data on vector density and distribution maps. There are no data on vector biting rates, sporozoite rates and entomological inoculation rates. While there is staff capacity to collect mosquitoes, the laboratory is not equipped to determine sporozoite infection rates, blood meal source and identify the specimens to species level. Staff training on these entomological aspects will be necessary once the laboratory is equipped.

2.3.3.9 Malaria Vectors Susceptibility to Insecticides

Past and recent studies indicate that there is no resistance in the malaria vector, *Anopheles gambiae s.l.* to pyrethroids and DDT. The Entomology Laboratory monitors the susceptibility of the malaria vector across the country. This routine monitoring is conducted in districts under routine spraying. There are no specific sentinel sites for this exercise. Data on susceptibility of *An. gambiae s.l.* to DDT and pyrethroids are available. *Anopheles gambiae s.l* (which includes the vector *An. arabiensis*) is more susceptible to DDT as compared to the other insecticides. The Entomology Laboratory plans to develop and up-date a computerised database on insecticide resistance and/or data ontologies. Data from 2006 and 2008 are shown in Table 6 below.

Table 6: Malaria Vector Susceptibility to Insecticides (2006/08), ~~Entomology (14).~~

Districts	Villages	Insecticides	24-Hour Mortality (%)	
			DDT and other pyrethroids (2006)	DDT (2008)
Okavango	Seronga Gani Mohembo*	DDT	100	100
		Deltamethrin	94.70	
		Lambdacyhalothrin	92.74	
		Permethrin	100	
Chobe	Kavimba Satau Pandamatenga*	DDT	93.33	100
		Deltamethrin	93.89	
		Lambdacyhalothrin	93.33	
		Permethrin	100	
Ngami	Maun* Chanoga Maun	DDT	100	100
		Deltamethrin	89.60	
		Lambdacyhalothrin	91.54	
		Permethrin	73.39	
Boteti	Motlopi Motlopi*	DDT	100	100
		Deltamethrin	100	
		Lambdacyhalothrin	100	

		Permethrin	99.17	
Tutume	Gweta	DDT	96.67	100
	Sebina	Deltamethrin	89.38	
	Mosetse Tutume Nata* Sepako* Maphosa* Monxotai*	Lambdacyhalothrin Permethrin	81.11 88.07	
North East	Tshesebe Masunga Moroka Tshetsebe*	DDT Deltamethrin Lambdacyhalothrin Permethrin	97.87 85.15 74.64 82.77	100
Charleshill	Makunda* Hanahai*	DDT		97
Bobirwa	Robelela* Mmamidi*	DDT		100
Kweneng	Khudumolapye*	DDT		100

*NB. *Study conducted 2008.* The sample size of female mosquitoes tested varied with locality

2.3.3.10 Malaria Vector Control Advocacy, IEC and Community Involvement

While there is a long history of malaria in the country, there is limited information on knowledge, attitudes and practices (KAP) on IRS and LLIN. However, for any vector control program to succeed, communities must be involved in the planning and implementation of the programs and their KAP taken into consideration while implementing the program.

2.3.3.11 Malaria Vector Control Indicators

Data on inoculation rates, sporozoite rates, human blood index, and malaria prevalence, are lacking in Botswana. The other vector control indicators available and used in Botswana include the number of households/structures covered by IRS and number of ITNs distributed. During the spraying exercise, standard forms are used to capture spray

performance activities on a daily, weekly, and monthly basis. The same is done for population protected by IRS. The Entomology Unit conducts cone bioassays to determine the quality and figures of the spraying in the districts receiving IRS. Although these bioassays are being performed, they need to be strengthened and conducted more frequently.

2.3.3.12 SWOT Analysis of the Malaria Vector Control

Strengths	**Weaknesses**
▪ Vector control activities decentralised to the districts ▪ Long history of IRS implementation ▪ Availability of IVM guidelines ▪ Spraying at no cost to beneficiaries ▪ History of CBOs involvement in net distribution ▪ ▪	▪ Low IRS coverage ▪ Data not analyzed and used for decision making at district level ▪ Lack of malaria focal persons at district level ▪ Low net re-treatment rate ▪ Low budget for ITNs ▪ Lack of vector control policy ▪ Low acceptance rate of IRS by community members ▪ Inadequate supervision of IRS
Opportunities	**Threats**
▪ Possibility for malaria elimination due to changing malaria epidemiology ▪ Availability of mapping tools to improve coverage ▪ Availability of LLINs ▪ Involvement of CBOs & international partner organisations in scaling up	▪ Reluctance of the community to accept IRS ▪ Competing priorities (e.g. HIV/AIDS) ▪ Potential development of insecticide resistance (pyrethroids) ▪ Change in malaria epidemiology ▪ Negative perception on nets

distribution of LLINs ▪ Winter larviciding ▪ History of net use in the country ▪ Success of recent LLIN pilot distribution in Okavango can lead to LLIN scale up in other districts ▪ Tax exemption on ITNs ▪ Vector susceptibility for a larviciding programme ▪ Learning opportunities from other government ministries (e.g. Agriculture) with models for pest control	(associating nets with coffins in some areas) ▪ Cultural factors affecting ITN/LLINs and IRS coverage (sleeping behaviour, three home system) ▪ Government budget constraints ▪

2.4 Malaria Case Management

Effective malaria control also includes prompt diagnosis and strong case management with effective combination anti-malarial drugs.

2.4.1 Malaria Case Management Policy and Guidelines

Malaria treatment policy in Botswana has had two major changes: chloroquine was used as the first line drug until 1997 when it was changed to Sulfadoxine-Pyrimethamine (SP). This was based on drug efficacy studies conducted between 1994 and 1997 which revealed high levels of chloroquine resistance. In 1994 and 95 7 day follow-up drug efficacy studies in Chobe Sub-District showed a resistance of 31.8 and 45.7% respectively(15). In 1997 14 day follow-up studies in Okavango, Tutume and Ngami showed resistance levels of 43%(8). In 2007 SP was replaced by Artemether-Lumefantrine (AL) as the first line drug for treatment of uncomplicated malaria. This policy change was based on results of SP drug efficacy studies which showed clinical and parasitological failure at day 28 of 9% in 2006(9). This change was also done in line with regional changes in policy from SP to Artemisinin-based Combination Therapy. Regionally, the resistance to SP was much higher than in Botswana. The seasonal nature of malaria and its close relation to rainfall makes it difficult to conduct proper studies in low transmission countries. This has been a challenge in recent years resulting in failure to recruit representative samples of patients.

Following a decision to shift drug policy from SP to AL, malaria diagnosis and treatment guidelines for management of malaria were revised in 2007. The current recommendation on diagnosis is that all suspected cases of malaria should have both rapid diagnostic test (RDT) and microscopy slide done before offering treatment. CMS maintains a list of RDTs recommended for use by MOH. The treatment guidelines states that false negative RDTs can occur. However, it recommends not to offer malaria treatment if the RDT is negative. Instead repeat RDT after 6 hours and if negative repeat again at 24 hours(16). However, 5/6 field teams observed that clinicians do not use the RDT results for making treatment decision. Almost all unconfirmed malaria cases are treated with AL. Furthermore, the RDT results are not reported to the malaria control programme. Thus the current use of RDTs neither serves the purpose of diagnosing malaria for treatment nor for surveillance.

2.4.2 Malaria Drugs for Case Management

The first line anti-malarial is Artemether-Lumefantrine (AL). Second line treatment is Quinine, which is also recommended for treatment failures. The latter is also recommended for the treatment of children weighing <5Kgs and pregnant women in the first trimester(16). AL is used in the second and third trimester of pregnancy. Parenteral quinine is recommended together with other supportive measures and specific treatments for severe malaria. For pre-referral treatment of severe cases, IM quinine is recommended.

The health workers in Zone A were very knowledgeable and appear to prescribe the correct dose of the first and second line drugs. However the health workers interviewed from the non endemic areas (zone C) lacked knowledge of dosage schedule of first and second line drugs. This implies that as the malaria transmission is declining health workers may apply inappropriate drug regimens for treatment of malaria particularly in zone C.

The percentage of children with fever who received treatment according to the Malaria Indicator Survey is also low (18.5%) while the percentage of children who took anti-malarials within 24 hours was a mere 4.1%(1). At the moment, treatments are facility based with no extension in the community.

2.4.3 Malaria Diagnosis of Infection and Disease

Clinical diagnosis and presumptive treatment is the common practice at health facilities. The clinical diagnostic algorithm for management of suspected malaria cases recommended by the NMCP is not displayed in most health facilities.

All suspected cases of malaria are supposed to be confirmed by Microscopy and also have a rapid diagnostic test (RDT) done. The Ngami district hospital laboratory mentioned that they do quality control of RDTs using positive control. However there was no evidence to support external quality control of both RDTs and microscopy. The national guideline for quality control of microscopy is to re-examine at least 10% of the slides. The review team did not see any documents to confirm that external quality control of microscopy is actually done. There are no clear national guidelines for external quality control of RDTs. There is no batch testing of RDTs before distribution to health facilities.

This implies that the function of external quality control and assurance of malaria diagnosis by the National Health Laboratory (NHL) is not satisfactory. The reported reason for this inadequate quality assurance is the shortage of staff at the NHL to coordinate the activities.

Attempts at making Nyangabwe hospital laboratory into a malaria reference laboratory have started. This laboratory has initiated an external quality assurance system of microscopy by sending blood slides to a lab in South Africa to validate the results but this External Quality Assurance system is confined to the blood slides examined in this laboratory alone. However, the staffing levels and space required for this laboratory to function as a reference laboratory is not addressed. The National Health Laboratory does not have the capacity to do PCR or ELISA for doing molecular and serological diagnosis.

2.4.4 Malaria Diagnosis, Treatment and Chemoprophylaxis in Special Groups

Malaria diagnosis and treatment of individuals with co-infection of HIV and AIDS is the same as that of the individuals without HIV infection. High incidence of HIV related fevers in this category of patients requires that a confirmatory diagnosis is practiced. The current policy is to give Chloroquine plus Proguanil for chemoprophylaxis to pregnant women of all parities in endemic areas and to residents of non-endemic areas (Zone C) visiting endemic

areas (Zone A). People who relocate to endemic areas are not covered in the current guidelines.

Although the ante-natal care (ANC) coverage in Botswana is >95%(17), the coverage of Chloroquine/ Proguanil (taking at least two doses) among pregnant women was only 43.5% in 2007[ii] . The coverage of regular chemoprophylaxis is likely to be lower than the coverage for just two doses of drugs. The reasons for this low coverage are unclear. Typically, adherence to once weekly regimen of prophylaxis tends to be lower than directly observed administration of drugs and this is probably the case in Botswana. However, there is no data to support or refute this assumption. There is no data on the coverage of chemoprophylaxis among residents travelling to endemic areas from non-endemic areas.

2.4.5 Case Management Delivery Systems

There is a Malaria Reference Group (MRG) which consists of experts from various disciplines including clinical medicine (physicians, paediatricians, and obstetricians), an epidemiologist, a representative of the NHL, a pharmacist from CMS, representatives from malaria endemic districts and Botswana Defence Force. The MRG should advise the NMCP on developing national treatment and prophylactic guidelines to make recommendations to the National Steering Committee on Drug. Unfortunately the MRG has been ineffective and meets infrequently.

Staffing at the primary and district hospitals is mainly with medical officers, nurses, and laboratory personnel. They provide in-patient care, laboratory support for confirming diagnosis and monitoring. They are also responsible for assessing for treatment complications.

The clinics, health posts and mobile stops are staffed mainly with nurses and some of the clinics now have resident medical officers, and are supposed to provide services for treatment of uncomplicated malaria and pre-referral treatment for severe cases. The mobile stops are only functional in the mornings of selected days when a visiting nurse visits.

There is inadequate staffing at the national level to oversee the area of malaria case management. Although there is a designated officer for this, he has additional responsibilities that may not allow for the necessary focus that this requires especially with new programme focus.

There is lack of a community component for the programme in areas served by mobile stops. This is a missed opportunity to build on the structures already existent at community level to assist with early diagnosis and treatment of malaria cases and probably in active detection of malaria cases. This is particularly important if the programme is to be re-oriented to achieve elimination goals. At the same time these community groups can be used to assist in organizing mass screening and treatment campaigns as and when they are required.

2.4.6 Quality Assurance of Malaria Diagnostics and Anti-Malarial Medicines

The Drug Regulatory Unit is mainly charged with the responsibility of setting the guidelines for the products procured for use in Botswana. CMS currently houses the laboratory for monitoring quality of products coming in the country. Product selection is based on MOH guidelines on drugs and related substances. On specific issues of laboratory requirements, specifications are given by NHL.

Batch testing and lot testing is not adequately addressed for products coming in the country. This is particularly so in the case of RDTs and ACTs where this is recommended. Furthermore, quality control (QC) of RDTs against microscopy is not done despite the opportunity for it as this is a requirement in all patients. For malaria microscopy, although the laboratory in Francistown is part of the EQA system run by National Institute for Communicable Diseases in South Africa (NICD SA), no quality assurance (QA) programme is run for clinics or even hospital laboratories.

There is as yet no regulation on the stoppage of importation of single formulations of artemisinin used in oral treatments (monotherapies). As such, several products are registered for use in the country. Information from DRU showed that a total of 7 antimalarials are registered that include 1 ACT (AL) (no single formulations of ACT are registered) and 1 parenteral anti-malarial registered.

2.4.7 SWOT Analysis of Malaria Case Management Delivery

Strengths	Weaknesses
▪ Protocol for Drug efficacy studies approved by WHO is available ▪ Laboratory facilities for diagnosis of malaria available in all districts ▪ RDTs have been available in all malaria endemic districts ▪ There is a system of drug management in place in all districts ▪ Presence of pharmaceutical units in all districts and hospitals ▪ Availability of drugs in facilities ▪ Availability of reasonably trained staff ▪ Deployment of doctors to clusters in districts ▪ Training of health workers in districts on case management IMCI guidelines available ▪ Monitoring of case management by DHT and NMCP is done on annual basis ▪ Free distribution of drugs	▪ Long turnaround time for laboratory results (7 days) for clinics ▪ Lack of quality assurance for RDTs ▪ Stock-outs of RDTs in some facilities ▪ There is no clear guidelines on which ground to treat suspected malaria cases ▪ chemoprophylaxis guidelines is not revised ▪ Lack of refresher courses for laboratory technicians ▪ Lack of IEC for case management ▪ Inadequate collaboration with other departments (IMCI, Safe motherhood, HIV, Nutrition,) ▪ Lack of external quality assurance for laboratory diagnosis
Opportunities	**Threats**
▪ IMCI programme present in all districts ▪ Potential for partnerships with private practitioners ▪ Potential to get funds from NGOs ▪ Availability of tools for auditing malaria deaths ▪ Availability of funding from government for	▪ Development of Artemether/ Lumefantrine resistance in Botswana ▪ Staff attrition and turnover ▪ Poor adherence of private practitioners to National Treatment Guidelines

case management ▪ Presence of pharmacovigilance system ▪ Potential for funding of Malaria Research Laboratory	▪ High HIV prevalence ▪ Low community participation in malaria control activities ▪

2.5 Malaria Epidemic Preparedness and Response

2.5.1 Forecasting: Risk mapping, collaboration with non-health sectors like meteorology

Malaria epidemiology map exists for Botswana, however in the phase of the changing malaria epidemiology, there is need to update this map. At the moment malaria epidemic risk maps do not exist, however each district is supposed to map the high risk areas (catchment pop) at the health facility level. In the recent past, NMCP started mapping high risk areas and the process is ongoing. Through collaboration with the National Meteorology department, NMCP is currently acquiring climate data (rainfall) and this data is used for annual malaria seasonal risk forecasting. NMCP also collaborates with the Drought Monitoring Centre (DMC), Southern Africa Regional Outlook Forum and Malaria Outlook Forum to acquire seasonal climate forecasts.

2.5.2 Preparedness: Emergency Funds and Stocks; EPR Plans for Malaria Epidemic-Prone Districts.

The government of Botswana through the Ministry of Health made a provision for contingency/ emergency funds for timely response to epidemics. These funds are available at national and district level and can be easily mobilized. Planning for malaria epidemics occurs at national and district levels and resource mobilisation is a priority area. Epidemic preparedness and response re-fresher training is conducted annually to personnel at the district level. At least 272 people are trained annually on EPR, and this pool of trained health workers can be recalled at short notice in the event of an epidemic. The number of health workers trained so far however may still be inadequate. Though training is conducted annually, the private health facility participation is minimal.

Although, there is a national Malaria Epidemic Preparedness and Response (EPR) Committee, there are no malaria specific preparedness committees at district level. However, each district has a disaster management committee. The national EPR Committee is a member of the National disaster management committee. According to IDSR guidelines, EPR Committee meets quarterly but in the event there is an epidemic, the frequency of meeting may increase.

Malaria epidemic thresholds have been developed for epidemic prone districts and are updated annually. However, data from the local health facilities have not been fully utilized and thresholds do not exist. Moreover, not all information on malaria indicators is collected, for example the data is not structured according to sex and age. At the district level, there are EPR plans which are not specific for malaria but include other epidemic prone diseases.

2.5.3 Early Epidemic Detection

The National Malaria Strategy (2006-2011) identified six strategic approaches as key pillars for control of malaria. Development of early warning systems is one of the critical approaches for control of malaria epidemics. Currently, Botswana is in the process of developing a comprehensive functional malaria early warning system (MEWS). Currently, remote sensing techniques are not being used for epidemic detection.

2.5.4 Response to Epidemics

Although no major malaria epidemic has occurred in Botswana since 1997, all minor local epidemics that have occurred in the past have been detected and responded to within 2 weeks of onset. Though response to malaria epidemics has been timely, documentation and tracking of malaria epidemics and post-mortem assessments still remain a major challenge.

2.5.5 National Malaria EPR capacities, structures and systems

The last major epidemic that was reported was in 1996 and 1997, with 250 and 143 deaths, respectively, and no major malaria epidemic has been reported in the recent past in Botswana. In the current Malaria Strategy (MoH 2006b), malaria epidemics, prevention and control is recommended on an “Epidemic preparedness and Response” strategy. Active surveillance of malaria cases throughout the year is required if this strategy has to be successful. Districts have been assisted to develop thresholds. The national threshold (alert and action thresholds) is established for declaring an epidemic

At the beginning of each malaria season and in the event of an epidemic, Health Education Assistants (HEA) provide a link between clinics, health posts, and communities, and they are the front runners in sensitizing the communities about malaria EPR. Community

participation in EPR exists through establishment of village health committees in every village countrywide, although they are not very active.

At the national level there is malaria Epidemic Preparedness and Response Committee, that provides technical and EPR logistics support to the NMCP. In the districts there are rapid epidemic response teams which respond to any health emergency including malaria and meet monthly to review health issues in the districts. These teams comprise a technical committee of the larger district disaster management committee. In addition, a Malaria Reference Group (MRG) which is a team of malaria experts is in place which serves as an advisory committee to the programme. MRG has a representative membership from most thematic malaria intervention areas, including EPR. In addition, NMCP holds an annual malaria conference, which offers a platform for districts to review their epidemic preparedness and response at district level, share experiences and technical knowledge, as well as to plan for the coming season.

2.5.6 Financing Malaria EPR

Currently, EPR activities are funded by the Government of Botswana. There is no specific budget allocation for EPR, but EPR activities are covered under the general disease control budget.

2.5.7 SWOT Analysis

Strengths	Weaknesses
▪ Epidemic preparedness and response committee in place ▪ District malaria thresholds available ▪ Strong collaboration with non-health sectors especially meteorology and Botswana Defence Forces ▪ Emergency contingency funds available ▪ Annual training in epidemic preparedness	▪ Lack of partnership with national and international research institutions ▪ Lack of adequate number of trained epidemic response staff ▪ Inadequate documentation of epidemic post-mortems ▪ Inadequate community involvement and participation

▪ 6 Epidemic response containers strategically placed and maintained yearly	▪ Inadequate supervisory support ▪ Lack of specific malaria guidelines on EPR ▪ Lack of health facility thresholds ▪ MEWS not fully functional
Opportunities	**Threats**
▪ Partnership with WHO, UNICEF and other UN organizations ▪ Cross border collaboration with neighbouring countries e.g. Namibia ▪ Partnership with key stakeholder ministries e.g. Ministry of Agriculture, Ministry of Environment, Wildlife and Tourism, and Ministry of Local Government ▪ Collaboration with regional climate forecasting institutions	▪ Global warming and climate change leading to frequent natural disasters ▪ Changes in the epidemiological pattern of malaria transmission ▪ Endemic malaria in neighbouring countries

2.6 Advocacy and Behaviour Change Communication

As the number of malaria cases reduces in Botswana, awareness about the disease is also likely to decline. Therefore, sustained levels of awareness and identification of risk behaviours is required. This MPR provides insights into relevant issues, challenges/gaps and best practices to further guide delivery of health promotion and education activities in the national malaria prevention and control programme. Malaria transmission in Botswana is seasonal with occasional epidemics. This seasonality possesses challenges on the acceptance of interventions such as vector control and calls for a strengthening of advocacy, information, communication and malaria for improved malaria awareness The

advocacy, information, education and communication and social mobilization are integral component of the current national malaria strategic plan that ends in 2011. The uptake and utilization of effective interventions such as Insecticide Treated Nets and Indoor Residual Spraying are below coverage targets, necessitating stronger Information, Education and Advocacy to bridge the coverage gap. IEC targets in the malaria strategic plan 2006-2011 include: 80% of the general population will have knowledge on malaria prevention methods by 2016; 100% health seeking behaviour among communities by 2016; and 80% of general population can identify prophylaxis use as one of the precautions taken when travelling to malarious districts(6). Over the years there has been a need for availability of education materials advocacy activities and Knowledge Behaviour Attitude and Practice studies (KBAP) to guide programme interventions.

2.6.1 Delivery Structures and Systems

The health education division in the public health department has one malaria IEC officer at the national level who is expected to direct and provide technical support to all the districts. At the district level, health education officers are responsible for coordination of all the health promotion and education interventions, including malaria as just one of their many focus areas.

While all health workers are involved in the delivery of IEC and advocacy activities at district level, the Health Education Officers (HEOs) and Health Education Assistants (HEAs) play a pivotal role in Health Education particularly in community mobilisation. There is heighted community mobilization campaign in malarious areas prior to the malaria season. In order to build capacity in IEC and advocacy, HEOs and HEAs must receive ongoing training on different malaria interventions.

The Institute of Health Sciences offers a diploma course on general Health promotion and education, but this training is not specific to malaria. The output from the Institute is low this has an impact on the number of health education officers assigned to districts. Additionally, training of HEAs has stopped, reducing the number of HEAs in communities and undermining community mobilisation activities.

In order to increase access to IEC and advocacy materials, the District Health Team, clinics, schools and health post must facilitate distribution and dissemination of key malaria messages.

2.6.2 The Media

IEC and advocacy materials are mainly produced centrally by the government of Botswana, but opportunities exist for engaging strategic partners to increase their availability and accessibility. These materials are produced in English and Setswana, which may create a barrier to level of understanding of malaria messages as there are several other languages.

The NMCP uses multi-media to disseminate IEC and advocacy materials, including brochures, posters, radio jingles, strip adverts and drama performances. However, the budget for IEC is inadequate, limiting the scope and depth of IEC for malaria prevention. For example, in the financial year 2008/2009, only hundred thousand copies of brochures were produced for the entire country. Key messages focusing on preventive interventions and environmental cleanliness have been developed and disseminated, though there is a need for regular review and updating after every 3 to 5 years. Furthermore, studies on Knowledge Attitude Behaviour and Practice (KAP) on malaria control interventions have not been undertaken. The Botswana MPR indicates that these studies are needed to help the programme target relevant messages.

2.6.3 Malaria Advocacy

It is recognised that for malaria to remain a public health priority, advocacy should be high among politicians, policy-makers, partners and civil society. Currently, malaria control remains high in the political agenda-as depicted by government funding over 95% of all program activities including health education, however most of this money goes towards procurement of insecticides. This political commitment has also been evidenced over the past 10 years. Malaria advocacy activities include global annual events such as the World Malaria Day and SADC malaria days, during which the Minister of Health and Minister of Local Government usually address the public on the theme of malaria that year through the national radio station and national events.

2.6.4 Community Based Malaria Control

Health Education Assistants, Village Health Committees and Community Based Organisations (CBOs) are involved in malaria control activities, though their participation lacks coordination. However, health education assistants do not have sufficient information on malaria prevention and control since most of the training targets nurses and focuses on case management rather than on prevention. The health education assistant at present are not authorized and trained able to test suspects with RDT and give community based treatment Community leaders and traditional health practitioners' involvement in malaria prevention and control is also minimal and needs to be strengthened.

2.6.5 Financing Malaria Advocacy, IEC and Community Mobilization

The National Malaria advocacy, IEC and community mobilization activities costing is elaborated in the National Malaria Strategic Plan, 2006-2011. However, the national budget for advocacy, IEC and community mobilisation needs to be increased to meet the increasing demand for health promotion and education intervention nationwide. In the period 2008/9 about 91,000 brochures were produced. There is need to develop a National Malaria Advocacy and Mobilisation guidelines and training modules. Furthermore, there is need to develop a research agenda which will guide prospective researchers on evidence gaps.

2.6.6 SWOT Analysis on Malaria Advocacy, IEC and Community Mobilization

Strengths	Weaknesses
▪ Availability of National Malaria Strategic plans 2002-2005 and 2006-201 with IEC targets ▪ Existence of community structures such as the Village Development Committee (VDC) and Village Health Committees (VHC) ▪ Availability of different channels of message delivery (radio and print media), and entry points into communities such as schools. ▪ Regular commemoration of designated malaria days such as SADC and World Malaria days.	▪ Lack of Malaria Communication Strategy document Limited operational research including Knowledge Altitude Behaviour Practices (KBAP) to guide decision-making in malaria control program ▪ Irregular Updating of IEC and advocacy materials Production and distribution of IEC material at district level is inadequate. ▪ Partnership with media is weak ▪ Shortage of Health Education Officers at district level ▪ Inadequate funding for the production of specific materials at district level
Opportunities	**Threats**
▪ Community Based Organisations exist and are mainly working on other diseases/conditions and malaria can leverage their services.	▪ Competing budget items for malaria

2.7 Surveillance, Monitoring and Evaluation, and Operational Research

2.7.1 Malaria Country Profile, Risk Mapping and Stratification

The Malaria Country Profile has not been fully developed. However, a World Malaria Report country profile has been updated for 2008 by the NMCP and WHO Country Office.

Malaria risk mapping has taken place only at the level of the district as indicated. Within districts, diseases are reported by health facility, but no mapping has been conducted at the level of the health facility or at the community level. IDSR data collected at district level

suggest that, in some districts, malaria may be concentrated in only a few communities. Mapping these malaria foci within districts would provide information for more appropriate and targeted interventions.

The NMCP has been trained in mapping, and some indicators have been mapped by district including the updating of the risk map. The Ministry of Health and NMCP can use Geographical Information Systems (GIS) for mapping but is limited , primarily due to inadequate human resource capacity within the NMCP for data entry and data management Even though some data is available, not all data is available for the NMCP to show equitable access to malaria control services in Botswana.

Stratification of malaria transmission has been conducted at district level, however no vector mapping or stratification has been performed on endemicity and epidemic risk with epidemiological (prevalence) and/or entomological data. The current stratification is based on suspected malaria cases recorded in recent years and not on parasite, See fig 2 2008 map.

2.7.2 Routine Monitoring Systems

2.7.2.1 Malaria Surveillance System: IDSR and HSU

As the country heads toward elimination, case based noftication and investigation is the primary purpose of the malaria surveillance. According to the draft strategic plan, the system exists to rapidly identify, report and respond to all new malaria cases and transmission foci in the country through an ongoing, systematic surveillance system; monitor program performance; and provide evidence for decision making.

Malaria is notifiable disease. Passive surveillance is currently the only form of case detection in the country with public health facilities mandated to report malaria cases and deaths. Health facilities and routine outpatient records are the only sources of case data. Routine in-patient admission for malaria is routinely reported, but deaths attributed to malaria must be reported to district health authorities. Private practitioners are required to report to the DHT any detection of notifiable disease or disease of epidemic potential, although follow up of the private sector reporting is lacking.

The IDSR collects indicators on malaria as follows:

- Unconfirmed malaria (below and above 5 years of age): any person with fever or fever with headache, back pain, chills, sweats, myalgia, nausea and vomiting diagnosed clinically as malaria.
- Confirmed uncomplicated malaria (below and above 5 years of age):: any person with fever or fever with headache, back pain, chills, sweats, myalgia, nausea and vomiting and with laboratory confirmation of diagnosis by malaria blood film or other diagnostic test for malaria parasites.
- Malaria with severe anaemia: any child 2 months up to 5 years with malaria and, if an outpatient, with severe pallor, or if an inpatient, with a laboratory test confirming severe anaemia.
- Malaria Admissions (below and above 5 years)
- Malaria deaths.

Both unconfirmed and confirmed cases and malaria-attributed deaths are reported weekly to the IDSR. Districts also report monthly to the Health Statistics Unit, but they adjust data to remain consistent with data reported to IDSR. The District Health Information System (DHIS) is currently being rolled out to districts in attempt to strengthen IDSR and the Health Statistics Unit.

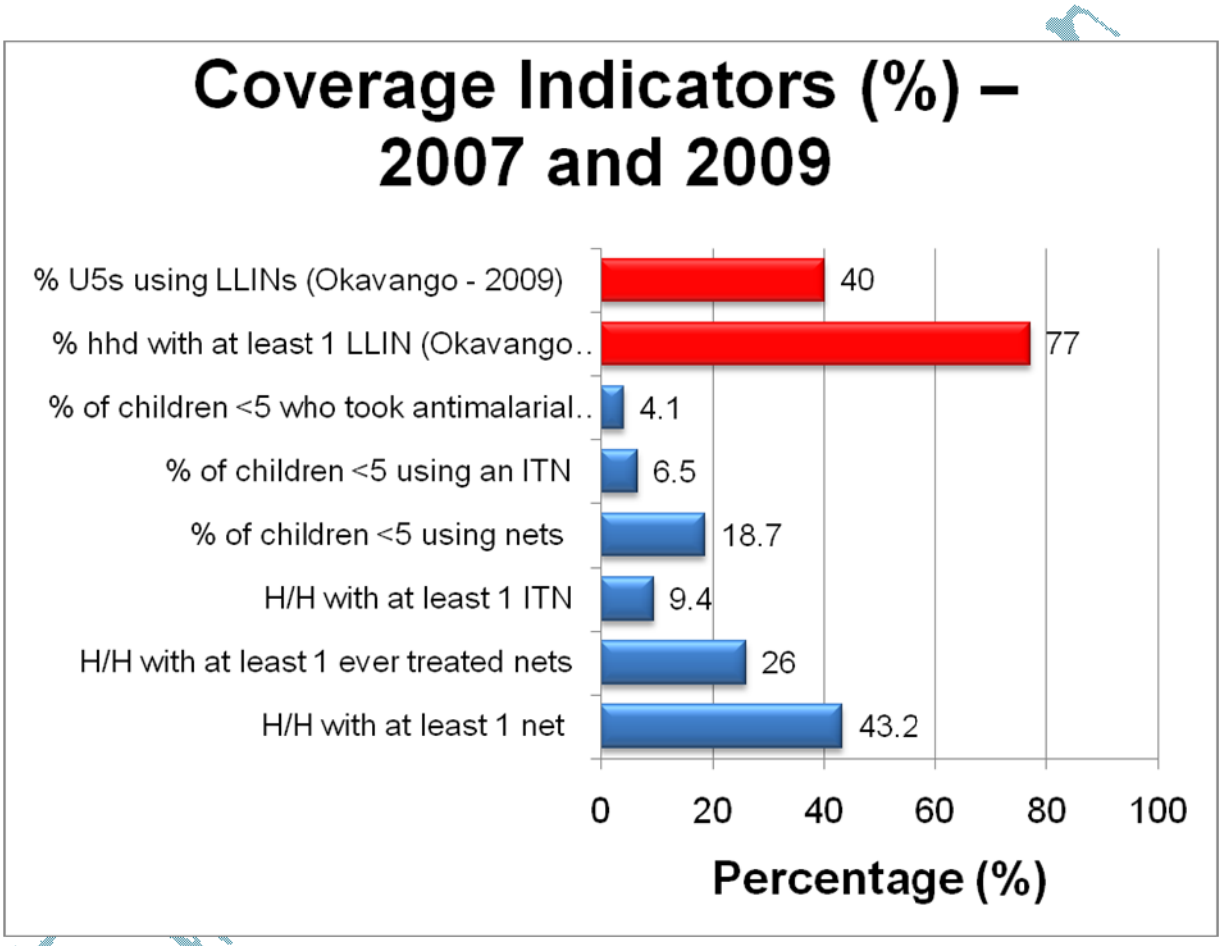
2.7.2.2 Malaria Logistics Information System (IRS, LLINs, RDTs and Stock Control)

The NMCP has a system for reporting progress and implementation of the activities. However, the reporting has shown that the annual reports were available for earlier years and that the vector control team has also been regularly producing annual reports. For example, the programme knows where the nets were distributed and a reporting system is in place using the health facilities in the local councils. For IRS a system for data collection and calculating the coverage is in place. The programme keeps records and reports on this coverage every year. There is evidence that this data has been used for decision making.

2.7.2.3 Malaria Evaluations and Surveys

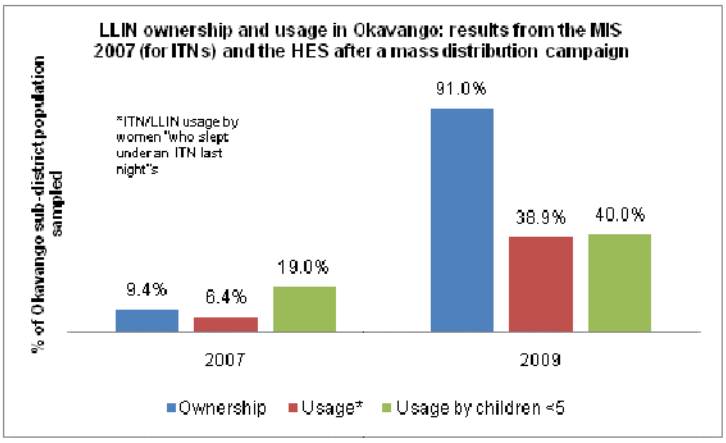
Parasite prevalence surveys have not been conducted as mentioned above. However, a sub-national malaria indicator survey was conducted in 2007 in three districts (Okavango, Chobe and Boteti/Tutume) and produced the following results:

Fig. 4 Malaria Indicator Survey Results



In 2009 a post LLIN campaign survey was conducted in Okavango and produced the following results.

Fig. 5 Post LLIN Okavango Campaign Household Evaluative Survey (HES) Results



No health facility survey has been conducted.

2.7.3 Malaria Reporting

Reporting is a crucial component of the national malaria programme. This review found that annual reports are produced at national level, although annual reports in recent years is lacking However, the vector control reporting has been more consistent, including vector susceptibility results. Malarious districts, include malaria in their quarterly reports. However, districts reports have been compiled and are available. Evidence of monthly malaria meeting reports were not available. Epidemic thresholds have been calculated.

2.7.4 Malaria Operational Research

The Health Research Unit and the National Health Research and Development Committee (the ethical review board for the Ministry of Health) supports operational research activities. The HRU collaborates with the national malaria program to develop studies in malaria endemic areas, including previous investigations into the use of nets and sleeping patterns of households. The Health Research Unit can catalyze research on program impact on the general health system and contributing factors to malaria transmission. As a technical contribution to the malaria program, the HRU developed a research agenda in 2008 with several malaria-related research questions with input from the NMCP. Some potential areas for research noted by the HRU include: qualitative assessment of the current poor uptake of malaria interventions (e.g. IRS, LLINs), examination of the cattle water reservoirs as potential vector breeding sites, design of a pharmacovigilance strategy around ACTs,

prevalence studies, and research on malaria and HIV/AIDS co-infection. In addition to the research agenda, the HRU is drafting health research policy, bill, and Standard Operating Procedures, including an SOP on the ethical approval process. (Central Report, HRU).

The agenda for basic and operational research has low priority in Botswana with few research institutes involved in malaria research and with almost no research institution with a malaria research section, field malaria centres and malaria research programs in place. It is unclear whether the national university has a malaria research program. The newly established School of Medicine has not yet started any work in malaria. However, possibilities of cooperation with other institutions in the region exist with the Medical Research Councils in South Africa, Zimbabwe and Zambia.

2.7.5 Malaria Database and Informatics Support System

The NMCP staff has computers, printers and other accessories. They also have access to internet and network facilities. Most districts have internet and computer facilities allowing information to be sent through the Internet. However, there is Ministry of Health website on which the NMCP can upload the information for sharing with other districts. Currently there is no malaria website and web reporting on malaria in Botswana.

The WHO prototype database has been adapted to a Country Malaria Database for Botswana. This database is an MS Access database that can be used to warehouse all malaria data. The database is in place and is partially updated., although The database was last updated in August 2009.

2.7.6 Strengths and Opportunities

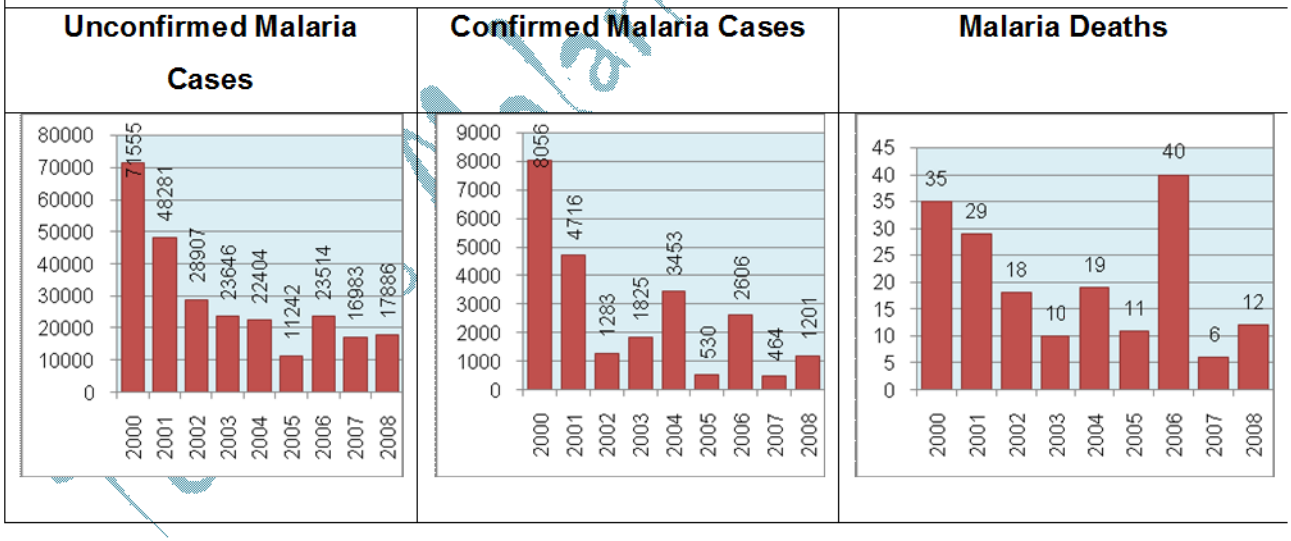
Strengths	Weaknesses
a) Existence of a functional weekly surveillance system that collects data b) The NMCP conducts annual review and planning meetings where the performance of the programme is	1. Lack of a comprehensive M&E plan 2. Limited data analysis and utilization at district level 3. Poor reporting by private sector

reviewed and new plans for the next season are established and discussed. Districts also conduct quarterly review meetings with at DHT level. c) Availability of computers and internet at National and district facilities d) The NMCP has adopted and established the NMCP database to warehouse all malaria data. e) There is some collaboration with Meteorological experts in terms of rainfall forecasting. f) Capacity to conduct surveys at National Level g) The NMCP uses data collected for decision making	4. Lack of malaria stratification at sub-district and health facility level 5. Few malaria indicators being monitored
Opportunities 1. A District Health Information System (DHIS) is being rolled out to districts to allow real-time transfer of data from the District Health Team to MOH (central level). a) Collaboration with the University of Botswana and other research institutions and the addition of new partnerships could improve the surveillance system and enhance operational research. b) The new District Health Information System (DHIS) is currently being	**Threats** 1. Competing priorities with other diseases

rolled out to districts and carries the potential to be a more efficient health reporting system. 4. A GIS-based database for mapping is available and should be integrated into the surveillance system	

2.8 Progress Towards Achievement of Global, Regional and National Goals and Targets and Best Practices

Figure 6: Trends of unconfirmed, confirmedmalaria cases and malaria deaths in Botswana



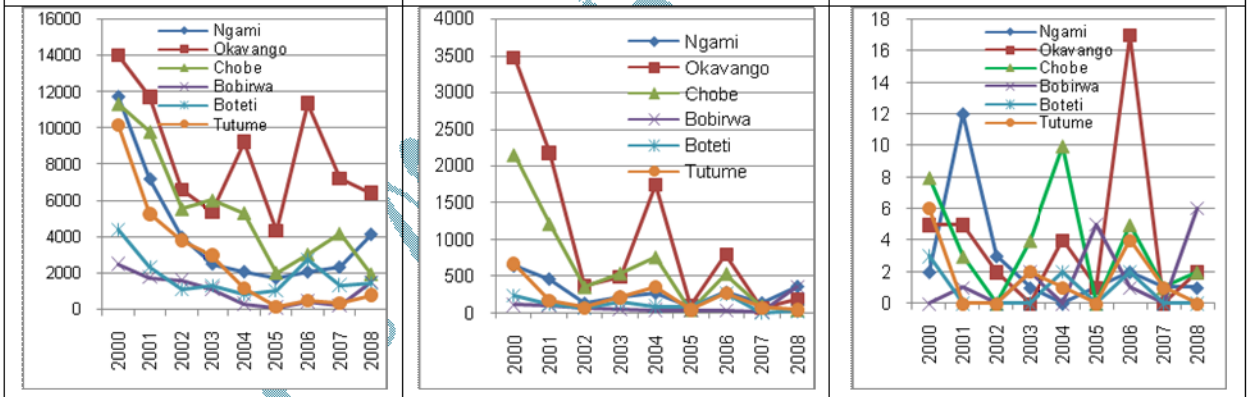
The graphs in Fig. 6 above shows data on unconfirmed, confirmed malaria cases and recorded malaria deaths using data collected and reported by the IDSR. In general, over the period 2000-2008 malaria has shown a decreasing trend with marked variations from year to year. Between 2000 and 2008 unconfirmed malaria cases, confirmed malaria and deaths decreased by 75%, 85.1% and 91.1% respectively. Incidence of unconfirmed malaria

declined from 42.6/1000 in 2000 to 10/1000 in 2008 a 76.2% decline(22). These graphs confirm the remarkable achievements made by the NMCP in reducing the malaria burden in Botswana.

Data was then ranked and analysed by transmission levels in all districts. In high transmission districts of Botswana of Ngami, Okavango, Chobe, Bobirwa, Boteti and Tutume, unconfirmed malaria cases have generally decreased in all districts with the exception of Okavango where there has been year on year variations (Fig. 7). This trend has also been confirmed by confirmed malaria cases recorded in these districts. In these districts malaria deaths have ranged between zero and 12 deaths per district per year and reached 17 in 2006 in Okavango district during the floods year.

Fig 7: Trends of malaria cases and deaths in "high transmission districts"

Unconfirmed Malaria Cases	Confirmed Malaria Cases	Malaria Deaths

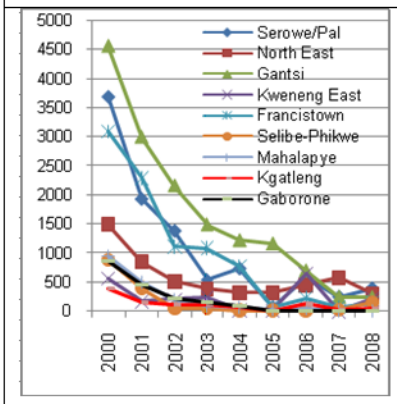


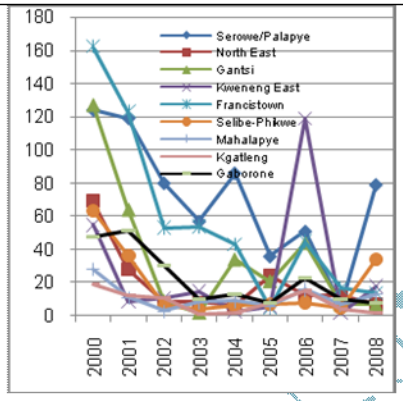
The three graphs in Fig 8 below relate to low transmission districts. Unconfirmed cases have also been on the decline, and since 2003, the number of unconfirmed cases range from around 20 to 1500 cases. The number of confirmed cases has also decreased and is around 60 cases per year per district. The number of deaths in these districts is around 2 deaths per district per year. This data indicates not all areas within districts possess the same malaria risk; instead, there are specific geographic areas, or malaria foci, where transmission risk is greater and the need for robust and targeted interventions is critical. If data is collected and analysed by health facility level, the DHT should be able to identify

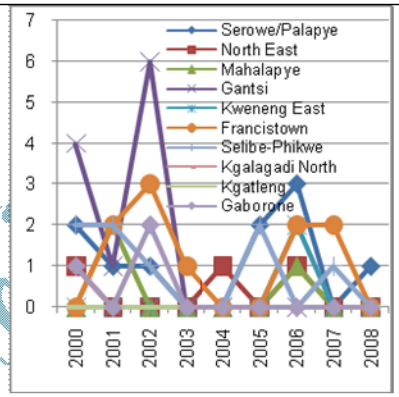
facilities reporting malaria cases, indicating higher malaria transmission in those facilities' catchment areas than in areas around facilities reporting zero malaria cases.

Fig 8: Trends of malaria cases and deaths in "low transmission districts"

Unconfirmed Malaria Cases	Confirmed Malaria Cases	Malaria Deaths



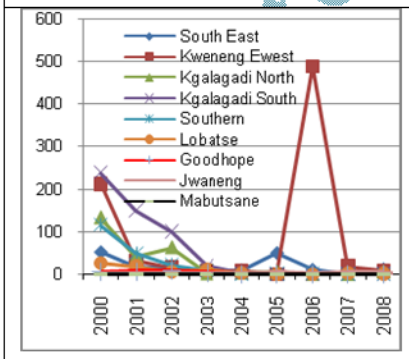


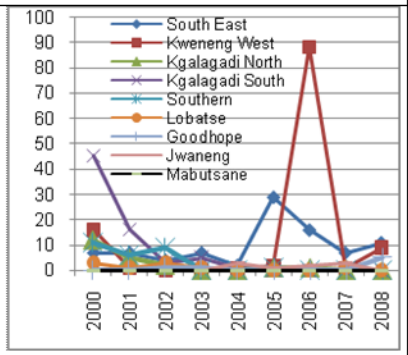


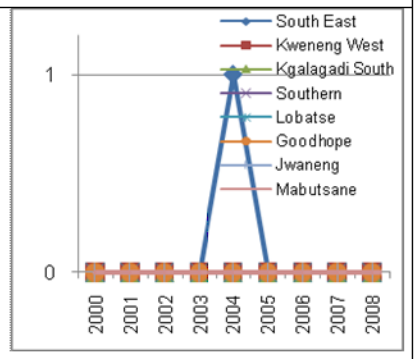
The graphs in Figure 9 below show malaria cases and deaths in areas with very low transmission and and primarily imported malaria cases. The unconfirmed and confirmed malaria cases declined between 2000 and 2008 with only one death

Fig 9: Trends of malaria cases and deaths in "zero" transmission districts

Unconfirmed Malaria Cases	Confirmed Malaria Cases	Malaria Deaths







2.8.1 Malaria Control and Elimination Targets and Indicators

A malaria strategic plan is available (2006-2011) with annual targets. National malaria indicators for malaria elimination have been identified, but data has not yet been collected on all the indicators.

The targets and indicators were identified as follows:

Target	Baseline 2005	Achievement 2008	Target 2011
Maintain malaria deaths at below 15 per annum	24	12	10
Reduce malaria case fatality rate per 100 malaria confirmed cases by 25% Maintain parasite prevalence ratios at below 2%	1.37% Not available	0.999% Not available	0.50% 2.0%
Reduce incidence of confirmed malaria to below 10 per 1000 population at risk	24	10	10
Decrease malaria endemic districts to 3.	5	5	2
Increase ITNs coverage to above 60%	18%	NA	>60%
Increase IRS coverage to above 80%	65%	72%	>80%

2.8.2 Best Practices

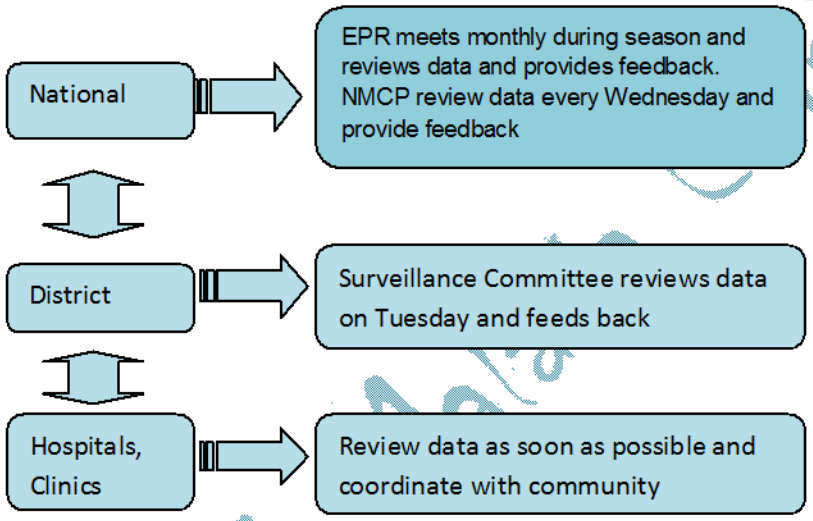
2.8.2.1 Weekly Reporting using the Integrated Disease Surveillance and Response System (IDSR)

The IDSR is used to detect malaria epidemics. Thresholds are used mainly at the district and national levels. It is an evidence based tool for detection of epidemics and helps the programme to answer the questions “who, where, when?” and to prepare and raise appropriate responses to malaria outbreaks. The week begins on Monday and ends on Sunday. All hospitals, clinics and health posts data to districts by Monday, districts to

national by Wednesday. Completeness and timeliness are the two performance indicators measured when all data reaches national level.

Analysis and Feedback of Weekly Surveillance Data

From Wednesday the national report is compiled and shared with the national malaria Control Programme. The NMCP takes this data and keeps a copy for further action and processing. This information is then entered into the national malaria database. Weekly malaria trends are monitored using a geographical information system with the use of the Health mapper programme the spatial distribution of the malaria cases and deaths in the country are monitored.



Feedback to districts is through the biannual health managers meetings and annual malaria conference.

2.8.2.2 Best Practices

6.8.2.1 Epidemic Preparedness and Response

Tremendous efforts have been made in malaria EPR in Botswana. All epidemics reported in the past have been responded to within two weeks of onset. There are seven epidemic response containers strategically placed in the malaria epidemic prone districts (Gaborone, Serowe/Palapye, Chobe, Okavango, Ngami, Gantsi,Tutume). These contingency containers are regularly checked for the EPR stocks. Additionally, NMCP has contingency funds for procuring commodities and launching operations and can be readily mobilized at district and national level during malaria epidemics. Malaria EPR teams at the district level are re-trained annually. Epidemic thresholds have been established in the endemic districts, although there are no thresholds for health facilities. The EPR unit also collects weekly epidemiological data through IDSR, though private health facility participation is minimal. There is a pool of trained health workers who are on standby and can be recalled at short notice.

Management and coordination

1. Government commitment in financing malaria control and prevention activities.
2. Joint work between MOH producing policy and MLG working on implementation
3. Annual malaria conference

Case management

1. Training of health workers at the beginning of the transmission season
2. Provision of ambulance services at all health facilities including Health Posts
3. Audit of all malaria deaths

Vector control

Provision of IRS at no cost to the community

2.8.3 Progress Indicators for the Botswana Malaria Control Programme

The following progress has been made in malaria control indicators:

	Variable	Source of info	Current status	Comments/Remarks
1	All-cause under-five mortality rate	DHS, Census	1925	MoH 2003
2	Malaria deaths U5	HIS	2	MoH 2008
3	Malaria Deaths Over 5	HIS	10	MoH 2008
4	Malaria cases per 1000 population	HIS, Census	10	MoH 2008
5	Deaths attributed to malaria among children under five years of age	HIS, DSS	2	MoH 2008
6	Deaths that are due to malaria (per confirmed malaria diagnosis) (proportion)	HIS	12	MoH 2008
7	Number of malaria (confirmed) admissions to hospitals	HIS	1128	MoH 2004
8	Proportion of malaria (confirmed) admissions among all hospital admissions	HIS	0.01	MoH 2004
9	% suspected malaria cases confirmed by microscopy or RDT	HIS	123	MoH 2008
10	% of uncomplicated malaria cases receiving prompt and effective treatment within 24 hours according to the national policy	MIS, MICS, DHS, AIS	4.10	MIS 2007
11	Proportion of malaria/fever cases treated with nationally recommended first-line antimalarial treatment (annual)	HIS, HF assessments	100%	MoH 2008
12	% of pregnant women protected by chemoprophylaxis (3 or more doses of Chloroquine and Proguanil)	HIS, ANC	85.1	MIS 2007
13	Number of people with uncomplicated or severe malaria receiving anti-malarial treatment as per national guidelines	HF assessment, supervision, HIS	17886	MoH 2008
14	Proportion of households (HH) with at least one ITN	MICS, MIS, DHS	0.09	MIS 2007

15	Proportion of children under 5 years of age who slept under an ITN the previous night	MICS, MIS, DHS	0.07	MIS 2007
16	Proportion of population in IRS-target areas covered with IRS in the last 12 months	MICS, MIS, DHS	0.71	MoH
17	Proportion o pregnant women who slept under an ITN the previous night	MICS, MIS, DHS	0.06	MIS 2007
18	Proportion of women who received 2 or more doses of Chloroquine and Proguanil for malaria during their last pregnancy (in the last 2 years)	MICS, MIS, DHS	0.38	MIS 2007
19	Number of children under 5 years of age (or other target age groups) presenting to a health worker with fever (or preferably with documented malaria infection) who received anti-malarial treatment according to national treatment policy (ACT/non-ACT)	HIS, CHW records	0.10	MIS 2007
20	Children under 5 years of age presenting to a health worker with fever who received anti-malarial treatment according to national treatment policy within 24 hours of onset of fever	MICS, MIS, DHS	0.10	MIS 2007
21	Proportion of children under 5 years of age presenting to a health worker with fever who received any anti-malarial treatment	MICS, MIS, DHS	0.10	MIS 2007
22	Proportion of children under 5 years of age (or other target age groups) with fever in the last 2 weeks who received any anti-malarial treatment	MICS, MIS, DHS	0.10	MIS 2007
23	Proportion of children under 5 years of age with fever in the last 2 weeks who received anti-malarial treatment according to national treatment policy within 24 hours of onset of fever	MICS, MIS, DHS	0.10	MIS 2007
24	ITNs/LLINs distributed within the past years (compare it to population divide by 2)	ITN database	0.01	UNICEF donated 36 560 Nets

				in 2008
25	Percentage of targeted structures or units/walls in IRS-target areas sprayed by IRS in the last 12 months	IRS database	0.66	MoH 2008
26	Proportion of households which received spraying through an IRS campaign in the last 12 months	IRS database	0.71	MoH 2008
27	Proportion of population which received spraying through an IRS campaign in the last 12 months		43.8	MoH 2008
28	Number of patients with fever receiving anti-malaria treatment as per national policy (for ACT)	HIS	17886	MoH 2008
29	Number of studies of drug efficacy completed according to WHO protocol	NMCP	1.	MOH 2006
30	Number of studies of insecticide efficacy completed according to WHO protocol	NMCP	8.	MoH 2008

3 Key Findings and Issues

3.1 Key Targets of the Current Programme

The main objective of the current malaria programme is to reduce the malaria burden. Key targets of the programme include: 1) maintain number of malaria deaths <15/year; 2) reduce case fatality rate <0.5%; 3) reduce incidence of confirmed cases of malaria <10/1000 population. 3) reduce the number of malaria endemic districts from 5 to 3; 4) increase the coverage of IRS >80% and ITN >60% in malaria endemic districts; 5) increase effective management of malaria cases using artemisinin combination therapy (AL) to 100%; and 6) increase malaria chemoprophylaxis among pregnant women to 100% in malaria endemic districts.

The data collected through the malaria weekly reporting system shows a sustained reduction in the incidence of unconfirmed and confirmed malaria in all districts in Botswana. The number of malaria deaths was maintained <15 per year. The estimated case fatality rate using all confirmed cases as the denominator was 1% in 2008. However, the ownership of ITN was less than 10% in the endemic districts in 2007(1), well below the national target. However, the ownership of at least one ITN has increase to 91% in Okavango after the ITN campaign in February 2009(12). The coverage of IRS was 71% in 2008/2009 season, also below programme targets. The country has successfully adopted Artemisinin combination therapy (ACT), a key step in effective case management and malaria elimination Coverage of chemoprophylaxis for pregnant women in the malaria endemic zones was substantially less than the 100% target at 43.5% for taking at least two doses(1).

The number of malaria endemic districts *did not* change. While some targets have been achieved, others remain pending and must be prioritized in future programme targets.

Malaria Commodities

Annual joint comprehensive quantification of malaria commodities based on consumption and target population and households and morbidity and mortality date is not in place. Although Botswana Essential Drugs list is not updated to reflect the changes made in malaria treatment guidelines. Communication system in CMS needs to be improved as it

was observed that some faxed documents from facilities were misplaced. It was also observed at CMS that there is wrong feedback from facilities with respect to their monthly and average annual consumption of drugs and other commodities. CMS was found to be unable to enforce procurement contract agreement with the suppliers making 100% availability of malaria medicines at all times unlikely. There was in accurate quantification of drugs and commodities due to wrong data especially from facilities to CMS and inadequate skilled staff. It was also found that there malaria drugs were expiring due to low consumption emanating from change in treatment guidelines and prescribing patterns. NDQC lab does not have the capacity for ascertaining the quality of medicines(post procurement batch sampling and testing). There was inadequate collaboration between central medical stores, national laboratory department and malaria program regards quantification of malaria commodities. It was also found that there is lack of monthly updates of malaria commodities consumption at district and central level. Current stocks of oral quinine and injectables were about to expire.

3.2 Malaria Epidemiology

Most of the malaria infection in Botswana (98%) is caused by *P falciparum* and *A. arabiensis* is the only vector. The health districts are classified into three transmission zones: (1) Zone A: Malaria endemic districts which include 5 northern western districts that have substantial local transmission and have high risk of epidemics; (2) Zone B: Malaria focal transmission districts which includes 7 districts in the north central zone that have focal local transmission and has high risk of outbreaks; (3) Zone C: Malaria free districts that include the remaining 11 districts in the south.

The analysis of the transmission intensity in the districts was based on the trend in the confirmed cases of malaria and malaria deaths from 2000 to 2008. Data on laboratory slide positivity rate, annual parasite incidence and age specific parasite prevalence rate were not available at the time of this review.

There has been near zero local transmission in the districts in zone C since 2003. The number of confirmed malaria cases reported annually ranged from 0 – 120 and the incidence of confirmed malaria ranged from 0 to 2/1000 person / year in these districts.

There were very few localized outbreaks of malaria (3 outbreaks since 2003) and very few deaths due to malaria (1 death since 2003). It appears that the local malaria transmission has been close to zero since 2003 in these districts. Thus the policies in this zone could be oriented towards sustaining the zero transmission and averting outbreaks.

In the 7 districts in the focal transmission zone (zone B), the confirmed malaria cases ranged from 0-160 per year with exception of Bobirwa district that had 350 cases in 2008. The incidence of confirmed malaria cases ranged from 0 to 2.6 /1000 person/ year. Most districts in this zone report malaria deaths annually ranging from 1-6. Thus it seems there is local but focal transmission of malaria in these districts and there is a high risk of outbreaks. Since there is a consistent trend in the reduction of confirmed cases of malaria since 2003, polices in this zone could be oriented towards elimination of malaria.

In the malaria endemic zone (zone A) also there is a declining trend in cases of confirmed malaria. However, the number of cases is relatively high (ranged from 50 to 1750 since 2003) and the incidence of confirmed malaria cases ranged from 0.2 to 39 / 1000 person/ year. There were malaria deaths in all districts (ranged from 1-10 with the exception Okavango that had 17 deaths in 2006). Thus in these districts the policies could be oriented to pre-elimination with an aim to move towards elimination

3.3 Malaria Programme Management

Malaria control is a priority public health program in Botswana. The malaria control program has developed a five-year strategic plan for 2006 - 2011. There is a well organised NMCP which is advised by a malaria reference group that meets on ad *hoc* basis. There is good partnership with WHO and UNICEF and building more partnerships for malaria control and elimination is at an early stage. There is very minimal resource input from external partners for malaria control and elimination in Botswana. The NMCP currently lacks adequate human resource to achieve the vision of malaria elimination. Lack of an overall malaria policy document is a serious programme management constraint. There are no designated malaria focal persons at district level to coordinate activities. There is an effective procurement and supply chain management system for most malaria commodities except for LLIN. The quantification, stock rotation and control of drugs and RDTs at the health facility level are not adequate. Inventory management system, storage and distribution

capacity of malaria commodities at facility level are inadequate. There has been inadequate collaboration between NMCP and research institutions

3.4 Case Management

The current policy is to confirm malaria diagnosis using both RDT and microscopy and treat with ACT (AL). However, most treatment for malaria is based on clinical diagnosis and the RDT results are rarely used for treatment decision. The ratio of confirmed vs. unconfirmed cases of malaria is 1:9. The diagnostic algorithm for malaria is not updated to be relevant for the current low malaria incidence. Guidelines on lab diagnosis and case management were not available in most health facilities. There is adequate communication and transport at all health post and health centres to transfer severe malaria cases. However the case fatality rate among hospital admissions appears to be relatively high in some districts. The quality control and assurance of microscopy and RDT is not in place. The private sector is not fully involved in training and some private practitioners continue to prescribe monotherapy.

3.5 Vector Control

A national IRS program is in place which has been decentralized to MLG and the districts for implementation. The coverage of IRS has remained around 70% over the last decade. One of the key reasons for this sustained suboptimal coverage of IRS is probably the community's acceptance of IRS is waning over time. The coverage of LLIN is also below the WHO recommended targets of above 80%(23). The funding of LLINs to reach universal coverage is not sufficient. There are guidelines for integrated vector control. However, the monitoring of the quality of IRS and susceptibility of vectors to insecticides is done *ad hoc*. There are no fixed field sentinel sites to support monitoring of malaria vector sensitivity and behaviour. There are no maps on vector distribution in the country. The insectary in Francistown is well staffed but lacks appropriate equipment such as PCR.

3.6 Epidemic Preparedness and Response (EPR)

All districts in Botswana remain highly receptive and vulnerable to malaria transmission. Malaria early warning system (MEWS) is still at developmental stages in collaboration with regional and national climate forecasting institutions (Met. Services, DMC, MALOF). The

IDSR and NMCP have an epidemic detection system using the weekly malaria surveillance that can detect and respond to an epidemic within one week. However, malaria thresholds at the health facility level need to be established to reflect the steady decline in the incidence of malaria and the variability between health facilities. The current malaria epidemic preparedness plan with containers for emergency supplies is integrated with the communicable disease epidemic preparedness plan. As the country moves closer to the elimination of malaria, the potential for malaria outbreak will increase. However, the existing capacity within the malaria program and the communicable disease epidemic control unit to forecast, detect and respond to frequent outbreaks is not adequate. There is also limited documentation of post-mortem assessments of epidemics, and private health sector participation in surveillance, training and preparedness is lacking.

3.7 IEC and Advocacy

There is strong political commitment for controlling and eliminating malaria. At time of review, the IEC / Communication strategy was at the draft stage, near printing and dissemination. However, the use of radio, TV, drama, and malaria bill boards is inadequate, and the distribution and availability of IEC/advocacy materials in both public and private health facilities and DHTs is insufficient. The current health education messages have very little input from local technical experts, communities, and operational research. There is significant population movement across borders with other malaria-endemic countries, requiring intense IEC for travellers and migrants. Malaria promotion and IEC appears to be a low priority area with an inadequate budget within the national malaria program.

3.8 Surveillance, Monitoring and Evaluation

Integrated disease surveillance system is functional. However there is no mapping of the cases of malaria to identify malaria transmission hotspots in any district. The surveillance data are not analysed at the health facility level to trigger action to detect potential outbreaks and respond. The last malaria indicator survey was conducted in 2007. However this survey did not have all essential indicators to assess progress and performance of the programme. This reflects the lack of comprehensive monitoring and evaluation plan. Sentinel surveillance of drug efficacy is conducted bi-annually and of insecticide resistance

is done on *ad hoc* basis. Entomological and epidemiological stratification is outdated. Collaboration between HSU and IDSR is inadequate and data from Health Statistics Unit (HSU) is untimely for decision-making. There is no operational research sponsored or conducted by the programme.

4 Recommendations

Based on the issues identified through the malaria program review, the following recommendations are proposed. More detailed discussion on these recommendations is included in the individual thematic reports included in a separate document.

4.1 Malaria Epidemiology

1) Redefine the stratification and mapping of districts by incorporating the slide positivity rate and annual parasite incidence data that is available in the districts.
2) In districts that are classified as malaria free (Zone C), implement strategies /interventions to sustain zero transmission.
3) In districts that are classified as focal malaria transmission districts (Zone B), implement strategies/interventions to reduce transmission to zero rapidly in transmission hotspots and sustain zero transmission in the rest of the district by 2011.
4) In districts that are classified as malaria endemic with substantial local transmission (Zone A), implement strategies/interventions to reduce transmission to zero in the entire districts by 2013.
5) Conduct a malaria prevalence survey
6) Move from unconfirmed case reporting to confirmed only

4.2 Programme Management

1) Increase the staff of the national malaria elimination program (NMEP) to ensure focal points for the coordination of case management, epidemic preparedness and response, entomology and administration & logistics.
2) Develop one policy document for malaria elimination and link it with the new national health policy.
3) Reconstitute the malaria reference group to provide guidance towards malaria elimination by 2013.
4) Establish a Malaria Elimination field centre in Maun with a small field laboratory.
5) MOLG/MoH should designate district malaria elimination coordinators in Zone A
6) The government should sustain its excellent political and financial commitment to malaria control
7) Develop a costed malaria elimination strategic plan that is linked to NDP10 (2010-2016)
8) Establish malaria elimination partnerships for advocacy and resource mobilisation.
9) MOH/MLG to scale up and harmonize cross border malaria control interventions
10) Develop guidelines to involve the private sector in the malaria elimination activities
11) NMCP to establish a technical working group as a sub-committee of the MRG on quantification of malaria commodities
12) MOH/MLG to upgrade warehousing capacity for districts with inadequate storage space and establish for ditricts which do not have for storage of malaria commodities at district levels
13) MOH should establish an Inventory Management System at all levels
14) In Zone C, implement strategies/interventions to sustain zero transmission.
15) In Zone B, implement strategies/interventions to rapidly reduce transmission to zero in transmission hotspots and sustain zero transmission in the rest of the district by 2011.
16) In Zone A , implement strategies/interventions to reduce transmission to zero in the entire district by 2013

Malaria commodities

1) Secure adequate financing for malaria vector control commodities to achieve universal coverage by 2010.

2) Monthly monitoring and reporting of malaria commodities consumption and stock levels at district and national level.

3) Prepare and annually update a comprehensive specification and commodity list of malaria commodities (RDTs, IRS & LLINs)

4) Ban monotherapy and use of untreated mosquito nets

5)Develop country specific guidelines for selection of RDTs, LLINs, IRS

6) Develop a modus operandi to guide quantification of IVM material

8) To strengthening capacity for monitoring and enforcement of procurement contracts at CMS

9) GOB to avail Inventory Management tools at all levels (Drug Management Unit MOH)

10) Training of health care providers on PSM

11) NDCQL to conduct post procurement batch testing

12) Increase storage and distribution capacity at facility level

13) Subcommittee to be formed by malaria programme (NMP) for appropriate quantification of malaria commodities (drugs, IVM, LLINs etc)

14) Stock monitoring tools to be developed and implemented by NMP as above

15) GOB to address skilled manpower issue especially in Pharmacy.

4.3 Case Management

1) Adopt RDT as the primary malaria diagnostic tools in all health facilities
2) MOH/MLG should train relevant health providers in the use of RDT, case management and should include private sector.
3) Establish a national malaria reference laboratory with capacity for molecular and serological analyses and conduct quality control and assurance for malaria diagnostics at all level
4) Develop guidelines by 2010 to follow up confirmed malaria cases and contact tracing in Zone B and C to eliminate the parasite.
5) Strengthen training on, supervision, and distribution of case management guidelines to all health facilities
6) Ensure all cases are treated promptly with ACTs, and end any use of monotherapies
7) Non-Radical (ACT) treatment for confirmed cases in Zone A
8) Radical treatment (ACT+primaquine) for confirmed cases in Zone B and C

9) Pregnant women and other resident high risk group to be put on chemoprophylaxis (chloroquine and proguanil) in Zone A
10) Travellers to zone A to be put on chemoprophylaxis (chloroquine and proguanil) or to malaria endemic countries (mefloquine)

4.4 Vector Control

1) The MOH/MLG need to establish a budget as well as mobilize external resources for LLIN to achieve universal coverage by 2010 in districts in Zone A and hot spots in B. (450,000 LLIN)
2) Provide free LLIN through the existing health facility based distribution system and supplement it by mass campaign every 3-5 years. (Zone A & B)
3) Achieve universal IRS coverage (>80%) using long lasting residual insecticide (DDT) in Zones A by 2010
4) Achieve universal coverage IRS in hotspots – focal regular in Zone B
5) Ensure focal IRS coverage – reactive to outbreak threat in Zone C
6) Conduct entomological investigations and focal larviciding
7) Establish a vector surveillance system at selected fixed sentinel sites for monitoring vector control program performance.
8) Establish a functional main insectary. The NMCP should consider shifting the current insectary in Francistown to another location in Zone A. Conduct KBAP study to guide development of malaria control strategies focused on community and implementers for improved IRS coverage
9) Capacity for quality assurance for both commodities for IRS and LLIN and application
10) Conduct KBAP study to guide development of malaria elimination strategies focused on community and implementers for improved IRS coverage
11)

4.5 Epidemic Preparedness and Response

1) The MOH/MLG should strengthen district EPR capacity and improve training in health facility EPR data management,

2) The NMCP and DHTs should support the development of thresholds at facility level and map high risk malaria areas
3) The MOH should designate a malaria EPR focal person within the NMCP.
4) The NMCP should coordinate documentation and tracking of epidemics and of EPR post-mortem assessments
5) MOH/MLG should collaborate with private health sector in training, surveillance and epidemic preparedness
6) All districts should have EPR plans guided by a malaria policy and guidelines.

4.6 IEC and Advocacy

1) Distribute and disseminate the communication strategy Increase production and dissemination of malaria IEC materials based on local information
2) Commission studies on community perception on malaria interventions, treatment seeking behaviour and adherence to develop appropriate IEC materials
3) Increase resource mobilisation for malaria advocacy and IEC to support malaria elimination.
4) Ensure updated messages on new increasing interventions (LLINs) and malaria elimination
5) Strengthen production and distribution of IEC material at district level by involving districts and communities in material and message development
6) Improve partnerships with the media and public and private partners to strengthen messaging and mobilize resources
7) Increase the number of Health Education Officers at district level and invest in malaria-specific training

4.7 Surveillance, Monitoring, Evaluation and Operational Research

1) Map malaria cases by health facilities to update the classification of malaria transmission risk at district and sub-district level and inform targeted interventions in malaria foci
2) Introduce standard operating procedures for case based notification and investigation of all malaria confirmed positive cases in Zone B and C.

3) Strengthen data management especially laboratory reporting Prioritize operational research areas and strengthen partnerships for research with University of Botswana and other academic and training institutions.
4) Refine data flow and feedback at all levels of the system and ensure guidelines and testing algorithms are uniform in all facilities and districts.
5) IDSR reporting should include collection of denominators such as total OPD attendances and total tested in order to be able to calculate proportions and also should collect information from private health facilities as is required.
6) The responsibilities of data collection, analysis, and reporting should be streamlined in the Ministry of Health as well as the roles of IDSR and HSU in light of the newly created District Health Information System (DHIS.
7) There is need to have biostatistician at HSU to link with people who make operational decisions on malaria and guide the roll out of the DHIS.

5 Conclusions

The Botswana malaria control programme is performing well and has achieved most of its targets through the excellent sustained political and financial support of the Botswana Government. The overall programme performance was rated B which is above average. There is however need to strengthen epidemic preparedness and response, vector control, IEC and advocacy which were rated average during the review. Districts which are malaria endemic were rated above average while the non-endemic districts were rated average. There is good collaboration between the Ministry of Health and Ministry of Local Government in the delivery of malaria prevention and control activities. The burden of malaria in Botswana has declined steadily and the local transmission has reached near zero in the southern part of the country. With some change in strategy and improved delivery of selected interventions, this review concludes that malaria elimination in Botswana by 2015 is feasible.

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7 Annexes

7.1 Annex1: Aide Memoire

Aide Memoire

Botswana Malaria Program Performance Review
Towards a Malaria Free Botswana

August 2009

Aide Memoire

I. Purpose

Botswana is one of the Southern Africa Development Community (SADC) countries which have embarked on malaria elimination by 2015. A strategic review of the Botswana malaria programme was conducted for assessing progress and performance of the programme with the aim of finding ways of improving performance and re-defining strategic direction in the context of moving towards elimination of malaria in Botswana. The review is expected to strengthen planning and resource mobilization for scaling up malaria control services leading to malaria elimination. The major findings and critical actions arising from the strategic review are summarised in this aide memoire. The aide memoire is not a memorandum of understanding and it is not legally binding. The aide memoire is a statement of the commitment of partners, to work together for the implementation and follow up of recommendations towards the achievement of the vision of malaria free Botswana.

II. Background

In April 2008, the Ministry of Health (MOH) supported by a malaria review task force and the Malaria Reference Group decided to undertake an in-depth review of the national malaria control program. This decision was made in the context of the observed decline in malaria incidence, deaths and epidemics in all malaria risk zones of Botswana and improving coverage of interventions. The overall objective of the review was to assess the current strategies and activities with a view of moving the national program from control to elimination.

The specific objectives of the Malaria Programme Review (MPR) were:

- To review malaria epidemiology in Botswana
- To review the policies and programming framework within the context of the health system and the national development agenda
- To assess the progress towards achievement of the regional and global Roll Back Malaria and United Nations Millennium Development Goal targets
- To review the current program service delivery systems, their performance and challenges
- To define the next steps for improvement of program performance

The review was done in two phases. In phase-1 a national team (internal team) conducted a systematic desk review of all published and unpublished reports relevant to malaria control in Botswana. They also conducted short interviews with National Malaria Control Programme (NMCP) officers to clarify issues arising from the review of documents. In phase 2, the observations of the national team were revised/supplemented and further validated by a joint internal and external team by conducting further document reviews, interviews of key informants at national, and district levels, and rapid field assessment of selected health facilities and focus group discussion with village development committees.

III. Key Findings & Action Points

1. Key targets of the current programme

The main objective of the current malaria programme is to reduce malaria disease burden and the key targets are: (1) maintain number of malaria deaths <15/year; (2) reduce case fatality rate <0.5%; (3) reduce incidence of confirmed cases of malaria <10/1000 population. (3) reduce the number of malaria endemic districts from 5 to 3; (4) increase the coverage of Indoor Residual Spraying (IRS) >80% and Insecticide Treated Nets (ITN) >60% in malaria endemic districts; (5) increase effective management of malaria cases using Artemisinin Combination Therapy (ACT)to 100%; (6) increase malaria chemoprophylaxis among pregnant women to 100% in malaria endemic districts.

The data collected through the malaria weekly reporting system shows a sustained reduction in the incidence of unconfirmed and confirmed malaria in all districts in Botswana. The number of malaria deaths was maintained <15 per year. The estimated case fatality rate using all confirmed cases as the denominator was 1% in 2008. The ownership of ITN was 9% in the endemic districts in 2007. However, the ownership of ITN has increase to 77% in Okavango after the ITN campaign in February 2009. The coverage of IRS was 71% in 2008/2009 season.

2. Malaria Epidemiology

Most of the malaria infection in Botswana (98%) is caused by *P falciparum* and *A. arabiensis* is the only vector. *The health* districts are classified into three transmission zones: (1) Zone A: Malaria endemic districts which include 5 northern western districts that have substantial local transmission and have high risk of epidemics; (2) Zone B: Malaria focal transmission districts which includes 7 districts in the north central zone that have focal local transmission and has high risk of outbreaks; (3) Zone C: Malaria free districts that include the remaining 11 districts in the south and one district in the north (north east district).

The analysis of the transmission intensity in the districts was based on the trend in the confirmed cases of malaria and malaria deaths from 2000 to 2008. Data on laboratory slide positivity rate, annual parasite incidence and age specific parasite prevalence rate were not available at the time of this review.

There has been near zero local transmission in the districts in zone C since 2003. The number of confirmed malaria cases reported annually ranged from 0 – 120 and the incidence of confirmed malaria ranged from 0 to 2/1000 person / year in these districts. There were very few localized outbreaks of malaria (3 outbreaks since 2003) and very few deaths due to malaria (1 death since 2003). It appears that the local malaria transmission has been close to zero since 2003 in these districts. Thus the policies in this zone could be oriented towards sustaining the zero transmission and averting outbreaks.

In the 7 districts in the focal transmission zone (zone B), the confirmed malaria cases ranged from 0-160 per year with exception of Bobirwa district that had 350 cases in 2008. The incidence of confirmed malaria cases ranged from 0 to 2.6 /1000 person/ year. Most districts in this zone report malaria deaths annually ranging from 1-6. Thus it seems there is local but focal transmission of malaria in these districts and there is a high risk of outbreaks. Since there is a consistent trend in the reduction of confirmed cases of malaria since 2003, polices in this zone could be oriented towards elimination of malaria.

In the malaria endemic zone (zone A) also there is a declining trend in cases of confirmed malaria. However, the number of cases is relatively high (ranged from 50 to 1750 since 2003) and the incidence of confirmed malaria cases ranged from 0.2 to 39 / 1000 person/ year. There were malaria deaths in all districts (ranged from 1-10 with the exception Okavango that had 17 deaths in 2006). Thus in these districts the policies could be oriented to pre-elimination with an aim to move towards elimination.

Action points

2.1. Redefine the **stratification of districts** by incorporating the slide positivity rate and annual parasite incidence data that is available in the districts.
2.2. In districts that are classified as malaria free (Zone C), implement strategies/interventions to **sustain zero transmission.**
2.3. In districts that are classified as focal malaria transmission districts (Zone B), implement strategies/interventions to **reduce transmission to zero** rapidly in transmission hotspots and sustain zero transmission in the rest of the district by 2011.
2.4. In districts that are classified as malaria endemic with substantial local transmission (Zone A), implement strategies/interventions to **reduce transmission to zero** in the entire district by 2013.

3. Advocacy, Information Education Communication/ Behavior Change and Community mobilization

There is strong political commitment for controlling and eliminating malaria. The use of radio, TV, drama, and malaria bill boards is inadequate. The distribution and availability of Information Education Communication (IEC)/advocacy materials in health facilities (public and private) and District Heath Teams (DHTs) is insufficient. The current health education messages have very little input from local formative and operational research. There is significant population

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Action points

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movement across the border and this requires intense IEC focused on travelers and migrants. Malaria promotion and IEC appears to be low priority area with inadequate budget within the national malaria program.

Action points

3.1. Increase production and dissemination of malaria IEC materials based on local information.
3.2. Commission studies on community perception on malaria interventions, treatment seeking and adherence to develop appropriate IEC materials needed to increase uptake of interventions.
3.3. Increase the budget for malaria advocacy and IEC to support malaria elimination.

4. Malaria Prevention: Vector control

A national IRS program is in place which has been decentralized to Ministry of Local Government (MLG) and the districts for implementation. The coverage of IRS remains around 70% over the last decade. One of the key reasons for this sustained suboptimal coverage of IRS is probably the community's acceptance of IRS is waning over time. The coverage of Long Lasting Insecticide-treated Net (LLIN) is also below the WHO recommended targets of above 80%. The funding of LLINs to reach universal coverage is not sufficient. There are guidelines for integrated vector control. However, the monitoring of the quality of IRS and susceptibility of vectors to insecticides is done *ad hoc*. There are no fixed field sentinel sites to support monitoring of malaria vector sensitivity and behavior.

Action points

4.1. The MOH/MLG need to establish a budget for LLIN to achieve universal coverage by 2010 in districts in Zone A and B. (450,000 LLIN)
4.2. Provide **free** LLIN through the existing health facility based distribution system and supplement it by mass campaign every 3-5 years. (Zone A & B)
4.3. Achieve universal IRS coverage using long lasting residual insecticide in zone A and in hot spots of zone B by 2010.
4.4. Establish a vector surveillance system at selected fixed sentinel sites for monitoring the program performance.

5. Malaria Prevention: Epidemic Preparedness and Response

All districts in Botswana are at risk for malaria outbreaks. Malaria early warning system (MEWS) is still at developmental stages in collaboration with regional and national climate forecasting institutions (Meteorological Services, Drought Monitoring Centre, Malaria Outlook Forum). The Integrated Disease Surveillance and Response (IDSR) and NMCP have an epidemic detection system using the

weekly malaria surveillance which can detect and respond to an epidemic within one week. However, malaria tthresholds at the health facility level need to be established to reflect the steady decline in the incidence of malaria and the variability between health facilities. The current malaria Epidemic preparedness plan with containers for emergency supplies is integrated with the communicable disease epidemic preparedness plan. As the country moves closer to the elimination of malaria, the potential for malaria outbreak will increase. The existing capacity within the malaria program and the communicable disease epidemic control unit to forecast, detect and respond to frequent outbreaks is not adequate.

Action points

5.1. Designate a malaria Epidemic Preparedness and Response (EPR) focal person within the NMCP.
5.2. Develop a malaria EPR policy and guidelines.

6. Malaria diagnosis and treatment

The current policy is to confirm malaria diagnosis using both Rapid Diagnostic Test (RDT) and microscopy and treat with ACT. However, most treatment for malaria is based on clinical diagnosis and the RDT results are rarely used for treatment decision. The ratio of confirmed vs. unconfirmed cases of malaria is 1:9. The diagnostic algorithm for malaria is not updated to be relevant for the current low malaria incidence. There is adequate communication and transport at all health post and health centers to transfer severe malaria cases. However the case fatality rate among hospital admissions appears to be relatively high in some districts. The quality control and assurance of microscopy and RDT is not in place. The private sector is not fully involved in training and some private practitioners continue to prescribe monotherapy.

Action points

6.1. Adopt RDT as the primary malaria diagnostic tools in all health facilities.
6.2. Establish a national malaria reference laboratory with capacity for molecular and serological analyses, and to conduct quality control and assurance for malaria diagnostics at all level.

7. Surveillance, Monitoring and Evaluation and operational research

Integrated disease surveillance system is functional. However there is no mapping of the cases of malaria to identify malaria transmission hotspots in any district. The surveillance data are not analysed at the health facility level to trigger action to detect potential outbreaks and respond. The last malaria indicator survey was conducted in 2007. However this survey did not have all essential indicators to assess progress and performance of the programme. This reflects

the lack of comprehensive monitoring and evaluation plan. Sentinel surveillance of drug efficacy is conducted bi-annually and of insecticide resistance is done on *ad hoc* basis. There is no operational research sponsored or conducted by the programme.

Action points

7.1. Map malaria cases by health facilities to update the classification of malaria transmission intensity at district and sub-district level, and to target interventions to malaria hotspots
7.2. Develop guidelines for case based notification and follow up investigation of each confirmed malaria cases and for contact tracing to eliminate the parasite.
7.3. Priorities operational research areas and strengthen the partnership for research with University of Botswana and other research institutions.

8. Program Policies, Strategies, and Management

Malaria control is a priority public health program in Botswana. The malaria control program has developed a five-year strategic plan for 2006 - 2011. There is a well organised NMCP which is advised by a malaria reference group that meets on ad *hoc* basis. There is good partnership with WHO and UNICEF and building more partnerships for malaria control and elimination is at an early stage. There is very minimal resource input from external partners for malaria control and elimination in Botswana. The NMCP currently lacks adequate human resource to achieve the vision of malaria elimination. There are no designated malaria focal persons at district level to coordinate activities. There is an effective procurement and supply chain management system for most malaria commodities except for LLIN. The quantification, stock rotation and control of drugs and RDTs at the health facility level are not adequate.

Action points

8.1. Increase the staff of the national malaria elimination program (NMEP) for the coordination of case management, epidemic preparedness and response, entomology and administration & logistics.
8.2. Reconstitute the malaria reference group to provide guidance towards malaria elimination by 2013.
8.3. Develop a comprehensive policy document for malaria elimination that is aligned with the new national health policy.
8.4. Develop guidelines to involve the private sector in the malaria elimination activities.
8.5. MOLG should designate district malaria elimination coordinators in Zone A.
8.6. Establish a Malaria Elimination field centre in Maun. (Epidemiology, reference laboratory, entomology).
8.7. Develop a costed malaria elimination strategic plan that is linked to National Development Plan 10 (2010-2016).
8.8 Establish a malaria elimination partnership for advocacy and resource mobilisation.

IV. Conclusion

The Botswana malaria control programme is performing well and has achieved most of its targets through the excellent sustained political and financial support of the Botswana Government. The burden of malaria in Botswana has declined steadily and the local transmission has reached near zero in the southern part of the country. This review concludes that with some changes in the strategies and increasing the intensity of delivering the selected interventions it feasible to achieve the vision of malaria free Botswana by 2016.

V. Commitment

We the Ministry of Health and the Ministry of Local Government and partners of the malaria control programme in Botswana, commit ourselves to the implementation of the action points recommended by this review and the acceleration and scaling up of malaria control and elimination interventions for universal access and sustainable impact and realise the ultimate goal of malaria free Botswana.

Signed on behalf of the Government of Botswana and Development Partners:

Newman Kahiya
Permanent Secretary
Ministry of Health

T Y Raphaka
Permanent Secretary
Ministry of Local Government

Eugene Nyarko
World Health Organization Representative
Botswana Country Office

Marcus Betts
UNICEF Representative ai
Botswana Country Office

In Gaborone Botswana Friday 21st August 2009

7.2 Annex 2 – Terms of Reference of Consultants

7.2.1 Lead internal Consultant

Introduction

From 2002 to 2005, the National Malaria Control Programme (NMCP) of the Ministry of Health implemented a RBM Strategic Plan that aimed at reducing morbidity and mortality due to malaria, in the country. This strategic plan guided Botswana to a number of significant achievements among others being the following:

a) Morbidity and mortality going down over years with case fatality that remained below the target of 0.5%
b) Strong commitment by government on malaria
c) Good case management by health workers
d) Good progress in the overall attainment of the objectives that were set in the strategic plan

The above achievements were identified during the program review in 2005, The review report came up with a number of ways in which the national program and the strategic focus areas could be improved. The report of the 2002-2005 strategic plan guided the development of the (2006-2011 Malaria Strategic Plan, which focuses on a new way of thinking and controlling malaria And envisage eliminating malaria. This strategic plan is in its second year of implementation and it is due for its mid term evaluation.

The current malaria strategic plan 2006 – 2011 is due for review since Botswana would like to accelerate malaria interventions to reach the SADC goal of eliminating malaria by 2015. As a result of this , the government of Botswana in collaboration with RBM partners is undertaking comprehensive review of the National Malaria Program with the view to assess malaria control program service delivery and public health system service delivery with the hope that outcome will provide valuable information, insight and recommendations to accelerate progress and improve program performance.

The review will be followed by the development of a new strategic plan (malaria elimination plan) based on the findings, recommendations and conclusions of the review.

The services of a national consultant is required to coordinate and guide the processes of program review from the beginning to the end

Extent of work

The national consultant will be required to provide technical, organizational, and logistic support for all phases of the review. The technical tasks will include the following:

- Lead the review process in partnership with the external consultants.
- Finalise the development of the evaluation proposal and facilitate submission and response to queries raised by ethics review committee
- Compilation of all reference documents required for the effective conclusion of the review and planning exercise
- Undertake technical reviews of all reference documents related to the review and produce summary reports of malaria-related information contained therein
- Conduct or prepare a comprehensive desk/systemic review of the programme, studies and surveys
- Review thematic reports and ensure they are in line with WHO framework
- Review malaria programme review tools
- Facilitate the adaptation of tools by internal and external reviewers
- Facilitate consultations, briefing and debriefing, Ministry of health, relevant agencies, and organizations and with RBM partners. (partially done)
- Facilitate the writing of the review report and ensures finalization of the malaria program review Report
- Facilitate the development of a draft New Strategic Plan
- Work with Dr Gobez as an assistant, (Whose terms of reference are attached)

Working relationships

The consultant will work under the supervision of the WHO Representative and SARN Malaria Coordinator will play a coordinating role between WHO and the Consultant. The

overall coordination of the programme review will be the responsibility of the Botswana Malaria Programme Manager.

Duration of consultancy

The consultancy will be from 3rd August to28th August, 2009.

Deliverables

The Consultant in collaboration with all other consultants is expected to personally deliver the following:

- ✓ Written summaries of all malaria related information in the reference documents
- ✓ An archive all reference documents used for the evaluation
- ✓ Written report of the consultancy
- ✓ Electronic and 3 bound hard copies of the final report of the malaria program review

7.2.2 Local Consultant

Introduction

From 2002 to 2005, the National Malaria Control Programme (NMCP) of the Ministry of Health implemented a RBM Strategic Plan that aimed at reducing morbidity and mortality due to malaria, in the country. This strategic plan guided Botswana to a number of significant achievements among others being the following:

e) Morbidity and mortality going down over years with case fatality that remained below the target of 0.5%
f) Strong commitment by government on malaria
g) Good case management by health workers
h) Good progress in the overall attainment of the objectives that were set in the strategic plan

The above achievements were identified during the program review in 2005, The review report came up with a number of ways in which the national program and the strategic focus areas could be improved. The report of the 2002-2005 strategic plan guided the development of the (2006-2011 Malaria Strategic Plan, which focuses on a new way of

thinking and controlling malaria And envisage eliminating malaria. This strategic plan is in its second year of implementation and it is due for its mid term evaluation.

The current malaria strategic plan 2006 – 2011 is due for review since Botswana would like to accelerate malaria interventions to reach the SADC goal of eliminating malaria by 2015. As a result of this , the government of Botswana in collaboration with RBM partners is undertaking comprehensive review of the National Malaria Program with the view to assess malaria control program service delivery and public health system service delivery with the hope that outcome will provide valuable information, insight and recommendations to accelerate progress and improve program performance.

The review will be followed by the development of a new strategic plan (malaria elimination plan) based on the findings, recommendations and conclusions of the review.

The services of a national consultant is required to coordinate and guide the processes of program review from the beginning to the end

Extent of work

The national consultant will be required to provide technical, organizational, and logistic support for all phases of the review. The technical tasks will include assisting the main consultant Dr Mazhani in the following areas:

- Lead the review process in partnership with the external consultants.
- Finalise the development of the evaluation proposal and facilitate submission and response to queries raised by ethics review committee
- Compilation of all reference documents required for the effective conclusion of the review and planning exercise
- Undertake technical reviews of all reference documents related to the review and produce summary reports of malaria-related information contained therein
- Conduct or prepare a comprehensive desk/systemic review of the programme, studies and surveys

- Review thematic reports and ensure they are in line with WHO framework
- Review malaria programme review tools
- Facilitate the adaptation of tools by internal and external reviewers
- Facilitate consultations, briefing and debriefing, Ministry of health, relevant agencies, and organizations and with RBM partners. (partially done)
- Facilitate the writing of the review report and ensures finalization of the malaria program review Report
- Facilitate the development of a draft New Strategic Plan
- To work with the Dr Mazhani as an assistant, (Whose terms of reference are attached)

Working relationships

The consultant will work under the supervision of the WHO Representative and SARN Malaria Coordinator will play a coordinating role between WHO and the Consultant. The overall coordination of the programme review will be the responsibility of the Botswana Malaria Programme Manager.

Duration of consultancy

The consultancy will be from 9th August to28th August, 2009.

Deliverables

The Consultant in collaboration with all other consultants is expected to personally deliver the following:

- ✓ Written summaries of all malaria related information in the reference documents
- ✓ An archive all reference documents used for the evaluation
- ✓ Written report of the consultancy indicating your contribution signed by yourself and Dr Mazhani
- ✓ Electronic and 3 bound hard copies of the final report of the malaria program review

7.3 Annex 3: Review Teams

7.3.1 Internal Review Team

Name	Designation	Organisation
Ms T Mosweunyane	Malaria Programme Manager	Ministry of Health- HQ
Mr S Ludik	Deputy Director Dept Primary Health Care	Ministry of Local Government- HQ
Dr Othwolo	Deputy Director Health Services	Ministry of Health- HQ
Ms K Moakofhi	NPO Malaria	WHO - Botswana
Dr S Chihanga	Public Health Specialist	Ministry of Health - HQ
Dr Nesridin	Public Health Specialist - IDSR	Ministry of Health - HQ
Mr D Ntebela	Principal Health Officer-Entomologist	Ministry of Health Entomology Unit Francistown
Dr. H. T. Masendu	Principal Health Officer-Entomologist	Ministry of Health- Unit Francistown
Dr Gokale	Parasitologist	Ministry of Health Nyangabgwe Hospital
Dr Carriapa	Public Health Specialist	Botswana Defense Force
Dr Carriapa	Peadiatrician	Princess Marina Hospital
Mr Omojuwa	Pharmacist	Ministry of Health-Central

		Medical Stores
Mr Okoye	Pharmacist	Ministry of Health- Clinical Services Department
Ms B. Seretse	Health Education Officer	Ministry of local Government - HQ
Mr T. Mapako	Environmental Health Officer	MLG - HQ
DrGSP Gasennelwe	PMO	MoH HQ
Dr. B. Wafuana Mr G Moalosi	PMO PHO	MLG – Lobatse Town Council MoH – NTB Programme
Mr. Dennis Bella	Environmental Health Officer	MoH –Dept Environmental and Occupational Health
Ms Berlin Maphosa	Matron	Sekgoma Memorial Hospital
Dr. Nanjenu	PHS	South East District
Ms. Kedikilwe	Matron	North East District
Ms Allison Tartasky	Programme Officer	Clinton Foundation
Captain J Pheresi	Environmental Health Officer	Botswana Defense Force
Keemenao Ramogalana	Principal Health Officer	Ministry of Health– Child Health Division
Dr R Ncube	Public Health Specialist	MoH Selebi Phikwe Town Council

Ms L Regoeng	Health Education Officer	Ministry of Health -Health Education Unit
Ms Mpho Motlaleng	Assistant Health Officer	Ministry of Health: NMCP
Ditiro Bogatsu	Principal statistic officer	Ministry of Health –HQ Health Statistics
T. Mphele	Chief Health Officer	Ministry of Health- HQ
Mr. S. Kanyenvu		Ministry of Local Government

7.3.2 External Review Team

Name	Organisation
25. Dr. C. Paluku	WHO IST- Malaria Team Leader -ESA
26. Dr. Shiva	WHO Global Malaria Program,Geneva
27. Dr. Daniel Chandrahanon	London School of Hygiene and Tropical Medicine, United Kingdom
28. Dr. J Govere	WHO IST- ESA
29. Dr K Gausi	WHO IST- ESA
30. Dr. J. Namboze	WHO IST- ESA
31. P. Pasipamire	WHO. NPO Malaria, Zimbabwe
32. Dr. Fred	WHO NPO Malaria Zambia

Masanginga	
33. Dr. S. Munga	Ministry of Health Kenya
34. Dr E Juma	Ministry of Health Kenya National Malaria Programme Officer
A lady	Clinton Foundation
35. Dr. Bruno Moonen	Clinton Foundation

7.3.3

Local Consultants For the Malaria Program Review

1. Dr. Loeto Mazhani (Lead Consultant) – School of Medicine, University of Botswana
2. Dr. Abebe Gobeze – Private Consultant

7.4 Annex 4: Schedule of Visits

Monday 10th August 2009			
1. Central visits to national institutions and organisations			
Time	Activity	Facilitator	Comments
Schedule to be updated after appointments have been booked	Briefing and consultation with Minister of Health and Permanent Secretary	Internal and External Review facilitator	
	Briefing and consultation with Director of Primary Health Care and Permanent Secretary MLG	Internal and External Review facilitator	
	Briefing and consultation with departmental and divisional heads in MoH	Internal and External Review facilitator	
	Briefing and Consultation with partners in research and academic institutions and other RBM stakeholder	Internal and External Review facilitator	
	Visit to the NMCP	Internal and External Review facilitator	
	Preparatory meetings of District teams	District teams	Meeting to be held at PGC with focal persons participating
	Day IV objectives	External	

		review facilitator	

Tuesday 11th August 2009
5. Teams Departure to the districts 07.00 0815 am
Leave for airport travel to Okavango, Kasane, Maun, and Francistown. Review teams will be picked by MoH/MLG cars to hotels already booked. The district team will meet with the DHT team after which it will split into groups of two to visit health clinics/health posts and conduct and do focus group discussions. The following day the team will regroup and meet the Hospital managers then split again to visit the wards, outpatient, ANC, lab and pharmacy. On day three of district visit the team will provide feedback to the district team. Each districts team will have two vehicles provided by MoH/MLG

Wednesday 12th August 2009				
6. District visits				
	District level	Health facility 1	Health facility 2	Health facility 3
Time	Activity			
8.30 am – 9.00 am	District review team meeting with the DHT(Gantsi, Chobe, Ngami, Okavango, Kgatleng and Francistown)	District review team District headquarters (DHT office)		

9.30am	District presentation on District malaria situation	Health facility teams depart for assigned health facilities after picking up designated guide from the DHMT		
	Meeting with District malaria team (PHS, matron, Pharmacist/pharmTech, HEO, Chief Environ Officer, Lab tech)	Meeting with health facility team	Meeting with health facility team	Meeting with health facility team
	Data collection with District malaria team	Data collection with health facility team	Data collection with health facility team	Data collection with health facility team
	Data collection from private hospital/clinic, pharmacy	FGD with community members and VDCs	FGD with community members and VDC	FGD with community members and VDCs
		Feedback to health facility	Feedback to health facility	Feedback to health facility
		Travel back to district headquarters	Travel back to district headquarters	Travel back to district headquarters
Thursday 13th August 2009				
08:00	Visit to Primary/District hospital			
08:15-8:45 AM	Meeting with hospital managers Hospital presentation on malaria situation			
0845-1000 AM	Data collection with Hospital managers			

10:30: – 13:00	Visit to hospital OPD, ANC clinic, Lab, Pharmacy, maternity ward and medical ward
1400 – 1530 Hrs	District Teams prepare summary report for district
1530 -1630	Brief written assessment summary and quick feedback to district team

Friday 14th August 2009			
District visits			
Time	Activity	Facilitator	Comments
	Summary of District Findings/ Feedback to DHT if not done the previous day	Team Leaders	
	TEA		
	Departure for airports and travel to Gaborone	Team Leaders	
	Arrival in Gaborone Phakalane Golf Club	Secretariat	

Saturday 15th August 2009			
6. Sharing of reports and presentations from central and district visits and consensus on key findings			
Time	Activity	Facilitator	Comments
	Detailed analyses and summaries from provincial and district findings	Team Leaders District Teams	
	SWOT by districts and	Internal and	

	provinces	External Review facilitator	
	SWOT by thematic areas		
	Success and best practices by thematic areas	Internal and External Review facilitator	
	Challenges, problems, solutions and recommendations by districts and provinces	Internal and External Review facilitator	
	Challenges, problems, solutions and recommendations by thematic areas	Internal and External Review facilitator	

CENTRAL VISIT

Office / Person	**Date and Time**	**Team Members**
MOH/ PS	9:00am	Team Leader: Dr. Charles. Paluku Team Members: Dr Shiva Dr A. Gobeze Dr. J. Namboze
Director PH MoH	7:30	
Child Health	8:30 am	**Team Leader**: Dr. J.Namboze **Team members** Dr. Nanjenu Kedikilwe Gasekgale Moalosi

Director PHC Ministry of Local Government	12/08/09 7:30 am	**Team Leader**: Dr.Elizabeth Juma **Team Members**: G. Moalosi, Berlin Maposa
Permanent Secretary, Ministry of Local Government	17 Aug 2009 07:00	**Team Leader**: Dr. Charles Paluku **Team Members**: Dr Shiva Mugurassampillay Dr L. Mazhani, Dr A. Gobeze
Standard Chartered Bank	11:00 am	**Team Leader** Dr.J. Othwolo Lorato Regoeng Tshenolo Mopako
Anglican Diocese	10:00 am	**Team Members**: Dr.J Othwolo Lorato Regoeng Tshenolo Mopako
CMS	12:00	Shiva Murugassampillay **Team Members** Bob Wafuana Berlin Maposa, Tuelo Mphele
WHO	15:00	Team Leader: Dr.L Mazhani Team Members: Dr.S. Chihanga Dr Abebe Gobeze

		Dr. GSP Gasennelwe
Health Stats		Team Leader: K. Gausi. Dr. Ncube Mr. Okoye Captain Julius Pheresi Judith Nawa
Integrated Disease Surveillance		Team Leader: K. Gausi. Dr Ncube Mr. Okoye Ms.Judith Nawa
National Health Laboratory		Dr.Josephine Namboze Dr. GSP Gasennelwe Dr Masendu
Health Promotion and Education		Dr. Fred Masaninga Ms. Berlin Maposa Mr. Ditiro Bogatsu
Malaria Programme	08:00 am	Dr. Shiva Mugurusssampillay Dr. Elizeth Juma Dr. Fred Masaninga Mr. Khoti Gausi Mr. Jasper Pasipamere
Drug Regulatory Unit(DRU)	14/08/09 11/08/09	Dr. J Namboze Mr. G. Moalosi Dr. Chihanga Dr. Gobeze
Health	10:00 AM	Dr.Steven Munga

Research		Ms. D.S.Ntebela Mr. Omojuwa Ms. Allison Tartasky
UNICEF	11:00 AM	Team Leader: Dr. L. Mazhani Team Members: Dr. S. Chihanga Ms.B Seretse

Field Review Teams

	Team Members
Ngami	
Team Leader	**Dr. Fred Masanginga**
Team Members	Dr. J. Othwolo
	Tuelo Mphele Keemenao Ramogalana Dr. H.T. Masendu
Okavango	
Team Leader	**Dr. Shiva**
	Dr. Ncube
	Pheresi

	L. Regoeng
Chobe	
Team Leader	**P. Pasipamire**
	Dr. Nesredin
	M. Kedikilwe
	O. Omojowa
	Ditiro Bogatsu
Gantsi	
Team Leader	**Dr. C. Paluku**
	Dr.Ali Nanjema
	Mr. A Okoye
	Mr. Mopako
	Ms. B. Seretse
Francistown	
Team Leader	**Dr. J. Namboze**
	Dr. Chihanga
	B. Maposa
	Dr. S. Munga
	Dr. Ntebela
Kgatleng	

Team Leader	**S. Kanyenvu**
	Mr. G. Moalosi
	Dr. Wafuana
	J. Nawa
Central Team	
Team Leader	**Dr. L. Mazhani**
	Dr. A. Gobez
	Dr. E. Juma
	K. Gausi
	Allyson Tartasky
	Dr. Daniel Chandrahanon
	Dr. Bruno
	Dr. J Govere

7.5 Annex 5: People Interviewed

7.5.1 Central level

NAME	DESIGNATION	Dept/organisation
Mr N Kahiya	Permanent Secretary	MoH
Mrs S L-Halabi	Director –Public Health	MoH
Ms T Mosweunyane	NMCP Manager	MoH- NMCProgram
Dr S Chihanga	Public Health Specialist	MoH- NMCProgram
Ms B. F. Nfila	CHO	MoH- Child Health Division
Ms Kehumile Modise	IMCI Manager	MOH
Ms M Molale	Principal Pharmacist	CMS
Ms E Rakwadi	Superintendent Pharm Tech	CMS
Ms E Ntesang	Senior Pharmacy Tech	CMS
Dr Nesredin	PHS	MoH-IDSR
Ms S Thebega	Acting HOD	Health Statistics Unit
Mr S. I Botlhasitswe	HOD	IT Unit-DPPME-MoH
Dr Mtoni	CPHLS	National Health Lab
Dr Selelo	HOD	DRU- MoH
Mr J Kebinakgomo	Senior Technical Officer	MoH- H. E & Promotion
Ms Mothowaeng	Senior Technical Officer	MoH- H. E & Promotion
Ms T Mphele	CHO	MoH- H .E & Promotion
Mr Khulumani	Chief Research Officer	Health Research Unit
Mr M. Keaja	Deputy PS	MLG
Dr Lebelonyane	Director- PHC	MLG
Dr E. Nyarko	W Representative	WHO
Marcus Betts	Acting Country Rep	UNICEF
Mercy Puso	Communications Officer	UNICEF

Jose`PauloDearaujo	Communications Officer	UNICEF
Kagiso Tokwe	Executive Assistant to CEO&Cooperative Affairs General Management	Standard Chartered Bank
Boniface G. Keoneeng	Project Coordinator	Anglican Diocese

7.5.1 Informants at District level

Informants at District level

Name	Designation	Facility/ Organisation
Dr Onyach	Hospital Superintendent	DRM
Ms S K Moilwa	Principal Nursing Officer	DRM
Mr G Muthu	Principal Pharmacist	DRM
Mr B. M Tebu	Chief Pharmacy Tech	DRM
Ms F Ramonala	Registered Nurse	DRM
Mr R Moje	Principal Reg Nurse/Mid	DRM
Ms M Mapiki	Senior Nursing Officer	DRM
Ms V Tladi	Senior Lab Tech	DRM
Dr N. V. M Mahboub	Senior Medical Officer	DRM
Dr M Mugwariri	Senior Medical Officer	DRM
Ms Barapedi	Ag Nursing Officer	DRM
Ms Planka	Nursing Officer	DRM

Dr S Worku	PHS	Kgatleng DHT
Mr M Kabwe	Pharmacy Technician	Kgatleng DHT
Ms P Nyathi	Environmental H. Officer	Kgatleng DHT
Mr P Moube	Health Education Officer	Kgatleng DHT
Ms R Palai	Senior Nursing Officer	Kgatleng DHT
Ms Tselaesele	Nursing Officer I	Kgatleng DHT
Dr Z Yonas	PHS	Kgatleng DHT
Ms O Kgame	Pharmacy Technician	Kgatleng DHT
Ms L Moyo	Environmental H. Officer	Kgatleng DHT
	Health Education Officer	Kgatleng DHT
	Senior Nursing Officer	Kgatleng DHT
	Nursing Officer I	Kgatleng DHT
Dr Z Yonas	Senior Medical Officer	Malolwane Clinic
Ms O Kgame	Senior Nursing Officer	Malolwane Clinic
Ms L Moyo	Registered Nurse/Mid	Rasesa Clinic
Mr S Perwaiz Ali	Director- My Chemist	Private PharmacyMochudi
Dr P Kyatwa	General Med. Practitioner	KT Health Care-Pvt Clinic
Dr E Mulomba	Principal medical officer	LII Memorial Hospital
MsL Paul	Principal Registerd Nurse	L II Memorial Hospital
Ms M M ijere	Principal Pharmacist I	LII Memorial Hospital
Ms E Peacok	Superitendent Pharm Tech	LII Memorial Hospital
Ms G Ramatu	Senior Nursing Officer	LII Memorial Hospital
Opelo Keorekile	NO II	LII Memorial Hospital
Sholoko Mahube	CRN	LII Memorial Hospital
Nakisane Mogotsi	Midwife	LII Memorial Hospital
Oladoyin Fasakin	Pharmacist	Delta medical centre
Dr L Hoko	Med Practitioner	Delta medical centre

S Nhlane	Sister-in-Charge	Delta Medical Centre
Galeo Raditsela	HET	Ngami DHT
Kebonye Ookeditse	HET	Ngami DHT
Keamogetse Badumetse	CHN	Ngami DHT
Gakenosi Sarefo	SHEA	Kubung H Post
Dr K Mashimango	CPHS	Ngami DHT
Dr Yared A Robele	PHS	Ngami DHT
Mr I Mphafe	EHO II	Ngami DHT
Osena Katshabile	CEHT	Ngami DHT
Mr D Olerilwe	PEHT	Ngami DHT
Mr T Balapi	PEHT	Ngami DHT
Mr Jonny Ditshinyegelo	Senior Lab Tech	Maun Clinic
Edule Horatius	Registered Nurse	Thito H Post
Mr K Kume	Principal Registered Nurse	Boseja Clinic
Dr J Masunge	Hospital Superintendent	Nyangabwe Hospital
Dr Chansa	Deputy Superintendent	Nyangabwe Hospital
Ms M.K Maphorisa	Chief Nursing Officer	Nyangabwe Hospital
Mr Setso	Hospital Manager	Nyangabwe Hospital
Dr Lawrence	HOD Medicine	Nyangabwe Hospital
Ms Wazha Hlabano	Infection Control Officer	Nyangabwe Hospital
Dr Dawit Habtemariam	Senior Medical Officer	Nyangabwe Hospital
Dr C Mbangtany	Consultant Surgeon	Nyangabwe Hospital
Ms D Kebohula	Nursing Superintendent	Nyangabwe Hospital
Dr M. G Madziyere	Specialist OBGY	Nyangabwe Hospital
Ms Lentswe Abotseng	PNO II OBGY	Nyangabwe Hospital
Mr O.K Lebitsa	HOD Pharmacy	Nyangabwe Hospital
Dr N T Gokhale	HOD Lab	Nyangabwe Hospital
Ms Janet Thubuka	Quality Officer	Nyangabwe Hospital
Ms Bazibi Moiteelasilo	TS	Nyangabwe Hospital
Mr Baldwin Khupe	Chief Lab Tech	Nyangabwe Hospital

Ms S. K Modiga	Acting Nursing	Ghanzi Primary Hosp
Ms Onalethata Lebobe	Superintendent	Ghanzi Primary Hosp
Matshediso Matabane	SNO	Ghanzi Primary Hosp
K Tawana	NO	Ghanzi Primary Hosp
Keipeile Gosekwang	SNO	Ghanzi Primary Hosp
Nick Ketshegile	SNO	Kalkfotein Clinic
M Dube	NO Lab Tech	Charleshill Clinic Lab
F Mare	Pharmacist	Delta Pharmacy-Ghanzi
Monei Segano	NO	New Xade Clinic
Dr Ntumba	PMO	Ghanzi DHT
Ms S Ngwako	PHCM	Ghanzi DHT
Ms D. E Disipi	Principal Reg. Nurse	Ghanzi DHT
Ms N Katonto	HEO	Ghanzi DHT
Mr K Mahupu	PEHT	Ghanzi DHT
Mr M Keamogetse	M&E Officer	Ghanzi DHT
Mr M. D Marokosi	SEHT	Ghanzi DHT
Ms T. N Gabosianelwe	Nursing Superintendent	Ghanzi DHT
Mr Cliff Mulenga	Pharmacy Technician	Ghanzi DHT
Dr Bertin K Ntoi	PMO	DHT Okavango
Chamunorwa Madziva	Pharmacist	DHT Okavango
Dr Pierrot Kanyinda	MO	DHT Okavango
Koketso Macala	M&E Officer	DHT Okavango
Monthusi Molefe	EHT	DHT Okavango
Celia Kauthenwa	HET	DHT Okavango
Dr Muchapa	MO	DHT Okavango
Dr Mayele	CMO	Gumare Primary Hosp
Ms Gwapela	SNO	Gumare Primary Hosp

Ms Kwarefo	Pharmacy Tech	Gumare Primary Hosp
Mr Sethoane	SMLT	Gumare Primary Hosp
Ms T. R. N Chadamoyo	Senior Registered Nurse	Gumare Primary Hosp
Dr Willie	Senior Medical Officer	Gumare Primary Hosp
Ms Ramakgwa	Senior Registered Nurse	Gumare Primary Hosp
Ms K Motshidisi	Senior Registered Nurse	Etsha 6 Clinic
Ms G Safero	HEA	Etsha 6 Clinic
Ms Rosemary Banda	Senior Registered Nurse	Etsha 6 Clinic
Ms Agnes Keilepile	V H C Member	Etsha 6 Clinic
Dr. J. D. Makuka	Public Health Specialist	DHT Chobe District Kasane
Dr A Almed	Senior Medical Officer	DHT Chobe District Kasane
Mr. E. Kajiso	Principal PharTechnician	DHT Chobe District Kasane
Dr. L.C.Muza	Senior Medical Officer	DHT Chobe District Kasane
W.G.Kelaotswe	Environmental HealtTech	DHT Chobe District Kasane
Florence Sithole	Nursing Officer II	Pandamatenga Clinic
Kemmonnye Kakanyo	Health Education Assistant	Pandamatenga Clinic
Kutlo Keobiditse	Nursing Officer I	Kachikau Clinic
Gasebonwe Mphang	Health Education Assistant II	Kachikau Clinic
Senong Otshepeng	Health Education Assistant II	Kachikau Clinic
Leo Wellio	Pharmacy Technician	Kachikau Clinic
Grace Keobokile	Assistant Nursing officer II	Kazungula Health Post
Sibusiso Phiri	Health Education Assistant	Kazungula Health Post
D.Makoyongo	Health Education Assistant	Kazungula Health Post
Naomi Webb	Nursing Officer II	Plateau Health Post
Ms Macklean	Matron	Kasane Primary Hospital
Dr N Lufuluabo	Chief Medical Officer	Kasane Primary Hospital
Obatre Jameseli	Laboratory Technician	Kasane Primary Hospital
Tedai Muriyami	Laboratory Technician	Kasane Primary Hospital
Olusina Alade	Pharmacy Technician	Kasane Primary Hospital
Van Resberg	Pharmacist	Pharma North Kasane (Pvt)

Dr F.B Luanga	Medical Practitioner	Kasane Private Clinic

7.6 Annex 6: MPR Tools

BOTSWANA MPR REPORTS FORMATS

DISTRICT

Key Informant (Name, designation, Address, Telephone). Team ?

Name of Facility:-

Date:

1. Introduction

- Objectives
- Province
- District
- Why this province and district was chosen.
- People met full name, designation, institution and address

2. Findings

1. Adequacy of the **organization and management of malaria control** at this level in terms of
   - 1.1 Availability of focal person for malaria control
   - 1.2 Availability and coordination of malaria control partnerships
   - 1.3 Availability of malaria control annual business or operational plans or malaria control activities within the healthy plan
   - 1.4 The status of resource mobilization and financing of malaria control activities
   - 1.5 Availability of appropriate malaria control guidelines and tools
   - 1.6 Adequacy of malaria control logistics: office space, office equipment, materials and supplies, transportation
   - 1.7 Status of malaria Surveillance, Supervision, monitoring and evaluation

2. **Malaria profile** in the district and the appropriateness of interventions being implemented

3. **Status of malaria control interventions** regards access, coverage, quality in relation to national set targets

3. Performance rating of the district

A **B**	**Highly Adequate** **Adequate**	
C	**Present but not adequate**	
D	**Not adequate at all**	

One paragraph explanation of evidence for the rating

4. Key issues

4.1

4.2.

4.3

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4.5

5. Define the Problems (Barriers, Challenges, Constraints)

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5. Solutions

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6. Recommendations

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7. References

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Annexe

- District malaria profile

- District data by month and year . (E.g Malaria cases, deaths, OPD, INP, etc)
- District data on delivery of interventions (LLIN,IRS, ACT,)

BOTSWANA MPR PARTNERS REPORTS FORMATS

Key Informant (Name, designation, Address, Telephone). Team ?

Name of Department/ Partner :-

Date:

1. Introduction

- Objectives
- Why this department and partners was chosen.

2. Findings

1) View on malaria control in the country
2) Role of your department /program/unit in malaria control in the country
3) Available data/guidelines on malaria control in the country
4. Political and Financial commitment
5. Case management/Vector control (for departments/private hospitals/private pharmacies)
6. Planned studies that will provide useful data on malaria control in the country
7. Suggestions on how to strengthen malaria control in the country

3. Performance rating regards support and collaboration and coordination

A	**Highly Adequate**	
B	**Adequate**	
C	**Present but not adequate**	
D	**Not adequate at all**	

One paragraph explanation of evidence for the rating

4. Key issues

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5. Define the Problems (Barriers, Challenges, Constraints)

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5. Solutions

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6. Recommendations

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7. References

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Annexe

BOTSWANA MPR REPORTS FORMATS

HEALTH FACILITY

Key Informant (Name, designation, Address, Telephone)

Name of Facility:-

Date:

1. Introduction

- Objectives
- Province
- Districts
- Facility
- Why this province and district and health facility was chosen.
- People met full name, designation, institution and address

2. Findings

1. Adequate infrastructure, trained staff, equipment and communication and access to transport for supply of LLIN routinely and diagnosis and treatment of uncomplicated and severe malaria

2. Adequate and updated information on catchment population and villages and maps with mapping of high risk areas and villages

3. Adequate malaria educational materials and is conducting group education and inter-personal communication on malaria prevention diagnosis and treatment IEC

4. Adequate equipment for malaria promotion, prevention diagnosis and treatment

5. Adequate malaria control service such as routine LLIN distribution, and provision of RDT and ACT.

6. Regular supplies of LLIN and RDT and ACT with a stock control and reporting system and buffer stocks

7. Conducting extension work , mobile clinics and regular community outreach and support to community health workers

8. Recording and reporting system on malaria and is using the data through weekly/ monthly/annual tables and graphs with thresholds.

3. Performance rating

A	**Highly Adequate**	
B	**Adequate**	
C	**Present but not adequate**	
D	**Not adequate at all**	

One paragraph explanation of evidence for the rating

4. Key issues

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5. Define the Problems (Barriers, Challenges, Constraints)

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5. Solutions

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6. Recommendations

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7. References

- Health facility data by month and year . (E.g Malaria cases, deaths, OPD, INP, etc)
- Health Facility data on delivery of interventions (LLIN,IRS, ACT,)

BOTSWANA MPR REPORTS FORMATS

COMMUNITY

Key Informant (Name, designation, Address, Telephone)

Name of Facility:-

Date:

1. Introduction

- Objectives
- Province
- Districts
- Facility
- Why this province and district and health facility was chosen.
- People met full name, designation, institution and address

2. Findings

2.1. Community access to sustained malaria Information

2.2 Community has access to LLIN with household record card

2.3. Community Household are sprayed with IRS once a year with a house hold record card

2.4. Community has access to community based diagnosis with RDT and treatment with ACT

2.5. Community household have adequate visits at least once a month by community health workers and health extension field workers.

2.6 Community has adequate access to clinics or health centres with adequate supplies of malaria commodities

3. Performance rating

A	**Highly Adequate**	
B	**Adequate**	

C	**Present but not adequate**	
D	**Not adequate at all**	

One paragraph explanation of evidence for the rating

4. Key issues

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5. Define the Problems (Barriers, Challenges, Constraints)

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5. Solutions

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6. Recommendations

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