GHANA MALARIA PROGRAMME REVIEW

FINAL REPORT

REPUBLIC OF GHANA

MINISTRY OF HEALTH

GHANA HEALTH SERVICE

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GHANA HEALTH SERVICE

NATIONAL MALARIA CONTROL PROGRAMME

June 2013

FORWARD

The malaria programme review (MPR) is a periodic joint management process for assessing progress and performance of countries' programmes with the aim of improving performance by refining and/or redefining the strategic direction and focus.

The Ministry of Health, through the Ghana Health Service and the National Malaria Control Programme (NMCP), in collaboration with technical and financial partners, decided to organize a comprehensive review of the progress and performance of the malaria programme for the period 2000 – 2012. This decision was made in the context of a mid – term review of the current strategic plan 2008 – 2015. The findings of this review will feed into the development of: i) a business plan to reach malaria pre – elimination by 2015 and ii) a new malaria policy and strategy beyond 2015. The exercise was undertaken by a Multi-disciplinary team facilitated by External and Internal Reviewers. The objective of the review was to assess the current strategies and activities with a view of strengthening the malaria control programme by sustaining the gains made and achieving further reduction in the malaria burden. The specific objectives of the MPR were to review the epidemiology of malaria in Ghana; assess progress towards achievement of national, regional and global targets by intervention thematic areas and service delivery levels; review the structure, organization, and management framework for malaria control within the health system and the national development agenda, and to define the next steps for sustaining and improving the programme performance.

Good progress has been made in Ghana. There is reduction in malaria case fatality in children under- five, reduction in deaths attributable to malaria in health facilities, and reduction in deaths among pregnant women. The average parasite prevalence in Ghana among children under five years in the MICS 2011 was 27.5%. Key interventions such as long lasting insecticide nets distribution, intermittent preventive treatment of malaria in pregnancy and diagnosis with Rapid Diagnostic Tests (RDTs) and treatment with Artemisinin-based Combination Therapies (ACTs) have shown increase in the coverage over the years, but there still remains a gap in achieving universal coverage compared to MDG and RBM/GMAP (zero deaths) targets. Key issues and challenges have been highlighted in the report.

Timely implementation of the action points in this MPR report will enable Ghana to efficiently use existing and additional resources mobilised by the government and Partners to achieve universal coverage and pre-elimination status.

The Government of Ghana and the Ministry of Health re-commit to the implementation of the programme review actions points. It is our hope that we and our partners (internal and external) will be able to efficiently use existing resources and mobilize additional resources to implement all the action points in this MPR report to enable Ghana to achieve universal coverage and pre-elimination status.

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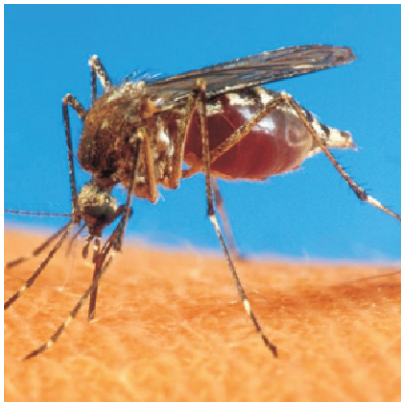

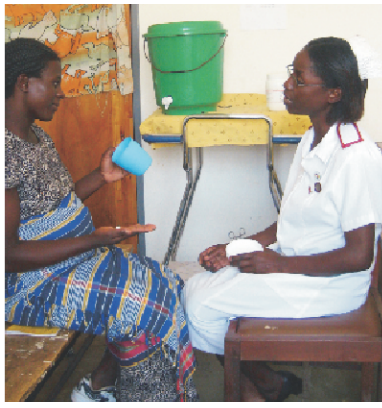

LIST OF ACRONYMS

AA	Artesunate-Amodiaquine
ACAME	African Association of Central Medical Stores
ACPR	Acute Clinical and Parasitological Response
ACSM	Advocacy Communication and Social Mobilisation
ACT	Artemisinin-Based Combination Therapy
AIDS	Acquired Immune Deficiency Syndrome
ADRs	Adverse Drug Reactions
AE	Adverse Effects
AGA	Anglogold Ashanti
AGAMal	Anglogold Malaria
AL	Artemether- Lumefantrine
AMDP	Antimalarial Drug Policy
AMFm	Affordable Medicines Facility-Malaria
AMTs	Artemisinin monotherapies
ANC	Antenatal Care
ARI	Acute Respiratory Infection
ART	Anti-Retroviral Therapy
ARV	Anti-Retroviral
AS-AQ	Artesunate- Amodiaquine
ATF	Accounting Treasury and Financial Reporting Rules and Instructions
BCC	Behaviour Change Communication
BMC	Budget Management Centre
BNF	British National Formulary
CBAs	Community Based Agents
CBO	Community Based Organization
CD	Continuous Distribution
CHAG	Christian Health Association of Ghana
CHIM	Centre for Health Information Management
CHO	Community Health Officer
CHPS	Community Health Planning Services
CFR	Case Fatality Rate
CMS	Central Medical Store
CSIR	Council for Scientific and Industrial Research
CSO	Civil Society Organisation
CSRIPM	Center for Scientific Research into Plant Medicine
DCE	District Chief Executive
DFID	Department for International Development
DHAP	Dihydro atemisinin piperaquine
DHFR	Dihydrofolate Reductase
DHS	Demographic and Health Survey
DHMIS	District Health Management Information Systems
DMS	District Medical Store
DNA	Deoxyribonucleic Acid

DOT	Directly Observed Therapy
DRG	Diagnostic Related Grouping
DSD	Disease Surveillance Division
EIR	Entomological Inoculation Rate
EML	Essential Medical List
EPI	Expanded Programme on Immunisation
EWS	Early Warning System
FAA	Financial Administration Act
FAR	Financial Administration Regulation
FBO	Faith Based Organisation
FDA	Food and Drugs Authority
FDC	Fixed-Dose Combination
FHD	Family Health Division
GAVI	Global Alliance for Vaccine Initiative
GDP	Gross Domestic Product
G6PD	Glucose 6 Phosphate Dehydrogenase Deficiency
GF	Global Fund
GFELTP	Applied Epidemiology and Laboratory Training programme
GHS	Ghana Health Services
GNDP	Ghana National Drugs Programme
GPRS	Growth and Poverty Reduction Strategy
GSS	Ghana Statistical Service
GSGDA	Ghana Shared Growth and Development Agenda
HBC	Home-Based Care
HIPC	Highly Indebted Poor Countries
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HMM	Home Management of Malaria
HPLC	High-Performance Liquid Chromatography
HTM	HIV/AIDS, TB, Malaria and Neglected Tropical Diseases
ICB	International Competitive Bidding
ICD	Institutional Care Division
IDSR	Integrated Disease Surveillance and Response
IE	Independent Evaluation
IEC	Information, Education and Communication
IHR	International Health Regulation
IGF	Internally Generated Fund
IM	Intramuscular
IMaD	Improving Malaria Diagnostics
IMCI	Integrated Management of Childhood Illness
INESS	INDEPTH Effectiveness and Safety Studies
IPT	Intermittent Preventive Treatment
IPTi	Intermittent Preventive Treatment for Infants
IPTp	Intermittent Preventive Treatment of Malaria in Pregnancy
IRS	Indoor Residual Spraying
ITNs	Insecticide Treated Nets

IV	Intravenous
KAP	Knowledge, Attitudes and Practices
Kg	Kilogram
KNUST	Kwame Nkrumah University of Science and Technology
LBW	Low Birth Weight
LCS	Licensed Chemical Sellers
LLIN	Long lasting Insecticide Treated Nets
LMIS	Logistic Management Information System
MARA	Mapping Malaria Risk in Africa
MCA	Medicine Counter Assistant
M&E	Monitoring and Evaluation
Mg	Milligram
MDGs	Millennium Development Goals
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in Pregnancy
MIS	Multiple Indicator Survey
MMV	Medicines for Malaria Venture
MOH	Ministry of Health
MOFEP	Ministry of Finance and Economic Planning
MPR	Malaria Programme Review
NADMO	National Disaster Management Organisation
NDPC	National Development Planning Commission
NGO	Non-Governmental Organization
NHIA	National Health Insurance Authority
NHIF	National Health Insurance Fund
NHIS	National Health Insurance Scheme
NMCC	National Malaria Communication Sub--Committee
NMCP	National Malaria Control Programme
NMIMR	Noguchi Memorial Institute of Medical Research
OIG	Office of the Inspector General
OPD	Outpatient Department
ORS	Oral Rehydration Salt
OTC	Over-The-Counter
OTSS	Outreach Training and Support Supervision
PCR	Polymerase Chain Reaction
PMI	President's Malaria Initiative
POW	Programme of Work
PPA	Public Procurement Authority
PPME	Policy Planning Monitoring and Evaluation
PR	Principal Recipient
PSD	Procurement and Supply Division
PSM	Procurement and Supply Management
PU	Procurement Unit
QA	Quality Assurance
QC	Quality Control
QAACT	Quality Assured Artemisinin-Based Combination Therapy

RCC	Regional Coordinating Council
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
RMS	Regional Medical Store
SBS	Sector Budget Support
SCMP	Supply Chain Master Plan
SDP	Service Delivery Point
SMC	Seasonal Malaria Chemoprevention
SMS	Short Message Service
SMTDP	Sector Medium Term Development Plan
SOP	Standard Operating Procedure
SP	Sulfadoxine-pyrimethamine
SPH	School of Public Health
SRP	Suggested Retail Price
SSDM	Stores Supply Drug Management
SSNIT	Social Security and National Insurance Trust
STG	Standard Treatment Guidelines
STI	Sexually Transmitted Infection
SWAp	Sector Wide Approaches
TDR	Training in Tropical Diseases
TH	Teaching Hospital
TORs	Terms of References
UNDP	United Nations Development Programme
USAID	United State Agency for International Development
UNDB	United Nations Development Business
UNICEF	United Nations Children's Education Fund
UNITAID	
URTI	Upper Respiratory Tract Infection
WB	World Bank
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

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EXECUTIVE SUMMARY

The malaria programme review (MPR) is a periodic joint management process for assessing progress and performance of countries' programmes with the aim of improving performance by refining and/or redefining the strategic direction and focus. The Executive Summary presents the major findings, key best practices, success stories and facilitating factors, as well as the main problems/ challenges, and critical actions emerging from the Ghana MPR.

A) KEY FINDINGS/CONCLUSIONS

1. Assessment of Progress towards Achievement of Global and National Malaria Targets

a) **RBM Abuja Targets:** All the RBM Abuja targets were achieved by 2010 with the exception of use of ITN/LLIN in children under-five years which lagged behind.

b) **World Health Assembly 2005 Targets:** There is mixed performance in reaching the World Health Assembly 2005 targets. While targets for 2010 were almost achieved, there are concerns about achieving the 75% reduction in incidence of malaria by 2015 if concrete measures are not put in place as discussed in the report.

c) **RBM Global Malaria Action Plan Targets:** Reasonable progress was made in achieving the **RBM's Global Malaria Action Plan targets.** measures are not put in place as discussed in the report.

d) **Specific Objectives of National Malaria Strategic Plan (2008-2015)**: It was assessed that 5 out of 11 of the specific objectives have been achieved already as at 2012, another 5 are on course and only one indicator is lagging seriously behind (i.e communities with access to community-based treatment for uncomplicated malaria as measured by the proportion of children under five with fever in the past two weeks. receiving treatment by CBAs with appropriate antimalarials (ACT).

e) **Intermediate malaria specific Targets of National Malaria Strategic Plan (2008-2015):** Of the 8 intermediate malaria specific targets envisaged to be used to monitor performance by 2011 (excluding reduction in incidence of malaria in pregnancy where reliable data was not available), all of them were achieved with the exception of use of LLINs by pregnant women that fell short of the target.

2. Malaria Epidemiology

Malaria is endemic in Ghana. However, there is insufficient data to clearly define the current malaria epidemiological profile to the district level in Ghana. The National Malaria Control Programme has increased coverage and use of available intervention tools over the past 5 years and indications are that the endemicity levels could be changing.

The 2011 Multiple Indicator Cluster Survey (MICS) in children under five years has shown endemicity ranging from hypoendemicity in the Greater Accra Region, hyperendemicity in the Upper West Region and mesoendemicity in the rest of the country (14% in southern coastal areas, 28% in forest, and 44% in northern and central Savannah). With parasite prevalence of 39%, rural Ghana shoulders three times as much burden compared to urban settings (13%). Prevalence is much higher among children in families of lower wealth quintiles and less

educated mothers. However, absence of prior population-based national surveys that measured parasite prevalence makes interpretation of epidemiological trends difficult.

Plasmodium falciparum is the predominant species causing malaria, mainly transmitted by ***An. gambiae s.l.*** **and** ***An. funestus*****, in all the ecological zones. So far** ***P. vivax*** **has not been reported in the country.** In view of the rapid urbanisation and possible effect of climate change there is the need to monitor parasite prevalence and malaria transmission on a continuous basis.

3. Programme management and Governance

The MPR assessed cross-cutting key management, policies and strategic issues relating to leadership, coordination, planning and financing. Malaria is a priority in the national development plan and National health agenda. Ghana has updated policies, guidelines and other operational documents. While Malaria strategic plan and coordination exist at the national level there is need to strengthen the operational planning and coordinating structures at all levels. Private sector participation is weak, particularly in information sharing. Funding for malaria control is heavily dependent on external donor support, however opportunities exist to mobilize domestic resources for the malaria control programme. There are national guidelines on malaria interventions at central and regional levels, but limited copies were observed at district and health facility levels.

4. Procurement and supply Chain Management

There is a functional technical working group for quantification that meets on ad-hoc basis. There is no standard operating procedure (SOP) for procurement and supply management (PSM) but there is SOP for stores and supplies. Delays in procurement of essential commodities for malaria control and periodic stock-outs of antimalarial commodities, especially Artemisinin-based Combination Therapy (ACTs) and Rapid Diagnostic Tests (RDT), have resulted in challenges in meeting set targets. Systems are in place for estimating commodities using store issues data (ACT, RDT and other health products). There is no functional system for tracking commodities supplied to lower levels using batch numbers. National Quality Assurance plan for antimalarial medicines and commodities for laboratory diagnosis is inadequate. Quality control system for testing of RDTs in the country is weak.

There is potential conflict between the relevant divisions of Ministry of Health (MOH) and Ghana Health Service (GHS) for malaria commodities procurement and there is a need to clearly define their roles. There is weak Logistics Management Information System (LMIS) at all levels of the health care system and there is also proliferation of inventory management soft-wares at the various levels.

5. Integrated Vector Management

The NMCP and Partners are implementing the full complement of the Integrated Vector Management (IVM) strategy for the control of Malaria in the country. During the period 2011-2012, using the door to door long lasting insecticide nets (LLIN) hang up campaign strategy, 12,481,336 LLINs were distributed and hanged to cover a registered population of 21,716,830. LLINs were distributed to reach an administrative coverage of 98%. Sustainability of the continuous distribution of LLIN to maintain universal coverage is ongoing.

Capacity for vector surveillance and insecticide monitoring exists in the Anglogold Ashanti (AGA) malaria control programme but linkage with the National Malaria control programme is weak in terms of coordination and information sharing but this is improving. Indoor Residual spraying (IRS) is being implemented in 4 regions in the country; Northern, Upper West, Upper East and Ashanti regions. A system for monitoring the efficacy of the insecticides used in the country is now being established. There is inadequate collaboration and coordination of Labiofam larviciding project with the NMCP. Findings of the evaluation by Labiofam need to be validated. There is a threat of galamsey (surface illegal mining) activities to malaria vector control.

6. Malaria diagnosis and case Management

Malaria diagnosis and case management as part of the overall malaria control efforts in Ghana is aimed at ensuring all people who live in Ghana have access to prompt and effective diagnosis and treatment that conforms to international standards of care and prolongs the life of the medicines. There is over-consumption of ACTs due to presumptive diagnosis of malaria. Local manufacturers' capacity should be enhanced to facilitate the local manufacturing of ACTS taking into consideration World Health Organisation (WHO) prequalification and Good Manufacturing Practice (GMP).

There is a huge gap in knowledge between the curriculum in pre-service training institutions and what is practiced in service. A recent study conducted indicated that the availability of monotherapy including artesmisinine monotherapies in the community pharmacies is still high.

Sustainability system for Outreach Training and Supportive Supervision (OTSS) in quality assurance for diagnostic services does not exist. There is currently no reimbursement of laboratory diagnostics for malaria by National Health Insurance Scheme (NHIS).

The rolling out of Home Based Care (HBC) in all the regions for universal coverage to community is inadequate. Performance of Community Health Officers (CHOs) is inadequate in the area of promotion of LLINs, diagnosis, treatment and tracking or follows up of malaria cases.

7. Malaria in Pregnancy

Malaria in Pregnancy preventive interventions (ITN/LLIN and IPTp) are mainly executed in Ghana through the Maternal and Child Health services provided from district through the sub-district to the CHPS zones. There is a guideline on malaria in pregnancy and it was last updated in 2009. The policy document has components on case management, intermittent preventive treatment and ITNs use. Challenges for MIP implementation include: Low up-take of second dose of Intermittent Preventive treatment in pregnancy (IPTp) and assessment of the impact of IPTp. There is a concern of clients with Glucose-6-Phosphate Dehydrogenase (G6PD) deficiency and possible adverse reactions following administration of sulphonamide based medicines. There is also concern about effectiveness of Sulphurdoxine pyremethamine with folic acid co administration which needs to be addressed. The system for Adverse drugs reaction (ADR) reporting is weak.

8. Advocacy, BCC, IEC and Social Mobilization (ACSM)

The Health Promotion Department of Ghana Health Service provides leadership and coordinates the implementation of malaria communication. At the national level, the malaria control programme in partnership with civil society organizations, the private sector, traditional leaders and the media commemorate World Malaria Day. The Ministry celebrates Child Health Promotion Week annually. These events provide opportunity at the District level for individuals and households, particularly those in underserved communities, to have access to a package of maternal and child health services, including malaria prevention messages, commodities and care. At the regional and district levels, malaria communication is integrated into routine services and also specific Behaviour Change Communication (BCC) campaigns are organised. However there are limited availability of IEC/BCC tools at district, sub district, health facility and community levels.

Other challenges include inadequate staff (Health Promoters) at District Health Management Team (DHMT) level and below, inadequate skills for ACSM design and poor implementation and monitoring at the various levels. There is also poor coordination with existing local structures for the promotion of Malaria ACSM.

9. Malaria in Complex Emergencies

Currently Ghana is not in a malaria emergency situation but there is an existing plan for emerging epidemics. The effect of climate change on malaria transmission and epidemiology should be considered.

10. Surveillance, Monitoring and Evaluation and Operational Research

There is a monitoring and evaluation plan (M&E) for the period 2008 – 2015. Data quality is not optimal. Sentinel sites for monitoring the efficacy of antimalarial medicines exist in ten (10) sentinel sites and the latest report was in 2011. Monitoring of vector susceptibility to insecticides used for IRS is an on-going activity in Anglogold Malaria (AGAMAL) and Noguchi Memorial research Institute but there is no national plan for this exercise.

In the field of operational research, the programme collaborates with partners such as School of Public health, (SPH), Noguchi Memorial Research Institute (NMIMR), Kwame Nkrumah University of Science and Technology (KNUST), Ministry of Health (MoH) research centres in Accra, Kintampo, Navrongo, Doduwa in conducting research on a wide range of issues related to malaria in the country. There is the need to consider implementing Seasonal Malaria Chemoprevention (SMC) on pilot basis as part of the operational research agenda.

There are other challenges such as: parallel and multiple data collection system, limited local capacity to sustain District Health Information Management System (DHIMS 2), weak health information management system, capacity for data collation, analysis and use at district and sub-district level. There is also lack of information on routine malaria indicators to include ACSM indicators and the display of trends in malaria prevalence in health facilities.

11. Financial Management and Economics of Malaria

Malaria is not only a health problem but also a developmental problem in Ghana. It places significant financial hardships on both households and the economy. The burden of malaria is

therefore a challenge to human development, manifesting itself as a cause and consequence of under-development.

Evidence from macroeconomic studies shows that malaria has a negative effect on real GDP growth. Growth per capita from 1965-1990 for countries with intensive malaria has been 0.4% per year, while average growth for other countries has been 2.3%, over five times higher.

We can conclude from the financial management assessment that there exists limited internal financial support for the prevention, control and management of malaria cases in Ghana. The bulk of the supports for such activities are from external sources and this poses challenges to the sustainability of the key interventions that are being implemented currently.

The current financial crisis has made future commitments uncertain, especially from the Global Fund, the main donor for malaria. This funding crisis represents a window of opportunity for malaria endemic countries like Ghana to invest more in health and make their own contributions towards healthy populations.

There is also room for more coordination of plans and budgets on malaria prevention, control and management among all stakeholders. While the software being used by the NMCP at the national level is good, its current utilization is sub-optimal.

B) KEY BEST PRACTICES, SUCCESS STORIES AND FACILITATING FACTORS

There were many observed success areas and facilitating factors in policy, coordination and programme implementation such as the following:

- Presence of a National Development Plan as well as a Public Health Act
- A well developed National Malaria Control Strategic Plan
- Availability of a framework for accountability such as Public Procurement Law, Act 663 of 2003 that guides the procurement process
- Systems to address underserved communities and vulnerable groups
- Strong partnership within the Health sector and with agencies, CSOs and partners
- Strong malaria control leadership and open-door interaction with stakeholders
- Establishment of an Early Warning System for procurement and supply chain management which helps managers to improve the visibility of stock status at the facilities and Regional Medical Store (RMS) for these products in real time for prompt intervention.
- Aided by an Excel based computer modelling program, NetCalc®, the nation adopted Ante Natal Clinics (ANC), Child Welfare Clinics (CWC), and Primary Schools as the main PUSH channels to distribute LLINs free of charge.
- In cooperating a system of entomological, parasitological, insecticide resistance monitoring and malaria morbidity/mortality as well as quality control monitoring to the IRS programme especially by AGAMaL.
- Reasonably functional National Malaria Communication Sub Committee (NMCC) responsible for coordinating all malaria communications activities.
- National Champions for malaria control- parliamentarians, traditional, religious and community leaders (strong support from the leaders to advocate as Malaria Champions during the nets distribution).

- Strong support by media gatekeepers and journalists (Media Advocacy Against Malaria, African Media and Malaria Research Network)
- Tax waiver on LLIN and ACTs
- Integrated computerized database (DHIMS2) from district, region and national levels

C) MAIN PROBLEMS, CHALLENGES AND KEY ISSUES

A number of challenges and key issues were identified and these are summarized below.

1. Absence of stratification of malaria endemicity up to the district level.
2. Need to monitor parasite prevalence and malaria transmission as well as monitoring insecticide resistance due to multiple use of insecticides by many partners and possibility of climate change effect on malaria transmission and epidemiology
3. The issue of P. vivax identification in the country has to be addressed.
4. Inadequate funding for regional malaria control activities especially at regional level and heavy dependence on donor funding for malaria control interventions
5. Availability and use of national guidelines and on malaria interventions at sub regional level
6. Delays in procurement of essential commodities leading to challenges with reaching targets.
7. Quantification based on morbidity data and issues data from the CMS and RMSs for most malaria commodities due to inadequate consumption data at the regional and district levels.
8. Weak LMIS at all levels with proliferation of inventory management soft-wares at the various levels.
9. Lack of control and coordination and independent evaluation of Labiofam larviciding project
10. Sustainability of the continuous distribution of LLIN to maintain universal coverage
11. Threat of Galamsey/surface illegal mining to malaria vector control intervention
12. Over-consumption of ACTs due to presumptive diagnosis of malaria
13. Huge knowledge gap between the curriculum in pre-service institutions as well as the universities (medical and nursing schools) and what is practiced in service (at the health facility level)
14. High rate of monotherapies, including artesmisinine monotherapies in the community.
15. Routine testing for G6PD deficiency and sulphonamide reaction
16. Issue of Folic acid and SP co administration
17. Weak system for ADR reporting
18. Inadequate staff (Health Promoters) at DHMT level and below
19. Local capacity to sustain DHIMS2

D) ACTION POINTS/RECOMMENDATIONS FOR GOVERNMENT OF GHANA/MINISTRY OF HEALTH

1. Translate high political commitment to increased funding up to and beyond Abuja target of 15% minimum, taking opportunity of oil discovery.
2. Develop innovative funding mechanisms to improve domestic investments in malaria control including mobilizing funds from the corporate/private sector.

3. Support the Affordable Medicines Facility for malaria (AMFm) programme to ensure the availability and affordability of quality ACTs.
4. Enforce the ban on prescription, importation and use of monotherapies for the treatment of uncomplicated malaria.
5. Regulate the widespread use of local herbal antimalaria medicines through the Food and drug Authority (FDA).
6. Follow up and evaluate the results of the ongoing phase III clinical trial for 5 current herbal extracts with antimalaria property for possible inclusion in treatment protocol.
7. Continue to engage the local manufacturers to achieve WHO prequalification.
8. Request Labiofam to provide all study methodology and other documents to validate their findings.
9. Bring all larviciding activities under the National Malaria Control Program for effective monitoring and national ownership.
10. Enforce environmental management laws and by- laws at district, regional and national levels by Local Government especially in areas where illegal mining activities are being practiced.
11. Expedite the process of ongoing procurement reform for public health commodities.
12. Develop a financial sustainability plan for malaria commodities to minimize the overdependence of the program on donor funding.

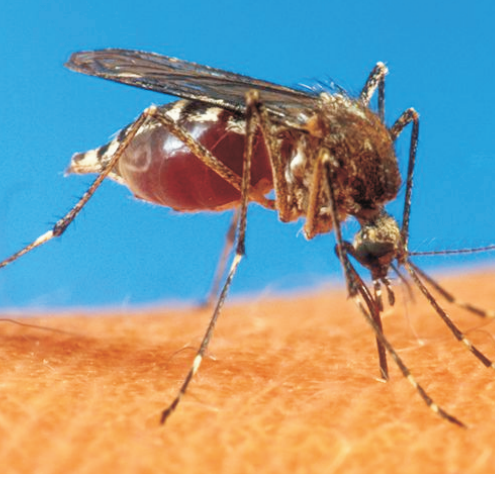
FOR GHANA HEALTH SERVICE/NATIONAL MALARIA CONTROL PROGRAMME

1. Undertake surveillance of *P. vivax* infection since its presence could have programmatic implications in Ghana
2. Improve integrated supportive supervision to include malaria programme from National to Regional level and from Regional to the district levels.
3. Strengthen Logistics Management Information System (LMIS) to capture consumption data at the regional, district and facility levels and monitor this centrally for proper forecasting and quantification.
4. Establish a Task team with terms of reference (TOR) to look into RDT quantification, selection, procurement, storage, supply and rational use.
5. Revise the current vector control policy to include the Continuous Distribution (CD) strategy and update it to include the current Demographic Health survey (DHS) ownership and usage figures.
6. Undertake continuous monitoring of IRS activities with regards to insecticide resistance development.
7. Build capacity for entomological surveillance at national and regional levels.
8. Strengthen infrastructure and capacity for malaria microscopy, technical supervision, quality assurance and control at regional and district health facilities.
9. Ensure regular updates of malaria control strategies in the package for pre –service training institutions and support them as required, such as provision of current malaria documents and training of tutors and facilitators in the current malaria policies and guidelines.
10. Ensure adequate funding for targeted scale-up of HBC for Community Case Management and follow up on the recommendations of the National Coordination Committee on the implementation of the HBC.

11. Prioritize malaria control activities as part of core delivery of CHO activities during outreach services at CHPS zones.
12. Ensure screening for suspected G6PD clients to prevent Adverse drug reaction (ADR). The initial screening should be verbal and those with previous reaction should then undergo laboratory screening.
13. Review the current guidelines on drug policy to include co-administration of 400ug of folic acid as well as administration of IPTp services to pregnant women till delivery.
14. Strengthen the system for ADR reporting and improve collaboration with Food and Drug Authority at all levels.
15. Recruit and deploy health education officers at the district level and build their capacity for ACSM planning, implementation and evaluation.
16. Intensify BCC campaigns and carry them out in a more systematic and co-ordinated manner in order to ensure optimal utilization of resources.
17. Strengthen the collaboration between the DHMT and Non-Governmental Organization (NGO), and other community based organizations and agents.
18. Ensure that emergency preparedness and response for malaria is well developed at all levels as part of IDSR.
19. Conduct parasite prevalence stratification up to the district level and monitor malaria transmission pattern on account of possible climate change.
20. Establish malaria parasite and vector sentinel surveillance sites to provide information on malaria parasite prevalence, vector bionomics and other routine indicators.
21. Ensure the implementation of routine data quality assessment and periodic data auditing at all levels of service delivery.
22. Ensure total migration of relevant data into DHIMS2 and enforce compliance at all levels.
23. Develop a financing sustain financial risk management plan, for malaria prevention, control and management in Ghana to address threats to sustainability.

FOR PARTNERS

1. Support the initiative of MOH to develop innovative funding mechanisms to improve domestic investments in malaria control including mobilizing funds from the corporate/private sector.
2. Partner with GHS/NMCP to assure the sustainability of the Affordable Medicines Facility for malaria (AMFm) programme to ensure the availability and affordability of quality ACTs.
3. Support the move to bring all larviciding activities under the National Malaria Control Program for effective monitoring and national ownership.
4. Collaborate with NMCP to establish vector surveillance sites in the country to respond to insecticide resistance management plans and provide information on vector bionomics.



CHAPTER I

Introduction

1.1 Background

The Republic of Ghana extends inlands from the Gulf of Guinea and is bordered on the south by the Atlantic Ocean, Togo to the east, Burkina Faso to the north, and La Cote D'Ivoire to the west. It covers a surface area of 238,837 sq km and a coastline of 540 km, most of which is relatively flat and lies below an altitude of 150 km, but several peaks in the east rise to above 800 km. Ghana has a tropical climate, warm to hot all year through, and can be divided into two broad geographical zones, the south and centre are moist while the north is savannah in nature and drier. It is bisected by the Greenwich Meridian and lies entirely within the northern tropics between 4^0N to 11^0N at the equator. Northern Ghana has a wet climate from April to October, the rest of the period is hot and dry with temperatures up to 38^0 C. In southern Ghana, the rains last from April to June, and also from September to October. There are drier months in between these periods. Generally, temperatures are between 21^0 -31^0 in the south [Ghana Tourist Board website 2012].

Ghana is a democratic nation with a presidency, cabinet, parliament and an independent judiciary. It is divided into ten regions: Ashanti, Brong-Ahafo, Central, Eastern, Greater Accra, Northern, Upper East, Upper West, Volta and Western Regions. Each region is headed by an appointed Regional Minister who represents the Head of State (the President of the country). The Regional Minister is assisted by a Deputy Regional Minister and a Regional Coordinating Council (RCC) to co-ordinate and formulate integrated district plans and programmes within the framework of approved national development policies and priorities. Each district is headed by a District Chief Executive (DCE), who is nominated by the President and approved by the District Assembly. The District Assembly is the highest political and administrative authority in the district. The districts are also divided into unit areas and are headed by elected executives.

Ghana's main exports include cocoa, timber, pineapple, and gold as one of its principal revenue source. The recent discovery of oil reserves in the country will boost the economy with a new source of revenue. Since 2009, Ghana has started exporting oil in commercial quantities, at approximately 70,000 barrels every year [Ghana EPI Final Review Report 2012].

Fig.1: Regional Map of Ghana

Not surprisingly, the climate, rainfall pattern and tropical conditions have made malaria perennial in Ghana and the country has been hyper-endemic in nature. Several initiatives have been undertaken over the decades to address its menace. In the year 2000, the first National Malaria Strategic plan (2000-2010) was drawn to give strategic direction to the control of malaria in Ghana. That strategic plan consolidated the achievements gained in the previous years and built on new interventions and strategies with support from a broader range of stakeholders including health partners, community members, research community, the academic sector and Nongovernmental Organisations (NGOs).

Since the first strategic plan was developed, new and effective interventions such as treating uncomplicated malaria with artemisinin-based combination therapy (ACT), malaria prevention in pregnancy through use of sulfadoxine-pyrimethamine (SP), and indoor residual spraying (IRS) in hyper-endemic countries had emerged. Moreover, the Abuja declaration of May 2006 which came into being aimed at achieving and sustaining universal access to

appropriate interventions for all populations at risk of malaria. There was therefore the need to develop a second strategic plan (2008-2015) to take care of these new developments as well as the Millennium Development Goals (MDGs). The **Goal** of malaria control in the Second National Strategic Plan (2008-2015) was to reduce morbidity and mortality by 75% by 2015. The specific objectives, by 2015, were as follows:

- 100% of households will own at least one Insecticide Treated Net (ITN)
- 80% of the general population will sleep under ITNs
- Increase the number of children under-five and pregnant women sleeping under treated net from current levels to 85%
- 100% (All) pregnant women shall be on appropriate Intermittent Preventive Treatment (IPT)(Receive at least two or more doses of sulphadoxine-pyrimethamine under DOTS)
- 90% of all structures in targeted districts will be covered through indoor residual spraying
- All (100%) health facilities will provide prompt and effective treatment using ACTs
- 90% of all patients with uncomplicated malaria will be correctly managed at public and
- private health facilities using ACTs
- All (100%) communities will have access to community-based treatment for uncomplicated malaria
- 90% of caretakers and parents will be able to recognize early symptoms and signs ofmalaria
- 90% of children under five years of age with fever will receive an appropriate ACT within 24 hours of onset.

Unfortunately, there were no intermediate targets set in the Strategic Plan to facilitate assessment of midterm performance against set targets.

Justification for the Malaria Programme Review (MPR) during that period

Since the development and implementation of the second National Malaria strategic Plan (2008-2015) there have been a number of assessments, including a Global Fund Malaria Program Evaluation in 2011 and the Multiple Cluster Indicator Survey (MICS) [MICS 2011]. The year 2013 is however taken as opportune to undertake a midterm review of the entire programme to assess progress with implementation, chart a new course for the future and to develop strategies for accelerated scale up.

The national malaria programme review (MPR) is a periodic joint programme management process for reviewing progress and performance of country programmes within the national health and development agenda with the aim of improving performance and/or redefining the strategic direction to focus and strengthen program delivery structures and systems.

1.2 Objectives of the MPR

The purpose of this midterm review of 2008-2015 Strategy is to ascertain the current malaria epidemiology with regards to burden and trends, carry out a revised stratification and create a framework for strategic revision in order to attain the Millennium Development Goals (MDGs) in the light of the changing environment, new trends and development in malaria control.

The specific objectives are:

- To review the malaria epidemiology (endemicity, seasonality, parasite prevalence, vector situation,) of the country.
- To review the policy and programming framework of the country within the context of the health system and the national development agenda (programme organization, structure and management)
- To assess progress towards achievement of 2010 and 2015 RBM and MDG goals and targets.
- To assess progress towards achievement of Strategic Plan targets.
- To assess the organization, internal and external partnerships, and the funding landscape for malaria control.
- To review the current program service delivery systems, their performance and their challenges.
- To define the next steps for improving programme performance or redefining the strategic direction and focus, including revising the policies and strategic plans.

1.3 Methodology of the MPR

The malaria program review **(MPR) was** conducted in four phases with specific steps.

Phase One: Planning and Preparation

The first phase of planning started in August 2012. During this phase, there were consultation meetings with stakeholders to define the need for the review and to develop terms of references (TORs). Different structures of the MPR were put in place: i) Nomination of one MPR Coordinator; ii) Nomination of the secretariat of the MPR; iii) Recruitment of a national consultant; iv) Constitution of 8 thematic desk review groups. These groups were multi sectorial with health workers, research institutes, NGOs. The plans and budget were developed and submitted to the Global Fund, WHO and RBM, the Malaria Unit for funding. Meanwhile a request for technical assistance was sent to WHO/IST – WA.

Phase Two: Thematic Desk Reviews

The second phase started in February 2013 and ended March 2013. This phase involved selecting tools for the field review and conducting thematic desk reviews. Thematic review groups were meeting every week and all existing documents were found and filed at the Malaria Unit and shared with all partners. Two retreats were organized to finalize thematic review reports. A checklist was developed to track activities and updated gradually as need arose. This desk review consisted of a summary of recent progress in achieving set targets for access, coverage, quality, use and impact. It allowed the program to identify best practices, recognize problems, determine the priority of those problems, decide on how to investigate those of highest priority and propose appropriate solutions. This phase revealed information on weaknesses and gaps and therefore where the field review process focused.

Phase Three: Field Review

The third phase was done according to the guidelines and it involved briefing of external review team. This ensured team-building between internal and external review teams, consensus-building on findings of thematic internal desk review, familiarization with data collection tools for field visits, briefing and formation of field teams for field review. The field visits started with central level visits to national institutions and organizations and concurrently other teams undertook regional, district and community field visits to malaria service delivery points. Later, teams re-converged and shared field reports through plenary presentations on key findings.

Thereafter, thematic review reports were updated with this information to ensure completeness, and then preparation of drafts of the final report, executive summary, aide-memoire and slide presentation of key findings and recommendations. The aide-memoire and a summary of the key findings and recommendations were presented to the Honourable Minister of Health by the external review team. The aide memoire was circulated to stakeholders for study. This phase ended on May 31st, 2013.

Phase 4: Follow-Up

Phase four officially started from 1st June 2013 and involved the following key actions:

1. Finalization and publishing of the report.
2. Dissemination of the report.
3. Implementation of the recommendations.
4. Monitoring of the implementation of the recommendations.
5. Updating policies and plans and redesigning the programme, if necessary.

1.4 Outline of the Document

The document begins by describing the context of malaria control in Ghana. It is followed by chapters according to the thematic areas identified for the MPR: epidemiology; programme management; procurement and supply chain management; vector control; diagnosis and case management; malaria in pregnancy; advocacy, information, education, communication and social mobilization; surveillance, monitoring, evaluation and operational research; and malaria burden and financial management. Each chapter describes roughly the current situation in the country, policy and guidance framework for the thematic area, key activities in place, achievements, best practices, problems or challenges and lessons learnt as well as recommendations for the way forward.

CHAPTER 2

Context of Malaria Control

2.1 Historical milestones in malaria control

Globally, malaria is estimated to impose a growth penalty of over 1.2 % of GDP on endemic countries. The WHO estimated that the total cost of malaria to Africa was US$ 1.8 billion in 1995 and US$ 2 billion in 1997 (WHO, 1997). In Ghana, malaria has been hyper-endemic and accounts for a considerable disease burden. It is the single most important cause of mortality and morbidity especially among children under five years and pregnant women. Intensive government efforts at controlling malaria in Ghana dates back to 1957 when a malaria control unit within the Ministry of health (MOH) was established in the Volta Region in collaboration with WHO to train personnel in geographical reconnaissance, malariometric and entomological surveys, and to conduct trials of indoor residual insecticide application in the control of adult mosquito population. Ghana followed up this in 1961 with the creation of a National Malaria Service when the country adopted the global Malaria Eradication Programme, which used residual spraying and larvicides to control malaria parasites. The programme had to be discontinued in 1967 due to technical and financial reasons. In 1992, the country launched a 5-year (1993-1997) National Malaria Control Action Plan with the focus on capacity building for improved disease management in health facilities. Drawing on past experiences and lessons, an accelerated malaria control programme piloted in 30 districts, was launched in 1997, again with a focus on case management.

Since 1998 Ghana committed itself to the Roll Back Malaria (RBM) Initiative, which builds on the Global Malaria Strategy with a focus on Africa. The goal of the Roll Back Malaria Initiative was to halve the world's malaria burden by 2010. Consequently the country drew a 'Medium Term Strategic Plan for Malaria Control in Ghana (1998-2002), which sought to improve the coverage of malaria control activity by adopting an intersectoral approach involving other government sectors and partnership with the private sector and the community[MOH 1998]. It also committed itself to the Abuja Declaration on Roll Back Malaria in Africa, which similarly seeks to achieve specific targets on malaria prevention and control with time limits. [Ghana Macroeconomics and Health Initiative Report 2005].

Unfortunately, the various control measures undertaken over the years met with limited success mainly due to a number of factors including focus on single strategies, lack of funding, poor human resource capacity and non-involvement of NGOs, civil society and other stakeholders. A new national strategic malaria control plan was therefore developed (2000-2008) in 2001 based on RBM principles of multiple interventions, involvement of all stakeholders and evidence-based interventions. Key interventions promoted in the new RBM

Plan included promoting home-based care, use of Insecticide Treated Nets (ITN)/Long Lasting Insecticide Nets (LLIN), improving case management in health facilities and use of appropriate chemoprophylaxis in pregnancy. Initially, implementation of most of these interventions was limited mainly to the national level due to lack of funds and capacity to move to scale. Some funds were therefore mobilized in 2002 from the Global Fund to implement some of these interventions in 20 selected districts initially with the view of scaling up to the then remaining 90 districts over the next 5 years. In 2004, additional funding was mobilised from the Global Fund and other partners to scale up most of the interventions countrywide.

In 2005, AGAMAL implemented an integrated Malaria Vector Control Program through the use of indoor residual spraying (IRS) using scientifically selected and approved insecticides. The program covered all communities within the Obuasi Municipality. In the first two years of its existence, the program attained a 50% reduction in the number of malaria cases [AngloGold Ashanti 2007]. In addition, there have been huge savings on malaria medication expenditure, from $55,000 in 2005 to $6,200 in 2010. Work absenteeism also dropped from 6,983 man-days in 2005 to 163 in 2010. Based on the success of the AGA 'Obuasi malaria control model' the IRS is currently being scaled up in 40 further districts in Ghana with financial support by a grant of the Global Fund.

The PMI-IRS started in 5 districts in 2008 and scaled up to 9 by 2012. Currently, the PMI-IRS has scaled down from 9 to 4 districts due to high cost of the new insecticide and the perceived no impact on malaria morbidity and mortality in the sprayed districts.

From 2002, following repeated reports questioning chloroquine efficacy as the first line drug for management of uncomplicated malaria, a number of studies were initiated in the country mainly in collaboration with Noguchi. The evidence gathered from 2002 on chloroquine efficacy culminated in the change of Ghana's Anti-malaria Drug Policy from the use of chloroquine to the adoption of Artesunate –Amodiaquine (AA) combination as the first line drug for the management of uncomplicated malaria in 2004.

Unfortunately, due to a number of reported adverse reactions to AA, the policy was recommended for revision by the then Minister of Health upon expert advice in 2007. The revised policy made provision for alternatives to artesunate- amodiaquine for the management of uncomplicated malaria, while recommending injection quinine and injection artemether for the treatment of severe malaria and sulphadoxine-pyrimethamine for intermittent preventive treatment in pregnancy.

In September 2012, the Anti-Malaria Drug Policy was again revised based on current evidence on malaria treatment (especially fresh evidence that injection artesunate is superior to injection quinine in managing severe malaria and WHO's recommendation for its use in preference to quinine) and lessons learnt in the implementation of the previous policy.

In summary, the key milestones are as follows:

- 1957: Creation of a malaria control unit within the MOH
- 1961: Creation of a National Malaria Service when the country adopted the global Malaria Eradication Programme, which used residual spraying and larvicides to control malaria parasites.
- The programme had to be discontinued in 1967 due to technical and financial reasons.
- 1992: Launching of a 5-year (1993-1997) National Malaria Control Action Plan with the

focus on capacity building for improved disease management in health facilities.

- 1997: an accelerated malaria control programme piloted in 30 districts with a focus on case management.
- 1998: Ghana committed itself to the Roll Back Malaria (RBM) Initiative which builds on the Global Malaria Strategy with a focus on Africa.
- 1998: The country drew a 'Medium Term Strategic Plan for Malaria Control in Ghana' (1998-2002), which sought to improve the coverage of malaria control activity by adopting an intersectoral approach involving other government sectors and partnership with the private sector and the community[MOH 2008]
- 2000: It also committed itself to the Abuja Declaration on Roll Back Malaria in Africa
- 2001: A new national strategic malaria control plan was therefore developed (2000-2008) based on RBM principles of multiple interventions, involvement of all stakeholders and evidence-based interventions.
- 2002: Round 2 of Global fund support to implement some of these interventions in 20 selected districts initially
- 2002: Initiation of efficacy studies on anti-malarials, including chloroquine with Noguchi
- 2004: Round 4 of Global Fund support for countrywide scale up of then interventions
- 2004: Change of Ghana's Anti-malaria Drug Policy from the use of Chloroquine to the adoption of Artesunate -Amodiaquine combination as the first line drug for the management of uncomplicated malaria.
- 2005: Initiation of IRS project in Obuasi by Anglogold Ashanti.
- 2007: Revision of policy to make provision for alternatives to artesunate-amodiaquine for the management of uncomplicated malaria, due to many reported adverse reactions while recommending injection quinine and injection artemether for the treatment of severe malaria and sulphadoxine-pyrimethamine for intermittent preventive treatment in pregnancy.
- 2008: PMI-IRS starts in 5 districts
- September 2012, the Anti-Malaria Drug Policy was again revised based on current evidence on malaria treatment (fresh evidence that injection artesunate is superior to injection quinine in managing severe malaria and WHO's recommendation for its use in preference to quinine) and lessons learnt in the implementation of the previous policy.

2.2 Malaria Control Within the National Development Agenda

The Ghana Poverty Reduction Strategy documents, (2002-2004) and (2006-2009) have an important policy area: increasing the extent and quality of health care by bridging equity gaps, ensuring sustainable financing arrangements that protect the poor and enhance efficiency. Among the expected outputs is the prevention and effective treatment of malaria including ensuring the availability and use of ITNs. As a policy, Government initially directed that free treatment should be given to all children under 5, pregnant women and the elderly through an exemption scheme. Government has also waived the tax on imported bed nets. Since 2003 the government has introduced a National health Insurance Scheme (NHIS) to address financial barriers to treatment due to out of pocket payments at point of service. Currently, there is the directive from government that 1% of District Assemblies Common Fund be set aside for Malaria Control activities at the district level. The government has created a new Ministry of Women and Children Affairs since 2002.

Ghana has shown continued commitment to the needs of women, children and the poor. Ghana was one of the first signatories to the Universal Declaration on the Right of the Child in 1990. Ghana is a signatory to the Abuja Declaration of 2000 on Roll Back Malaria. Additionally, in 2000 Ghana participated in the 2000 African Development Forum in Abuja and signed the Abuja Declaration on HIV/AIDS, TB, Malaria and other Infectious Diseases. Ghana is a signatory to the UNGASS declaration of June 2001. Ghana has also assented to various WHO and World Health Assembly resolutions including "RBM in the African Region: A Framework for Implementation" (AFR/RC50/12).

2.3 National health policy

This is fully described under section 4.1.2 of Programme Management.

2.4 National health sector strategic plan

The Health Sector Medium Term Development Plan (SMTDP) 2010 – 2013 reflects the government's health development agenda for the medium term and aligns succeeding policies with the national objective of attaining middle income status by 2015. It also coincides with the fourth year of implementation of the sector's third 5-year Programme Of Work (POW) (2007 – 2011). The SMTDP builds on the general principles of providing affordable primary health care to all people living in Ghana; cost-effective general health systems development; bridging of current equity gaps in access to health care services, and reinforcement of continuum of care. It also builds upon the work of the last decade and the lessons learnt. To ensure consistency, and alignment of programmes and investments around a common framework for health development, the SMTDP and Third 5-year POW (2007 – 2011) have been fully harmonized [MOH, SMTDP 2010].

The objectives of the health sector are to:

1. Bridge the equity gaps in infrastructure, human resource and financial access to health care and nutrition services and ensure sustainable financing arrangements that protect the poor
2. Improve governance and strengthen efficiency in health service delivery, including medical emergencies
3. Improve access to quality Maternal and Child Health services
4. Intensify prevention and control of non-communicable and communicable diseases (malaria, HIV/AIDS/STI/TB) and promote healthy lifestyle
5. Strengthen Mental Health service delivery.

2.5 National Development Plan

The broad policy directions provided by the Growth and Poverty Reduction Strategy 2006-2009 (GPRS-II; GOG, 2005) focus on three key areas. These are to:

- Bridge equity gaps in access to quality health and nutrition services
- Ensure sustainable financing arrangements that protect the poor
- Enhance efficiency in service delivery.

These objectives were aimed at improving the health status of all Ghanaians, with particular emphasis on people living in deprived areas and making health care accessible to the poor and vulnerable in the identified deprived districts. It was also expected that these would enable the sector to make the most impact on poverty reduction by addressing specific poverty related health problems and to enable the identification of the poor and vulnerable to be targeted with specific health delivery interventions.

Since 2010, the government has developed a new Medium-term national development policy framework entitled "Ghana Shared Growth and Development Agenda (GSGDA), 2010-2013" to replace the previous one [GOG NDPC 2010].

The Ghana shared growth and development agenda (GSGDA) policy frame work, recognizing achievements made in the health sector and the existing challenges in access, high/increasing morbidity and mortality from communicable and non-communicable disease, human resource constraints and weak performance management systems among others, defines five policy objectives one of which is "to intensify prevention and control of non-communicable and communicable diseases (malaria, HIV/AIDS/STI and TB)". Among the listed strategies are institutionalizing rapid diagnostic test and microscopy in all health facilities, scaling up indoor residual spraying, improving malaria data management, scaling up home management of malaria and improving household ownership and use of insecticide treated bed nets.

2.6 Organizational structure for Malaria Control

This is fully described under section 4.1.3 of Programme Management.

2.7 Key strategies for Malaria Control

Strategies to achieve the objectives envisaged in Ghana as outlined in the current National Malaria Strategic Plan include the following:

- Equip all health facilities with malaria diagnostic facilities (microscopes or RDTs) andprovide effective and quality affordable antimalarial drugs.
- Strengthen human resource through in-service training of laboratory technicians, pharmacists, clinicians and other relevant health staff.
- Scale-up community based treatment of malaria in all districts through the home base care of malaria targeting children under five years living in rural areas and areas with limitedaccess to healthcare.
- ITN scale-up access to Long Lasting Insecticide Nets (LLINs) to achieve universal coverage
- IRS to be scaled up rapidly, building on the models of IRS campaigns in Obuasi and the Northern Region.
- Strengthen the routine data collection system to capture reliable information, and undertake regular operational researches to provide evidence for decision making.
- Forge functional partnerships and mechanisms between departments, programmes within
  and outside the health sector.

2.8 Key players in Malaria Control

This is fully described under section 4.1.5 of Programme Management.

2.9 Linkages and Coordination

This is fully described under section 4.1.6 of Programme Management.

2.10 Conclusions and Recommendations

2.10.1 Conclusions

- Long history of malaria control activities in Ghana over decades influenced mainly by many Global Initiatives. Most of these initiatives were however prematurely aborted after the Global Initiatives ceased due to under-funding.
- Previous control measures undertaken over the years met with limited success mainly due to a number of factors including focus on single strategies, lack of funding, poor human resource capacity and non-involvement of NGOs, civil society and other stakeholders.
- There is a well-designed national malaria Strategic Plan with clearly defined measurable objectives and targets but intermediate targets were not defined.
- Policy framework is supportive of malaria control in Ghana

2.10.2 Recommendations

- Next Strategic Plan should provide yearly targets also instead of end-period targets only.
- Sustainability plans should be developed to ensure that malaria control interventions do not depend on donor funding or donor initiatives only.

CHAPTER 3

Epidemiology of Malaria

3.1 Geographical Distribution of Malaria

Seventy five percent of the country is said to be malaria endemic now, (MARA/ARMA collaboration http//www.mara.org.za), however, malaria is generally stable in Ghana and recent studies in 2011(MICS) have shown endemicity ranging from hypoendemicity in the Greater Accra Region, hyperendemicity in the Upper West Region and mesoendemicity in the rest of the country (Figure 2 &3). Parasitaemia levels in children under five years of age and in the Northern Ghana 5 to 10 years have been used to determine the malaria endemicity in Ghana. The National Malaria Control Programme has increased coverage and use of available intervention tools over the past 5 years and indications are that the endemicity levels could be changing. The map (Fig. 3) shows parasite prevalence by region (MICS 2011). However, stratification of endemicity has not been extended to the district level.

Malaria Prevalence in Children 6-59m, by Ecological Zones 2011

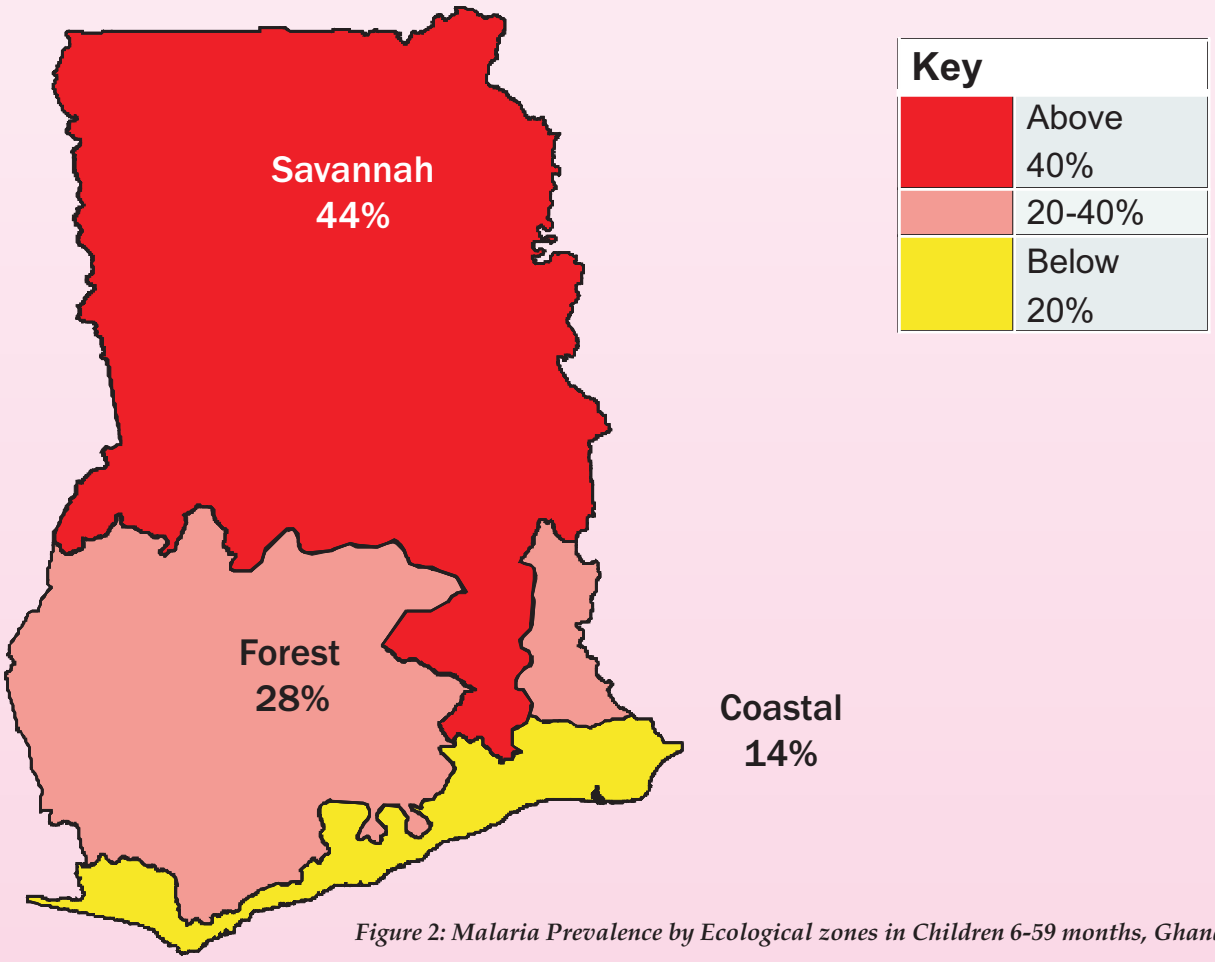


Figure 2: Malaria Prevalence by Ecological zones in Children 6-59 months, Ghana

Malaria Prevalence in Children 6-59m, by Regions 2011

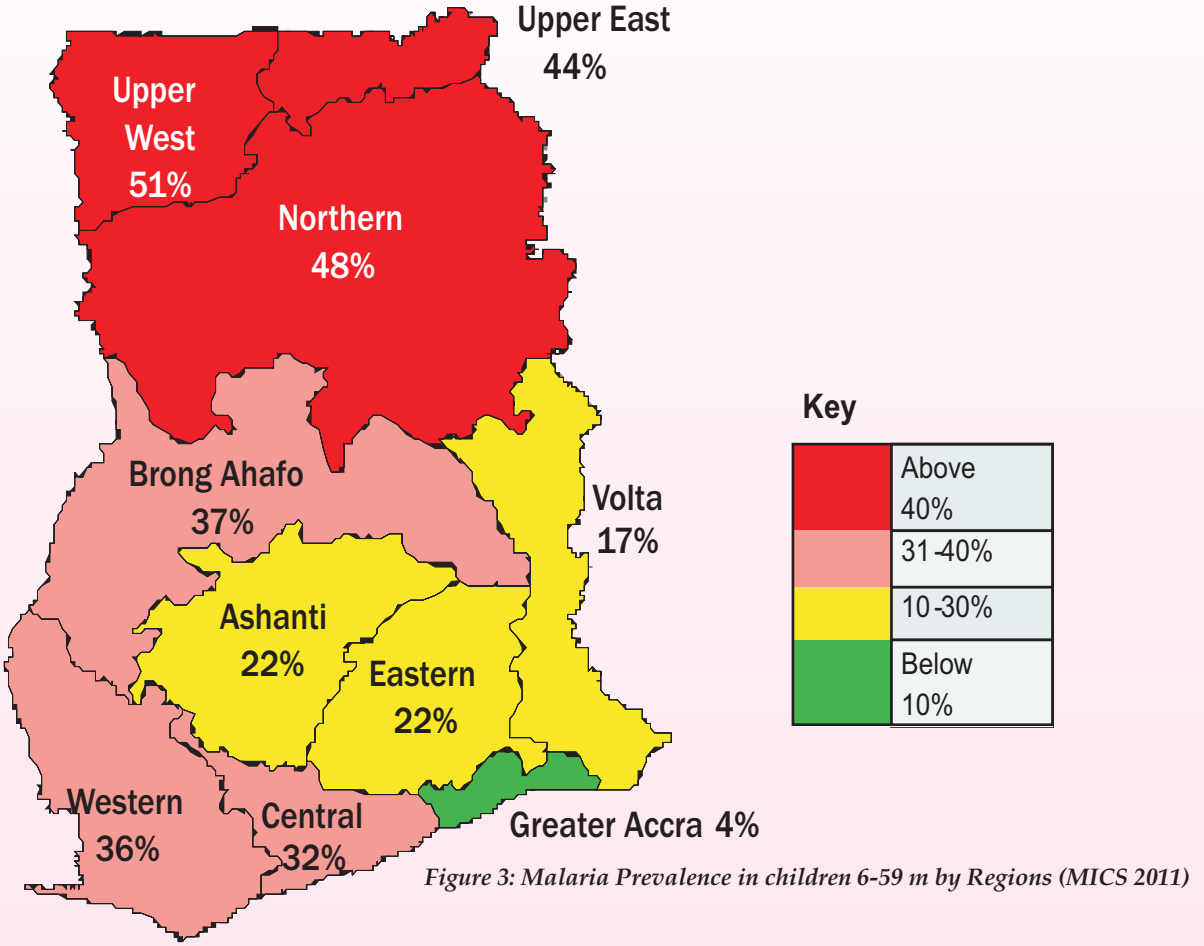


Figure 3: Malaria Prevalence in children 6-59 m by Regions (MICS 2011)

Malaria transmission (EIR) is much lower in large cities

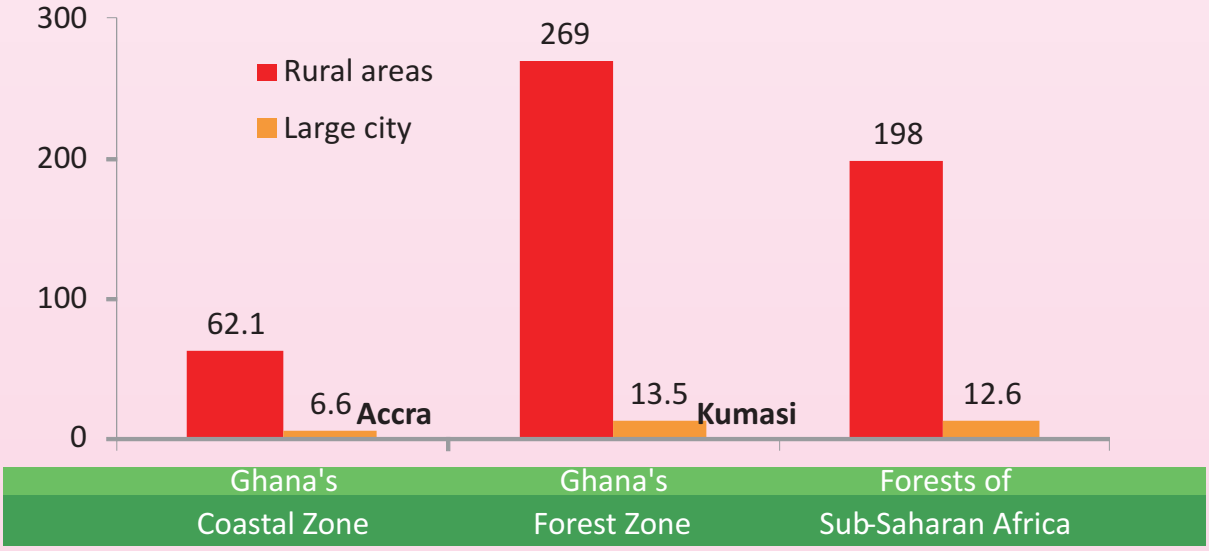


Fig 4: Risk of malaria in urban versus rural settings, Ghana
[Source: **The Ghana Urban Malaria Study 2012**]

In a review of the literature, especially using information from MICS 2011, the Ghana Urban Malaria Study 2012 made some very interesting findings concerning some of the most important determinants of the burden of malaria in Ghana. Their conclusions are that there is increasing risk of malaria for people living in rural areas [Fig 4], being poor, and living near urban agriculture, among others.

For instance, Children living in Accra were 86% (95% C.I. = 66% to 94%) less likely to be infected with malaria than children in rural areas of the coastal zone. Children living in Kumasi were 85% (95% C.I. = 66% to 95%) less likely to be infected with malaria than children in rural areas of the forest zone. Children living in Tamale were 68% (95% C.I. = 37% to 84%) less likely than children in rural areas of the savannah zone. [Fig 5].

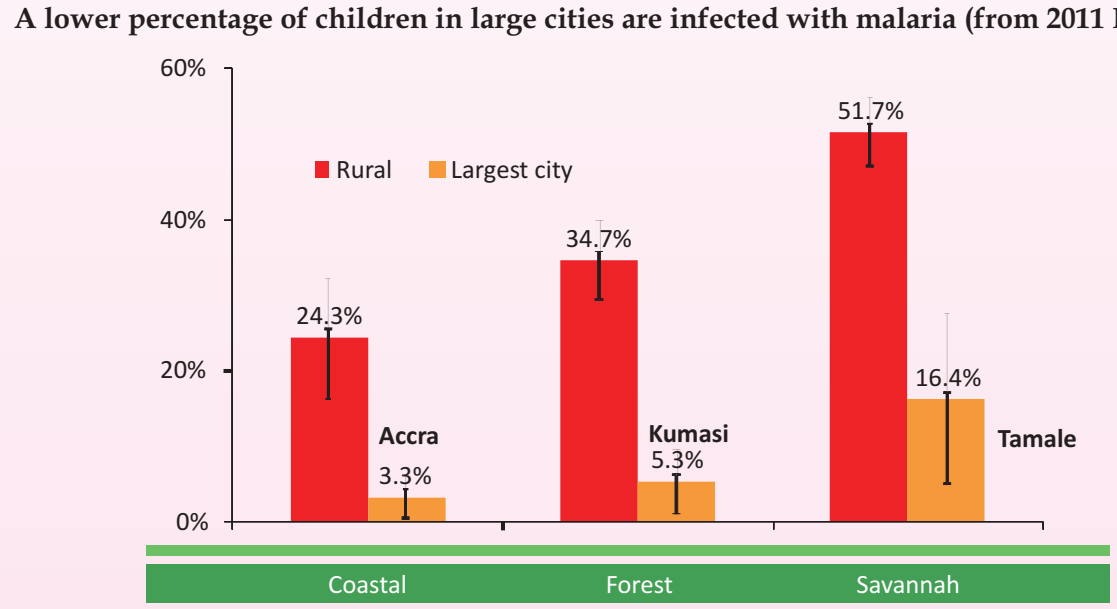


Fig: 5 Malaria infectivity; rural versus urban in various ecological zones (The Ghana Urban Malaria Study, 2012).

The 2011 MICS showed that the prevalence of malaria infection is higher for children living in the poorest urban households (6%) compared to those living in the wealthiest households (2%). [Fig 6]

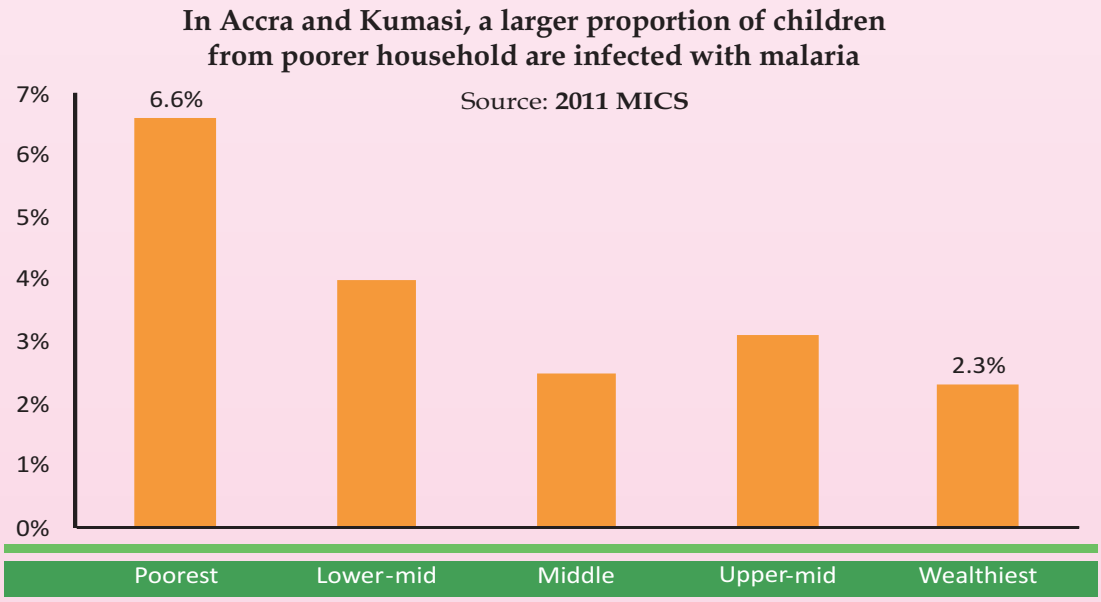


Fig 6: Prevalence of malaria among children per wealth quintiles, Ghana 2011.

Transmission of malaria (EIR) is higher near to urban agriculture

Source: Klinkenberg et al, Afranet al

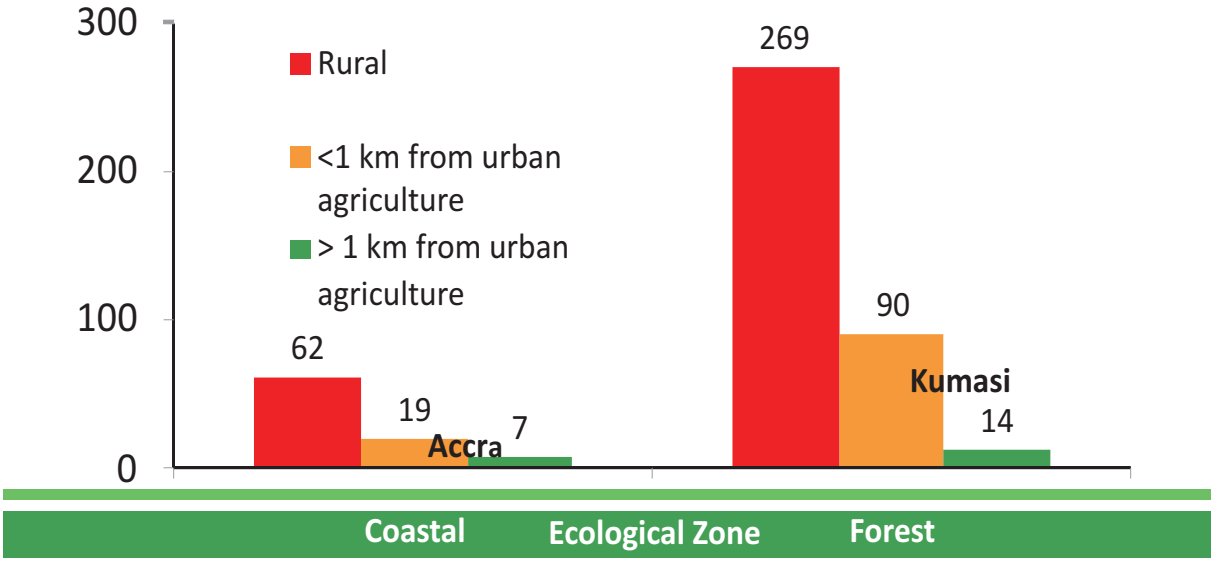


Fig 7: Comparison of intensity of malaria transmission with distance from urban agriculture (The Ghana Urban Malaria Study, 2012).

Entomological studies show that the breeding of anopheles and the intensity of malaria transmission are both higher in neighbourhoods less than 1 km from sites of urban agriculture than in neighbourhoods more than 1 km from such sites [Fig 7].

3.2 Population at risk

Ghana's population has increased from 18,412,247 in 2000 to 24,658,823 in 2010 (2000 and 2010 Population Census, GSS). The projected population in 2012 is 25,932,162 and it is estimated that all the population are at risk of having malaria but children and pregnant women are the most vulnerable. Environmental factors such as land cover of vegetation (savannah, tropical forest, mangrove) and swampy areas, rainfall patterns and average annual temperatures of 26 degree centigrade and rain fall also ranging from 100mm to 2800mm (Figure 8) all affect risk of getting the disease.

Figure 8: Ecological Zones of Ghana

The altitude also ranges from 0-750m above sea level (Figure 9) and these create favourable conditions for the mosquito vectors (Anopheles gambiae ss, An. Arabiensis, An. funestus) to breed and transmit the disease and significantly increase the malaria risk in Ghana.

Figure 9: Altitude of Ghana

The micro-geographical and seasonal variations in the biting and the level of malaria transmission observed in many areas showed that malaria transmission is heterogeneous in Ghana. The EIR (average infective bite an individual will receive from a mosquito in the night) ranges from 418 in the Northern part of the country to about 20 in the South (Fig 10).

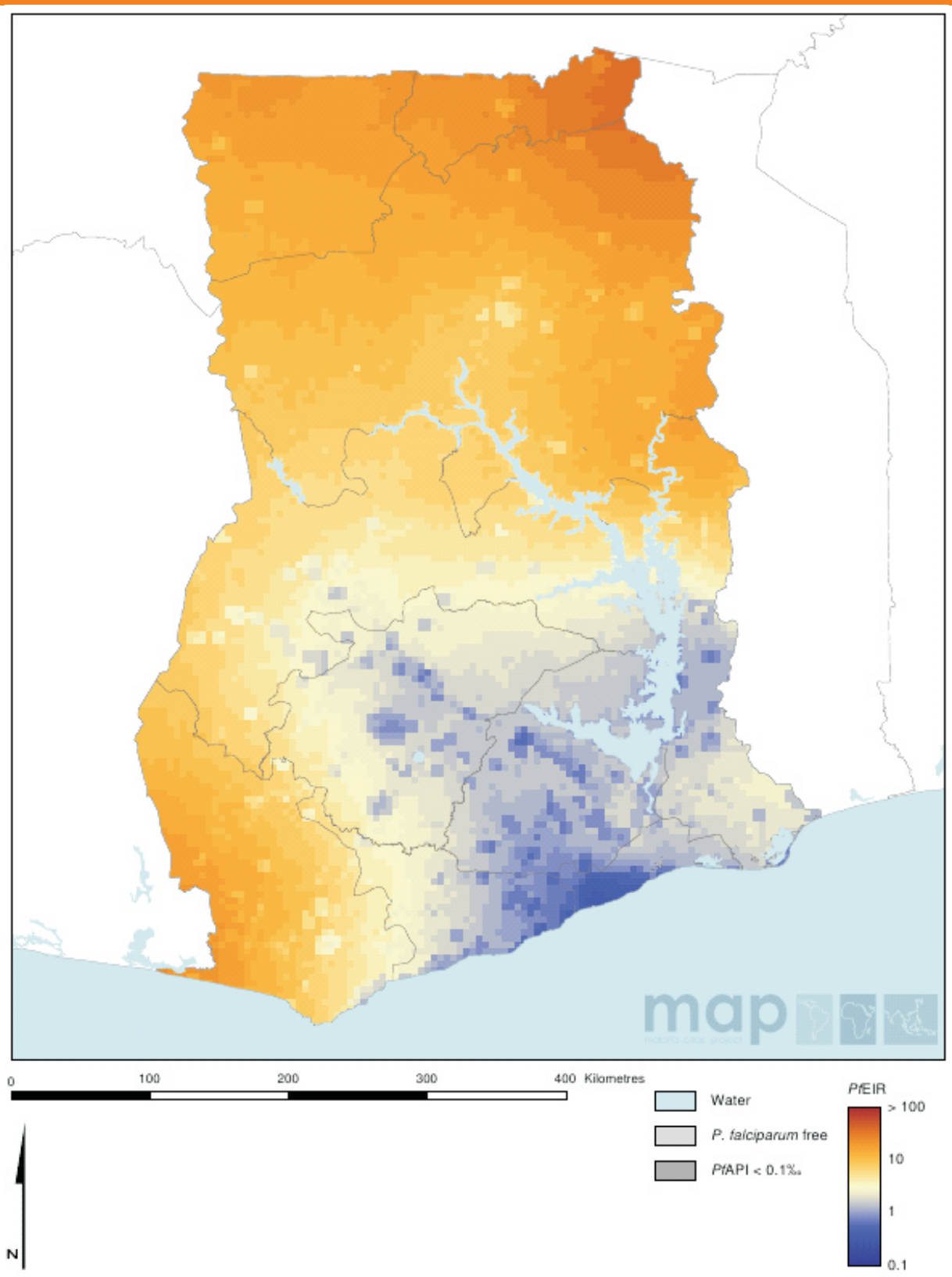


Figure 10: Risk of Malaria transmission across the different ecological zones (EIR)

Source: (www. map.ox.ac.uk)

3.3 Stratification and Risk Map

Figures 3, 8-10 show the risk maps of malaria in Ghana with geographical stratification based on climate and ecological zones. The intensity of transmission is highest in northern zone, followed by middle zone and least in the southern zone, as per EIR.

3.4 Malaria Parasites

Plasmodium falciparum is the predominant malaria parasite (about 80-90%) causing severe morbidity and mortality particularly in children under five years of age and pregnant women in Ghana. The other parasites found in Ghana are the *Plasmodium malariae* (about 10-20%) *and Plasmodium ovale* (about 1%). *P. vivax* has not been reported from health facilities or identified in any part of the country because historically more than 90 % of the population in West Africa have Negative Duffy Antigens on red blood cells, making them relatively unsusceptible to infections with *P.vivax.* Indications are that the small proportion of the population with the Duffy Antigen could be susceptible to *P. vivax* infection and should be investigated since it could have programmatic implications in Ghana.

3.5 Malaria Vectors

In Ghana, *An. gambiae s.l.* and *An. funestus* have been identified as the major vectors of malaria in all the ecological zones of the Northern Sahel, Middle transitional and in the Southern zone (Figure 11). Within the *An. gambiae* complex, *An. gambiae s. s.* was the most dominant sibling species and accounted for the majority of the *P. falciparum* infective bites in all the areas. *Anopheles arabiensis* has been found in the sahel zone but in fewer numbers. *Anopheles gambiae* Giles was found to be predominant in many ecological areas of the country with local presence of *Anopheles melas* Theobald in areas with brackish water along the southern coast. The distribution of *An. melas,* one of the sibling species of the *An. gambiae* complex, was limited to the vicinity of breeding sites associated with mangrove swamps.

The Molecular forms of the *An. gambiae s.s.* (Mopti and Savanna) forms also exist in many areas in Ghana with seasonal and geographical variations. *An. funestus* s.s and *An. lessoni* have been identified as the members of the *An. funestus* group in Ghana with the former being the only species implicated as vector malaria (Figure 11). There are a number of other species that have been identified in Ghana but not involved in malaria transmission including *An. pharoensis, An. rufipes, and An. Melas. Additional information on malaria vector bionomics can be found under Chapter 4.4 on Integrated Vector Control.*

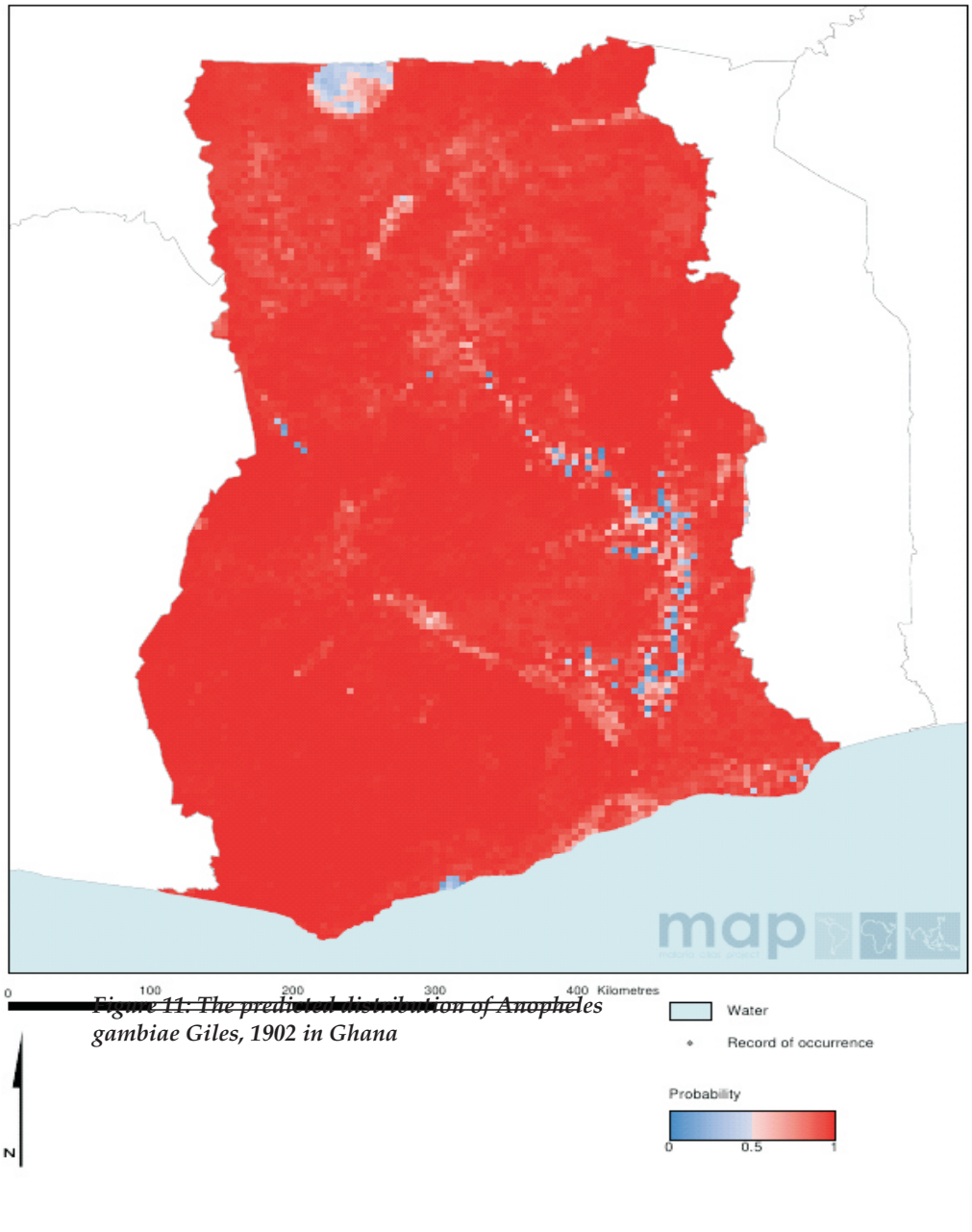


Figure 11: The predicted distribution of Anopheles gambiae Giles, 1902 in Ghana

3.6 Disease trends

Malaria Morbidity and Mortality/Malaria Burden (HMIS)

Reports from health facilities captured in the routine health information system (HMIS) indicate that, the total OPD malaria cases per 1000 population were about 250 cases per 1000 in 2000. This reduced to about 150 in 2001 and stayed around the same until 2012 when it went up to about 300 cases per 1000 population (Figure 12). This trend of increasing malaria OPD per thousand was similar though the absolute values were higher as compared to what was found from the Rapid Impact Assessment (RIA June 2013) of 83 health facilities (i.e.80 per 1000 in 2005 to about 159 per 1000 in 2012 in RIA) whose data for the period of 2006 to 2012 were retrospectively reviewed. The trend observed after 2008 may be due to a number of factors including improved data capture, denominator issues and increasing presumptive diagnosis of the disease.

Fig. 12 : Total OPD Malaria Cases Per 1000 Population, 2000-2012

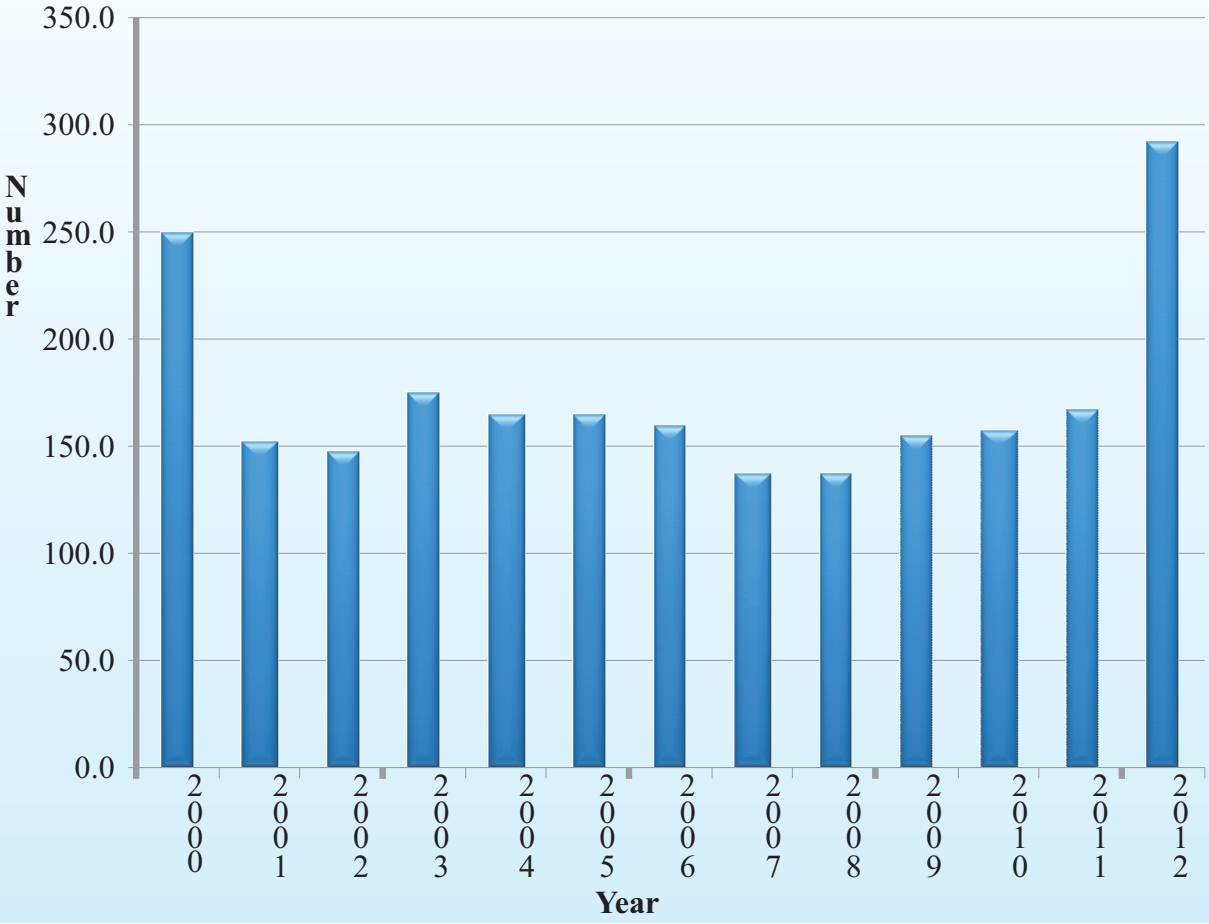
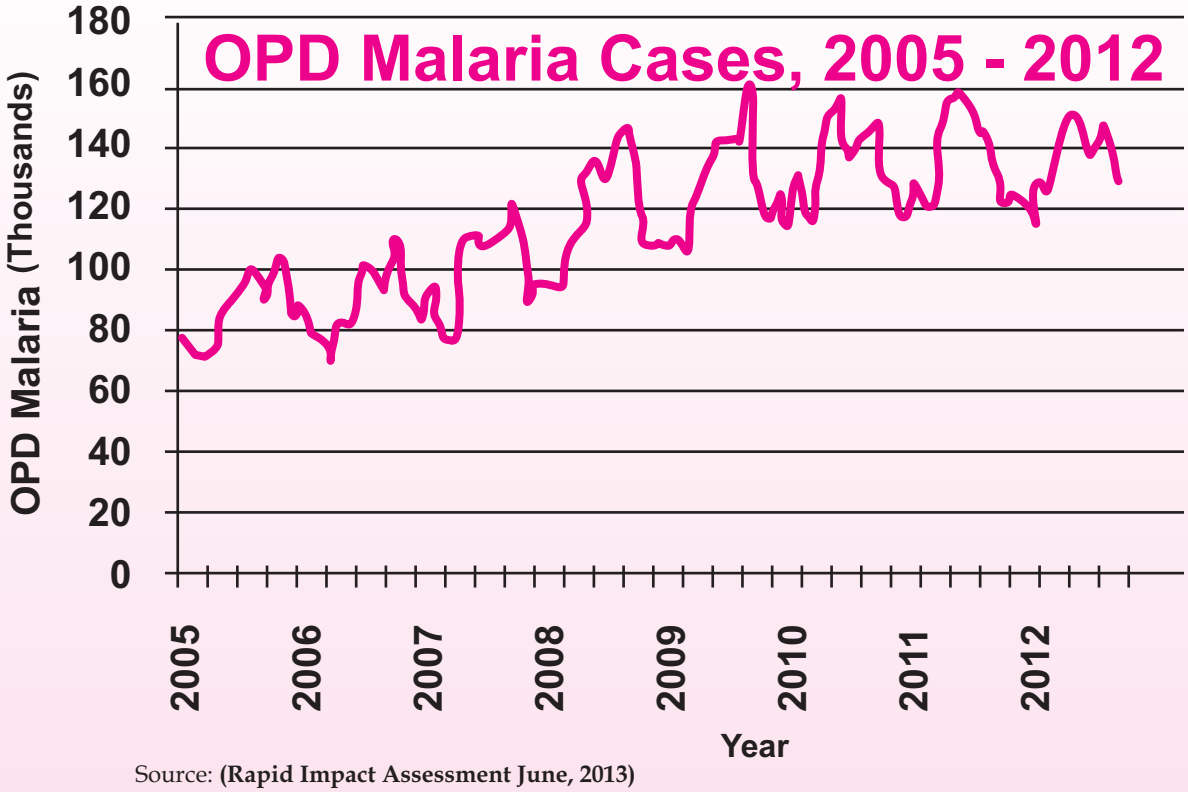


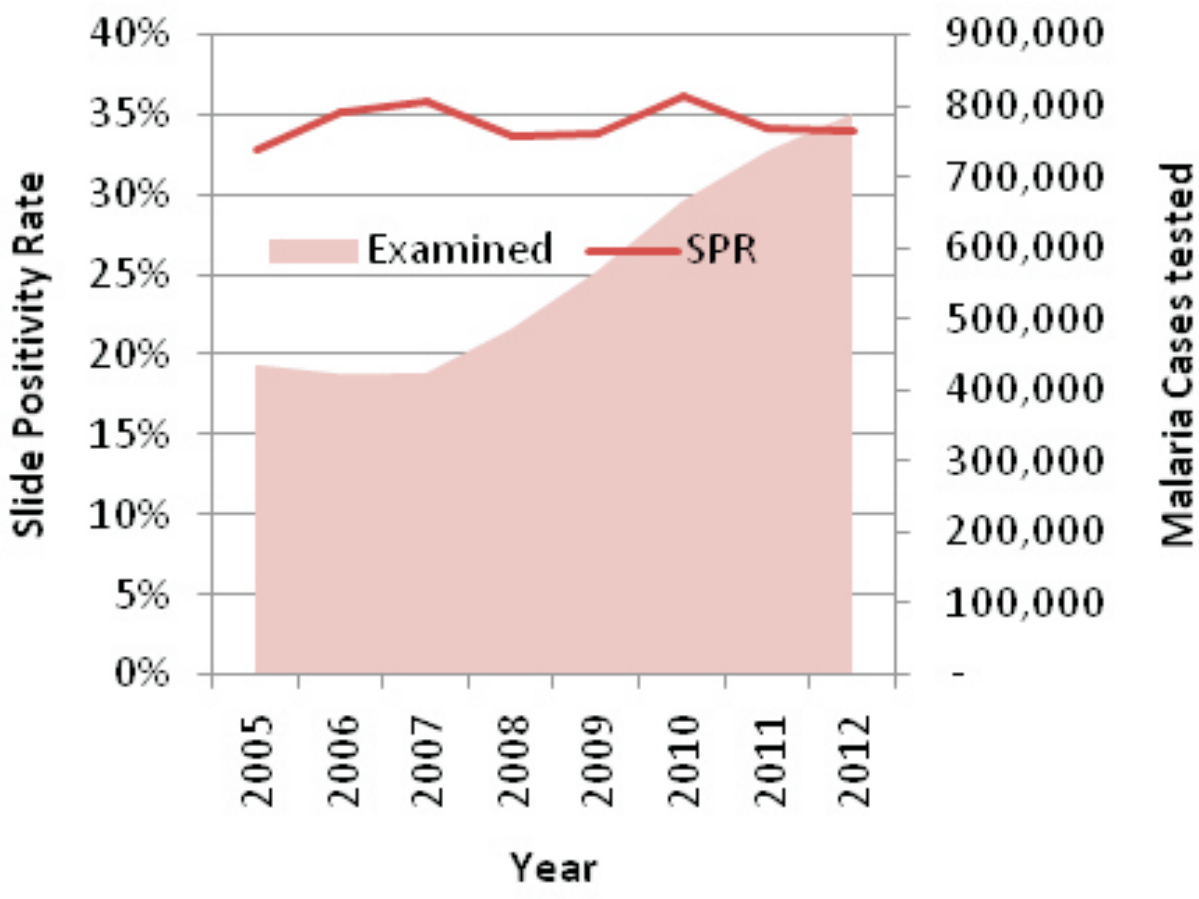
Figure 13: OPD malaria cases 2005 to 2012



Source: **(Rapid Impact Assessment June, 2013)**

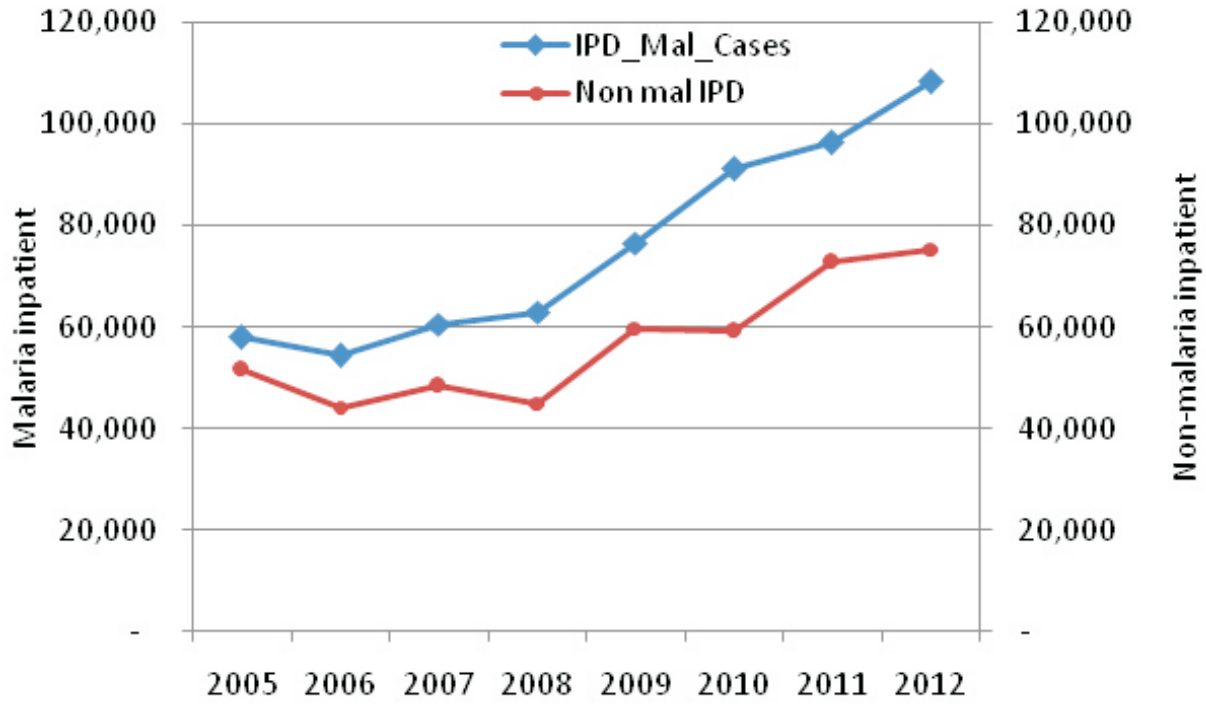
The testing rates of suspected malaria cases in the country had stagnated from 2005 to 2007 but saw a steady increase from about 18% in 2007 to 35% in 2012. The level of testing however still remains low and the programme now recommends that as much as possible all cases should be confirmed by testing before treatment. With this low level of testing it is not surprising that the slide positivity rates remained around the same level from 2005 to 2010 around 40% slightly decreasing after that year to 36% in 2012. It is expected that once the level of testing is significantly increasing the effect of interventions being implemented in the country is likely to show reduction in the slide positivity rate.

Figure 13: Slide positivity rate versus number of cases microscopically tested in all ages in 2005-2012



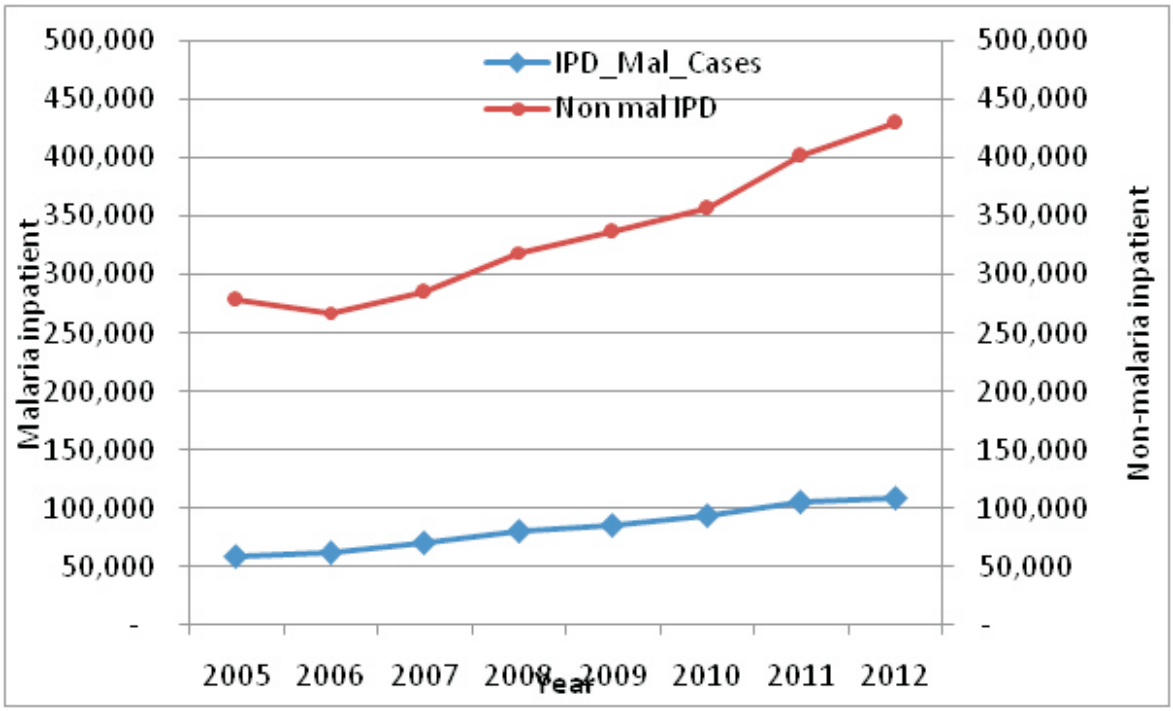
(Source: Rapid Impact Assessment (RIA), June 2013)

Fig 14a:Inpatient malaria cases vs non-malaria in-patient cases in 83 hospitals from 2005-2012 in Children Under 5 years



(Source: **Rapid Impact Assessment (RIA), June 2013**)

Fig 14b: Inpatient malaria cases vs non-malaria in-patient cases in 83 hospitals from 2005-2012 in Children Above 5years



(Source: **Rapid Impact Assessment (RIA), June 2013**)

Proportion of in-patients admitted with malaria for the various target groups appear to be increasing (Figure 13). The trend of increase from 2007 is more marked for children under five years. This may be due to provider adaptation to the introduction of DRG (Diagnosis Related Grouping) as a payment mechanism under the National Health Insurance Scheme (NHIS) in 2007. With the introduction of DRGs for payment, the payment for malaria treatment was significantly higher when a patient was admitted than when they were treated as outpatients. The incentive for providers to admit patients with diagnosis of malaria became high, as they are paid more for inpatient admissions than OPD. This conclusion is supported by Fig 15 that is showing a consistent increase in admission of insured patients from 2008-12 compared with non-insured patients.

Fig. 15: Graph of Insured and non-Insured to malaria by target groups, 2000-2012

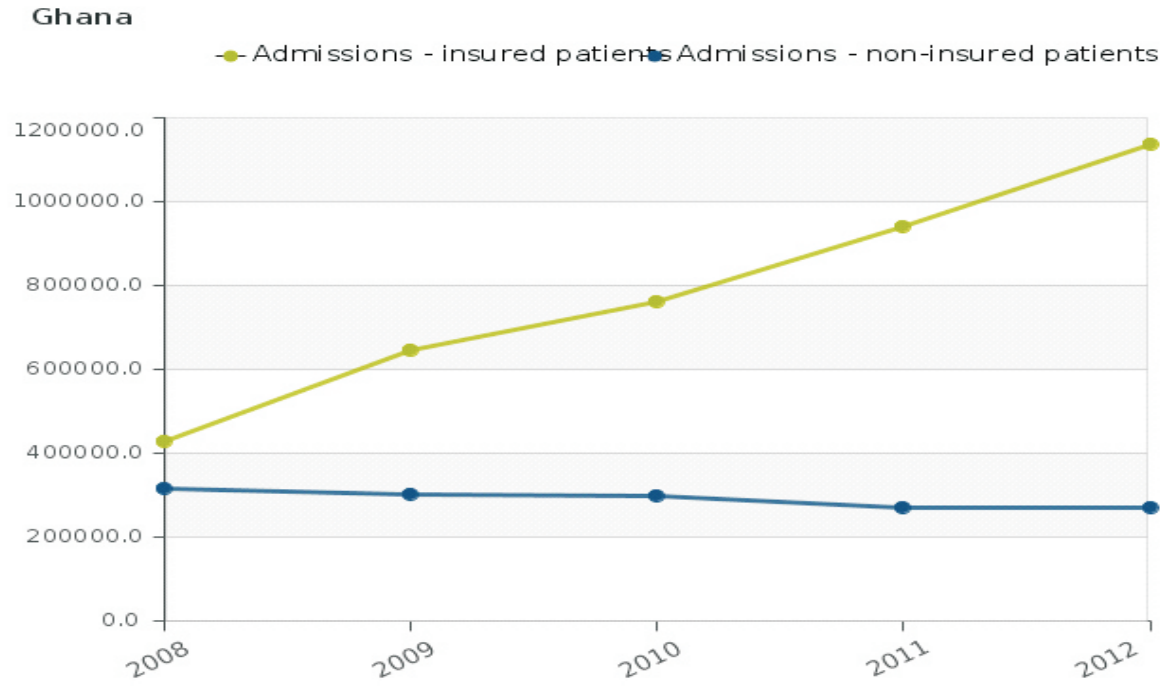
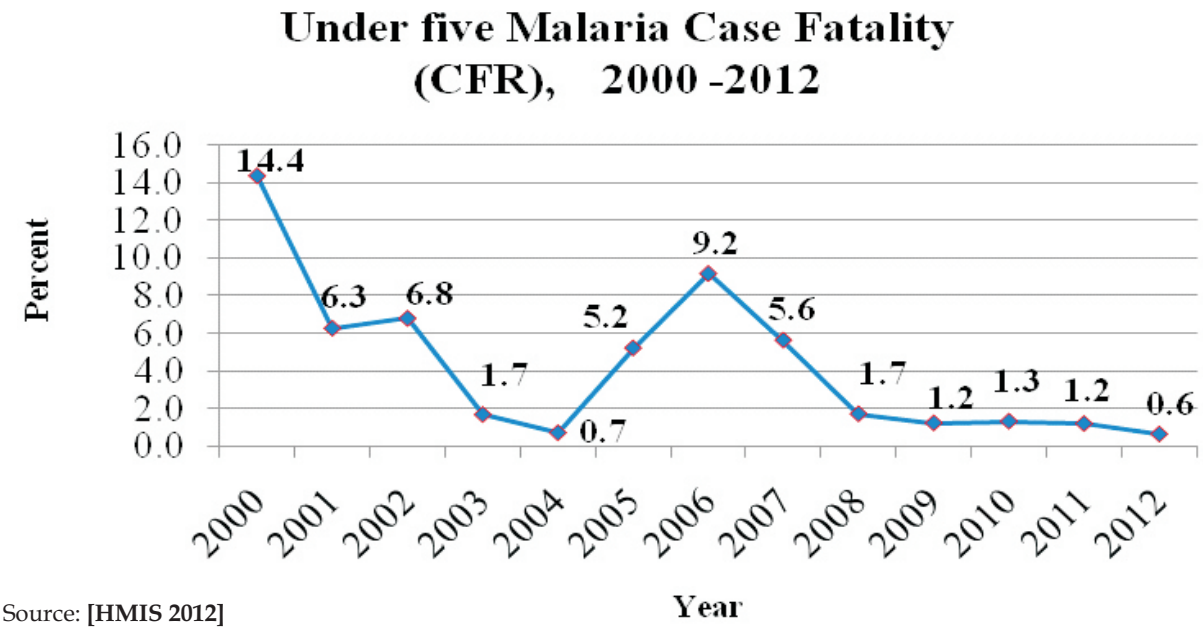
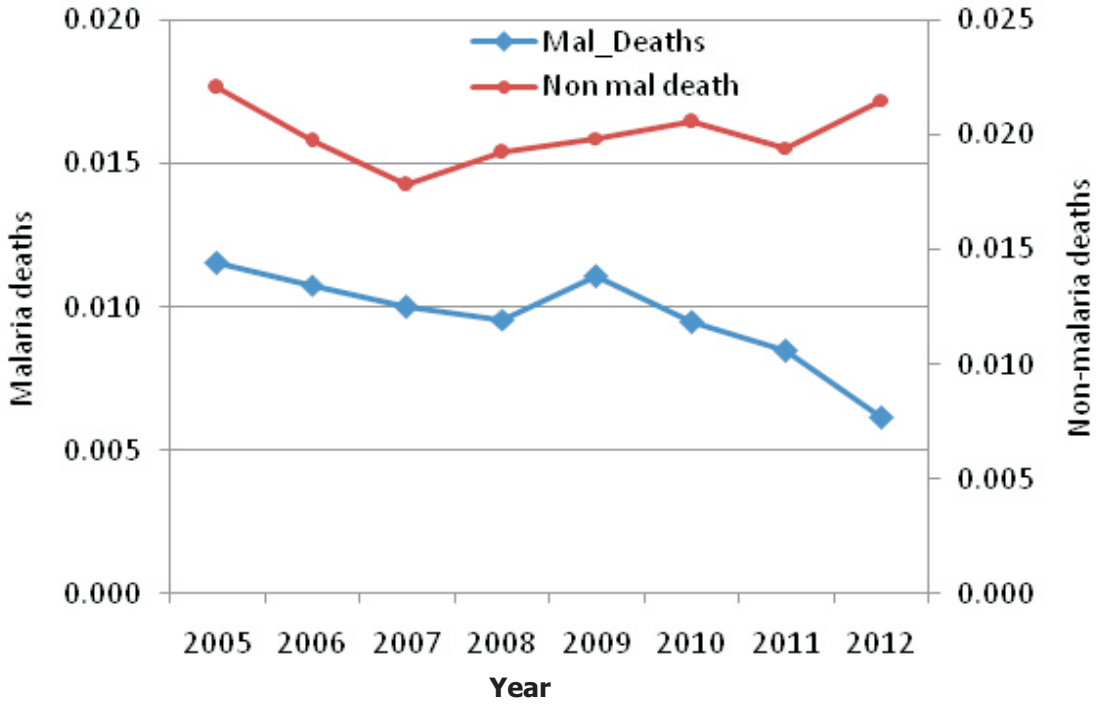


Figure 16: Trend of Malaria Case Fatality Rate for Children Under Five Years, 2000-2012,



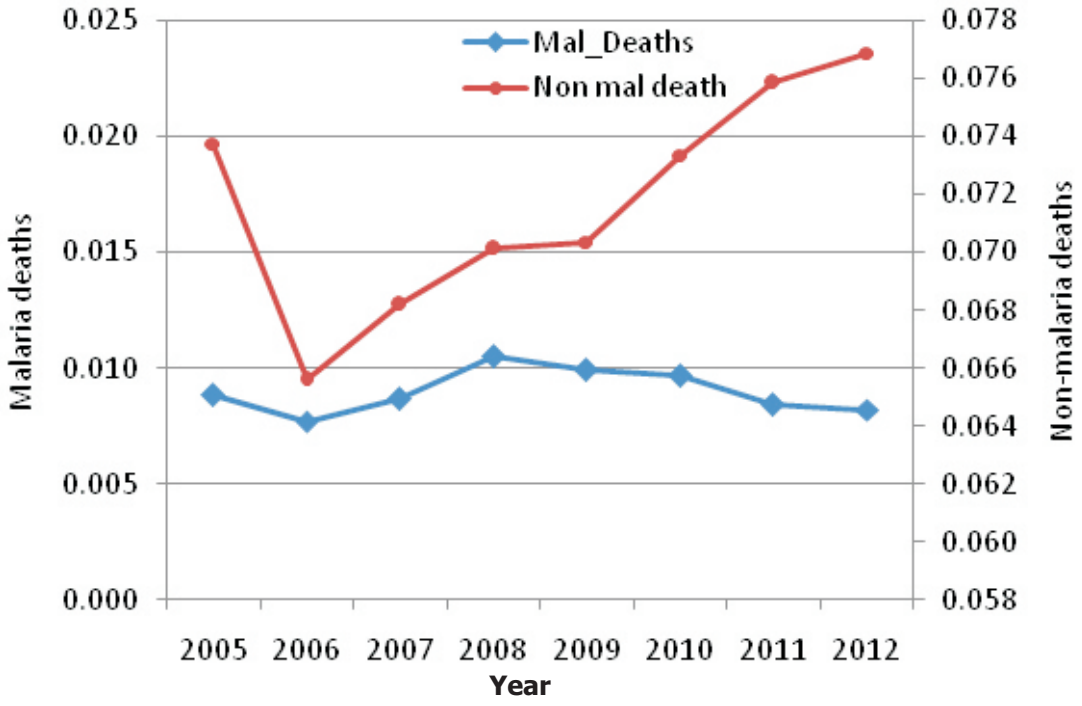
Source: **[HMIS 2012]**

Figure 17a: Malaria deaths vs non-malaria deaths per 1000 for Children Under Five Years, 2005-2012



(Source: **Rapid Impact Assessment (RIA), June 2013**)

Figure 17b: Malaria deaths vs non-malaria deaths per 1000 for Children Above Five Years, 2005-2012



(Source: **Rapid Impact Assessment (RIA), June 2013**)

From the two graphs (Figures 16 and 17) above, there is a general decline in institutional deaths due to malaria. This finding is very significant in the case fatality of children under five admitted for malaria. This is a good trend, which may be a reflection of an improvement in the case management of malaria. This observation is not consistent with the increase in the admissions over the same period as shown in Figure 14a and 14b. thus giving further credence to the suggestion that the observed increase in the admissions was a behaviour change adaption from health workers due to the NHIS. It is however important to keep monitoring the trend of Case Fatality Rate (CFR) as a measure of quality of management of cases.

3.7 Conclusions and Recommendations.

3.7.1 Conclusion

- Recent studies in 2011(MICS) have shown endemicity (as per EIR, intensity of transmission) ranging from hypoendemicity in the Greater Accra Region, hyperendemicity in the Upper West Region and mesoendemicity in the rest of the country. The EIR (average infective bite an individual will receive from a mosquito in the night) ranges from 418 in the Northern part of the country to about 20 in the South.

- The risk of malaria is highest among people living in rural areas and near urban agriculture, and among the poorest.

- *Plasmodium falciparum* is the predominant malaria parasite (about 80-90%) causing severe morbidity and mortality particularly in children under five years of age and pregnant women in Ghana. The other parasites found in Ghana are the *Plasmodium malariae* (about 10-20%) *and Plasmodium ovale* (about 1%). *P. vivax* has not been reported from health facilities or identified in any part of the country.

- *An. gambiae s.l.* and *An. funestus* have been identified as the major vectors of malaria in all the ecological zones of the Northern Sahel, Middle transitional and in the Southern zone. *Anopheles arabiensis* has been found in the sahel zone but in fewer numbers.

- There is no evidence of reduction of malaria cases over the years from 2000 to 2012. This may be attributable to the presumptive diagnosis of malaria cases and there is the need to increase the testing rate. Proportion of in-patients admitted with malaria for the various targets groups appear to be going up. This may be due to distortions by providers with the introduction of DRG as a payment mechanism under the National Health Insurance Scheme (NHIS) in 2007.

- There is a general decline however in institutional deaths due to malaria. This is very significant in the case fatality of children under five admitted for malaria and may be due to improved management of malaria cases.

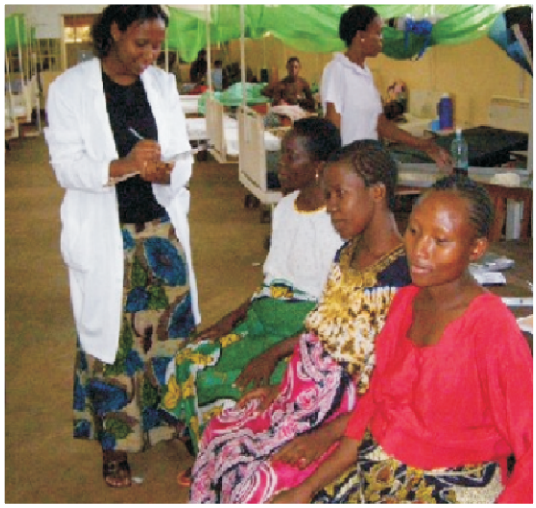
Synthesis of the NMCP performance in area of epidemiology

AREAS	SCORE				COMMENTS
	3 high adequate	2 adequate	1 present but inadequate	0 inadequate	
Observed reduction in trends of cases over time			X		
Observed reduction in trends of deaths over time Observed decreasing of Slide Positivity Rate (SPR) over time	X		X		
Reduction in cases and deaths by 50% every five years Observed reduction in districts with malaria transmission over time	X (deaths)	X	X (cases)		For deaths but not for cases

Recommendations

- Stratification of malaria endemicity has not been extended to the district level. We recommend that parasite prevalence by districts should be carried out.
- The small proportion of the population with the Duffy Antigen could be susceptible to *P. vivax* infection and should be investigated since it could have programmatic implications in Ghana.
- There is the need for continuous monitoring of biting habits of mosquito vectors in the country in view of many vector control interventions in place.
- In the long term, we recommend that monitoring the trend of the positivity rates among suspected cases will be a better way of monitoring the burden of malaria in the country than the total malaria cases seen at the OPD due to many distortions.
- Monitor malaria transmission pattern on account of possible climate change by compiling and linking epidemiological, entomological and meteorological data for mapping.
- Ensure the use of strategic information such as the stratification data (SPR) in the country for decision making.

CHAPTER 4
Programme Performance by thematic areas



4.1 Programme Management and Governance

4.1.1 Introduction

This section provides information on the governance and programme management structure/systems for malaria in terms of: Policy formulation, Organisational structure and oversight responsibility, Stakeholder participation, coordination and partnership arrangements, Health system responsiveness (health sector priority, national development agenda, regulatory framework in support of malaria control), Accountability, Human resource capacity development, Supervision, and systems for monitoring and evaluation of performance.

4.1.2 Policy

The National Health Policy

Ghana has attained its vision to become a middle-income status with over 1000 USD per capita. In line with this, the health sector in 1996 was restructured through Act 525 that led to the creation of Ghana Health Service (GHS) and Teaching Hospitals with defined roles and responsibilities and decentralized administration with MoH as the policy body [GHS/TH Act 1996].

The PPME Unit of the MoH provides the needed leadership and coordinates policy formulation in the health sector. In consultation with National Development Planning commission (NDPC) and in partnership with development partners, its agencies, WHO and appropriate research and other relevant institutions, the Ministry makes use of outcomes of sector performance review processes, research findings and technical support to define its policies.

The health sector is currently implementing its third Programme of Work (2006-2011). The **mission** of the health sector is to contribute to socio-economic development and wealth creation by promoting health and vitality, ensuring access to quality health, population and nutrition services for all people living in Ghana and promoting the development of a local health industry. The ultimate **goal** of the sector is to ensure a healthy and productive population that reproduces itself safely by ensuring that people live long, healthy and productive lives and reproduce without an increased risk of injury or death; reducing the excessive risk and burden of morbidity, mortality and disability, especially in the poor and marginalized groups and reducing inequalities in access to health, populations

and nutrition services and health outcomes. These are currently (2013) captured in the ministry's five strategic objectives to:

HO1: Bridge the equity gaps in infrastructure, human resource, and financial access to health care and nutrition services and ensure sustainable financing arrangements that protect the poor
HO2: Improve governance and ensure efficiency and effectiveness in health systems
HO3: Improve access to quality maternal, neonatal, child and adolescent services
HO4: Intensify prevention and control of non-communicable and communicable diseases and promote healthy lifestyle
HO5: Strengthen institutional care including mental Health service delivery [MOH SMTDP 2010].

The GHS framework [GHS 2008] has identified clear Health/Sector Policy **objectives (**Healthy lifestyle and healthy environment, Health reproduction and nutrition services, General health system strengthening and Governance, partnership and sustainable financing) and **priorities** (Ensuring healthier mothers and children through HIRD scale up; promoting good nutrition, food security and food safety; Combating communicable diseases such as HIV/ADS, malaria, Tuberculosis, epidemic-prone diseases and diseases that almost exclusively affect the poor; Reducing risk factors to non-communicable diseases such as tobacco and alcohol uses, improving physical exercise etc; Strengthening clinical management of diseases; Strengthening surveillance and response to epidemics and emergencies; Strengthen regulatory framework and forge integrated, effective, equitable and accountable health system).

Sector-Wide Approach (SWAp) in Ghana

As part of the process of integrated planning and financing of the health sector, Ghana adopted a sector-Wide Approach (SWAp) which involved joint planning with a common fund "basket" arrangement but now reformed into a sector budget support where some health partners support the health sector programme of work through central government budget. Current management arrangements still allow for joint planning and reviews making use of sector-wide indicators.

Ghana's Commitment to the Abuja Declaration

Ghana in 2000 participated in the African Development Forum in Abuja and signed and implemented the Abuja Declaration on HIV/AIDS, TB, Malaria and other Infectious Diseases. The HIPC initiative of the government [GOG HIPC Initiative 2004], which targeted the poor and vulnerable groups, made provision for subsidies and exemptions for certain types of services including provision of LLINs, free treatment for vulnerable groups (pregnant women, children, the aged) and the poor. The Government of Ghana is currently scaling up the Community Health Planning Service (CHPS) strategy which involves placing trained community health officers (CHOs) in communities to provide a package of essential health services, including malaria prevention and control.

Malaria control strategy

The main policy document guiding malaria control in Ghana is the "Strategic Plan for Malaria Control in Ghana 2008-2015". The preparation of this document was informed by lessons in the implementation of a 2000-2010 strategy with the RBM goal to reduce the malaria disease burden by 50% by 2010, and the Abuja declaration of May 2006, which aims at achieving and sustaining universal access to appropriate interventions for all populations at risk of malaria. This new strategy has a goal of reducing the current malaria disease burden by 75% by the year 2015 in line with the attainment of the Millennium Development Goals (MDGs) and focuses on improving multiple prevention, improving access to prompt and effective treatment, strengthening health systems at all levels, and creating and sustaining partnership.

Other Positive issues in the Policy Environment

Ghana has in 2012 revised its Integrated Disease Surveillance and Response (IDSR) based on International Health Regulation (IHR) guidelines and now tracks malaria morbidity and mortality through DHIMS2.

The MOH Strategic framework on Survival of Sickle Cell Disease (SCD) children has a goal to ensure long, healthy and fulfilling quality lives of persons with SCD and to reduce disease burden among SCD persons living in Ghana by providing among others "routine malaria prophylaxis including use of treated bed-nets". [MOH 2011]

Ghana has a Health Sector Gender Policy that recognizes that for MDG Goal 3 (Promoting Gender equality), Goal 4 (Reducing Child mortality), Goal 5 (Improving maternal health) and Goal 6 (Combating HIV/AIDS, TB, Malaria) to be attained, "the susceptibility of pregnant women and children to malaria for instance makes it important to see gender considerations as imperative" and that "communicable diseases- malaria, TB and HIV/AIDS and all other communicable diseases- are critical diseases which have exemplary gender dimensions that should be analyzed and addressed" [MOH 2009]. While gender mainstreaming is still underway, the use of SP for IPT and universal household ownership of ITN seek to address gender inequity in malaria control.

More than 75% of blood in the rural areas and 50% in urban areas are transfused to children under five years and women in child bearing age. With Ghana Blood Transfusion policy to ensuring safe, efficacious and adequate blood and blood products for all patients in all health institutions of the country, both public and private, making it accessible and affordable, possible deaths arising from anaemia as a complication of malaria can be averted [MOH 2006].

In 2012, Ghana passed a public health law (PH ACT 851) to give direction to and facilitate the implementation of essential public health interventions. The act has nine parts with part four on vector control, which mandates District Assemblies whenever necessary to establish a vector control team for the purpose of the control of vectors of public health importance, including mosquitoes. It also prohibits owners of premises or a person in occupation of premises from allowing on the premises the presence of a receptacle for water containing mosquito larvae, or water to be kept uncovered in a receptacle that has not been emptied [Ghana Public Health Act 851 2012].

4.1.3 Organization

The Health sector in Ghana is public and private. The public sector is run by Ghana Health Service and Teaching Hospitals. The private sector is made up of faith-based and private-for-profit health institutions. The current health sector organisation provides for leadership at the ministerial level and supported by the following implementing agencies:

- Service delivery (Teaching hospitals, Ghana Health Service, Psychiatric hospitals, Ambulance Service, Blood Service, CHAG)
- Health training and research institutions
- National health insurance Authority
- Regulatory bodies.

The Ghana Health Service is a three-tier health delivery system of primary, secondary and tertiary levels. The primary level is the district level where a district hospital with a medical doctor serves Health Centres in Sub-districts with Physician Assistants in charge. In some sub-districts are Community Health Planning & Services (CHPS) zones where Community Health Officers (CHOs) work with community volunteers to increase access to health care. A typical district with a population of 100,000 has one hospital, 5 health centres and 10-15 CHPS zones. The leadership of the district is the District Director of Health Services who works with a District Health management Team and reports administratively to the District Chief Executive (Political Head) and technically to the Regional Director of Health Service.

At the regional level is the regional hospital, which is the referral level for secondary care and run by general practitioners and specialists. There are ten regional hospitals receiving referrals from districts and providing outreach support to districts in Ghana but only Ho, Cape Coast, Takoradi and Sunyani hospitals meet the standard. The Regional Director of Health Services oversees all matters of health in the region, works with a Team and reports administratively to the regional Minister (Political Head) and technically to the Director General of the Ghana Health Service who reports to the Minister of Health through a Council. Komfo Anokye, Korle-Bu and Tamale are the current teaching hospitals providing tertiary care and training of doctors. The Chief Executives of these teaching hospitals report to the Minister of Health through a Board.

The health sector has adopted an integrated approach to delivery of health interventions. Access, quality and coverage of health service, preventive care, clinical care and emergency services are all important aspects of health service delivery system. There is a National Health Insurance Scheme (under the National Health Insurance Act 650, 2003 and LI 1809, 2004) to take care of the cost of providing most of the services in health facilities. As part of the approach, public health interventions are packaged and delivered in communities as part of CHPS and outreaches, in health centres and in district, regional, and national levels.

The NMCP is within the Disease Control Department of the Public Health Division (PHD) of Ghana Health Service (GHS). PHD is one of the ten Divisions at GHS HQ that reports to the Director General (DG), (Please see HR section 4.15, for HQ staff at national level). In practice the NMCP tends to deal directly with the Ministry or the DG of GHS by-passing the public service bureaucracy. While this approach facilitates speedy execution of programmes, it fails to mobilize the needed oversight and support required to call regions and districts to accountability in technical results and financial reporting.

At the national level the NMCP contributes to policy formulation, strategic planning, coordinating interventions and providing technical support.

Below is the organogram of the NMCP.

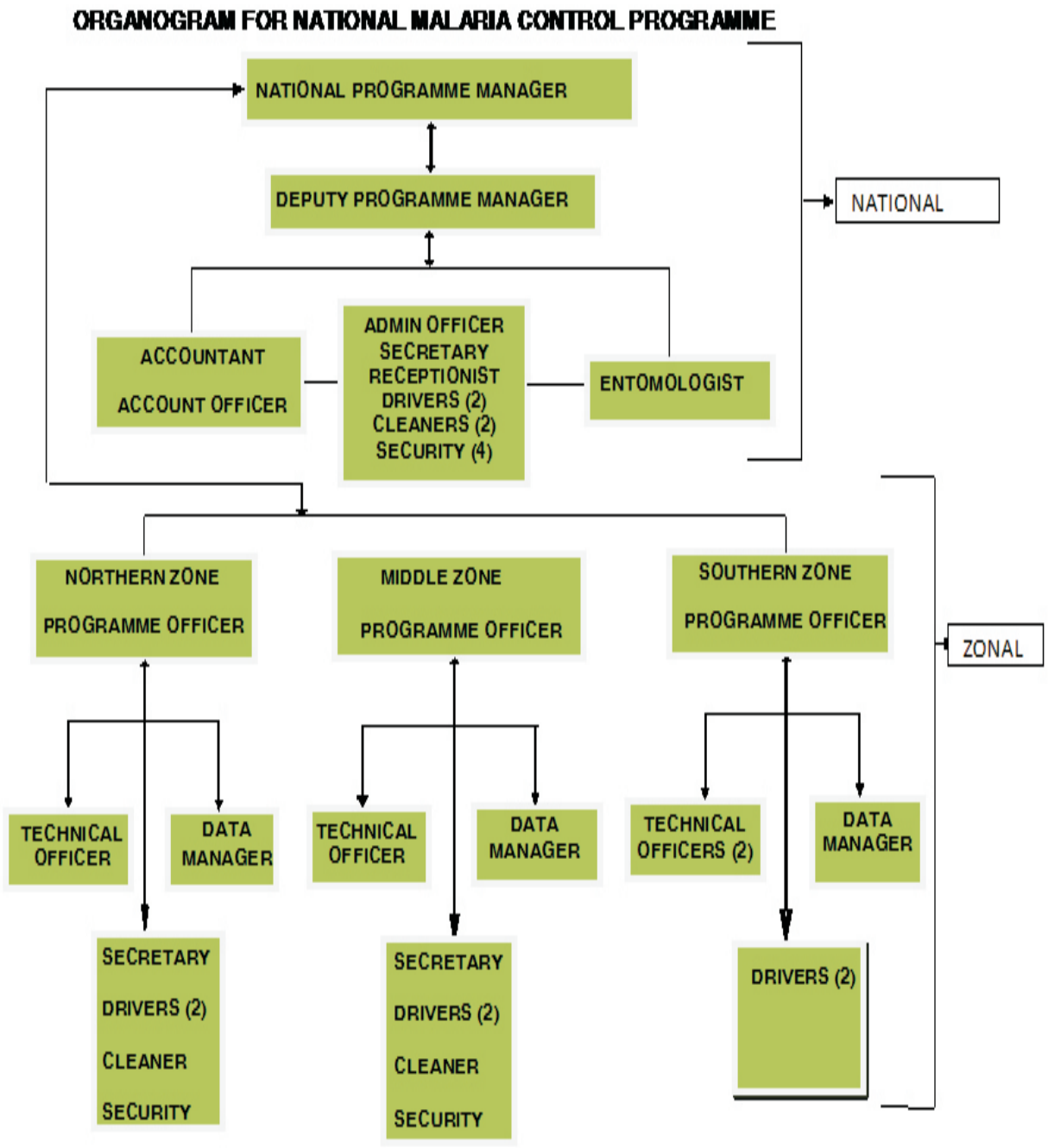


Fig 18: Organogram of NMCP, 2012

Within the regions and districts are multi-purpose disease control technical officers that ensure integrated health service delivery. These officers report to their respective district and regional Directors of Health.

The Zonal teams are part of the NMCP national level human resource and are not mandated to report to the regional Directors of the regions in which they work. While the zonal coordinators facilitate capacity building, follow up on activities and financial returns, validate malaria control data and generally enhance implementation of interventions, their activities sometimes create undue demand or apathy on the part of regional officers thereby creating a seemingly vertical malaria programme implementation with gaps that could otherwise be addressed by local teams.Following over seven years of practicing this zonal structure, it is time to review it for improved performance.

At the subdistrict and CHPS compounds are Disease Control Technical Officers and Field technicians, community health nurses and medical assistants who carry out malaria control activities, supported by community volunteers.

4.1.5 Human Resources, Training and Capacity Development

The Ghana National Health Policy captioned Creating Wealth through Health, September 2007, considers human resource under that policy to include all human capacity involved in developing, providing, managing or supporting curative, preventive, promotive and rehabilitative health, both in-country and externally, who directly or indirectly influence health development [National Health Policy 2007]. In the light of this, human resource for malaria control programme management will be examined at the national (central), regional, and district, facility and community levels.

At the central level, the NMCP which is the only unit specifically dedicated to malaria and its related issues is headed by a Programme Manager with a Deputy, both of who are Medical Officers with a master's degree in Public Health. There is one Entomologist at the national level. Ghana's malaria control programme also operates 3 zonal offices covering 3-4 administrative regions. Each of the zones has a Zonal Coordinator or Programme Officer, currently one Medical Officer and two Pharmacists. In addition to the zonal coordinators, there are three biologists, one Disease Control Officer with an additional training in Health Education, two Statisticians who are recognized as Data Managers and one officer with training in Marketing and communication who handles IE&C related issues for the programme. All the zonal staff also double as focal persons for specific intervention areas such as Case Management, Malaria in Pregnancy etc. These constitute the core technical staff of the NMCP. The Programme has a team of administrative staff consisting of Secretaries, Finance Officers and drivers. All the Technical Staff have undergone further training in either the WHO's International Course on Malaria and Planning its Control organized in Ethiopia and Ghana or the CDC/Emory University's International Course in Applied Epidemiology.

There is no dedicated staff for Malaria Control Programme at the regional level. Beyond the national level, focal persons are appointed to exercise an oversight responsibility for malaria related activities. The focal persons are either biologists or Disease Control Officers who have other responsibilities in addition to the malaria control activities. They usually don't have specific training in malaria control but they join other health workers during refresher trainings

on case management or malaria in pregnancy. The organizational structure does not place these focal persons directly under malaria control neither do they receive any additional remuneration for the activities they perform.

At the facility level, health workers provide a package of health interventions and are therefore not necessarily "malaria staff"; however provision is made to improve their competencies in malaria control interventions through training and refresher trainings.

At the community level there may be a Community-Based Agent or Volunteer who has been trained to offer some basic services to the community members. Those services may or may not include malaria control activity. There are therefore no malaria control personnel at the community level except in places implementing the Home Based Care programme.

A section of the NMCP staff are permanent employees of the Ghana Health Service while a section were recruited under the Global Fund Grant to support programme implementation at the zonal level and are therefore not on the government pay roll. Four of the technical staff and six administrative staff are not permanent employees of the GHS. The NMCP's Strategic Plan eloquently states this situation as unsustainable and admits it to be a concern. [NMCP National Malaria Strategic Plan 2008].

Findings from the field visits indicate that the capacity of the staff at lower levels, especially CHPS zones, to execute malaria control activities is limited and the system is not optimally utilizing the potential of the CHPS concept for scaling up malaria control interventions. A similar finding was observed at some of the Health Training institutions where it was realized that some of the tutors were not abreast with current developments in malaria control.

4.1.6 Strategic, Annual Planning and Coordination/Partnership

The National Malaria Control Program (NMCP) of the Ghana Health Service plays the leading role in coordinating all implementation activities related to malaria by both development partners and the Ministry of Health. The National Malaria Control Programme has partnered with a number of relevant divisions, units and programs within the Health sector to solicit their input into malaria control. There is reported good intra-sectoral coordination with EPI within the Public Health Division and MCH (IMCI program) and Health Promotion within the Family Health Division. There is also collaboration with other ministries such as Education, Agriculture, Women and Children's Affairs, Finance and Local Government as well as the CSOs and private sector even though there is room for improvement.

COORDINATING BODIES

Defunct Roll Back Malaria Coordination Committee

Until 2008, a national Malaria Coordinating Committee met regularly to give guidance to the NMCP and, as the name implies, coordinate among various partners. Unfortunately, this committee has become defunct, and has not met since 2009. Ghana currently has no functioning RBM Coordination Committee, National Malaria Commission, or other such high-level advisory body.

Technical Working Groups

While the RBM Coordinating Committee was active, a number of technically-focussed subcommittees were established, to address the fragmentation and poor coordination, and ensure a harmonized and coordinated malaria control effort by all partners, departments and agencies. Each of these committees had Terms of Reference developed, and in theory are supposed to meet regularly to ensure a harmonized output in the specific areas of operation. In reality, most of these groups have been **task-focused and have lapsed into inactivity once the initial need passed. Examples of such task-focused committees are** Drug Policy Review Committee, Monitoring and Evaluation Working Group, Malaria Advocacy and Communications Committee, Malaria Vaccine Technical Advisory Group, Procurement and supply chain management (PSM) Technical Working Group, Case Management/Home Based Care Technical Working Group, ITN Coordinating Committee, the AMFm Coordinating Committee and Malaria Vector Control Oversight Committee. With the exception of the last three sub-committees all the others are either defunct or hardly meet at all.

4.1.7 Financing

This is fully described under section 4.2 of Economic and social burden of malaria and Financial Management.

4.1.8 SWOT Analysis

The GHS Strategic framework for service delivery (2007-2011) observes weaknesses most of which still remain. These include: Institutional, management and leadership inefficiencies and functions overlap between MoH and GHS, ineffective communication; most health centres not providing full complement of services; inadequate budgetary provision, inequity in resource allocation and vertical funding of programmes at district level, insufficient monitoring and supervision, reporting system challenges, weakness in accountability to patients and clients, HR production not matching with need with chronic staffing imbalance; Weak public private partnership; Teaching hospitals programmes planning and implementation not linked with that of GHS.

It also recognizes among others, the following ***threats***: Reliance on foreign aid (earmarked donor fund), widespread poverty and low capacity to pay for NHI; poor environmental sanitation and inadequate access to potable water.

Table 1: Summary of Strengths, Weaknesses, Opportunities and Threats, Programme Management

	Strengths	Weaknesses	Opportunities	Threats
Policy Formulation	- Established mechanism that prioritises health issues into policy - Malaria Policy informed by a strong national research capacity - Many guidelines and protocols available to guide policy implementation - Existence of periodic policy and operational review processes	- Inadequate consultation in policy formulation - Inadequate compliance and weak enforcement - Inadequate logistics supply to meet policy needs	- DHIMS2 to improve inventory and service outputs - NHIS to ensure universal access to care and commodities - Availability of UNDAF for resource mobilization	- Dependence on external funds to address key policy issues - Dependence on WHO to drive policy direction - Multiple policy documents with varying sector objectives - Absence of sustainability plan in the face of dwindling GF
Organizational Structure	- Zonal teams support to region - Levels of oversight within GHS and MoH - Integration at regional & district levels	-Weak sphere of control of Zonal teams -Poor information sharing at national level -Overburdened NMCP HQ staff -	- Partnership with other programmes (e.g. NTD) for surveillance -	- Weak link between GHS and THs -
Stakeholder Participation & Coordination	- NMCP in lead, accessible - Some international partners well engaged - Coordination within GHS (regions, PPME, MCH etc) - NGO and private sector roles recognized - Some TWGs active (ITNs, MavCOC)	- RBM coordinating. Committee defunct since 2009 - Most TWGs inactive (M&E, CM, BCC) - Private sector often an afterthought in practice	- Coordination with NHIA could align financial incentives with guidelines - Multiple partners keen to increase coordination with and inputs from NMCP - Vigorous private sector in Ghana	- Some malaria control players bypass NMCP and TWG - Political support for unconventional, wasteful methods by passes malaria control strategy - Numerous partners place increasing demands on NMCP time, overwhelming capacity to coordinate

	Strengths	Weaknesses	Opportunities	Threats
Human Resources	- Flexibility of recruiting staff from the GHS main stream - Possibility of capacity development for staff - Possibility of technical support from partners - Stable set of technical staff ensures continuity	- long recruitment process for GOG paid staff - Temporary nature of donor supported staff - semi-functional nature of the zonal concept	- Contractual engagement of GF supported staff - Availability of technically sound Disease Control Officers within the entire GHS structure	- Multiple roles played by regional and district focal persons - Other competing Public Health Programmes offering better remunerations
Supervision, monitoring and accountability	- Multiple systems for accountability: performance contract, Staff appraisal, performance review targets - DHIMS2 and HIO in districts - Appropriate indicators and targets - NMCP M&E framework with clearlydefined indicators and - Use of sector-wide indicators	- Overlapping roles and responsibilities - Lack of GoG resources to back performance contract - Data inconsistencies and incomplete data - Clinicians not confirming cases - Incomplete data particularly from private health facilities	- Use of sector wide indicators - Existence of DHS, MICS for independent assessment - IDSR and sentinel sites for data validation - New initiatives: Adoption of coverage assessment by DCD and bottleneck analysis by PPME - Private sector oversight: Link private hospitals and maternity registration with data submission	- Virtual lack of GoG service funds for operations - Inadequate support for integrated monitoring - Inadequate RDTs supply for case confirmation

4.1.9 Successes, Best Practices and Facilitating Factors

There were many observed success areas and facilitating factors in policy, coordination and partnership such as:

- Public Health Act
- National Development plan
- MoH/GHS PoWs
- NMCP Strategy
- Framework for accountability
- Systems to address underserved communities and vulnerable groups
- Some functional technical working groups

Best Practices

- Elaborate policies, strategies and guidelines
- Strong partnership within the Health sector and with agencies, CSOs and partners
- Strong malaria control leadership and open-door interaction with stakeholders
- Zonal concept potentially efficient

4.1.10 Problems and Challenges

- The main challenge is limited Government financing of NMCP interventions
- Additional challenges include
  - weak collaboration with other vector-borne disease programmes and low reporting from the private sector
  - inadequate compliance and weak enforcement
  - Conflict of reporting relationship of zonal officers and Regional Directors in their zones vis-a vis the Programme Management at NMCP

4.1.11 Conclusions and Recommendations

a) Conclusion:

- There are sufficient opportunities in policy and organizational arrangement that facilitate and promote malaria control interventions.

- There is potentially strong stakeholder participation, partnership & coordination system to facilitate resource mobilization and programmes implementation but this has been limited by the non-functionality of the coordinating committee.

- There is adequate human resource with the requisite training and capacity at NMCP, supported by experts from partners to execute malaria control strategy.

- Unfortunately, findings from the field visits indicate that the capacity of the staff at lower levels, especially CHPS zones, to execute malaria control activities is limited and the system is not optimally utilizing the potential of the CHPS concept for scaling up malaria control interventions. A similar finding was observed at some of the Health Training institutions where it was realized that some of the tutors were not abreast with current developments in malaria control.

- There is sufficient evidence of monitoring and accountability and efforts are in place to make improvements, but zonal system needs further fine tuning to ensure that officers are performing optimally.

Synthesis of the NMCP performance in area of Programme management

AREAS	SCORE				COMMENTS
	3 high adequate	2 adequate	1 present but inadequate	0 inadequate	
Place of Malaria Control in the National Development Agenda		X			
Place of Malaria Control in the Health System		X			
Adequacy of the organisation and management of national malaria control programme		X			

b) Recommendations

The following recommendations are made for proper programme management

- Strengthen the capacity of the Regional Health Teams, District and Sub-district teams to coordinate RBM activities and ensure effective management, supervision and monitoring of service delivery in the region using opportunity of Leadership Development Programme
- Ensure the functioning of the RBM oversight committee and technical working groups
- **Take steps to improve partnership with the private sector and the Teaching Hospitals**
- Include and prioritize malaria control activities in the sub regional health plans
- Improve integrated supportive supervision to include malaria activities from National to Regional level and from Regional to the district level.
- Review the zonal coordination arrangement or structure for improved performance
- NMCP should widely disseminate any revision of policies and guidelines in malaria especially clinical health staff.
- Include malaria in the package for pre –service training institutions and support them as required

4.2 Economic and Social Burden of Malaria and Financial Management

4.2.1 Introduction

Malaria takes an economic toll on human health and wellbeing as well as on the health system in Africa. According to the World Health Organisation, the disease is responsible for 20-40% of outpatient visits and 10-15% of hospital admissions in Africa (WHO, 1999). In Sub-Saharan Africa, 10.8% of all disability-adjusted life years (DALYs) were lost to malaria in 1990. Again, among the 10 leading factors in DALYS in the world in 1998, malaria ranked eighth with a share of 2.8% of the global disease burden. In Sub-Saharan Africa (SSA), however, malaria ranks second after HIV/AIDS, accounting for 10.6% of the disease burden.

Furthermore, while malaria contributed 2.05% to the total global deaths in 2000, it was responsible for 9.0% of all deaths in Africa (WHO, 2002). The WHO also estimated that the total cost of malaria to Africa was US$ 1.8 billion in 1995 and US$ 2 billion in 1997 (WHO, 1997). Malaria is therefore an enormous problem, which plagues all segments of the society.

The aim of this chapter is to assess the economic and social burden of malaria on families/households and at country level, as well as the financial management of the disease.

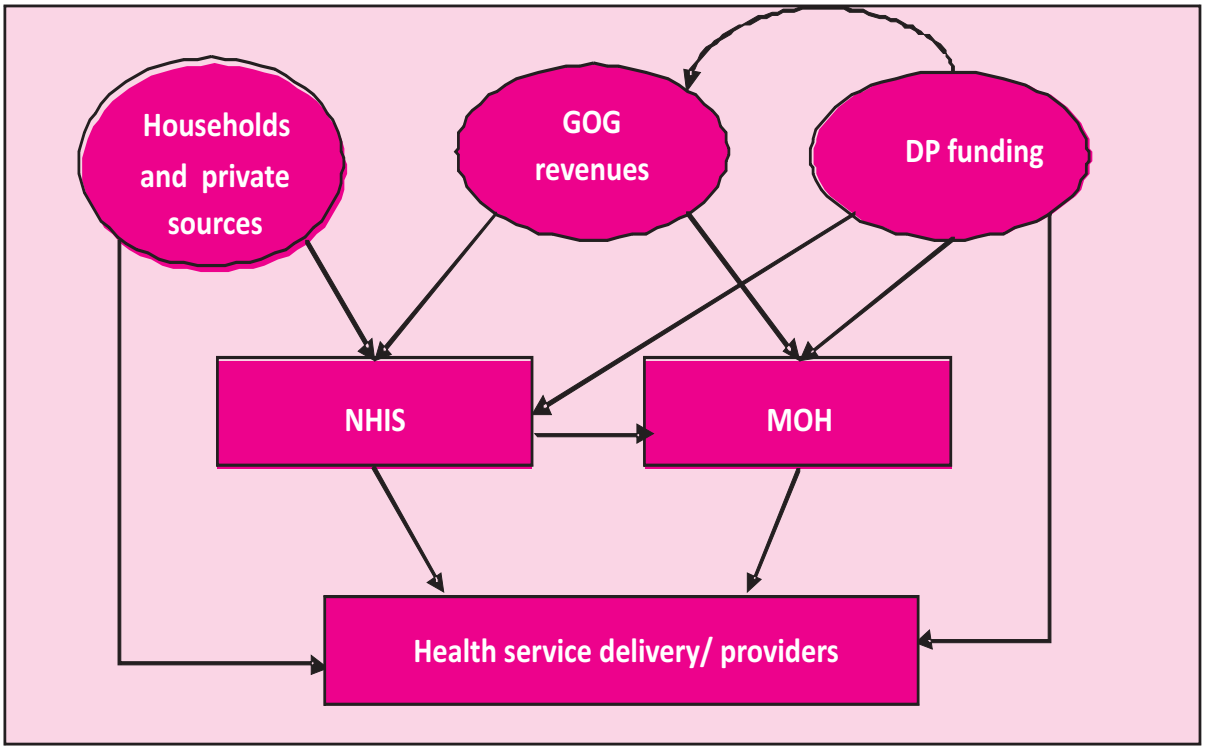
4.2.2 Policy and Guidance

The Financial Administration Act, Act 654, 2003 (FAA) and its regulations (FAR, 2004) and the Accounting Treasury and Financial Reporting Rules and Instructions (ATF) are the key documents that guide the accounting for funds received and managed in the Sector. Project Agreement Documents and Grant agreement documents are also complied with in the custody, disbursement, accounting and reporting for funds. They provide regulations and guidance on how public funds should be managed including revenue receipts, expenditure, records, audit etc.

FUNDING THE HEALTH SECTOR

The three main sources of finance for the health sector in Ghana are the public sector, Development Partners (DPs), and the private sector, including households. These are channelled to the sector through a variety of different mechanisms, summarised in Figure 19.

Figure 19: Flow of major funding sources within the Ghana health sector



Source: **MTHS, MOH, 2010-2013**

GOG funding flows through two main routes. Firstly, discretionary funds are allocated to the sector through the Ministry of Health as part of the routine budget. Secondly, statutory funding is allocated to the governing body of the National Health Insurance Scheme (NHIS), the National Health Insurance Council (NHIC), in the form of the National Health Insurance Fund (NHIF). The NHIF itself is funded by a combination of sources. These include a 2.5% additional National Health Insurance Levy (NHIL) on domestic and imported goods and services, and a 2.5% contribution from the Social Security National Insurance Trust (SSNIT) contributions of formal sector employees.

Development partners provide funding through two main channels. With the evolution of the Sector-Wide Approach, and the move towards increased use of government systems as agreed under the Paris Declaration and re-affirmed in the Accra Agenda for Action, partners who earlier supported the MOH Health Fund have moved either to Multi-Donor Budget Support (ie in general support of the GOG) or to Sector Budget Support (SBS) which is channelled to the MOH through Ministry of Finance and Economic Planning (MOFEP). In addition, a significant number of DPs provide earmarked funding for specific activities. These include both bilateral and multilateral partners, and increasingly also the international Health Initiatives such as the Global Fund for AIDS, Tuberculosis and Malaria (GFATM) and the Global Alliance for Vaccines and Immunisations (GAVI). Earmarked partners provide a combination of grants and loan funding, and the range of partners is expanding to include bilateral arrangements with countries such as Kuwait and China, and partnerships between governments and financing institutions, particularly for infrastructure projects.

The Highly Indebted Poor Countries initiative was introduced as a means of channelling debt relief to priority poverty reduction projects. While nominally it forms part of GOG resources, this has typically been captured in the budget as a separate source of funding.

The health sector has relied on Internally Generated Funds (IGF) to supplement other sources for over quarter of a century, and has been granted dispensation from the requirement to submit all such revenues back to the treasury as a means of improving service provision. With the advent of the NHIS, the level of IGF funding (as reported by facilities) has increased significantly over the period under review. However, distinction must be made between direct household contributions as "Cash & Carry" or user fees, which are a net addition to the sector resource envelope, and the NHIS claims revenues which are funded primarily through the statutory budgetary allocation to the NHIF, supplemented to a limited extent through premium contributions of informal sector employees.

Accounting and Reporting

The Principal Recipient (NMCP PR) has a finance office that coordinates financial activities of the Global Fund supported programs in the Ministry. Program finance offices also exist to facilitate financial activities at the program level. We observed that the PR finance office currently prepares payment vouchers and keeps and writes cheques to effect payment for the programs. The cheques are sent to the programs, after they have been written, and issued from there. The office also supervises the work of the three programs, prepares financial statements of the programs for the Ministry, coordinates financial monitoring and coordinates all audits of the Global Fund supported programs in the Ministry.

The Financial Administration Act (FAA) and its regulations and the Accounting Treasury and Financial Reporting Rules and Instructions (ATF) are the key documents that guide the

accounting for funds received and managed in the Sector. Project Agreement Documents and Grant agreement documents are also complied with in the custody, disbursement, accounting and reporting for funds. Though adherence to these documents ensures sound internal controls there was no evidence of a documented plan for financial risk management to target more specifically the management of the unique risks associated with malaria funds management given the funding mechanism.

In all Ghana Health Service facilities, authorized bank accounts are opened in line with the FAA. All funds received are lodged into the designated bank account(s) and disbursed from these accounts. All disbursements are approved by the head of department and authorized by the head of finance. Authorization involves checking to ensure there is a budget available for the activity and whether the budget is approved. We also observed that authorization involves checking to ensure that the activity has been performed according to specification and that all details on the payment documents are accurate. In most cases payment vouchers are pre-audited by internal auditors before the cheques are written. Program activity budget ledgers are maintained to track the movement of funds on key programs and activities. In most cases, activities in the Program activity ledgers are pooled on broad disease burden basis and so it is cumbersome to decipher program activity balances by specific donor.

At the national level, the NMCP uses an accounting software (Great Plains). We observed that the software is off-the-shelve software. The software is currently being used to manage transactions up to the cashbook and bank reconciliation level. The NMCP also uses the software for budget accounting and budget performance monitoring of key activities under the program. However, the NMCP is not using the software to manage advances given to implementing partners. Such advances are recorded as expenditure in the system though they are subtracted from total expenditure during reporting. We also observed that implementing partners retire previous advances before they are given new advances. However, there is a general delay in the retirement of the advances and this affects program implementation. This is because the disbursement of additional funding from the Global Fund depends on the utilization and retirement of previously disbursed funds.

At the regional and BMC level, funding received and disbursed for malaria activities are reported on as part of the standard financial reports of the Ministry of Health. At the National level we observed a parallel reporting system. Thus the GHS collates all reports from the BMCs and regions and headquarters to produce quarterly financial reports for submission to the Ministry of Health. Financial reports from NMCP are prepared separately as part of the consolidated financial reports of the Global Fund Supported programs in the Ministry of Health and submitted directly to the Ministry of Health also on a quarterly basis. These reports contain schedules on funds disbursed to the BMCs to assist the Ministry to effect the appropriate eliminations to prevent double counting of financial information for the BMCs through GHS Finance Division and the NMCP and the GF supported programs in the Ministry in general.

Internal financial reports are also prepared to the donors. In the case of the NMCP, half year reports are prepared and sent to the Global Fund through its local Fund Agents (Price Waterhouse Coopers) to report on the progress of implementation. We noticed that there are outstanding issues of errors in some of such reports emanating from earlier periods. We also noticed that the NMCP does not use the software to prepare any financial report apart from the bank reconciliation statement and trial balances.

It is important to note that we found out that plans are far advanced to customize all of the reports on the system. The provider of the software had been given the standard reporting formats at the time of the assessment and he is working on them. The provider was also providing training to users at the time of this assessment. We also observed that apart from the required reports no other financial reports were prepared for management.

Internal Audit

The Internal Audit Division of the Ghana Health Service and the Ministry of Health conduct internal audit activities to ensure compliance to internal controls in the management of the funds for malaria activities in the GHS and the MOH. Such exercises are conducted separately. This is done through internal audit units in the various BMCs. We noted that most units are without internal audit. As such it becomes necessary for the teams at headquarters to conduct internal audit visits to BMCs periodically. However, such visits are less routine and restricted to GHS facilities.

We also observed that even in the BMCs where internal audit capacity was present, internal audit activities on malaria fund management is largely financial and restricted to pre-auditing of payment documents before payments are effected. We also observed that at the National level pre-audit has ceased in line with the recommendations of the Management letter of the internal audit conducted by the Office of the Inspector General of the Global Fund.
The Global Fund also has a local fund agent who conducts a review of reports produced by the NMCP before they are submitted to the Global Fund in Geneva. In addition the Global Fund has an internal audit department located in Geneva that conducts internal audits of The Global Fund Grants in countries.

External Audit

The Ministry of Health undergoes an annual audit. The audit is a statutory audit and is carried out jointly by the auditor general and an independent audit firm. All funds, including funds for malaria, under the Ministry are subject to the audit. However, for funds from the Global Fund, they are subject to two audits. The statutory audit and another separate audit carried out by an independent audit firm. We found that the situation is sometimes confusing and disruptive. In a few cases it has been difficult to trace vital documents due to the documents changing so many hands within a year. (i.e. LFA-2times,Auditor General-1,Audit Firm-1,Internal Audit-1).

4.2.3 Organization

There is a Directorate of Finance at GHS level responsible for financial management of all funds to GHS. In addition financial officers have been seconded and or recruited to NMCP to manage especially Global Funds and other partner funds approved for malaria control. Regional and district finance officers manage funds for malaria as part of the overall integrated financial management system at that level.

4.2.4 Human Resources, Training and Capacity Development

The ATF rules have been extensively disseminated in the health sector as a way of building the capacity of non financial managers at Budget Management Center (BMC) level in the

management of funds allocated for their programmes. As part of this exercise a periodic assessment of the eligibility of BMCs to manage their own funds is carried out. It has also allowed for a programmed approach to capacity building of BMCs in financial management issues.

4.2.5 Budgeting and Planning

Budget preparation at the Ministry of Health takes into consideration the funding expected from GoG, Budget Support, HIPC, NHIF, User Fees and earmarked funding. These funds are allocated to pay Employee Compensation, Goods and Services and Investments. Malaria is classified under communicable diseases in the Goods and Services Category. It was observed that whiles the Sector budgets for inflows is based on Source of Funds, the expected allocation of funds is more detailed and captures allocations to tackle interventions in specific non-communicable and communicable diseases including malaria. At the facility level up to the regional level, the budgets, which are based on the MTEF, do not explicitly capture expected resource and allocations for the treatment and management of the disease. Again, budgeting for earmarked activities is localized at the headquarters level. For example, detailed budgets for Global Fund Malaria activities are prepared mainly by the NMCP while the budgets for the NMCCSP are prepared by the NMCCP Project Team.

4.2.6 Performance Indicators and Targets

The following are some of the key financial performance indicators of the MOH/GHS which is also relevant to NMCP:

- % Total government expenditure on health
- % Recurrent spending on districts and below
- Per Capita Expenditure in US$
- % Non wage recurrent expenditure at district level to total recurrent expenditure

4.2.7 Service Delivery Outputs and Outcomes

Economic Burden

In Ghana, the disease is the leading cause of workdays lost due to illness and thereby contributes more to potential income lost than any other disease. A study carried out in Ghana showed that, on the average three workdays is lost per fever episode by the patient and two workdays by the caretaker. The value of these days lost to the management and treatment of fever per episode is US$ 6.87 and this amounted to about 79 % of the cost of seeking treatment in 1994 (Asenso- Okyere and Dzator, 1997). In another study by WHO, malaria accounted for 3.6 ill days in a month, 1.3-work days absence from work and 6.4% of potential income loss in Ghana for 1988/89 (WHO, 1992).

Gallup and Sachs (2001) carried out a study and used malaria as an explanatory variable in economic growth models using cross-country regression analysis. This study demonstrated a significant relationship between growth in gross domestic product (GDP) per capita and the burden of malaria. Their findings revealed that growth per capita from 1965-1990 for countries with intensive malaria has been 0.4% per year, while average growth for other countries has been 2.3%, over five times higher. More than a third of the countries with intensive malaria (11

out of 29) had negative growth from 1965- 1990. The study also confirmed that a 10% reduction in malaria was associated with 0.3% higher growth in the economy.

A similar study carried out by McCarthy and Wolf (2000) to explore the impact of macro policy variables on malaria morbidity across countries and the importance of indirect effects of malaria on total factor productivity, showed a negative association between higher malaria morbidity and GDP per capita growth rate. Most of the Sub-Saharan African countries used in the study incurred an average annual growth reduction of 0.55%. There is no specific study relating malaria morbidity to GDP in Ghana but it is assumed not to be different from those in SSA.

Evidence on direct costs suggests that households can spend quite substantial sums on prevention and especially treatment, and also that direct costs to governments are substantial (Goodman et al, 2000; Asante and Asenso-Okyere, 2003; Mia *et al,* 2012; Akazili *et al*., 2007; DFID working paper; Onwujekwe *et al*., 2000).

FINANCIAL MANAGEMENT

Flow of Gunds

In recent times funds for Malaria control in Ghana has come principally from the Global Fund (GF), and to some extent the World Bank, the Government of Ghana, the people of Ghana and other international organizations. In the mainstream health sector, Ghanaians have contributed directly through the payment of hospital fees and drugs to manage their malaria ailments whenever the disease attacks them. Since 2005, this contribution from the people has been increasingly indirectly due to the equally increasing number of people enrolling with and accessing health care through the National Health Insurance. Thus, funding for Malaria prevention and management has flowed into the sector mainly from Earmarked donor funds/grants and payments from the NHIA through contributions from the Government and people of Ghana.

Funds flow into the system comes in three main ways. One is through direct transfers to programs particularly the National Malaria Control Programme (NMCP) to carry out agreed interventions. Some of such funds are transferred to health facilities through the Regional Health Administrations (RHAs) and also direct to other implementing partners (NGOs). In other cases, earmarked funds flow direct to the Ministry of Health and then to the Ghana Health Service Headquarters for onward transfer to health facilities through the RHAs.

In the third case which has to do with treatment, funds flow directly from the patient or indirectly through the NHIA to service providers to reimburse service providers for the treatment and management of malaria cases among patients. The bulk of the funds have been disbursed to carry out interventions aimed at preventing people from contracting the disease and also reducing the incidence of the disease in the general population. Funds have been spent on interventions like the free distribution of ITNs, procurement and distribution of RDTs, nutrition and growth monitoring, mass spraying and the standardization and subsidization of medicines.

Sources of Funding

Total estimate of the 8-year strategic plan of the NMCP was $358m. This is from all sources.

Table 2: Expected Contributions by Partner (Available/Pledged)- 2008-2015 Strategic Plan

Source	Total Amount (US$)	%
GOV	231,482,046	65%
Private Sector	3,340,000	1%
Global Fund	29,408,069	8%
UNICEF	2,800,000	1%
PMI	36,295,000	10%
WORLD BANK	9,000,000	3%
WHO	40,000	0%
UNITAID	901,800	0%
USAID	44,555,000	12%
Italian Government	70,000	0%
TOTAL	**357,891,915**	**100%**

Source: NMCP Evaluation Report (2003-2011)

Total domestic sources expected contribution was 66% whilst external sources were to contribute 26 %. The Global Fund contribution over the period was expected to be 8% of the total and 23.3% of external sources (see pie chart below).

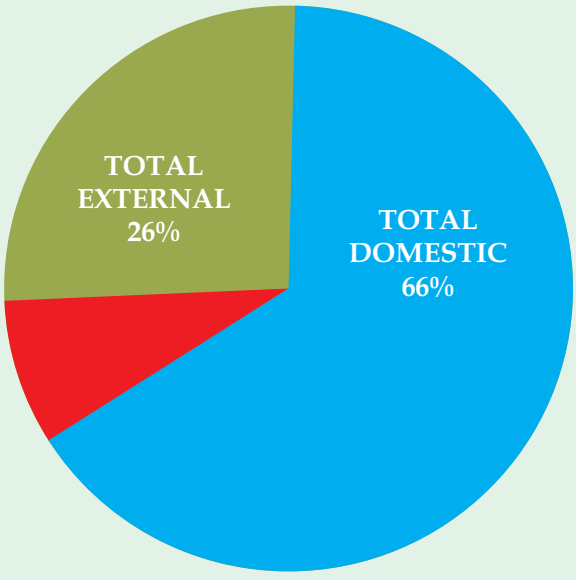


Fig 20: Total Expected Budget by Broad sources as per Strategic Plan 2008-2015

Table 3: Expected total budget by broad source, Malaria Strategic Plan, 2006-2015

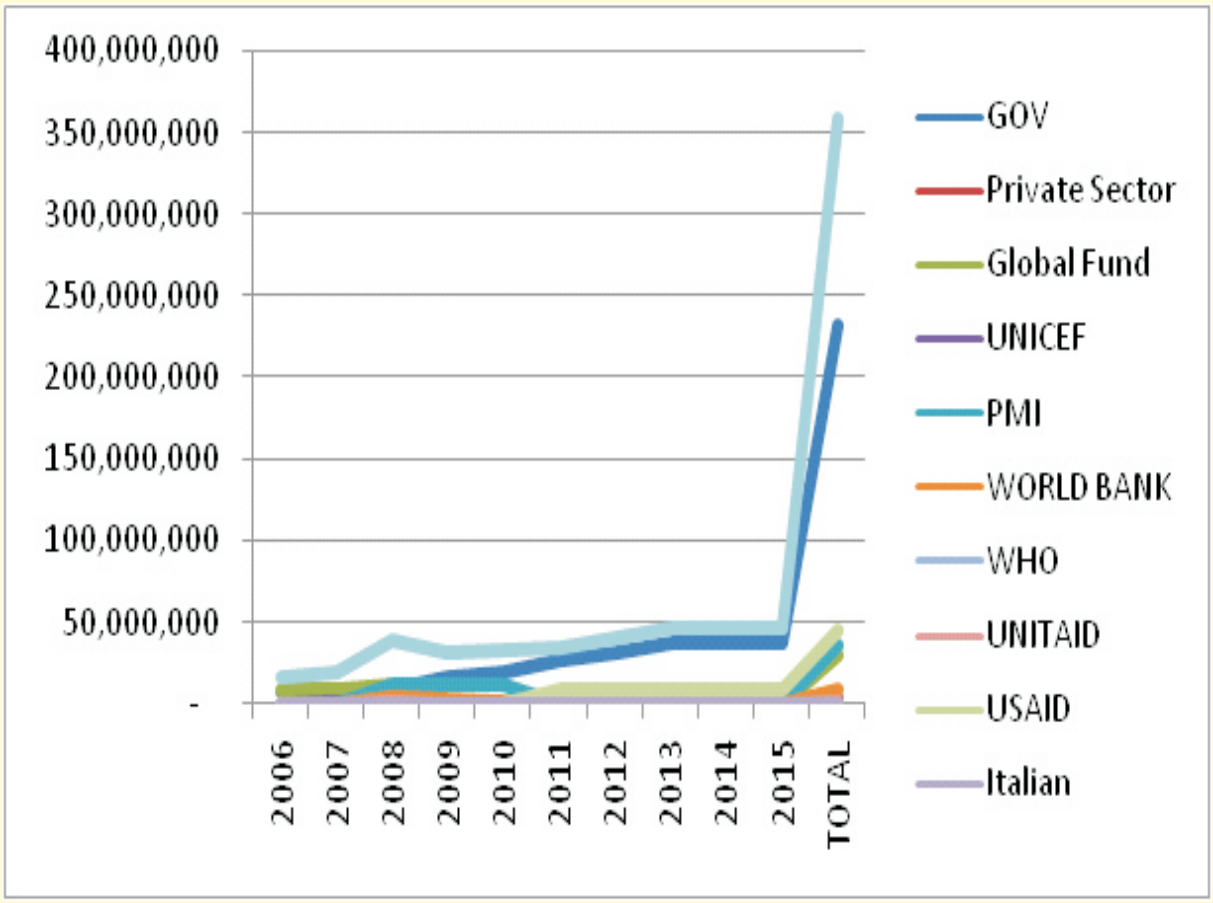
Year	Domestic (US$)	Global Fund (US$)	External (US$)	TOTAL (US$)
2006	7,529,000	8,580,437	604,000	16,713,437
2007	8,835,000	8,763,587	1,754,000	19,352,587
2008	9,585,000	11,738,495	17,210,800	38,534,295
2009	16,700,000	325,550	15,299,000	32,324,550
2010	19,692,000	-	14,299,000	33,991,000
2011	26,409,000	-	8,899,000	35,308,000
2012	31,493,880	-	8,899,000	40,392,880
2013	38,192,722	-	8,899,000	47,091,722
2014	38,192,722	-	8,899,000	47,091,722
2015	38,192,722	-	8,899,000	47,091,722
TOTAL	**234,822,046**	**29,408,069**	**93,661,800**	**357,891,915**

The USAID contribution to the funding of the strategic plan was the highest among the external sources at 12%, followed by the President's Malaria Initiative (PMI), with expected contribution of 10%.

The Government of Ghana (GoG) was to contribute 65% of the total financial requirement of the strategic plan. This amount of $231.5m constitutes most of the domestic sources.

The private sector contribution was 1%. As in Table 4, other partners who financed the Strategic Plan include UNICEF, World Bank, WHO, UNITAID, and the Italian Government.

Fig 21: Total Budget by Individual sources per year, Malaria Strategic Plan



Actual/Pledged Sources of Funding

- In actual fact, the total contribution (actual or pledged) from all partners for the 8-year strategic plan of the NMCP was $475m. This is from all sources.
- The Global Fund contribution to the funding of the strategic plan was the highest among the external sources at 31%, followed by the USAID with expected contribution of 9%.
- The Government of Ghana (GoG) was to contribute 49% of the total financial requirement of the strategic plan. This amount of $231.5m constitutes most of the domestic sources
- The private sector contribution was 1%. As in Table 1, other partners who financed the Strategic Plan include UNICEF, World Bank, WHO, Unitaid, and the Italian Government.

Table 4: Actual/Pledged Contributions by partners to Strategic Plan

Source	Total Amount (US $)	%
GOV	231,482,046	49%
Priv ate Sector	3,340,000	1%
Global Fund	147,010,312	31%
UNICEF	2,800,000	1%
PMI	36,295,000	8%
WORLD BANK	9,000,000	2%
WHO	40,000	0%
Unitaid	901,800	0%
USAID	44,555,000	9%
Italian Government	70,000	0%

The total estimate of resources required for the 8-year strategic plan is approximately $880.6m but the estimated resources available is $258m (Table 5). This amount is from the GoG, the private sector and other sources. This implies there is a 71% funding gap, with the biggest shortfall in 2012 (13%).

Table 5: Funding Gap for 8-year Strategic Plan

Year	Amount required (US$	Total amount available (US$)	Funding Gap (US$)	%
2008	40,664,189.00	32,484,295.00	8,179,894.00	1%
2009	86,990,617.00	24,624,550.00	62,366,067.00	7%
2010	98,278,115.00	25,191,000.00	73,087,115.00	8%
2011	108,947,096.00	25,958,000.00	82,989,096.00	9%
2012	149,442,343.00	31,042,880.00	118,399,463.00	13%
2013	128,849,945.00	37,741,722.00	91,108,223.00	10%
2014	131,286,792.00	37,923,340.00	93,363,452.00	11%
2015	136,221,298.00	42,929,240.00	93,292,058.00	11%
TOTAL	**880,680,395**	**257,895,027**	**622,785,368**	**71%**

According to the WHO World Malaria Report for 2012, the total contribution reported by the Global Fund between the 2000-2011 to fight Malaria in Ghana is $105.3m (Table 6).

Table 6: Contributions reported by donors for malaria control, Ghana

Year	Global Fund	PMI	The World Bank	DFID	Government
2000	-	464,048	-	-	-
2001	-	474,434	5,536,764	-	-
2002	-	-	23,000	-	-
2003	886,150	-	-	4,354	-
2004	2,034,960	-	-	65,787	-
2005	15,400,000	369,500	-	64,837	-
2006	5,177,461	2,358,500	-	22,976	1,229,000
2007	13,700,000	7,965,500	-	5,003,002	2,980,000
2008	10,500,000	17,000,000	2,379,226	361,860	269,583
2009	27,000,000	21,500,000	708,817	-	6,214,286
2010	30,600,000	33,000,000	655,112	15,600,000	6,533,333
2011	-	30,400,000	-	-	6,663,582
TOTAL	**105,298,571**	**113,531,982**	**9,302,919**	**21,122,816**	**23,889,784**

Source: WHO World Malaria Report 2012

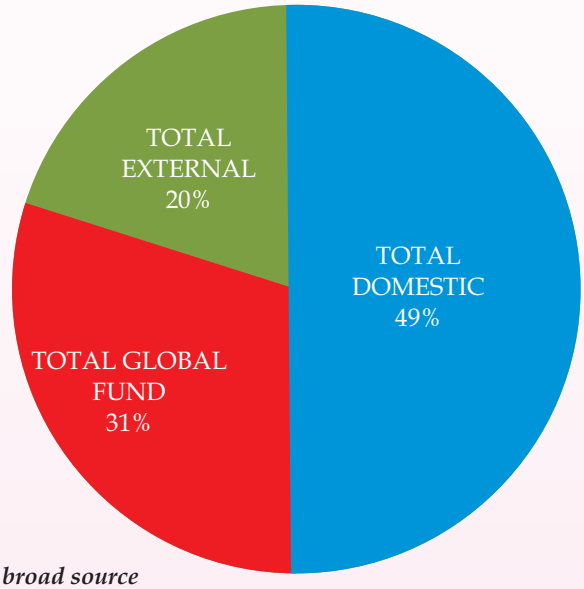


Figure 22: Total Budget contribution by broad source

Total domestic sources contribution was 49% whilst external sources were to contribute 20%.

The Global Fund contribution over the period was expected to be 31% of the total sources of funds.

Expenditure

The total estimated budget for Round 2 funding from Global Fund was $8.8m with actual expenditure for this period (2003-2008) being $ 8.9m. The expenditure for health products and health equipment was the highest at 34%.

Table 7: Expenditure for Global Fund Round 2 by cost category

Cost Category	Budget (US$)	Expenditure (US$)	% Exp (US$)
Human Resources	806,933.03	744,530.96	8%
Training	484,159.82	446,718.58	5%
Health Product and Health equipment	2,580,400.00	2,999,626.20	34%
Medicines	86,400.00	221,814.55	2%
PSM	645,546.42	595,624.77	7%
Infrastructure and other equipment	806,933.03	744,530.96	8%
Communication	322,773.21	297,812.38	3%
Monitoring and Evaluation	645,546.42	595,624.77	7%
Planning and administration	1,936,639.26	1,786,874.30	20%
Overheads	484,159.82	446,718.58	5%
TOTAL	**8,799,491.01**	**8,879,876.05**	**100%**

Source : GF Round 2 2003-2008

The Round 4 (2005-2010) budget for funds from The Global Fund was $ 31.4m. However, the actual expenditure was $ 96.5m (Table 9).

Table 8: Expenditure for Global Fund Round 4

Year	Budget (US$)	Actual (US$)
2005	9,724,679.00	4,966,337.00
2006	6,497,486.00	74,803,434.00
2007	2,548,435.00	7,731,102.00
2008	7,877,443.00	1,857,306.00
2009	2,858,310.00	6,274,696.00
2010	1,913,823.00	868,271.00
TOTAL	**31,420,176.00**	**96,501,145.00**

Source: GF Round 4 Budget and Actual

The total budget estimated for Round 4 (2005-2012) was US $135.6m but only US$74.4m was actually spent.

Table 9: Expenditure for Round 4 by Cost Category

Cost Category	Budget (US$)	Expenditure (US$)	% Exp (US$)
HR	4,419,679.10	4,328,413.39	6%
Technical assistance	12,000.00	-	
Training	9,272,889.40	2,813,636.69	4%
Health products and health equipment	45,548,618.00	28,813,998.53	39%
Medicines	31,268,699.27	16,055,714.27	22%
PSM	8,949,467.75	3,148,305.31	4%
Infrastructure	11,223,695.13	7,944,766.96	11%
Communication	7,704,015.48	4,674,500.19	6%
Monitoring and evaluation	10,867,891.08	3,848,776.04	5%
Planning and administration	2,925,815.97	1,910,365.34	3%
Overheads	3,462,561.30	876,513.08	1%
TOTAL	**135,655,332.48**	**74,414,989.80**	**100%**

4.2.8 Successes, Best Practices And Facilitating Factors

- Successful implementation of many Global Funded projects
- No major corruption case identified even after exhaustive auditing by Office of Inspector General (OIG) of Global Fund
- Strong leadership

4.2.9 Issues and Challenges

Even though funding commitments for anti-malaria programmes began rising significantly following the launch of the Global Fund in 2002, the WHO in its World Malaria Report 2012 noted that rapid expansion in global funding for malaria prevention and control levelled off between 2010 and 2012. (WHO, 2012). The key issue now is how those funding mechanisms will be topped up amid changes in the way some of these donors operate. The Global Fund has come under significant budgetary pressure, having cancelled its eleventh round of funding. It is in the process of reviewing its approach to resource allocation with a view to reducing the number of eligible countries and also tightening the criteria for the approval of grants.

International funding for malaria has shown a plateau and this funding is well below the level required to reach the MDG targets. Even though many countries have increased domestic funding for malaria control, the total available global funding remains at $2.3bn, which is less than half of what is actually needed.

4.2.10 Conclusion and Recommendations

Conclusions

Malaria is not only a health problem but also a developmental problem in countries of the African Region. It places significant financial hardships on both households and the economy. The burden of malaria is therefore a challenge to human development, manifesting itself as a cause and consequence of under-development.

There is very limited study on costing and economic impacts of malaria at household level and this can be attributed to the limited availability of suitable data and information of malaria morbidity and mortality due to climate change as well as variation in methods and approaches to estimate and quantify the costing and impacts of the disease. There is also limited study on economic impact of malaria by socio-economic status of households and especially its impact on the poorest.

Evidence from macroeconomic studies show that malaria has a negative effect on real GDP growth; growth per capita from 1965-1990 for countries with intensive malaria has been 0.4% per year, while average growth for other countries has been 2.3%, over five times higher. Areas with intensive malaria are almost all poor and continue to have low economic growth. The geographically favoured regions that have been able to reduce malaria have grown substantially faster afterwards.

We can conclude from the financial management assessment that there exists limited internal financial support for the prevention, control and management of malaria cases in Ghana. The

bulk of the supports for such activities are from external sources and this poses challenges to the sustainability of the key interventions that are being implemented currently.

The current financial crisis has made future commitments uncertain, especially from the Global Fund, the main donor for malaria. This funding crisis represents a window of opportunity for malaria endemic countries like Ghana to invest more in health and make their own contributions towards healthy populations.

There is also a lot of room for more coordination of plans and budgets on malaria prevention, control and management. There is therefore the need for a more coordinated approach to the audit of the NMCP activities.

Finally, the software being used by the NMCP at the national level is a good software, however, its current utilization is sub-optimal.

Recommendations

The following are some policy recommendations that are proposed:

1. Better information on economic impact is required to identify the population groups and regions most at risk of adverse economic effects. Studies are especially required on the impact of malaria on economic sectors, such as mining and quarrying, manufacturing, building and construction, commercial large-scale agriculture, tourism, and general commercial services.

2. Translate high political commitment to increased funding up to Abuja target of 15% minimum, taking opportunity of oil find.

3. Though there exist a strategic plan on malaria in Ghana, stringent efforts must be made to develop a financing strategy for malaria prevention, control and management in Ghana. This would address threats to sustainability since funding would become more reliable and predictable.

4. All annual plans and budgets on the disease must be coordinated to make more efficient use of resources.

5. It is vital that the government develops innovative funding mechanisms to improve domestic investments in malaria control.

6. The corporate sector can support to bridge the funding gaps in host communities.

7. Since the cost of malaria treatment is well beyond the means of the poorest household there is a need for policies to make access to effective treatment a priority for the most vulnerable groups. This is particularly urgent with the deployment of the more expensive ACTs in countries of Africa. The AMFm programme should therefore be supported by the government to assure availability of affordable ACTs.

8. It was difficult analysing expenditure according to the format in the strategic plan. To improve reporting and analysis of financial implications of the strategic plan, expenditure should be reported in the same format as in the plan.

9. Ideally one annual audit should be conducted. Discussions must be held with the Financial Controller, the Auditor General and the Global Fund to harmonize the annual audit and make it one (1) audit.

10. Regular capacity building programs must be organized for all finance staff especially those working on projects. As a matter of urgency, everything must be done to come to an agreement and a conclusion on the outstanding financial issues on some of the PUDRs.

11. Internal audits at all levels must be encouraged post audit exercises of malaria funds management rather than pre-audit. Pre-audit compromises the independence of the internal auditor if the same person or unit has to conduct a post audit in a subsequent period.

12. There is also the need to document a financial risk management plan and implement same for the NMCP.

13. Community based health insurance schemes that facilitate access to treatment and reduce pressure on governments and households need to be further explored and implemented.

4.3 Procurement and Supply Chain Management

4.3.1 Introduction

Commodity security exists when every person is able to obtain and use quality essential health supplies whenever he or she needs them [USAID 2011]. A properly functioning supply chain is a critical part of ensuring commodity security—financing, policies, and commitment are also necessary.

One of the key objectives of the strategic plan (2008-2015) related to commodity security was to strengthen the routine data collection system to capture reliable information. An expected outcome of the strategic plan was to strengthen health systems at all levels through improved procurement and supply management.

Specifically, Commodity Security assesses the performance of the commodity security system for malaria commodities at all levels of healthcare with respect to:

- Forecasting, and Quantification procedures, estimates of commodities in strategic plan
- Procurement practice, actual vs. estimated, quality control system
- Warehousing/storage
- Distribution including transport
- Logistics Management Information System (LMIS) in both Public and Private sector supply chain system
- Pipeline Monitoring, stock control system
- Addressing expired stock
- It also identifies the current issues and challenges in relation to each of the components and suggests ways for improving upon the malaria commodity security system in Ghana.

4.3.2 Policy

Ghana has the Public Procurement Act, Act 663 of 2003 that defines the structures, system, rules and procedures of procurement in the public sector. It also defines the various procurement methods, review of activities, procurement thresholds, mandatory bodies to be established and guidelines for disposal of unserviceable stores commodities and equipment [GOG Public Procurement Act 2003].

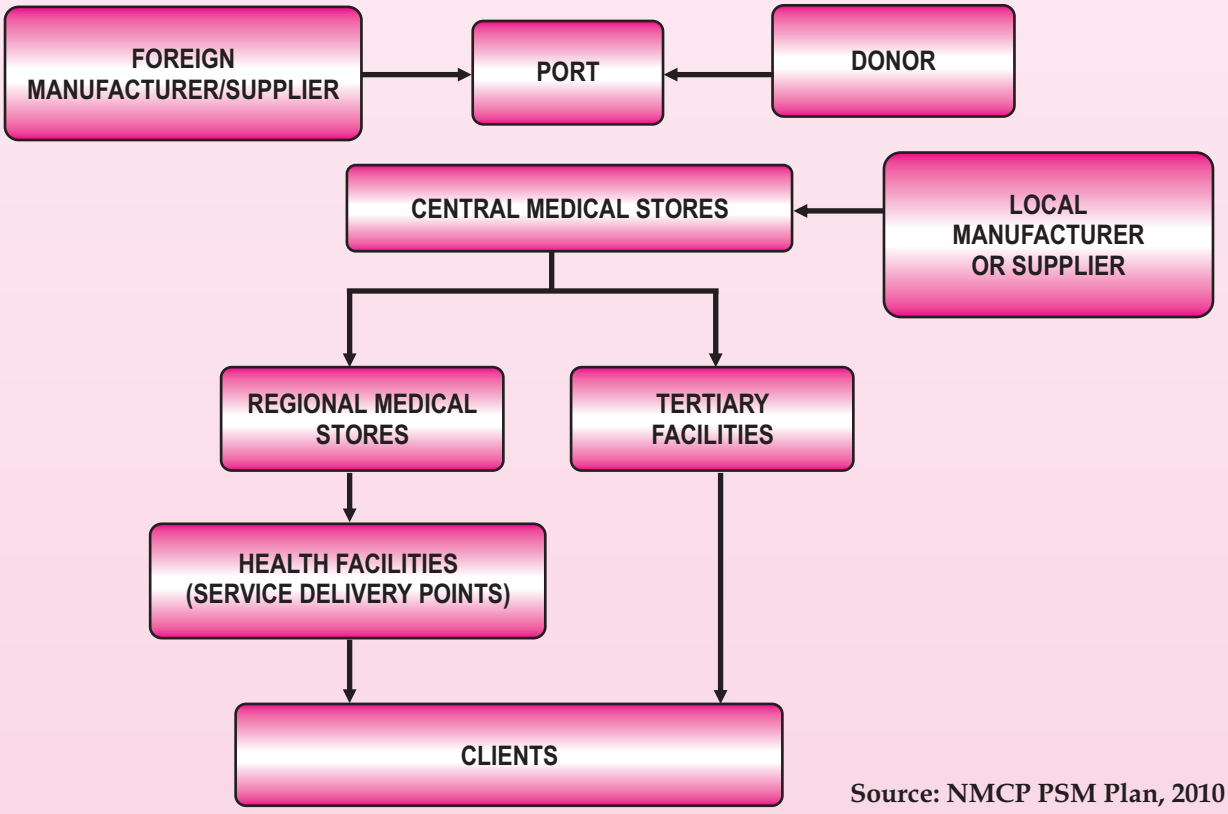
4.3.3 Guidelines

Malaria Commodities currently being used for interventions are:

- ANTIMALARIALS- Quinine tablet and injection, Artesunate injection, Sulphadoxine Pyremethamine and Rectal Artesunate.
- Artemisinin Combination Therapy (ACTs) made up of Artesunate Amodiaquine, Artemether Lumefantrine and Dihydroarteminisinn Piperaquine, RAPID DIAGNOSTIC TEST KITS, RDTs, (Histidine Rich Protein 2 Specific for *P. Falciparum)*
- LONG LASTING INSECTICIDE TREATED NETS (LLINs)
- PESTICIDES –Propoxur, a carbamate and Methyl Pirimiphos, an organophosphate.

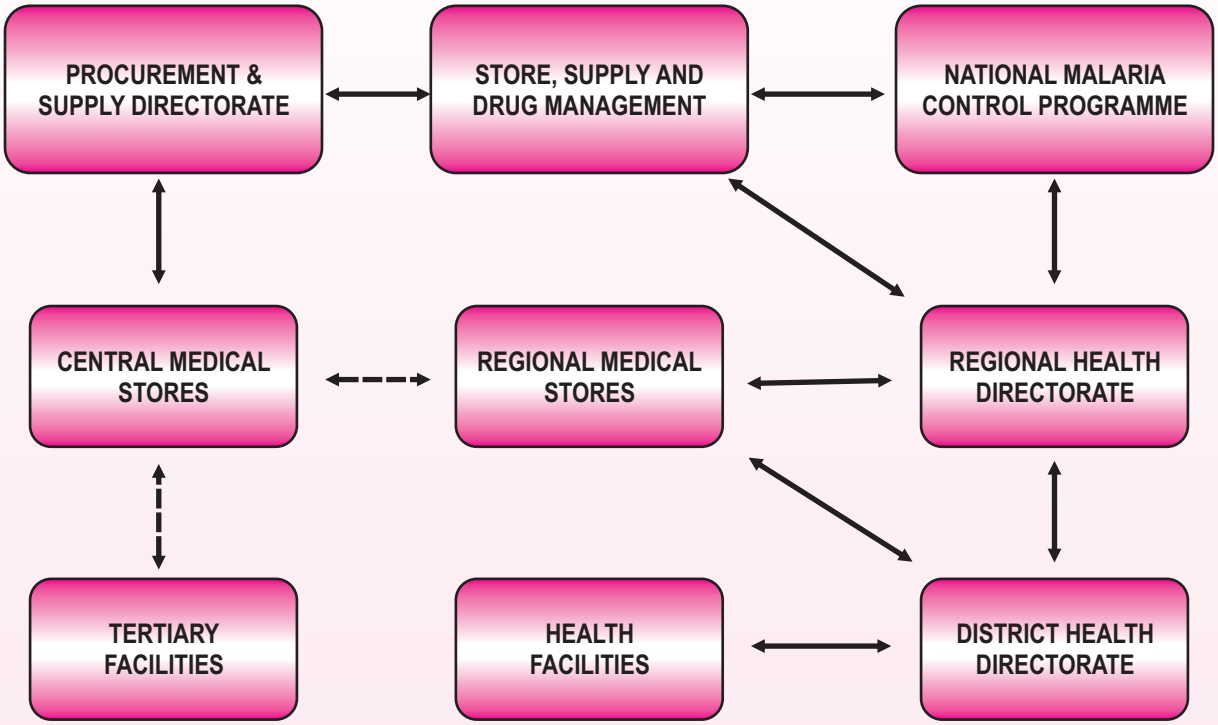
Ghana has a *comprehensive* integrated supply system which is served by a Central Medical Store (CMS) and ten (10) Regional Medical Stores (RMS). The flow of malaria commodities from the central level to the service delivery points in the public sector follows a 3- tier system as shown in Fig 18 below. Lower level health facilities, especially the health centres, rely on the District Health Administration for the transportation of their commodities. Information on consumption and stock balances etc. also flow from the service delivery through the districts, regions then to the central level as depicted by Fig 19 below.

Fig. 23: Ghana Public Sector Commodity Pipeline



Source: NMCP PSM Plan, 2010

Fig. 24: Reporting Pathways in the Public Health Sector



Source: NMCP PSM Plan, 2010

4.3.4 Registration of products

Registration of all drugs, medicines and products is done by the Food and Drug Authority after submission of all required dossiers on the product and payment of approved fees.

4.3.5 Specifications

Specification of malaria products required to be procured is done by the NMCP in consultation with Procurement Division of MOH and GHS and WHO. Only WHO prequalified products are procured. Guidelines provided by the Global Fund are also consulted as appropriate.

4.3.6 Quantifications

PRODUCT SELECTION, FORECASTING, QUANTIFICATION AND PROCUREMENT PRACTICES STRENGTHS

According to the OIG report of the Global Fund, only WHO pre-qualified drugs and bed nets that met the WHOPES recommendations criteria were procured [OIG Report 2012]. Only drugs from the Ghana Essential Medicines List (EML) and the Standard Treatment Guidelines (STG) were selected. Procurement activities are guided by the Public Procurement Law, Act 663 of 2003 and Global Fund Policy. This is an example of best practice and can potentially lead to improved availability of good quality affordable health products. There is donor support for the procurement of malaria commodities.

CHALLENGES

Despite significant gains and achievements, there are major challenges in the availability, affordability, quality and rational use of essential antimalarial medicines and other program commodities. The following are the most important contextual factors affecting the healthcare supply chain:

For essential antimalarials, the roles of the key actors such as the MOH, Procurement Unit, Central Medical Store (CMS), Stores Supply Drug Management (SSDM), NMCP, have not been clearly defined and have not been given sufficient mandate to ensure product availability.

From a situation where the CMS was the main supplier of all essential medicines in the public sector, the supply chain has evolved to a decentralized model, where the private sector supplies most medicines to public facilities and CMS plays a supplementary role.

A thriving private sector plays a key role in ensuring availability, but is highly fragmented with attendant risks for both product availability and quality.

There appears to be no evidence of the involvement of specification expert committee in specifying health products. Quantification was done using morbidity data and issues data from the CMS and RMS for most malaria commodities due to inadequate consumption data at the regional and district levels. Where data was available, the quality was not reliable. These weaknesses have resulted in over and under stocking, expiry, and poor quality.

LMIS at the CMS, RMS and the district level was unable to record batch numbers (OIG Report, 2012). As a result batch tracking was not possible in the event that product recalls happened. These processes needed to be part of both the quality assurance (QA) process and the regular documentation process of the procurement division. Pre- or post-shipment inspection of products was not done. FDB did not undertake routine testing of products as required by the programme. Other challenges indentified in quality control (QC) are as follows:

- Lack of funding for QC after delivery and through the supply chain
- No national reference laboratory
- Difficulties to implement a quality assurance system
- Difficulties to implement a pharmacovigilance system. [RBM secretariat 2012]

A Survey showed that there is no national co-ordination mechanism structure in place to share financial or logistical information among funding Partners. [The World Medicines Situation 2011]

OPPORTUNITIES

In spite of the weaknesses, opportunities exist to improve performance through placing advertisements on websites like dgMarket or UNDB online to ensure wider circulation among potential suppliers in cases where international competitive bidding (ICB) is followed and this can ensure lower prices.

4.3.7 Procurement, Storage and Distribution

(WAREHOUSING/STORAGE, DISTRIBUTION & TRANSPORT) STRENGTHS

There is availability of existing systems of warehousing, storage facilities, transport system at central, regional and district levels. The Global Fund through NMCP donated ten (10) No. 3.5 tonner trucks for the regions and two (2) No. 10 tonner Articulator Trucks for the CMS for schedule delivery system. NMCP/GF also refurbished six (6) Regional Medical Stores. There is availability of the DHIMS that serves to capture some data on the use of malaria commodities at the service delivery points. Quality assured ACTs were available across all sectors exceeding 80% in both rural and urban areas. (AMFm endline full report Outlet surveys 2010). The quarterly End Use Evaluation or surveys done by USAID in collaboration with GHS/NMCP provided platform for improving commodity security.

The combination of both the pull and push system for distribution of malaria commodities at the CMS has a number of advantages. Currently, RDTs, LLINs, Sulphadoxine Pyremethamine (SP) and Microscopes are distributed equitably through the push system based on needs that can easily be determined at the central level. ACTs and other antimalarials are also distributed based on needs determined by facilities and the regions since it is very difficult to determine the real facility needs of these commodities at any given time since they also usually procure these commodities from other sources. Push system is generally for distribution of medicine in vertical programs.

In Ghana NGOs and Faith Based Organizations (FBO) also act as important sources of medicines supply and distribution. A range of distribution options are used by Faith Based Organisations (FBO) but the two most common are:

- Hospitals, clinics and health post pick their orders using their own transport from distribution warehouse of FBO.
- Hospitals, clinics health post submit orders electronically or by phone and FBO arranges for delivery with their own transport. [The World Medicines Situation 2011]

CHALLENGES

In an assessment of world situation of storage and supply chain management, 2011, it was identified that ware housing and distribution cost is substantial part (about 16%) of medicines budget in low and middle income countries. Duplication and fragmentation exist in most countries but integration is underway in most countries. Storage capacities and conditions are inadequate at the peripheral level in many countries. [The World Medicines Situation 2011].

In spite of the refurbishment of the RMSs in the country, there were challenges related to storage space and condition, security and material handling equipment. Drugs and commodities were not stored in an organized manner and racks were not labelled in any of the RMS and health facilities visited. Manual stock cards or tally cards were used, but no stock ledgers in some of the RMS or district health (DHMT) stores. Bin /Tally Cards were sometimes not updated and in some cases physical stock figures were different from recorded balances. (OIG visits to the Northern, Ashanti and Eastern RMS, 2009-2010). This is not in line with the findings of the assessment of world situation of storage and supply chain management, 2011 that the distribution system has to ensure that good storage practices are maintained in order to

guarantee the quality of medicines throughout the chain. [The World Medicines Situation 2011] There is a proliferation of inventory management soft-wares at the various levels. These are not aligned with the Corporate M-supplies software, hence compromising data visibility.

The new supply chain master plan (SCMP) developed by MOH, 2012 and the Ghana Healthcare Supply Chain & Commodity Security Strategic Review, June 2011 also identified the following challenges in the distribution system: Delivery of supplies within the public sector supply chain is limited (lower levels generally collect from higher levels). This is due to low prioritization of this supply chain function and transport capacity limitations. Facilities, programs, the 10 RMSs, and CMS all make distribution related decisions, depending on the commodity or program involved. Coordination of these decisions is minimal. Most private sector vendors deliver as part of the services they provide making public sector services not competitive. [MOH 5- year Supply Chain Master Plan (SCMP 2012)

4.3.8 Inventory Management [LMIS and Pipeline Monitoring]

STRENGTHS

Some automation systems are currently on going at the CMS and RMS. LMIS designs exist for some public sector commodities like ARVs and other related commodities and there is widespread access to internet, and IT capacities are expanding. The Early Warning System is being piloted in over 200 health facilities in Ghana. Through the use of mobile phone, health facility staff report on stock levels for some tracer commodities via SMS to a dedicated short code on a weekly basis. This information helps managers to intervene when there is a problem and implement appropriate interventions to improve the availability of health commodities. It therefore helped to improve the visibility of stock status at the facilities and RMS's for these products in real time.

The majority of the twenty one CMS members of African Association of central Medical Stores (ACAME) use the same software for warehousing management in order to facilitate exchange of information (price, logistics information and dashboard). This harmonization of software has enabled ACAME to organize pooled training of staff of several CMS. [The World Medicines Situation 2011]

CHALLENGES

Despite strengths in the LMIS and pipeline monitoring, there are some weaknesses. LMIS was identified as a challenge for both public and private sectors. The LMIS was to be strengthened by improving health management information system and logistics management system. This was to include training health informatics, data managers and supply chain managers who will help capture data on service delivery and commodities. [MOH 5- year Supply Chain Master Plan (SCMP 2012)].

Modern automated information systems for the management of health commodities are limited throughout the supply chain, especially in relation to the levels of efficiency and effectiveness expected in Ghana. Data collection and sharing are poor and data visibility for managers is lacking. Multiple organizations are involved in supply chain activities, and sharing of data and information is weak (due to a lack of good data systems and coordination). Data reporting is inhibited by organizational boundaries. National-level data for decision making are largely unavailable due to poor systems and a lack of incentives for reporting (especially with regard to private sector purchases).

Inventory data for the CMS and the 10 RMSs are not connected in real time, so transfers and active stock management are not common. CMS and implementing programmes (NMCP) do not routinely receive information on procurements and shipment tracking for programme commodities. Supply plans resulting from quantification efforts are not currently being strictly followed to inform actual procurements.

At RMS levels, inventory management of program commodities including some malaria commodities are not integrated with the inventory management software being used. The inventory management software being used had gone through a number of changes and proper information on ledger and tally cards were not available at the CMS at time of audit (OIG Audit 2012). The M-supply had been available for use since 2008, yet it was unable to generate annual reports or regional reports to regions. The regions had different inventory management systems with in-puts different from the M-supply software at the CMS.

Store ledgers were not uniform at regional and district levels and were not regularly updated. Documentation of supplies and inspection of goods were also poor at certain facilities.

In some of the RMSs or district health facilities visited by the OIG team, manual stock cards or tally cards were used. The tally cards were not properly maintained, with some of the inspected cards showing irregularities and missing dates. These are managed separately and manually. Inventory data on these are therefore difficult to generate. (OIG Audit 2012)

Currently data capturing tools on consumption pattern for commodities such as RDT and antimalarials at user end do not capture consumption data needed for quantification of individual medicines and dosages.

Stock cards contained name, dosage form of drug but expiry and batch numbers are not captured. Minimum and maximum stock levels are not recorded on the tally cards in some instances. [LFA 2012]

CHPS sites have no inventory control card for tracer drugs. Inventory cards are not updated. In primary health care facilities such as Health centers and CHPS compounds, personnel are not trained to manage pharmaceuticals and stores. There was no inventory record for RDT making it difficult to track consumption. With the exception of CMS, all stores did not have thermometers for monitoring temperatures in the stores. [LFA 2012].

OPPORTUNITIES

SCMP will provide a number of opportunities to improve LMIS and pipeline monitoring. The SCMU will define data needs and requirements for each user group, as well as information sharing policies, procedures, processes, and service levels. It will review current automation projects (including CMS and RMSs), to ensure they are appropriate to meet future needs and complete integrated LMIS design. The SCMP will establish logistics coordinating committees, which meet on a regular basis, where data and issues are reviewed and shared with stakeholders. There will be the use of quantifications / updated supply plans to inform actual procurements. [MOH 5. 5- year Supply Chain Master Plan (SCMP)]

There is donor and government support for the implementation of the reforms proposed in the SCMP. There will be an expansion of the Early Warning System (EWS) for health commodities

by USAID to include key malaria commodities. This system will provide some timely inventory information at service delivery points to program and commodity managers for the needed action to improve inventory management.

Change in government and possible slowing of the implementation of the SCMP and funding inadequacies to set up the various LMIS infrastructure and qualified personnel to manage it, however, pose major threats.

4.2.9 Quality Control

QUALITY

Food and Drugs Authority (FDA): Conducts quality testing of food and medicine. Annual Reports of 2010 and 2011 indicated that the companies that had issues with either quality or efficacy in 2010 had the same issues in 2011 and it will be important to find out the reasons for this.
FDA has been collaborating with United States Pharmacoepia with funding from PMI to conduct quality studies and post-marketing surveillance on drugs including antimalarials.

Ghana Standards Board and Food and Drugs Authority: The Ghana Standards Board and Food and Drugs Authority register and test all foods and medicines including anti-malarials that are brought into the country. These agencies also ensure that the medicines do not stay on the shelves beyond the manufacturers' instruction by doing periodic checks of medicines in the chemical shops and by sanctioning defaulters.

The Traditional Medicine Division of Ministry of Health monitors the quality of plant medicine in collaboration with Center for Scientific Research Into Plant Medicine (CSRIPM) and other agencies.

The Universities: The Faculties of Pharmacy and Chemistry in particular are also involved in quality testing of drugs including antimalarials.

ADEQUACY OF QUALITY TESTING SYSTEM

There is local capacity for quality testing. However it seems there is a need for more coordination among the agencies carrying them out. There seems to be the need for more resources to be channelled for quality testing. Agencies should closely monitor companies that repeatedly have breaches with quality over the years.

4.2.10 SWOT analysis

See 4.2.8 above

4.2.11 Successes, best practices and facilitating factors

BEST PRACTICES

The Early Warning System that is being piloted in over 200 health facilities in Ghana is a best practice. This information helps managers to intervene when there is a problem and implement

appropriate interventions to improve the availability of health commodities. It therefore helped to improve the visibility of stock status at the facilities and RMS's for these products in real time.

Only WHO pre-qualified drugs and bed nets that met the WHOPES recommendations criteria were procured. Only drugs from the Ghana Essential Medicines List (EML) and the Standard Treatment Guidelines (STG) were selected. This improves quality of drugs and medicines procured by the programme.

Facilitating factors

- Availability of Public Procurement Law, Act 663 of 2003 that guides the procurement process
- Global Fund Policy on procurement and preparation of PSM plans in Malaria grant renewal.

4.2.12 Issues and Challenges

- Capacity for local production of drugs vis-a-vis WHO pre-qualification to assure quality.
- Delays in procurement of essential commodities leading to stock-outs and challenges with reaching targets.
- For essential antimalarials, the roles of the key actors such as the MOH, PU CMS, SSDM, NMCP, have not been clearly defined and they have not been given sufficient mandate to ensure product availability.
- Non involvement of specification expert committee in specifying health products.
- Quantification based on morbidity data and issues data from the CMS and RMSs for most malaria commodities due to inadequate consumption data at the regional and district levels.
- Pre- or post-shipment inspection of products not properly done routinely as required by the programme.
- **Lack of funding for QC after delivery and through the supply chain**
- **Lack of national reference laboratory**
- There is a proliferation of inventory management soft-wares at the various levels. These are not aligned with the Corporate M-supplies software, hence compromising data visibility.

4.2.13 Conclusions and Recommendations.

a) Conclusion

The desk review and field visits of the malaria commodity security have established a number of strengths in the supply chain system such as the procurement of only WHO pre-qualified medicines by the Principal Recipient (PR). In spite of these strengths there are some weaknesses and threats such as inadequate & non-reliable consumption data that need to be addressed. Opportunities such as the development of the 5 year SCMP, however, exist to leverage the performance.

There is enhanced capacity of warehousing and transportation due to refurbishment of six (6) RMS and donation of ten (10) No. 3.5 tonner trucks. Unfortunately, warehousing and storage practices remain poor.

Synthesis of the NMCP performance in area of PSM

AREAS	SCORE				COMMENTS
	3 high adequate	2 adequate	1 present but inadequate	0 inadequate	
There is a system in place for supply chain management that ensures no stock outs of products		X			
There is system of PSM with written SOPs that is adhered to			X		
Availability of agreed on ordering system that includes key variables of supply points, lead time, and adjusted for damage and pack sizes			X		
System in place for procurement	X				
Quality of ACTs and RDTs constantly monitored		X			
There is a functional PV system			X		
Availability of national centre and technical committee on PV		X			

b) Recommendations

The following recommendations are hereby made for the sustenance of commodity security of malaria commodities in the country.

LMIS

- Take immediate steps to implement the 5- year Supply Chain Master Plan (SCMP) of MOH
- Build capacity in PSM – forecasting, stock management and requisition especially at lower levels
- Integrate information from central and regional medical stores in order to maintain uniformity and to facilitate the monitoring of inventories, for example through a specialized software system for pharmaceutical supplies in all RMSs. The software should be able to facilitate the exchange of information between the central level and regional stores and generate appropriate reports

- Capture consumption data at the regional and facility levels and monitor this centrally for proper forecasting and quantification

- Establish a tracer code for donor-funded products in the supply chain at different levels.

- Undertake annual physical stock checks at the regional level to generate data on stock on hand to support the forecasting and quantification process.

QUALITY ASSURANCE

- Strengthen pre and post shipment inspection of malaria commodities. Random post shipment inspection should be done by FDA or WHO accredited facility as required by law.

- Establish batch tracking at least up to the regional level and this will support the batch recall mechanism in the event that substandard products are to be recalled.

- Quantify expired malaria commodities remaining in facilities at different levels and dispose them off in accordance with sections 83 &84 of the Public Procurement Act , Act 663 of 2003

DISTRIBUTION/AVAILABILTY OF COMMODITIES

- In response to the general low availability of child-specific medicines in Ghana's health sector, the national medicines selection process should be made child medicines sensitive. Dispersible antimalarial tablets should be made available.

- These medicines should be listed on the national EML and on the NHIA list to ensure subsequent procurement, distribution and reimbursement.

- The private wholesalers and distributors should also be engaged to procure child specific medicines for their product lines. In this way the private sector supply chain can augment efforts in the public supply system.

- Prescribers and dispensers should be informed about available child-specific formulations to ensure the prescription and dispensing of appropriate formulations.

STORAGE

- MOH/NMCP should procure and supply thermometers to all regional/facility stores.
- Ensure proper warehousing and storage practices at all the stores (CMS, RMS, DMS).

4.4 Malaria Vector Control

4.4.1 Introduction

An Integrated Malaria Vector Control approach is an essential component of malaria control programmes and takes into account the available health infrastructure and resources and

integrates all available and effective measures, whether chemical, biological, or environmental. Integrated Malaria Vector Management also encourages an integrated approach to disease control. Ghana started using ITNs and distributed to targeted groups through multi pronged distribution system in 1998 alongside Public Private Partnership involving social marketing. Nets used were conventional nets bundled with insecticides till 2004 when the country started using long lasting insecticidal nets (LLINs). Distribution had been targeted till 2009 when with the adoption of the Universal Coverage (UC) strategy (1 net for 2 persons in a household), the country started its implementation in 2010 with door-to-door distribution and hanging of nets in recipients' sleeping places. The continuous distribution strategy was instituted in 2012 to maintain and sustain gains made in ownership and utilization coverage during the mass distribution campaigns.

4.4.2 Policy and Guidance

The National malaria Control Programme developed an Integrated Malaria Vector Control Policy in 2009 which outlines the key integrated malaria vector management interventions including the use of Insecticide Treated Materials, Adulticiding (Indoor Residual and Space Spraying), Larviciding (through use of Biological and Chemical insecticide) and Environmental Management. Other measures in the policy include the use of Biological Control through the use of larvivorous fish, the Sterile Insect Technique and Repellents. Prior to that in 2002, an ITM policy was developed.

The concept of modifying vector habitat to discourage larval development or human vector contact is generally referred to as Environmental Management (EM). Environmental modification, Environmental manipulation and Modification of human habitations and behaviours constitute the specific techniques of environmental management.

The current environmental sanitation policy (Revised Environmental Sanitation Policy 2010) addresses some of the major components of environmental management and housing. These interventions include storm water drainage, control of pests and vectors of disease, environmental sanitation education, and environmental inspection, enforcement of sanitary regulation and monitoring as well as observance of environmental standards.

The NMCP/GHS in May 2002 produced an Insecticide Treated Materials (ITMs) Policy, which culminated into the production of an Integrated Malaria Vector Management Policy in 2009. ITN distribution in Ghana from 1998 witnessed a targeted distribution through multi-pronged channels such as Health Facilities (subsidized sale), the voucher scheme, health campaigns (free net distribution) and commercially available nets at full cost recovery (Public Private Partnership).

Ghana adopted the UC of LLIN distribution in 2009 and embarked on a nationwide LLINs door-to-door mass distribution and hang- up campaigns from 2010 to 2012. The mass campaigns as a catch up strategy was aimed at making up for the low LLINs access in the household to reach Universal Coverage i.e. one LLIN to 2 people in the household. A Continuous Distribution (CD) strategy of LLINs has been introduced to maintain the coverage reached and to sustain gains made with the mass campaigns.

4.4.3 Organizational Structure

See 4.4.5 below

4.4.4 Guidance

See 4.4.2

4.4.5 Human resources, Training and Capacity Development

ITN/LLIN is distributed throughout the public health system as well as by private sector and NGOs. IRS is currently being undertaken by AGAMal and PMI. The AGAMaL IRS programme is well established and follows a rigorous system including initial community entry to discuss with opinion leaders and District Assemblies and Health staff to solicit their buy-in. Staff from the communities are recruited and passed through an elaborate training programme to undertake twice yearly spraying of identified structures. Systems for baseline and periodic parasitological, entomological, insecticide resistance, quality control checks, and morbidity and mortality studies are built into the programme. Quality control studies undertaken by AGAMaL in 2012 after IRS in randomly selected communities showed high compliance to standard operating procedures, optimal efficacy of the insecticide used was assured, and that householders had not tampered with the insecticide on the wall. Hence it can be concluded that in 2012, spray operators were discharging the right dosage of insecticide on the wall, that the insecticide, vectoguard with an active ingredient of pirimiphos-methyl is effective for IRS operations in the selected communities. [AGAMaL 2012].

Larviciding is being handled mainly by Labiofam and other partners.

4.4.6 Annual Planning

ITN/LLIN planning and budgeting is undertaken as part of the regular MTEF planning and budgeting of GHS/NMCP. NMCP takes into consideration all sources of funding with particular reference to Global fund and other partner support.

4.4.7 Service Delivery Outputs and Outcomes

Vector Prevalence, Species, Behavior, Resistance Patterns for main insecticides used for IRS, LLINs, Larviciding over the years.

In Ghana, *An. gambiae s.l.* and *An. funestus* have been identified as the major vectors of malaria in all the ecological zones of the Northern Sahel, Middle transitional and in the Southern zone (Figure 10). Within the *An. gambiae* complex, *An. gambiae s. s.* was the most dominant sibling species and accounted for the majority of the *P. falciparum* infective bites in all the areas. *Anopheles arabiensis* has been found in the sahel zone but in fewer numbers. *Anopheles gambiae* Giles was found to be predominant in many ecological areas of the country with local presence of *Anopheles melas* Theobald in areas with brackish water along the southern coast. The distribution of *An. melas, one of the sibling species of the An. gambiae complex* was limited to the vicinity of breeding sites associated with mangrove swamps.

Biting habits of malaria vectors

The predominant human biting mosquitoes in the country include the major vectors, *An. gambiae s. l.* and *An. funestus*. Most of the major vectors in all the areas were relatively biting indoors. The biting rate of the major malaria vectors in rural and urban Navrongo showed that biting was significantly higher outdoor in the urban area than in the rural parts of Navrongo.

The major peak of biting during the night occurred within the hours of 12-02 hours and a minor one around 03-04 hrs (Fig) [Appawu et al 2004]. The biting rate of *An. gambiae* is influenced by rainfall whilst that of *An. funestus* appeared less affected by rainfall. The biting pattern of malaria vectors in the Navrongo area in Northern Ghana, which has not been reported in many parts of the sub-region, is the distribution of sporozoite-laden bites during the night. The pattern indicated that malaria transmission in the area occurred mostly from late evening and peaked at daybreak (Figure 25). This has important epidemiological implications because this is an area where insecticide treated bed nets (ITN) have been introduced and are being used by the people, but most of the inhabitants were usually awake during the period of 05.00 and 06.00 hours and out of their bed-nets, thereby increasing their exposure to infective inoculations from the vectors.

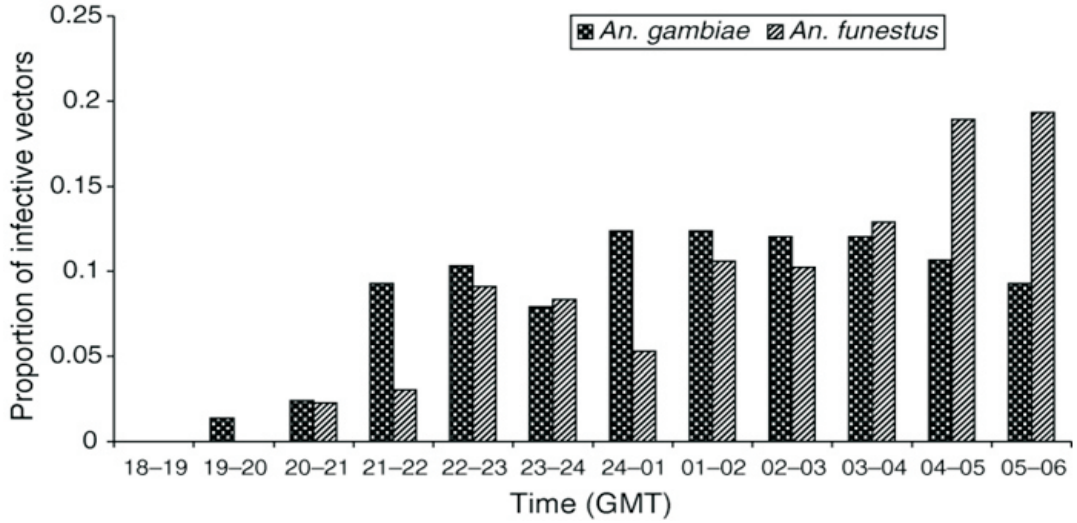


Figure 25 : Distribution of sporozoite infective bites of Anopheles gambiae and Anopheles funestus by hour of the night in Kassena Nankana district (Appawu et al, 2004).

In the Southern sector of the country, the overall biting rate of malaria vectors was twice in the coastal forest area of Dodowa than in the coastal savanna area of Prampram.

Human Landing Catches from AGAMaL

In monitoring the vector behaviour, diversity and density, human landing catches was conducted in all eight (8) selected communities in both zones being operated by AGAMaL in 2012.

Fig 26: A graph showing the biting pattern of Anopheles gambiae the Northern Zone in August 2012

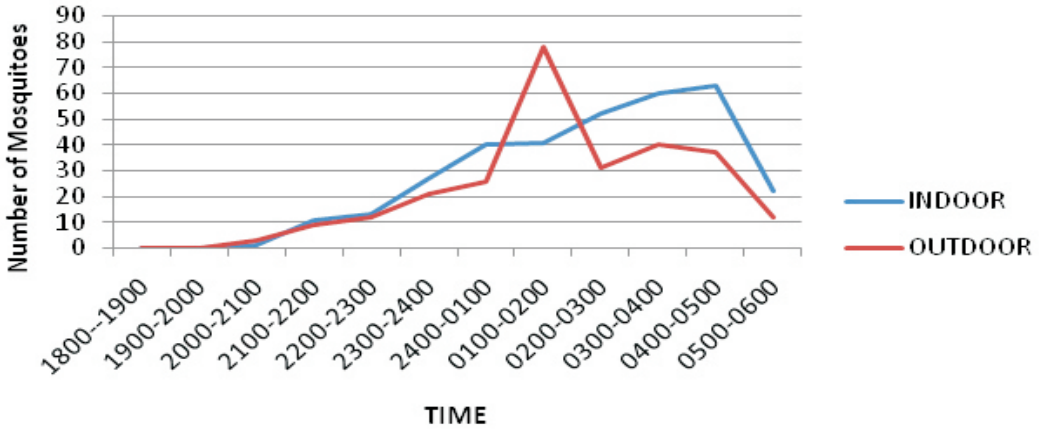
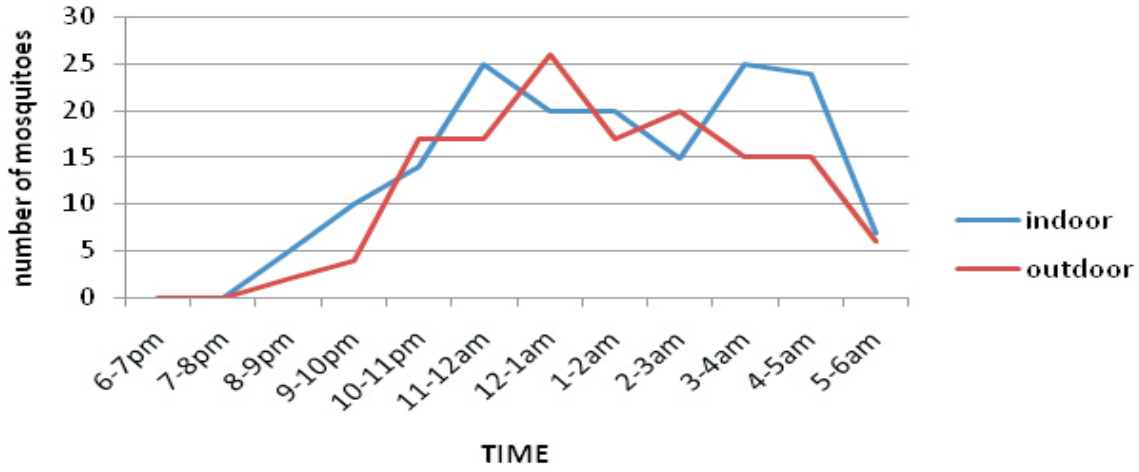


Fig 27: A graph showing the biting pattern of Anopheles gambiae in the Southern Zone



Resting habits

An. gambiae s.l. and An. funestus group were mainly endophilic and endophagic in many areas in the country. An. gambiae s.s. and An. funestus s.s. were highly anthropophilic.

Plasmodium falciparum sporozoite rates

In the Northern Savanna belt, Plasmodium falciparum sporozoite rates of 7.2% and 7.1% were estimated for An. gambiae s. s. and An. funestus respectively. In Southern coastal belt, overall mean infectivity rate was 2.5 times higher at Dodowa than at Prampram. Anopheles pharoensis encountered in Prampram was not found to be infected with Plasmodium parasites.

Entomological inoculation rates (EIR)

The level of malaria transmission as measured by the entomological inoculation rate shows that transmission is heterogeneous across the country. The transmission in the country is mainly determined by climatic conditions such as rainfall, temperature, humidity and altitude. In the Northern sahel savanna area which is mostly drier throughout the year, transmission is highly seasonal and the heaviest transmission occurs from June to October. In the transitional forest and southern savanna area, transmission is all year round.

There are micro-geographical variations in the transmission pattern. In Navrongo for example, the level of malaria transmission was higher for people in the irrigated communities than the non-irrigated ones. An individual living in the Kassena Nankana district unprotected is likely to receive 418 P. falciparum infective bites per year from the major vectors. The intensity of malaria transmission at Dodowa, the coastal forest area, was about six times higher than Prampram, the coastal savanna area. Most of the transmission occurs indoors. For example, in the Northern savanna belt, over 70% of malaria transmission occurred indoors during the second half of the night, peaking at daybreak between 04.00 and 06.00 hours. This means that ITNS can be effective in reducing the malaria disease in this area. However, other control measures such as repellents are recommended to reduce outdoor transmission.

There were micro-ecological variations in the EIR. For example, within the micro-ecological areas of Kassena Nankana district, EIR values of 228, 360 and 630 infective bites per year were estimated for the rocky highlands, lowlands and the irrigated area respectively.

The micro-geographical and seasonal variations in the biting and the level of malaria transmission observed in many areas showed that malaria transmission is heterogeneous in Ghana (Figure 10). The EIR (average infective bite an individual will receive from a mosquito in the night) ranges from 418 in the Northern part of the country to about 20 in the South. This implies that local specific vector control interventions need to be encouraged to target the local vectors. The research also highlighted the importance of irrigated schemes in creating active breeding sites for mosquito vectors because of the availability of water from the irrigation system even during the dry season. There is paucity of information on the level of malaria transmission in many areas in the country.

Conclusion

In both the northern and southern zones, higher numbers of Anopheles gambiae were collected indoor than outdoor. This was significant mostly in the southern zone. In the northern zone there were a few occasions where almost an equal number of collections were made both outdoor and indoor.

Generally, two peak biting periods were observed for the anopheles mosquitoes in both zones. These are between 12am to 2am and between 3am to 4am. We can therefore state that the peak biting period is between 12am to 4am for Anopheles gambiae mosquitoes in both sentinel districts. The biting pattern of the main malaria vectors has implications for malaria control in the country. The ITN intervention is useful and practicable in areas where the vectors are biting indoors. This means that ITN can be successfully used in all these areas to reduce malaria disease.

ITN/LLIN

Ghana adopted the UC of LLIN distribution in 2009 and embarked on a nationwide LLINs door-to-door mass distribution and hang- up campaigns from 2010 to 2012. The mass campaigns as a catch up strategy was aimed at making up for the low LLINs access in the household to reach Universal Coverage i.e. one LLIN to 2 people in the household. The UC was employed in all the 10 regions of the country through campaigns and completed in 2012 where over 12,000,000 LLINs were distributed and hanged. A nationwide coverage of 98% was achieved (UC validation data, 2012). Aided by a computer Excel based modeling program, NetCalc®, the nation adopted Ante Natal Clinics (ANC), Child Welfare Clinics (CWC), and Primary Schools as the main PUSH channels to distribute LLINs free of charge.

The Ghana Demographic Health Survey (GDHS) in 2008 revealed that an average of 45.4% households owned at least one mosquito net (both treated and untreated) as compared to 18% of households owning at least one mosquito net in 2003 (GDHS). Thirty three percent (33%) owned at least one treated net (ITN) in 2008 (GDHS) compared to only 3% in 2003. The results in both years showed a great variation in ownership across the 10 regions. Twenty eight percent (28%) of children under five years and 20% of pregnant women in 2008 slept under ITNs the previous night as compared to 3.5% and 2.2% respectively in 2003(GDHS). The 2011 Multiple Indicator Cluster Survey (MICS) with Enhanced Malaria Module and Biomarker showed ITNs ownership and use as 49% and 48% respectively. Children under the age of five years and pregnant women who slept under ITN the night before were 40% and 33% respectively. Fifty eight percent (58%) of pregnant women who slept under ITN the previous night were between the ages of 15-49 years. Only 18.7% of households were found to own an ITN in the MICS 2006 survey. A survey carried out by the School of Public Health, University of Ghana, Legon, from

August to September 2012 reported an encouraging household ITN ownership and utilization of 86.6% and 80% respectively.

Table 10: A summary of performance outputs and outcomes from various surveys from 2003-2012.

INDICATOR	GDHS 2003	GDHS 2008	MICS 2011	SPH 2012
Percentage of Households owing at least one mosquito net (both treated and untreated)	18.0%	45.4%	-	-
Percentage of Households owning at least one treated net	3.0%	33.0%	49.0%	86.6%
Percentage of children under five years sleeping under a treated net previous night	3.5%	28.0%	40.0%	77.6%
Percentage of pregnant women sleeping under a treated net previous night	2.2%	20.0%	33.0%	59.7%
Percentage of all persons who slept u nder ITN the previous night	-	-	48.0%	80.0%

IRS (PMI)

- The PMI-IRS started in 5 districts in 2008 and scaled up to 9 by 2012
- Currently, the PMI-IRS has scaled down from 9 to 4 districts due to high cost of the new insecticide and the perceived no impact on malaria morbidity and mortality in the sprayed districts
- Over the last 5 years, the IRS program in Northern Ghana has used a single spray round per year starting just before the rains
- In the 2012 spray season, a total of 355,278 structures were sprayed out of 383,142 eligible structures found by spray operators, resulting in 92.7% spray coverage
- A population of 941,240 people was protected. Of this number 22,704 were pregnant women whilst 187,653 were children under 5 years

Entomological Inoculation Rate (EIR) often expressed as the total number of infective bites per person per day and adequately used to express malaria transmission intensity showed a 74% reduction in malaria transmission in the Northern IRS districts compared to adjacent control district (PMI-RTI report 2010)

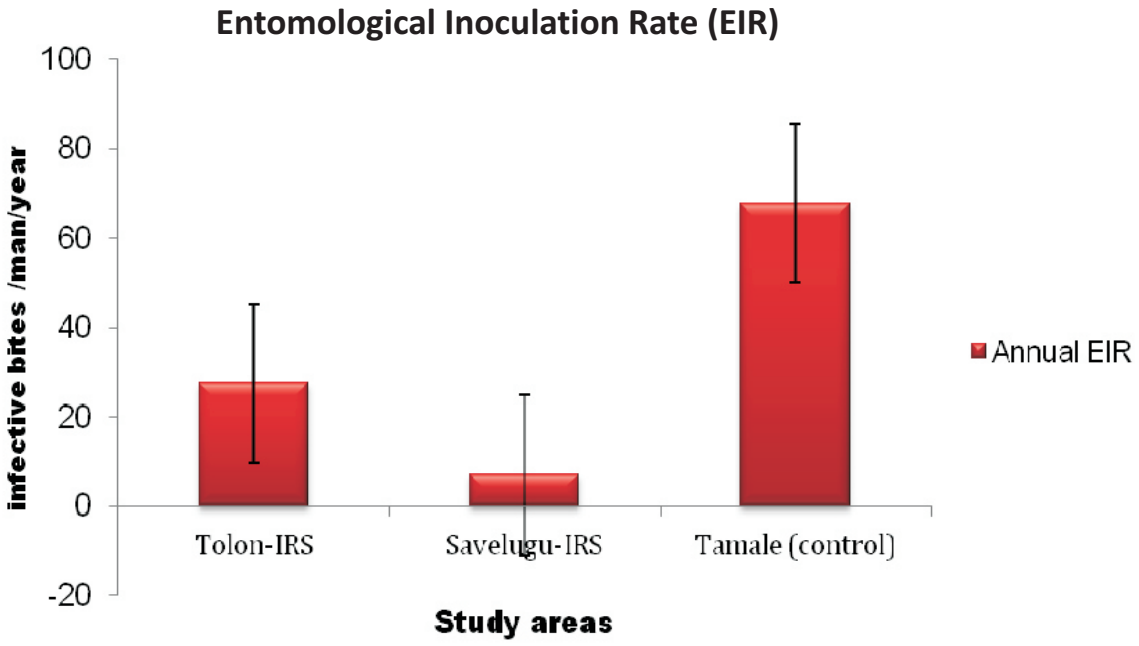


Fig 28: Entomological Inoculation Rate, Northern Region (PMI-RTI report 2010)

ANGLOGOLD ASHANTI MALARIA CONTROL PROGRAMME (AGAMal)

The AngloGold Ashanti (AGA) IRS programme started in Obuasi in 2006. It was subsequently selected on 30th October 2009 as Principal Recipient of the Global Fund Grant in 2008 by the Ghana Country Coordinating Mechanism to serve as the Principal Recipient of the Global Fund Round 8 Grant to scale up Indoor Residual Spraying (IRS) into 40 districts over a period of 5 years. The total grant amount was USD 133 Million.

Vector susceptibility to main insecticides used for IRS, LLNs

Malaria vector control remains the main strategy of controlling the disease in the country. One of the challenges that threaten the success of any vector control program is the development of insecticide resistance by the vectors. Data of insecticide susceptibility among the main malaria vector populations in Ghana from 2004 to 2012 (Figure 29) showed that pyrethroid and DDT resistance is widespread in many areas in Ghana. Notable among the pyrethroids which are ineffective are permethrin and DDT. Vector susceptibility to deltamethrin, alphacyperthrin as well as all the other classes of insecticides remains relatively high in many areas but indications are that the vectors may be developing resistance to them.

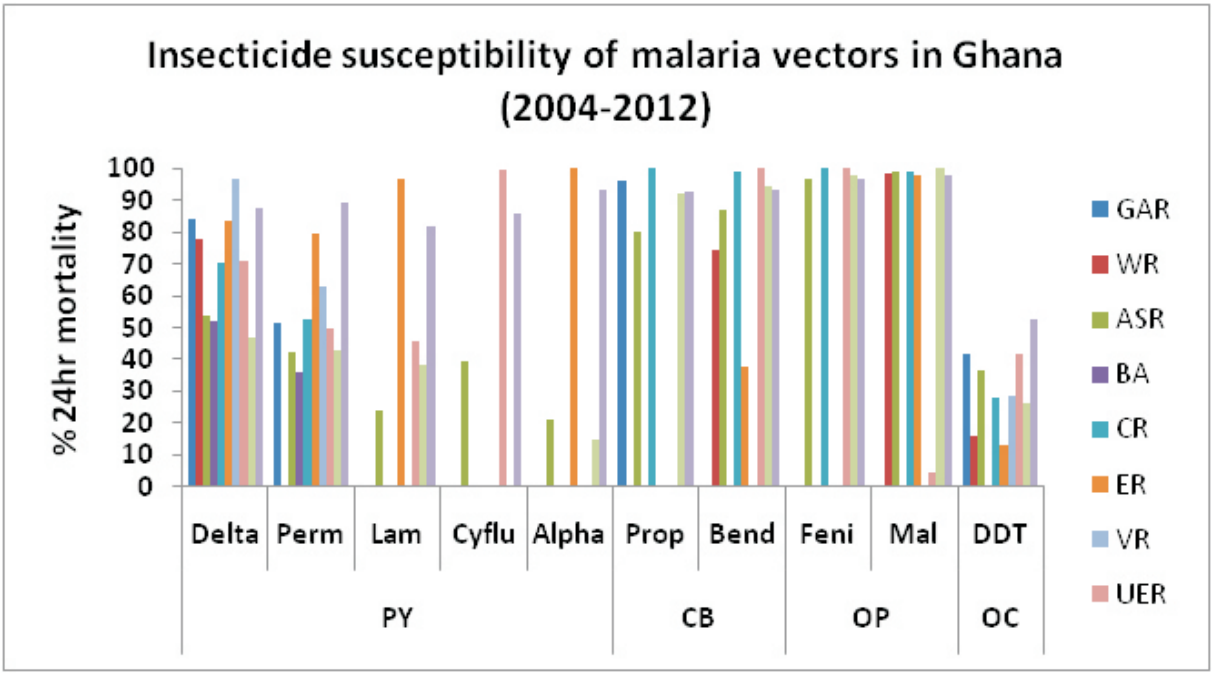


Figure 29: Insecticide susceptibility levels of malaria vectors at the regional level, 2004-2012
(Delta-Deltamethrin, Perm-Permethrin, Lam=Lamdacylothrin, Cyflu-Cyfluthin, Alpha-Alphacypermethrin, Prop-Propoxur, Bend-Bendiocarb, Feni-Fenithrothione, Mal-Malathion, DDT-Dichlorodiphenyltrichloroethane, GAR-Greater Accra Region, WR-Western Region, ASR-Ashanti Region, BA-Brong Ahafo Region, CR-Central Region, ER-Eastern Region, VR-Volta Region, UER-Upper East Region, UWR-Upper West Region, NR-Northern Region)

The development of pyrethroid resistance in the country has been mostly linked to the knockdown gene (kdr), which is known to confer resistance to pyrethroids and DDT. There is variation in the frequency of this gene in the malaria vector populations in the country. It ranges from 45% to 85% across the country (Figure 30). Other mechanisms of resistance have been detected in other areas.

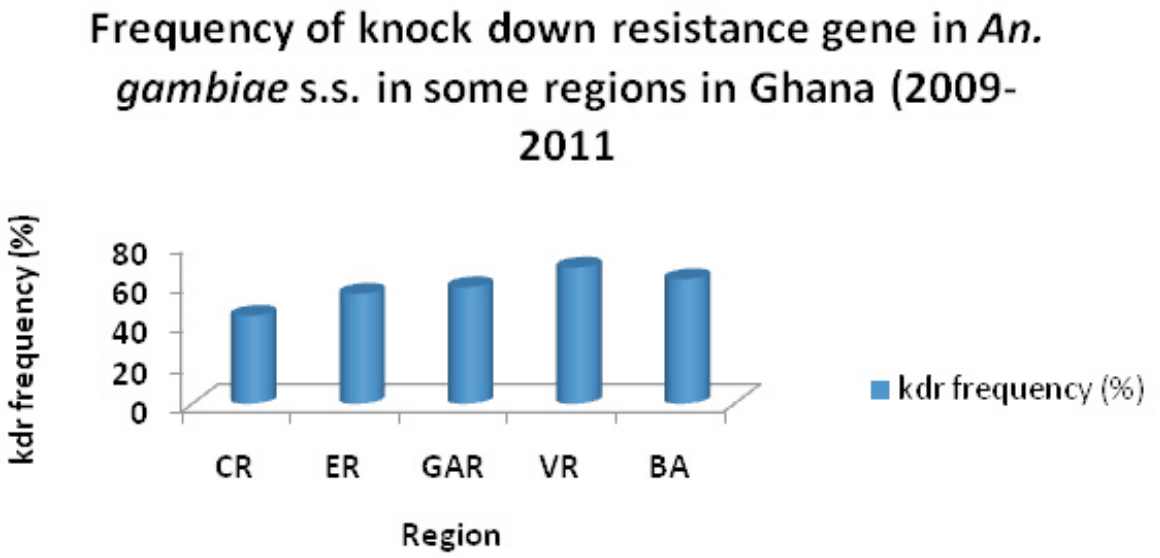


Figure 30: Frequency of knock down resistance gene (kdr) responsible for pyrethroid and DDT resistance in different regions of Ghana (GAR-Greater Accra Region, BA-Brong Ahafo Region, CR-Central Region, ER-Eastern Region, VR-Volta Region)

The development of pyrethroid resistance by mosquitoes in many areas in the country is worrying. This is because most of the vector control interventions in the country that have helped to reduce malaria incidence such as ITN and IRS use pyrethroids which are less toxic to humans.

In a preliminary report on insecticide susceptibility test in 7 districts in Ghana by Boakye et al 2011 supported by AGAMaL, the insecticides tested and the results are shown in table 11. The data indicated that wild *An. gambiae* mosquitoes in all the 6 districts are resistant to DDT and all the pyrethroids tested. Mortalities for pyrethroids ranged from 3.3 - 75.0% in all the districts with permethrin giving the highest mortality of 75% in Amansie Central. Mortality results for organophosphates ranged from 97.5 – 100% with the exception of Adansi North where 90% mortality was recorded.

With the exception of Adansi North where test showed marginal susceptibility, *An. Gambiae* from other districts showed susceptibility to organophosphates (Malathion and Fenitrothion). In all the districts, *An. gambiae* showed marginal susceptility to carbamates (Propoxur and Bendiocarb).

The level of pyrethroid and DDT resistance detected for *An. gambiae* in the Northern sector could be due to the widespread use of insecticides for agricultural activities such as cotton cultivation and also for mining activities in the Southern sector. However, the resistance detected for DDT and permethrin in the study areas is not unusual, because most of the sites tested in Ghana showed moderate to high levels of resistance to permethrin and DDT (Boakye *at al,* unpublished).

Table 11: Mean percentage mortalities of Anopheles gambiae s.l. exposed to diagnostic doses of different insecticides

Insecticide	Wa Municipal	Wa West	Wa East	Adansi South	Adansi North	Amansie Central
	% mortality after 24 hours	% mortality after 24 hours	% mortality after 24 hours	% mortality after 24 hours	% mortality after 24 hours	% mortality after 24 hours
Pyrethroids						
Alphacypermethrin	11.7	20.0	13.3	16.3	8.8	38.7
Deltamethrin	3.3	46.0	45.0	28.8	27.5	47.5
Etofenprox	25.0	8.0	20.0	20.0	13.8	40.0

Lamda-cyhalothrin	28.8	38.3	50.0	18.8	12.5	25.0
Permethrin	15.0	20.0	45.0	40.0	16.3	75.0
Carbamates						
Propoxur	95.0	82.0	90.0	96.3	87.5	93.8
Bendiocarb	93.0	88.0	92.0	96.3	92.5	97.5
Organophosphates						
Malathion	100	100	100	100	97.5	100
Fenitrothion	97.5	98.3	100	98.8	90.0	98.8
Organochlorine						
DDT	3.8	5.0	13.3	51.3	10.0	58.8

The findings are supported by studies conducted by Kintampo Health Research Institute et al. in 10 districts in January 2013 also as part of baseline studies contracted by AGAMal before extending its operations to other districts.

In a similar study of insecticides resistance by Nimako Sarpong et al 2012, for all the communities in the Upper West District where the tests were conducted, Anopheles mosquitoes from all the districts showed highest susceptibility of 98-100% to Organophosphates (Malathion, Fenitrothion and Pirimiphos-Methyl). The exception being Fenitrothion, which showed marginal susceptibility of 97% in the Lawra District.

Pirimiphos-Methyl was found to be the most effective with a mortality of 100% for all districts tested. The susceptibility of Anopheles mosquitoes to Carbamates (Propoxur and Bendiocarb) was restricted to Sissala West district in the Upper West, and to the Upper Denkyira in the Central Region. The remaining districts (Lawra and Nadowli) recorded marginal susceptibility with the exception of Bendiocarb in Jirapa and Lambussie Districts which were susceptible. Wild Anopheles mosquitoes caught in the 5 districts were found to be resistant to all the Pyrethroids and Organochlorides tested. [Nimako Sarpong et al 2012].

Table 12: Performance of AGAMal IRS programme

Indicators reported to the Global Fund : July – December, 2012		
Indicator Description	**Target**	**Actual**
Number and percentage of structures in targeted districts sprayed by IRS	606, 486	571,139 (94%)
Number of districts implementing IRS	12	12
Number of sentinel sites established and functioning	36	36
Number of staff recruited at national, zonal and district level for IRS management	51	88
Number of people trained on IRS	700	662
Percentage of districts with no stock-out of insecticide prior to spraying	100	100

Table 12: Performance framework for AGAMaL to Global Fund, 2012 [AGAMaL 2012]

- IRS operations of AGAMaL were scaled up to 7 between January & June in 2012 and to 12 districts from July to December 2012.
- A total of 571,139 structures out of a targeted 606, 486 were sprayed in 12 districts between July & December, 2012.
- A total population of over 1,200,000 benefitted from IRS protection.
- AGAMaL received a Global Fund rating of A1 for grant implementation and management in 2012.
- It also received an award from RBM-WARN subsequently.

Breeding sites

The malaria vectors in Ghana prefer different aquatic sites for larval development. Some of the breeding sites that have been identified include temporal pools (Figure 32) and stagnant rainwater or flooded areas (Figure 31), hoof prints, mining pits. These sites are located within urban and rural areas. *Anopheles* vectors have also been found to breed in small puddles, irrigation canals, drains and abandoned swimming pools. Contrary to the notion that *Anopheles gambiae* cannot breed in polluted water, a recent survey in Accra and Kumasi found the species breeding in semi-polluted and polluted waters exposed always to the sun.

A: Irrigated fields

Figure 31: Vector breeding sites; Irrigated field

B: Temporal turbid pools

Figure 32: Vector breeding sites; Temporal turbid pool

KEY FINDINGS-LARVICIDING

Following the pilot project at Kpeshie, Korle and Chemu lagoon areas in Accra, the following achievements were claimed to have been made by Labiofam and presented before ECOWAS Ministers of Health in Yamosukrou, Ivory Coast:

- A monthly reduction of incidence of malaria in the Accra Metropolitan area of 62.6% from March to December 2008
- A monthly reduction in incidence of malaria in the Accra Metropolitan area of 71.9% from January to April 2009.

Unfortunately, there has not been any independent evaluation of the programme to validate the findings to inform future direction.

Other Interventions

A number of other minor targeted interventions such as environmental management, use of repellents etc are being promoted on limited bases across the country but there are no scientific evidence in country to support their large scale promotion.

4.3.8 SWOT Analysis

Table 13: SWOT analysis of Integrated Vector Control

SWOT_IMVC

NO	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS/ CHALLENGES
1	The establishment of a Malaria Vector Control Oversight Committee (MaVCOC) under the leadership of NMCP to ensure the effective coordination of all vector control activities	Inadequate storage facilities	Continual commitment of support of health partners to policy	Long lead time in procurement
2	Removal of taxes and tariffs on ITNs	Inadequate distribution logistics like vehicles, motorbikes etc	BCC to convert ITNs ownership to use	Health partner interest shifting from malaria
3	Vibrant national ITN committee including health partners	Bottlenecks in procurement procedures resulting in serious delays	Attaining community wide vector control benefit	Development of insecticides resistance because of the large scale application of insecticides
4	Vulnerable populations are not neglected	Non commitment of government in provision of physical nets	Promote local communities involvement in planning and implementation of strategies	The drying up of donor funds for implementation
5	Integrated Strategies targets the entire population	Mainly donor partners driven	Large numbers of ITNs contribution to ITN awareness and eventual	Unavailability of insecticides and other equipment needed for

SWOT-IMVC cont.

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS/ CHALLENGES
6	Sharing of existing structures in areas of operation with other partners (MOFA, MMDAs)	Effectiveness depends on adherence to specified criteria of the insecticide and the application procedure	Getting donor partners to support malaria control activities	Procurement bottlenecks may delay implementation
7	Use of Health Facilities, RCCs, MMDAs, Traditional leaders, communities to increase access in mass distribution		Meeting the country's targets for malaria control targets in good time	Foreign actors dominating the sector and thus NMCP loosing control and not be able to control the intervention
8	Insecticides selection is based on strict adherence to international standards and well regulated		Engagement of foreign actors in the sector	
9	Availability of an arsenal of insecticides to choose from		Community engagement in the form of providing spray men and owning the intervention	

SWOT-IMVC cont.

	STRENGTH	WEAKNESSS	OPPORTUNITIES	THREATS CHALLENGES
11	The presence of an Insecticide Resistance Management Programme to monitor the development of any potential resistance			
12	High potential of reducing the incidence of malaria in a community			
13	Indoor residual spraying Intervention is implemented in targeted areas for maximum impact			
14	Spray operators are trained and registered in accordance with the laid down criteria of MOH/MOFA			
15	The availability of a registry of trained spray operators			
16	Involvement of Public and or Private institutions is regulated to curtail resistance development			
17	Target of larviciding as an intervention is immobile and confined within relatively small aquatic habitats			
18	Targeted interventions encouraged			
19	Interventions reduces the overall insecticide usage			
20	Biological larvae control agents are effective at relatively low doses, safe to humans and non target wildlife			

4.4.9 Successes, Best Practices and Facilitating Factors

- Aided by a computer Excel based modeling program, NetCalc®, the nation adopted Ante Natal Clinics (ANC), Child Welfare Clinics (CWC), and Primary Schools as the main PUSH channels to distribute LLINs free of charge.

- Incooperating a system of entomological, parasitological, insecticide resistance monitoring and malaria morbidity/mortality as well as quality control monitoring to the IRS programme especially by AGAMaL.

- Public Private partnership for the IRS programme

4.4.10 Issues and Challenges

- Sustainability of continous monitoring of insecticide resistance due to multiple use of insecticides by many partners

- Lack of control and independent evaluation of Labiofam larviciding project

- Threat of surface mining to malaria vector control due to increasing generation of breeding grounds

4.4.11 Conclusion and Recommendations

a) Conclusions

The Integrated Malaria Vector Management Policy as a document is largely adequate in addressing the vector control needs of the country. However, implementation of some of the interventional activities needs further evaluation by the GHS/NMCP.

Ghana has made great strides in ITN distribution from 1998 when nets had to be treated by users or for users through to use of LLINs given to targeted groups through child health campaigns and ultimately to door-to-door distribution and hanging of nets in recipients sleeping places. Over 12,000,000 LLINs were distributed between 2010-2012 and this has resulted in great improvement in ownership and utilization of ITN in the country.

The major peak of biting during the night occurred within the hours of 12-02 hours and a minor one around 03-04 hrs. The biting pattern of malaria vectors in the Navrongo area in Northern Ghana, which has not been reported in many parts of the sub-region, is the distribution of sporozoite-laden bites during the night. The pattern indicated that malaria transmission in the area occurred mostly from late evening and peaked at daybreak. This has important epidemiological implications because this is an area where insecticide treated bed nets (ITN) have been introduced and are being used by the people, but most of the inhabitants were usually awake during the period of 05.00 and 06.00 hours and out of their bed-nets, thereby increasing their exposure to infective inoculations from the vectors.

In both the northern and southern zones, higher numbers of Anopheles gambiae were collected indoor than outdoor. This was significant mostly in the southern zone. In the northern zone there were a few occasions where almost an equal number of collections were made both outdoor and indoor.

Indoor Residual Spraying as a malaria vector control intervention is being scaled up and the country has built adequate capacity to sustain the programme.

Number and percentage of structures in targeted districts sprayed by indoor residual spraying in the last 12 months (2012) was 439937 out of targeted 446752 (98.5%) for PMI; and 94% of targeted structures by AGAMal IRS in 2012.

Data indicate that pyrethroid and DDT resistance is widespread in many areas in Ghana. Notable among the pyrethroids which are ineffective are permethrin and DDT. Vector susceptibility to deltamethrin, alphacyperthrin as well as all the other classes of organophosphates (Malathion and Fenitrothion) remains relatively high in many areas but indications are that the vectors may be developing resistance to them.

The development of pyrethroid resistance by mosquitoes in many areas in the country is worrying. This is because most of the vector control interventions in the country that have helped to reduce malaria incidence such as ITN and IRS use pyrethroids which are less toxic to humans.

Quality control testing experiments performed confirms that, spray operators are discharging the right dosage of insecticide on the wall. It also confirms that the insecticide, vectoguard with an active ingredient of pirimiphos-methyl is effective for IRS operations.

Even though larviciding is an effective malaria control intervention it is not widely used in Ghana. Labiofam a Cuban company (with the support of the MOH) is currently implementing a limited larviciding program in the urban areas of Accra, Sunyani and Kumasi. Available information indicates that the last phase of the project with the MOH has come to an end. However, MONAD Chemical is setting up a facility to produce bio-larvicides for countries in West Africa. There has not been any independent evaluation of the Labiofam project to validate its claim of success.

Synthesis of the NMCP performance in area of Vector control

AREAS	SCORE				COMMENTS
	3 high adequate	2 adequate	1 present but inadequate	0 inadequate	
Use of LLINs as primary strategy for community prevention		X			
Indoor Residual Spraying					
Integrated Vector Management		X			

b) Recommendations

- It is recommended that the ITN component of the current vector control policy is revised to include the Continuous Distribution (CD) strategy and update on DHS to current ownership and usage figures.
- It is recommended that IRS operators should report on the proportion of households with at least one ITN and or sprayed by IRS in the last 12 months (Annex 8, indicator 21)
- It is recommended that strong monitoring of insecticides used for IRS is undertaken with regards to insecticide resistance development to inform policy
- It is recommended that there should be consistent monitoring of EIR across the country (Annex 8, indicator 9)
- Conduct an independent evaluation of the Labiofam project to confirm the claimed achievements
- It is recommended that all larviciding companies be brought under the National Malaria Control Program for effective monitoring and ownership
- Malaria control interventions in urban and peri-urban environments and across borders (malarious countries) should be planned and implemented concurrently
- Communication particularly in environmental management interventions should be well structured to avoid ambiguity
- It is recommended that impact of environmental management and housing on transmission/morbidity should be consistently monitored
- Building regulations should be well enforced to ensure buildings are properly sited
- It is recommended that environmental management by laws should be well enforced at district, regional and national levels
- Adequate funding coupled with its timely release is required for environmental management interventions to be more effective
- It is recommended that more research is conducted into repellants including coils and other natural products for reducing man-vector contacts outdoors.

4.5 Malaria Diagnosis and Case Management

4.5.1 Introduction

In Ghana as well as worldwide, the emergence and spread of *P. falciparum* resistance to commonly used antimalarials poses a serious challenge to the benefits of early diagnosis and prompt treatment as a priority within the current strategy for malaria control efforts.

Chloroquine used to be the drug of choice for the management of uncomplicated malaria until the emergence of resistance got to its peak in the year 2002. In November 2000, an informal Consultation on the use of anti-malaria drugs was convened by W.H.O. in Geneva. The meeting reviewed and updated recommendations on the use of anti-malaria drugs for chemoprophylaxis and treatment, based on the data available. The potential value of malaria therapy using combinations of drugs was identified as a strategic and viable option in improving efficacy and delaying development and selection of resistant parasites. In this regard, the Ministry of Health through the National Malaria Control Programme in collaboration with the Noguchi Memorial Institute for Medical Research studied the efficacy of chloroquine country wide in 2002 and found that treatment failure following chloroquine was in the range between 6% and 25% and parasite clearance rates were low and in some cases below 50%.

These results prompted the search for alternative treatment for uncomplicated malaria. A comparative study conducted subsequent to the chloroquine efficacy tests showed that the efficacy of the tested Artemisinine-based combination therapies (ACTs) Artemether - Lumefantrine (AL) and Artesunate +Amodiaquine (AA) were similar. The study went on to document the efficacy of Artesunate Amodiaquine on both day 14 and day 28 was 99.9% as compared to Arthemether Lumefantrine which was 99.9% efficacious on Day 14 and 97% on Day 28. Therefore AA was selected as the first-line treatment for uncomplicated malaria. Other reasons for this choice were the local capacity for the production of Artesunate Amodiaquine and the drug's lower price. The process culminated in the change of Ghana's Anti-malaria Drug Policy from the use of Chloroquine to the adoption of Artesunate -Amodiaquine combination as the first line drug for the management of uncomplicated malaria in 2004. Sulphadoxine-pyrimethamine was reserved as prophylaxis for intermittent preventive treatment in pregnant women to be given as 'directly observed therapy' in the presence of a trained health worker.

The implementation of the new (2004) antimalarial drug policy was set for January 1st 2005 but rolled out later on in the year due to procurement delays. Feedback from monitoring systems put in place revealed widespread reports of adverse drug reactions, even before the procurement of the public ACTs, due to differences in drug responses between adults and children from the private sector. This resulted in serious negative publications and criticisms in both the print and the audiovisual media leading to loss of confidence in the drug by both health workers and the general public.

A committee was then constituted at the auspices of the Minister of Health in 2007 to look into the concerns and make recommendations to advise policy. The Committee's work led to the introduction of two other artemisinin-based combination drugs (Artemether Lumefantrine and Dihydro Artemisinin Piperaquine) as alternatives to Artesunate Amodiaquine particularly for those who could not tolerate the latter. The antimalarial drug policy was therefore revised in 2007 and 2009 to reflect modern trends. (The policy was revised in 2007 to include Arthemether Lumefantrine and Dihydroartemisinin Piperaquine as an alternative to Artesunate Amodiaquine. The drug policy was further revised in 2009 to add arthemether injection as an alternative to injectable quinine for the treatment of severe malaria.)
In 2012, following new evidence that injection artesunate is superior to injection quinine in managing severe malaria and WHO's recommendation for its use in preference to quinine, among other concerns, the drug policy was revised after careful review of implementation challenges as well the validity of the document to current situation of malaria in the country.

4.5.2 Policy and guidance

Ghana has a National Drug Policy that supports drug regulation over its importation, safety, distribution, storage, sale, and pharmacovigilance. Although the public sector drives the drug policy, there is a free market system for the private sector to participate in the sale of antimalarials. There is a general practice of rational selection through implementation of the Essential Medicines List (EML), Standard Treatment Guidelines, and the use of approved herbal medicines based on hardcore evidence.

Since 2010, the Affordable Medicines Facility-malaria, a novel financing model managed by the Global Fund, has been critical in reducing the cost of Quality-Assured ACTs by providing a subsidy to first-line buyers and reducing the retail price of ACTs in both public and private outlets and facilities.

There are specific guidelines developed to cover various aspects of Case Management, including diagnosis, Treatment with ACTs, and HBC.

Systems of Efficacy

Universities of Ghana and KNUST: The National Malaria Control Programme collaborates with Universities and Research Institutions to carry out efficacy testing of antimalarials. The most notable institution partnered with over the years, has been Noguchi Memorial Institute for Medical Research (NMIMR). Since 2003 the Institute has continued to investigate the efficacy and the safety of artemisinin-based combination therapy (ACT). An antimalarials surveillance system was established by Noguchi in 2005 to monitor the efficacy and safety of antimalarials, which provided an evidence-base for decision-making and policy changes by the NMCP. The Institute currently has 10 sentinel sites across the country.

The antimalarials surveillance system continued until 2011 when the Institute conducted studies on the therapeutic efficacy of Artemether-Lumefantrine combination in the treatment of uncomplicated malaria among children under five years of age in three ecological zones in Ghana using the 2009 WHO protocol for surveillance of anti-malarial drug efficacy (Abuaku et al 2012).

The institute has also carried out surveillance of Molecular Markings of *Plasmodium falciparum* resistance to Sulphadoxine-Pyrimethamine 5-years after change of Malaria Policy in Ghana (Duah, 2012). The Institute also collaborates with Kintampo and Navrongo Health Research Centres, among others to carry out these activities.
As part of their academic work, students of School of Health Sciences, School of Medical Sciences and Faculty of Pharmacy and Agriculture also conduct research into the quality and resistance of antimalarials.

The Centre for Scientific Research Into Plant Medicines, Mampong Akwapim and Traditional Plant Medicine Division of Ministry of Health: These institutions collaborate to register all herbal medicine including anti-malarials that are manufactured in Ghana or brought into the country. The herbal medicines are tested for efficacy, toxicology and resistance, among others. The Centre has Pharmacology and Toxicology Departments that carry out scientific investigations to evaluate the safety and efficacy of herbal medicines to provide preclinical data. They perform efficacy, toxicology and therapeutics testing of plant medicines. The Centre also has dedicated hospitals for the use and study of herbal preparations used to treat malaria. The Centre collaborates with the Animal Research Institute of CSIR for the confirmation of some of the tests of the medicines conducted; and has also collaborated with the Ministry of Health and WHO on related activities and programmes.

Adequacy of Efficacy System

Efficacy tests are currently being conducted by Noguchi for ACTs, which are in the policy. However, there is the need for efficacy tests to be carried for other drugs such as clindamycin, quinine, etc. which are also recommended in the Antimalarial Drug Policy. It will also be important later to conduct local efficacy testing for other antimalarials that have recently been developed and are currently under development such as pyronaridine-artesunate and MMV39008 to gain local experience and knowledge of their efficacy and advise future decision-making.

Ghana has the capacity for efficacy testing and collaboration between the institutions exists. However there is the need for more collaboration between the CSRIRPM and Noguchi in terms of testing for the efficacy of Herbal Medicines. This will in turn further strengthen country capacity.

There is also the need for continued resourcing of responsible agencies to ensure continued efficacy testing.

Pharmacovigilance

Food and Drugs Authority (FDA): FDA has the legal mandate for Adverse Event Monitoring in the country. The FDA has systems / mechanism in place for the collection, detection, assessment monitoring, and prevention of adverse effects of medicines including antimalarials. The Board then determines causality of the adverse drug reactions. The Board has well-documented policy/guidelines and forms for reporting adverse drug reactions.

The Institution also does Cohort event monitoring as part of its pharmacovigilance activities. From the Board's 2010 Annual Report, 34 Adverse Drug Reaction (ADR) were reported. In 2011, 236 ADRs were reported. The agency also participated in local and international drug monitoring meetings in 2010, thus building local capacity on adverse events monitoring.

Pharmacovigilance Unit, University of Ghana Medical School*:* This Institution initially introduced Pharmacovigilance into Ghana. It now operates as the Africa Regional Office of Uppsala Monitoring Centre.

NMIMR: During efficacy testing adverse events are documented.

INESS (In-depth Effectiveness and Safety Studies) also conducts safety studies.

The Centre for Scientific Research into Plant Medicine*:* The Centre's Pharmacology and Toxicology Department carries out scientific investigations to evaluate the safety and toxicology studies of plant medicines. CSRPM has performed observational studies on 35 herbal medicines and continues to assist the Food and Drugs Authority of Ghana to conduct some safety and Efficacy Studies. Side effects have been noted for antimalarials for newborns. Further research/ testing is necessary to reduce side effects in this age group.

Traditional Medicines Division: The Division has guidelines on the use of herbal medicine; policy of treatment audits and pharmacovigilance. It also has systems / mechanism in place for the collection, detection, assessment monitoring, and prevention of adverse effects of medicines including antimalarials.

Ghana Health Service (Institutional Care Division (ICD): Under ICD there are Health Facilities with Drugs and Therapeutic Committees and Pharmacies to monitor adverse drug reactions (pharmaco-vigilance). In 2006 ICD came out with a policy statement in which all hospitals and clinics were to monitor adverse events including drug reaction (antimalarials included). Since then, in almost all the hospitals and clinics, the Head Nurse has kept Incidence Reporting Books - lodged at the Head Nurses' Office. ADR reporting forms are kept at the pharmacy units of hospitals manned by the Head of the Unit.

In 2011, a study carried out by **Avortri, Baah-Odoom & Abeka-Nkrumah to** assess adverse event/reaction reporting in nine hospitals, among 953 health staff (participants were mainly

doctors, nurses, midwives and pharmacists), found that over 80% of the staff who participated in the study were aware of the books/forms and where they were located. However, reporting of adverse reaction by both the health staff and patients was found to be an average of four per facility per year.

NMCP with Support from Global Fund: NMCP resourced FDA and other agencies such as Pharmacovigilance Unit of University of Ghana Medical School to carry out pharmacovigilance studies. NMCP also carries out routine monitoring of malaria control activities and a component of this assessment includes pharmacovigilance activities in health facilities. Routine monitoring reports in Western Region in 2010 and 2011 indicated that health workers did not seem to be aware of the existence of Adverse Event Reporting Forms and therefore were not reporting on them.

Adequacy of Adverse Event Monitoring System:

There are systems in place for adverse event reporting. The system however, needs to be consistently resourced. The international standard from Uppsala Monitoring Centre indicates that the measure of an appropriate Pharmacovigilance system is 200 AE reports per a population of one million per year. In the FDA report of 2011, 236 AEs were reported; representing approximately 10 AEs per year out of a population of one million. This indicates that the system is not functioning optimally. The system needs some improvement from all levels from patient, through to health workers and finally to the national level and needs to be more coordinated from the National level. From the functions of the various institutions, they have been documenting a number of adverse events in their studies. However there is no indication that reports of these AEs are sent to FDA, which has the legal mandate to document and assess AEs. There is a need to put measures in place to ensure AEs seen while carrying out studies are reported to FDA.

QUALITY

Food and Drugs Authority (FDA): Conducts quality testing of food and medicine. Annual Reports of 2010 and 2011 indicated that the companies that had issues with either quality or efficacy in 2010 had the same issues in 2011 and it will be important to find out the reasons for this.
FDA has been collaborating with United States Pharmacoepia with funding from PMI to conduct quality studies and post-marketing surveillance on drugs including antimalarials.

Ghana Standards Board and Food and Drugs Authority: The Ghana Standards Board and Food and Drugs Authority register and test all foods and medicines including anti-malarials that are brought into the country. These agencies also ensure that the medicines do not stay on the shelves beyond the manufacturers instruction by doing periodic checks of medicines in the chemical shops and by sanctioning defaulters.

The Traditional Medicine Division of Ministry of Health: monitors the quality of plant medicine in collaboration with CSRIPM and other agencies.

The Universities: The Faculties of Pharmacy and Chemistry in particular are also involved in quality testing of drugs including antimalarials.

ADEQUACY OF QUALITY TESTING SYSTEM

There is local capacity for quality testing. However it seems there is a need for more coordination among the agencies carrying them out. There seems to be the need for more resources to be channelled for quality testing. Agencies should closely monitor companies that repeatedly have breaches with quality over the years.

4.5.3 Organization of Case Management Services

Organisational of case management services is not different from what has been described under organization of health services in Programme Management Chapter in section 4.1.5 above. An integrated approach to managing patients is the norm and there are no stand alone special facilities or services exclusively for malaria.

4.5.4 Human resources, Training And Capacity Development

As a way of keeping staff of all levels of health service delivery, particularly the public sector, abreast with the revised antimalarial drug policy, the NMCP and other partners like the President's Malaria Initiative (PMI) rolled out a nationwide training of health staff in 2010. This targeted all categories of health staff who are in one way or another associated with diagnosing and treating malaria cases including doctors, nurses, midwives, pharmacists/ dispensing technicians, community health nurses/ officers and enrolled nurses (health assistants).

As part of supporting interventions under the pilot project Affordable Medicine Facility-malaria (AMFm), trainings were conducted for all private pharmacies, Licensed Chemical Shop owners and their assistants and Medicine Counter Assistants from 2010 to February, 2012. A recent monitoring conducted by the Pharmacy Council indicated that about 67% of service providers (private pharmacies and Licensed Chemical Sellers) interviewed reported having received training on malaria case management. Between 2010 and 2012, the following providers were trained:

- **1,404 Pharmacists were trained** by the Pharmaceutical Society of Ghana
- **6,400 Licensed Chemical Sellers** conducted by the Pharmacy Council
- **522 Private Sector Prescribers** conducted by the Association of Private Clinics
- **1,002 Medicine Counter Assistants** conducted by the Pharmacy Council
- **15,000 Licensed Chemical Seller Assistants**

HBC Capacity Building

HBC has been scaled up to almost all regions across the country paying particular attention to the remoteness of communities and lack of access to health facilities. At the end of 2012, 83 districts in the six regions were implementing HBC under Global Fund support while 12 districts in the Central region and 38 districts in the three northern regions were implementing with UNICEF support. The total number of districts implementing HBC in the country is now 133, above the target of 123 by the year 2013. About 11,633 Community-based Agents (CBAs) and 2,303 CHOs have been trained on HBC in the six regions under Global Fund support. Refresher trainings have also been done for CBAs and CHOs (including other supervisors). In the UNICEF supported districts there are currently about 10,500 CBAs in the Northern Region, 2,500 in the Upper East Region, and 2,500 in the Upper West Region implementing the

intervention, also called Community Case Management. CBAs have also been trained in the Central Region. In a number of districts however especially during the field visits it was realised that the HBC programme was non-functional probably because they were not part of the implementing districts. There is inadequate use of the CHPS system to promote HBC in a number of places visited.

4.5.5 Annual Planning

Annual planning for malaria case management services is part of the integrated MTEF and annual health planning at all levels of the health service. Special plans and proposals are however developed by the NMCP for additional funding and resources such as to Global Fund and other earmarked partner support.

4.5.6 Malaria Diagnosis

The increasing cost and the need to practise rational drug use requires that diagnosis of malaria must be confirmed with microscopy or Rapid Diagnostic Tests. There has been a gradual shift to testing before treating but supplies are limited, in particular RDTs. RDTs therefore need to be scaled-up in both the public and private sectors and providers need to be trained on their appropriate use. The WHO Global Malaria Programme issued revised guidelines for the treatment of malaria in which it was recommended that all suspected cases of malaria receive a diagnostic test prior to treatment. Treatment solely on the basis of clinical suspicion should be considered only where parasitological diagnosis is not accessible. (i.e Not available within 2 hours of the patient presenting at a point of care). [WHO 2011].

In Ghana, there is a progressive shift from clinical to laboratory confirmation of malaria either by Microscopy or RDTs as the basis of treatment. Hence wherever possible, a diagnosis must be confirmed before giving antimalarial treatment, in tandem with WHO and Integrated Management of Child Illnesses.

Current Status of Implementation

The NMCP guidelines for Malaria case management in Ghana stress on accurate diagnosis and prompt treatment of malaria. However these essential components of the NMCP's case management strategy continue to face challenges. Malaria diagnosis in health facilities based on laboratory test in 2008 was less than 14%. [Malaria Consortium, 2008 In: DFID, 2011]. In 2012, routine data on malaria diagnosis indicated that only 34.7% of all presumptive malaria cases were tested (DHIMS 2 Software, 2012). The figure in 2012 represents 148% increase in the proportion of presumptive malaria cases tested when compared with 2008. Although this marked a massive improvement over the situation in 2008, the number of presumptive malaria cases reported is still extremely high and falls short of the provisions of the national guidelines.

In 2008, PMI in conjunction with the NMCP carried out a Health Facility Survey. Results from the Health Facility Survey indicated that 22 out of the 59 facilities assessed had a laboratory. One hundred percent (100%) of hospitals, 20% and 17% of clinics and maternity homes respectively had a laboratory. Only 63.6% of facilities that had a laboratory also had all of the required materials (i.e. functioning microscope, slides, giemsa stain, trained lab technician) needed for malaria microscopy. Overall, less than 20% of patients (60 out of 314 patients) diagnosed with malaria had any laboratory tests ordered. Also, same day results were available for only 24% of patients for whom lab tests were ordered. (PMI, NMCP, 2008).

The National Malaria Control Programme in collaboration with PMI and USAID have allocated to health facilities about 460 microscopes and over 6 million malaria rapid test kits in an effort to strengthen the health system and also move progressively from clinically diagnosing malaria to actual testing.

Despite these efforts, most clinicians would still not adhere to negative test results from either microscopy or malaria rapid test kits. This is evident in reports from the DHIMS 2, which indicates low percentages of patients tested as compared to the number of OPD attendants (source DHIMS 2). It is therefore necessary that NMCP conduct a survey or research as to why this is so.

Facilities Performing Microscopy And RDTs With Appropriate Guidance

"Guidance" refers to the ability of the laboratory technician to accurately adhere to the recommended steps for malaria microscopy and Rapid Diagnostic Tests (RDTs) set forth by the National Malaria Control Program and Clinical Laboratory Unit with technical assistance from IMaD.

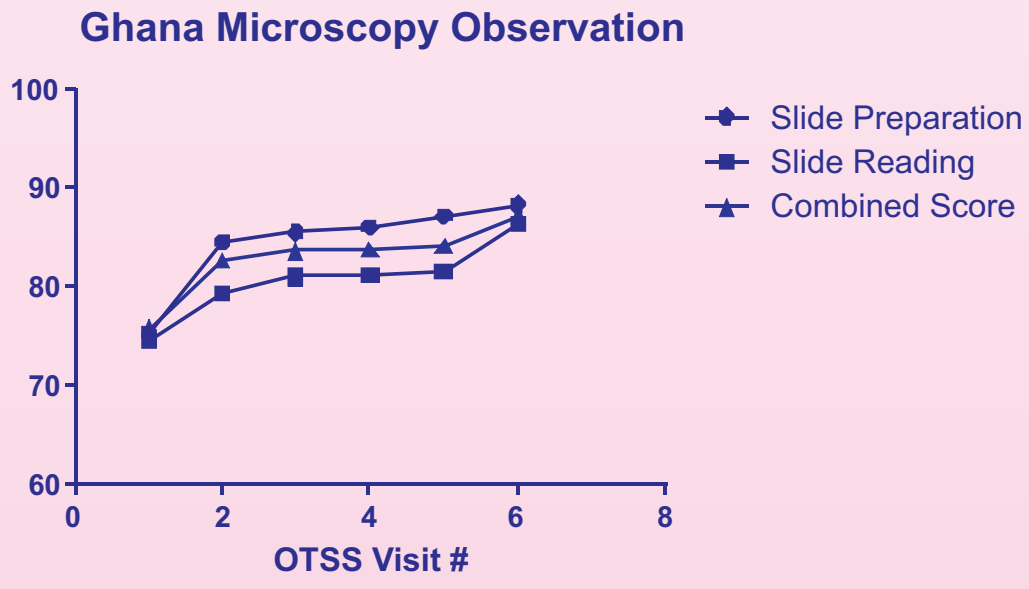
Microscopy Diagnosis

The guidance indicator for microscopy testing exclusively targets the component for "staining and reading blood films". The results shown are an average of the scores received for the following tasks: preparation of stain, staining field or Giemsa stain, slide drying, slide examination, slide reading, result reporting, result delivery, slide cleaning and storage.

Table 14: Number and Percent of Facilities Performing Malaria Microscopy Using Appropriate Guidance

Percent (avg.) of Malaria Microscopy Tasks Performed According to Protocol During OTSS	OTSS Visit						
	visit 1	visit 2	visit 3	visit 4	visit 5	visit 6	visit 7
Ghana	76%	83%	84%	84%	84%	87%	

Fig 33: Malaria Microscopy Performance



Results Summary

There has been an 11-percentage points increase in malaria microscopy performance between OTSS visit 1 and 6.

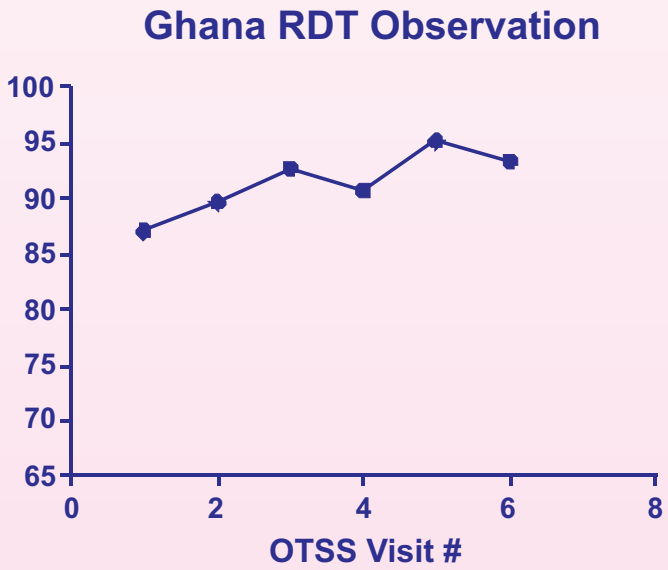
RDT Diagnosis

The guidance indicator used for RDT testing is defined as: carrying out rapid diagnostic testing according to manufacturers' instructions, once the product is approved by WHO.

Table15: Percent Average of RDT Task Performed Correctly

Percent (avg.) of RDT Tasks Performed According to Protocol During OTSS	OTSS Visit						
	visit 1	visit 2	visit 3	visit 4	visit 5	visit 6	visit 7
Ghana	87%	90%	93%	91%	95%	93%	

Fig 34: RDT Performance



Results summary

- A 6-percentage point increase in RDT performance was observed during OTSS visits.
- RDT performance is already very high in Ghana.
- One of the major challenges faced by health staff performing RDTs is the lack of a timing device. Therefore points may be lost during supervision if the health worker fails to read the device at the appropriate time. In response to this need, the NMCP (with support from the IMaD project) purchased 225 multi-task timers that will be distributed to health facilities during quarterly supervision visits. However, additional timers are still needed.

4.5.7 Malaria Treatment

See section on policy and guidance [section 4.4.2] above

4.4.8 Malaria Prophylaxis

The policy on malaria prophylaxis is part of the Anti-malaria drug policy. The policy covers malaria prophylaxis in non-immunes, who are defined as:

- Persons living in non-malarious countries for six months or more
- Immuno-compromised subjects, including sickle cell patients.

All persons travelling to Ghana from non-malarious countries are advised to consult their general practitioners for the appropriate advice on malaria prophylaxis. Dosing schedules for children should be based on body weight. Anti-malarials should be started 2-14 days before arriving in Ghana, and continued for 1-4 weeks after departure, depending on the anti-malarial chosen.

The recommended doses of any of the following anti-malarials may be used for malaria prophylaxis in non-immune persons while visiting Ghana unless contra-indicated:

- Doxycycline
- Mefloquine
- Proguanil
- Atovaquone/proguanil

4.5.9 Performance Indicators and Targets

Performance indicators and targets as per Strategic Plan under Case Diagnosis and Case Management are the following:

- All (100%) health facilities will provide prompt and effective treatment using ACTs
- 90% of all patients with uncomplicated malaria will be correctly managed at public and private health facilities using ACTs
- All (100%) communities will have access to community-based treatment for uncomplicated malaria
- 90% of caretakers and parents will be able to recognize early symptoms and signs of malaria
- 90% of children under five years of age with fever will receive an appropriate ACT within 24 hours of onset.

4.5.10 Service Delivery outputs and outcomes

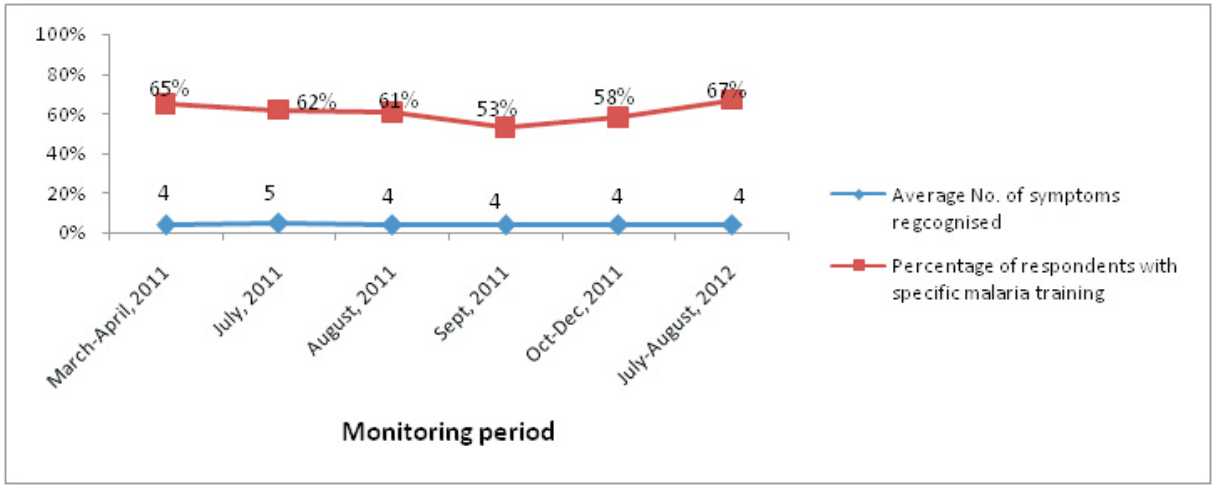
***Access And Knowledge Base of The Antimalarial Drug* Policy**

Generally, there is a fair amount of knowledge on the use of ACTs to treat uncomplicated malaria. A recent Knowledge Attitude and Practice (KAP) study by the School of Public Health, Legon conducted in 2011, revealed that 54.1% of respondents had heard of artemisinin-based combination therapy (ACTs). In the same study however, many (63.2%) of them did not know what constituted the drug called ACTs. Most (87%) of the respondents cited the health facility as the likely place to get ACTs. (SPH, 2012: AMFm Endline Survey Report).

There is however a big gap at the level of the pre-service curriculum (i.e. Medical Schools and Nursing/Midwifery Training Schools). Information from the NMCP Monitoring Reports indicates that most new staff heard of the existence of an Antimalarial Drug Policy (AMDP) after school, when they were posted to health facilities (NMCP Annual Report 2010).

As part of their monitoring activities of the private sector, the Pharmacy Council has monitored malaria case management knowledge of providers, including Licensed Chemical Sellers (LCS), private pharmacists and Medicine Counter Assistants (MCAs). The graph below illustrates the coverage of trainings conducted and the number of symptoms recognized by private sector providers.

Figure 35: Number of Symptoms Recogised and Trainings Received by Private Sector Providers



Source: **Pharmacy Council Monitoring**

In August 2012, 67% of the service providers interviewed reported having received specific malaria training. However, despite the fact that the majority of respondents had been trained the average number of symptoms recognized by respondents was 4 (out of 10 for uncomplicated malaria and 11 for severe malaria). Therefore, in the future it will be important to reinforce these trainings to ensure that the target providers retain the correct information on malaria case management. Moreover, as Ghana looks to scale-up RDTs in the private sector, it will be important to update these trainings accordingly to sensitize providers on the correct use of RDTs and adherence to RDT results.

Access To Treatment (HBC)

There has been a steady rise in the number of people treated at the community level either by a CBA or Community Health officer. The number of persons treated by CBAs however, falls far below target. Routine data from DHIMS 2 indicated that in 2012, 87,258 children were treated in the community, as against the target of 1,416,175, representing just 6% of the target. The proportion of children under five with fever in the past two weeks receiving treatment by CBAs with appropriate antimalarials (ACT) increased from 2% (MICS 2006) to 3.1% (MICS 2011). There are a number of reasons for this situation. These include the poor supply of logistics as has been alluded to earlier. Also, the increased number of functional CHPS compounds in which caregivers prefer to send their wards to rather than to a CBA. NHIS has increased financial access, further reducing the need to use a CBA instead of a trained health worker.

REVIEW OF ACCESS TO ACTs

Since 2005, efforts have been made to increase availability of ACTs in the country, with efforts being made to ensure that these drugs are Quality-Assured ACTs. "Quality-Assured ACTs" (QAACTs), refers to ACTs that have received pre-qualification from the World Health Organization. Recent studies indicate that there exist many antimalarials on the Ghanaian market that have not received pre-qualification and some of these are ACTs, referred to as *Non*-Quality Assured ACTs, and these are both imported and locally produced antimalarials. (Non quality-assured ACTs are discussed in a section below).

The Affordable Medicine Facility Malaria (AMFm) has been instrumental in increasing the access to Quality-Assured ACTs in both public and private outlets in Ghana. This was shown in a baseline and endline Independent Evaluation commissioned by the Global Fund in 2010 and 2011 respectively (AMFm Section for details). This section reviews the access/ availability of ACTs from various data sources/ surveys.

Review of Access to ACTs from Routine Data

Routine Data from the NMCP and Ghana Health Service (DHIMS 2) indicate that in absolute terms there has been a steady increase in the number of malaria cases (either confirmed or unconfirmed) provided with ACTs at health facilities across the nation in 2012. However when one reviews the percentage of malaria cases (confirmed and unconfirmed) receiving ACTs the data reveals a declining trend for the last three years. In 2010, the percentage of patients put on ACTs was 99.1%; reducing to 92.6% in 2011 and to 85.5% in 2012. The adherence to test results may be the reason for the reduction in the proportion of patients put on ACTs.

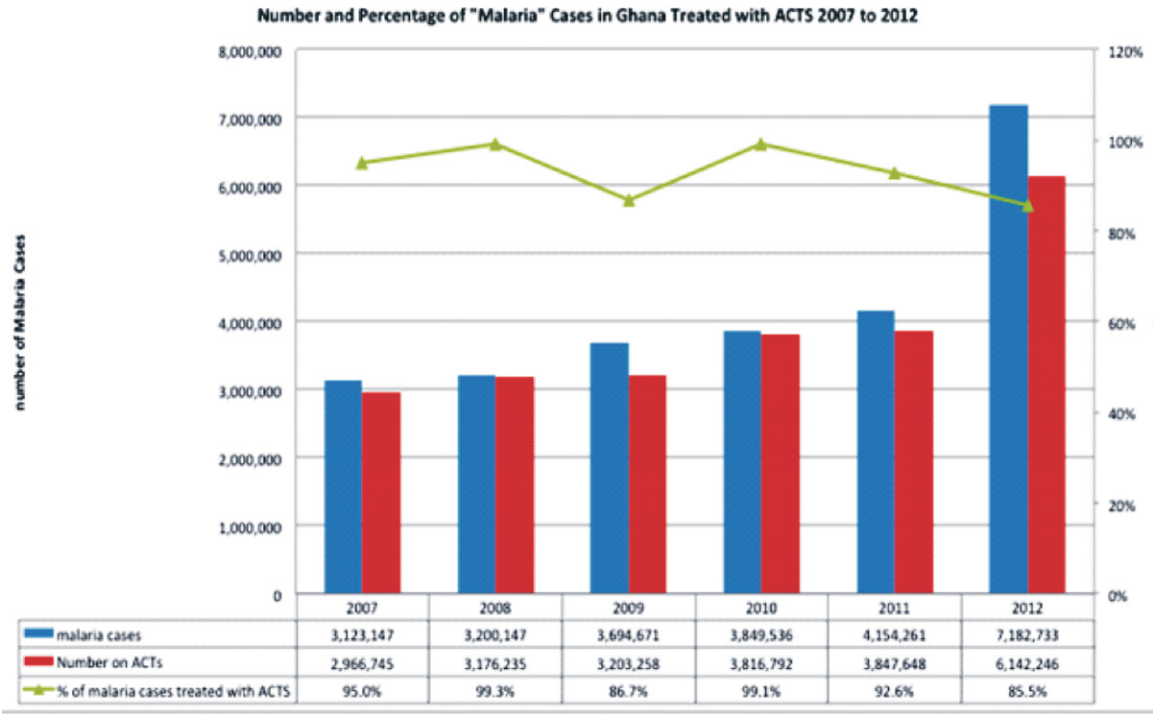


Fig 36: Number and Percentage of "Malaria" cases in Ghana Treated with ACTs 2007-2012

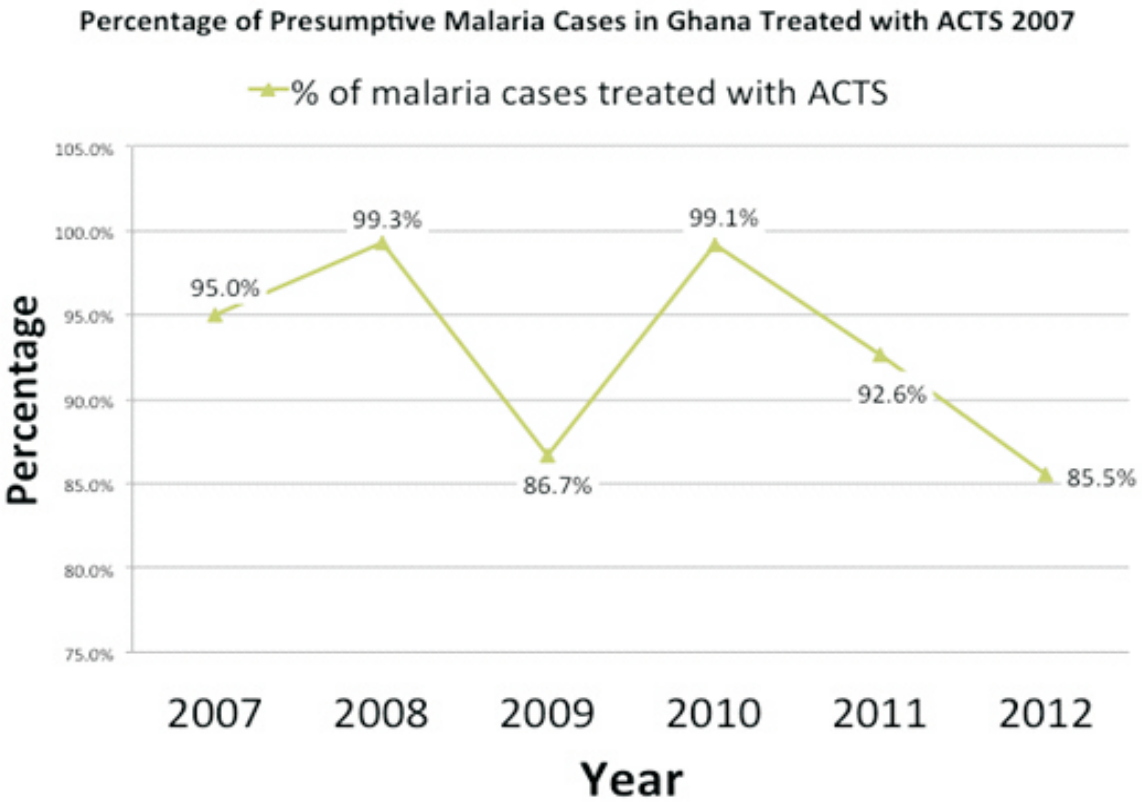
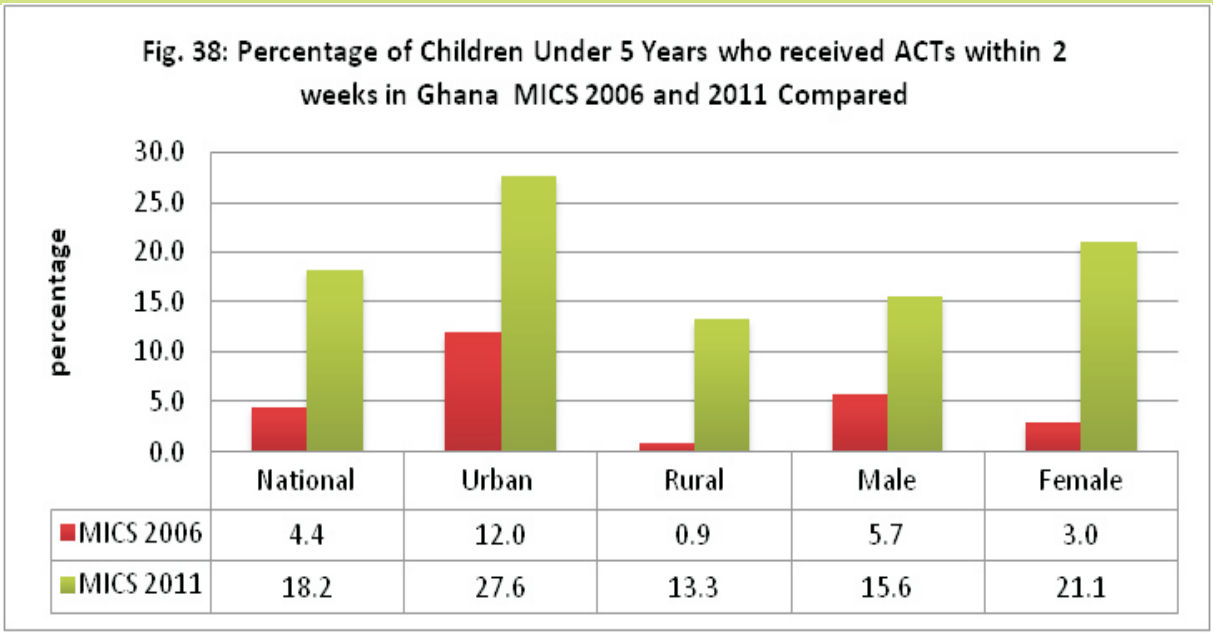


Fig 37: Percentage of Presumptive Malaria Cases in Ghana with ACTS, 2007-2012

Review of Access to ACTs from Major Population-Based Studies

There has been an increase in access to ACTs for children under 5 years of age when one compares the results of the Multiple Indicator Cluster Survey 2006 and 2011. In 2006, 4.4% of children under 5 years received ACTs compared with 18.2% in 2011. [MICS 2006, 2011]

Rural/ Urban Access: When access to ACTS is differentiated by rural/urban distribution, we can note that the access to ACTs was much higher in urban areas. For every 1% of rural children receiving ACTs, about 12% of urban children had access to ACTs. However, the access to ACTs in rural areas has increased over the years. In 2011, more rural children had access to ACTs (13.3%) compared with the situation in 2006. The rural urban comparison had improved in 2011 when one compares it with the situation in 2006.



Wealth Quintile Access: Data from MICS 2011 and the Ghana DHS 2008 reveal that children from wealthier quintiles had a greater access to ACT than those from Lower Wealth Quintiles. The higher the wealth quintile, the more access children had to ACTs within two weeks of Malaria onset. Other issues relating to availability of ACTs are in Section under '*Review of AMFm*').

Percentage of Children under 5 years who received ACTs weeks by Wealth Quntile DHS 2008 and MICS 2011

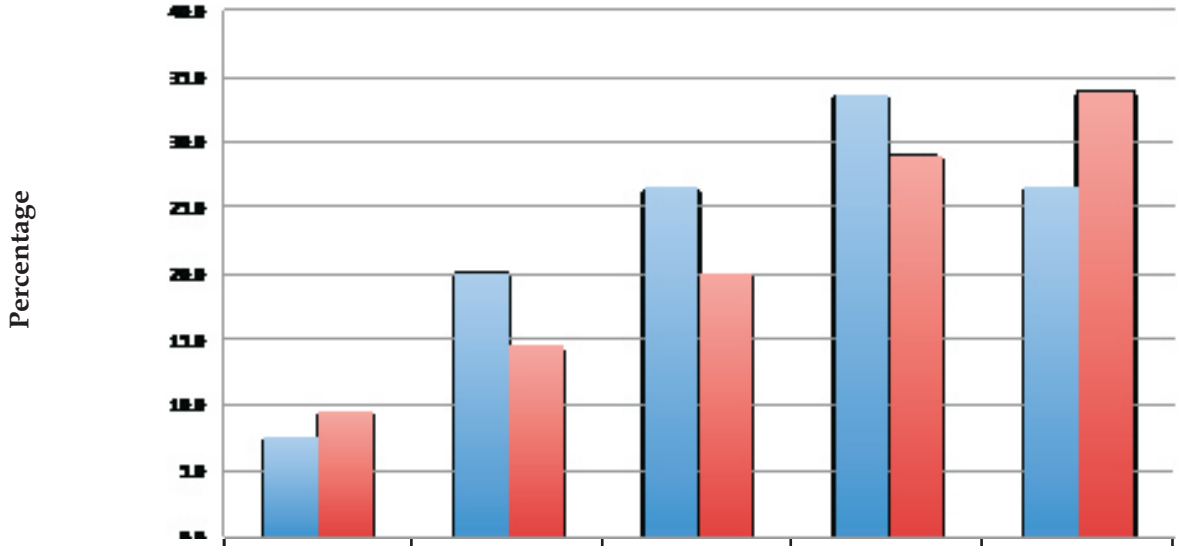


Fig. 39: Percentage of Children Under 5 Years who received ACTs within 2 weeks in Ghana by Wealth Quintile DHS 2008 and MICS 2011

AMFm

In contravention of 2004 National Policy on the use of ACTs for the treatment of Malaria, and the revised Malaria Drug Policy for Ghana 2009, the patronage of artemisinin mono-therapies was very high in Ghana. Nearly 41% of outlets had in stock oral mono-therapies, in addition to the approved ACTs [AMFm Independent Evaluation Team, 2012]. The high availability of monotherapies may be due to the presence of SP in the market. It is note worthy that the private sector had 47% of outlets with Artemisinin mono-therapies. [(ibid). Amuasi et al (2012), Independent Evaluation Team (2012)] and AMFm Independent Evaluation Team, (2012) providing baseline figures identified that in 2010, between 49% to 57.3% of outlets with any antimalarial in stock at the time of a baseline survey visit carried artemisinin mono-therapies. Other sources such as the Ghana Health Service (2011) cited in Euro Health Group (2012, p. 44) also reveal, "65% of pharmacists continue to sell mono-therapies".

Although one can infer that the current situation is better compared with the baseline situation, it is also important to place on record that Ghana currently has the highest percentage of outlets with Artemisinin mono-therapies in 8 countries evaluated by the Global Fund Independent Evaluation team. Apart from Nigeria (33%), all other countries evaluated by the Independent Team from the Global Fund had less than 1% of outlets stocking mono-therapies (AMFm Independent Evaluation Team, 2012]. It must be put on record that Ghana however recorded the best score for all the other indicators evaluated in the 8 countries.

4.5.11 SWOT Analysis

Table 16: SWOT analysis, Case Management and Diagnosis

TORs	STRENGTHS	WEAKNESS	OPPORTUNITIES	THREATS
Assess progress towards implementation of current anti-malaria drug policy including home-based care and malaria prevention and treatment in pregnancy and identify any implementation challenges	**Implementation Framework:** - Ghana has a National Drug Policy that supports drug regulation over its importation, safety, distribution, storage, sale, and pharmacovigilance. - The cost of medicines is either covered by the National Health Insurance System or paid out-of-pocket. - Antimalarial drugs generally enjoy import tax reduction as a general practice.	**Implementation Framework** - High rate of monotherapies, including artesmisinine monotherapies **HBC:** - There have been delays in procurement of drugs and other logistics and that affected the roll out of the intervention in most districts. There have been challenges with respect to the supply chain. - The number of	**Implementation Framework:** - Reinforce the curriculum in pre service institutions as well as the universities. - Reinforce the trainings on malaria case management, especially in the private sector where symptom recognition remains low (as reported by the Pharmacy Council). - Survey the use of SP sold OTC (to ensure they are used for IPTp and not treatment).	**Implementation Framework:** - Over-consumption of ACTs due to presumptive diagnosis of malaria - Important knowledge gap between the curriculum in pre-service institutions as well as the universities (medical and nursing schools) and

TORs	STRENGTHS	WEAKNESS	OPPORTUNITIES	THREATS
	-Training programmes were conducted for all relevant health care providers at all levels of service delivery including Licensed Chemical Sellers, Medical Counter Assistants, pharmacists as well as community workers to understand and implement the policy. HBC: -HBC has been scaled up to all regions across the country; paying particular attention to the remoteness of communities and lack of access to health facilities. Availability of only anti-malarials in HBC-selected districts in the six regions apart from the three Northern and Central regions; Zinc, Oral rehydration salts (ORS),Paracetamol and Amoxycillin are yet to be supplied. - NHIS has increased financial access, further reducing the need to use a CBA instead of a trained health worker. - There has been a steady rise in the number of people treated at the community level either by a CBA or	persons treated by CBAs falls far below target. - ARI and diarrhoea drugs are not given free of charge due to a lack of funding	**HBC:** - Need to clarify health messages (IEC/BCC) that CBAs communicate when working in the community - Need to ensure that HBC interventions are responsive to new case management strategies/ developments; namely the Test, Treat and Track strategy. - Need to clarify the role of local pharmaceutical manufacturers in producing drugs for HBC.	what is practiced in service (at the health facility level) **HBC:** -Frequent stock outs of needed antimalarials eg. AA -Lack of motivation (including financial) of CBAs and their supervisors to ensure the effective roll out of the intervention. (HBC Monitoring Report, 2012) -Misconceptions relating to Artesunate Amodiaquine, and its potential complications/ side-effects. - High turnover of CBAs and need to replace and re-train - Transfer of health workers to other areas, causing discontinuity in services - Female CBAs suffer from competing household and their responsibilities as CBAs though show a lot of commitment

TORs	STRENGTHS	WEAKNESS	OPPORTUNITIES	THREATS
	Community Health officer. -Antimalarials are given at no cost to children and this ensures financial access to good quality drugs.			- Slow pace of activity implementation (from proposal writing to activity implementation)
Review access to ACTs, diagnosis (microscopy/ RDTs) per place and time, and special groups (under 5s, PW and PLWH)	**Access to ACTs** - Availability of routine reports/data, NMCP Annual reports, population based studies and survey-MICS , Ghana DHS, SPH reports, IMAD reports etc for review - Availability of Global Fund Commissioned study on the	**Access to ACTs** - Data unavailable for Vulnerable Groups such as PLWHA - Routine data do not disaggregate data of persons receiving ACTs by Vulnerable groups (Children under 5, and Pregnant Women Data for	**Access to ACTs** - Data for vulnerable groups can be collected during the field data gathering stage **AMFm** - Strengthen the reporting system for the private sector. - Explore opportunities for domestic funding for a subsidy for antimalarials.	**Access to ACTs** - Poor documentation at health facilities - Issues of confidentiality For PLWHA can limit data collection on this vulnerable group **AMFm** - Financing is limited for the
Review access to ACTs, diagnosis (microscopy/ RDTs) per place and time, and special groups (under 5s, PW and PLWH)	**Access to ACTs** - Availability of routine reports/data, NMCP Annual reports, population based studies and survey-MICS , Ghana DHS, SPH reports, IMAD reports etc for review - Availability of Global Fund Commissioned study on the Implementation of the AMFM and Malaria Programmes in Ghana **AMFm** - Increased availability of QAACT - Private sector	**Access to ACTs** - Data unavailable for Vulnerable Groups such as PLWHA - Routine data do not disaggregate data of persons receiving ACTs by Vulnerable groups (Children under 5, and Pregnant Women - Data for teaching hospitals are not reported as part of the routine data. **AMFm** - Delays in procurement for the public sector	**Access to ACTs** - Data for vulnerable groups can be collected during the field data gathering stage **AMFm** - Strengthen the reporting system for the private sector. - Explore opportunities for domestic funding for a subsidy for antimalarials. **Diagnosis:** - Based on the results of the operational research, RDTs could be rolled-out in Licensed Chemical shops and pharmacies. - Opportunities to reinforce	**Access to ACTs** - Poor documentation at health facilities - Issues of confidentiality For PLWHA can limit data collection on this vulnerable group **AMFm** - Financing is limited for the Transition Period, meaning the approved orders may not meet the demand of first-line buyers. **Diagnosis:** - Inadequate

TORs	STRENGTHS	WEAKNESS	OPPORTUNITIES	THREATS
	outlets had a wide reach in remote communities - Price of QAACTs decreased from $2.74 to $0.94 in the public sector and $3.42 to $1.13 in the private for-profit sector. - Market share of QAACTs more than tripled, from 17% to 58% between baseline and endline. - The AMFm strengthened the public-private partnership in Ghana and actively involvement the private sectorin malaria case management -The Pharmacy Council actively participated in monitoring of availability and price of QAACTs in private sector outlets. **Diagnosis:** - There has been an 11 percentage points increase in malaria microscopy performance - RDT performance is already very high in Ghana	(which only received its orders in December 2011 - Curbing of orders by GF Secretariat due to financial restrictions implied fewer approved orders for Ghana - IE reported that artemisinin monotherapies remained high (41%) at endline.	Programme forecast and inform the right quantities to procure if the Accurate documentation of test results would inform the - Opportunties to strengthen the supportive Supervision for prescribers by the Institutional Care Division (ICD) of the Ghana Health Service, NMCP and other partners results. - RDTs could be used at Licensed Chemical Shops and pharmacies that are NHIS accredited pending the results of the Operational Research feasibility study.	infrastructure, insufficient stocks and quality of equipment and supplies, and inadequately trained laboratory personnel. - Difficulties in maintaining microscopy facilities in good order. - Low Acceptance and Use of RDT Results By Prescribers - Logistic problems and high costs of maintaining adequate supplies and equipment - Lack of adequate training and retraining of laboratory staff - Lack of Quality-assured and supervision of laboratory services - Poor storage and transport conditions of RDTs - Stock outs of RDTs -
Review adequacy of systems in place for efficacy testing, quality assurance and adverse drug reporting	- There are institutions in place that carry out efficacy testing, quality assurance and adverse drug reporting	- Lack of coordination among the agencies carrying them out. - Lack of resources for quality testing.	- Political will to put in place institutions to conduct efficacy testing, quality assurance and ADR	- Without continued funding, the systems in place will not be able to perform their tasks

TORs	STRENGTHS	WEAKNESS	OPPORTUNITIES	THREATS
Assess the current policy on herbal medicine including its patronage and outcomes		- The production capacity of local manufacturers is limited - Ghana does not have a Bioequivalence Center, which is necessary for locally produced medicine to reach WHO prequalification standards.	- Ghanaian manufacturers can connect with Kenya and Nigerian manufacturers who have scaled-up their cultivation and production of artemisinin.	- Without international funding, the NMCP may not have the means to increase production and reinforce their capacity.

4.5.12 Successes, best Practices and Facilitating Factors

- Ghana has a National Drug Policy that supports drug regulation over its importation, safety, distribution, storage, sale, and pharmacovigilance.
- The cost of medicines is covered by the National Health Insurance System for the insured.
- Antimalarial drugs generally enjoy import tax reduction as a general practice.
- Increased availability of QAACT.
- Market share of **QAACTs more than tripled, from 17% to 58% between baseline and endline due to AMFm introduction.** The AMFm strengthened the public-private partnership in Ghana and actively involved the private sector in malaria case management.
- The Pharmacy Council actively participated in monitoring of availability and price of QAACTs in private sector outlets.
- There are institutions in place that carry out efficacy testing, quality assurance and adverse drug reporting and there is good collaboration among key stakeholders.

4.5.13 Issues and Challenges

Implementation Challenges Identified (Case Management)

1. Over-consumption of ACTs due to presumptive diagnosis of malaria
2. Huge knowledge gap between the curriculum in pre-service institutions as well as the universities (medical and nursing schools) and what is practiced in service (at the health facility level)
3. High rate of monotherapies, including artesmisinine monotherapies

Some Challenges Diagnostic (OTSS monitoring report):

1. Inadequate funds to support integration of malaria diagnosis into general laboratory services
2. Microscope & other equipment maintenance challenges

3. Inability to cope with workload therefore not routinely cross-checking slides (including lack of QA systems)
4. Delays in providing results to clinicians
5. Separation of RDTs and microscopy in terms re-imbursements by NHIS

Other Implementation Challenges (HBC)

- Availability of only anti-malarials in HBC-selected districts in the six regions apart from the three Northern and Central regions; Zinc, Oral rehydration salts (ORS), Paracetamol and Amoxycillin are yet to be supplied.
- Frequent stock outs of needed antimalarials eg. AA
- Lack of motivation (including financial) of CBAs and their supervisors to ensure the effective roll out of the intervention.
- Misconceptions relating to Artesunate Amodiaquine, and its potential complications/ side-effects.
- Need to clarify health messages (IEC/BCC) that CBAs communicate when working in the community
- Need to ensure that HBC interventions are responsive to new case management strategies/ developments; namely the Test, Treat and Track strategy.
- Need to clarify the role of local pharmaceutical manufacturers in producing drugs for HBC.
- High turnover of CBAs and need to replace and re-train
- Transfer of health workers to other areas, causing discontinuity in services
- Female CBAs suffer from competing household and their responsibilities as CBAs though show a lot of commitment

4.5.14 Conclusion and Recommendations

a) Conclusions

- High coverage of districts implementing HBC but there is low percentage of children treated in the community in 2012 (only 6% of the target)
- Malaria diagnosis in health facilities based on laboratory test in 2008 was less than 14%. In 2012, routine data on malaria diagnosis indicates that 34.7% of all presumptive malaria cases were tested. There is however adequate laboratory resource network for diagnosing malaria
- Most clinicians still do not adhere to negative test results for suspected malaria from either microscopy or malaria rapid test kits.
- There is improved performance in malaria microscopy tasks performed according to protocol
- There is a declining trend in the percentage of malaria cases (confirmed and unconfirmed) receiving ACTs for the last three years. The adherence to test results may be the reason for the reduction in the proportion of patients put on ACTs. Percentage is higher in urban than rural areas.
- There has been an increase in children under 5 years of age receiving ACTs [4.4% in 2006 compared with 18.2% in 2011]. Children from wealthier quintiles had a greater access to ACT than those from Lower Wealth Quintiles [9.5% lowest to 33.9% for highest in 2011]
- The patronage of artemisinin mono-therapies was very high in Ghana. Nearly 41% of outlets had in stock oral mono-therapies.

Synthesis of the NMCP performance in area of case management

AREAS	SCORE				COMMENTS
	3: high adequate	2: adequate	1: present but inadequate	0 inadequate	
There is a written parasite-based diagnosis at all levels of the health system and it is adhered to			X		
There is a written parasite based diagnosis document at all levels		X			
All the different levels of health care adhere to the written policy			X		
There is a system for diagnosis, QA/QC that includes laboratory network system, with a competent workforce, guidelines and strategic plan for its implementation					
There is a written diagnosis and treatment guidelines that has been communicated to all levels of health care and is adhered to	X				
Home management of malaria is implemented in all malaria endemic districts			X		
Policies on free acess or highly subsidised ACT by private sector		X	X		
National ban on use of artemisinine monotherapies					
Supervision and capacity building on MCM		X			

b) Recommendations

- RDTs need to be scaled-up in both the public and private sectors and providers need to be trained on their appropriate use.

- Improve access to quality assured diagnostic services especially RDTs and promote the use of RDTs at health centres and CHPS Zones and to complement diagnosis in Hospitals, especially for emergencies

- Strengthen infrastructure and capacity for malaria microscopy, technical supervision, quality assurance and control at regional and district health levels

- Update health training curriculum, and provide new guidelines in library and train tutors and facilitators in the current malaria policies and guidelines

- Enforce the ban on prescription, importation and use of monotherapies for the treatment of uncomplicated malaria

- Follow up and evaluate the results of the ongoing phase III clinical trial for 5 current herbal extracts with antimalaria property for possible inclusion in treatment protocol

- Ensure adequate funding for targeted scale-up of HBC for Community Case Management

- Follow up on the recommendations of the National Coordination Committee on the implementation of HBC

- Prioritize malaria control activities as part of core delivery of CHO activities during outreach services in the CHPS zones

- Undertake Refresher training in malaria microscopy (shift from the Plus (+) system of reporting to parasite quantification) and RDTs .

- Clinicians should be trained to trust negative test results. In order to promote good prescriber compliance, the NMCP may consider the establishment of a certification system to those health facilities that demonstrate good compliance to negative test results.

- RDTs should be properly stored according to/near to manufacturers' instructions

- A second assessment on the Diagnostic Capacity of Health Facilities should be carried out, since the last one was conducted in 2008

– Need to analyse available data (if any), or conduct an operational research study on anaemia testing, G6PD, and hemoglobinopathies and malaria.

4.6 Malaria in Pregnancy

4.6.1 Introduction

This chapter addresses the strengths, weaknesses, opportunities and threats with regard to the prevention and treatment of malaria in pregnancy; as well as progress and performance in prevention and treatment; key issues, challenges and problems in prevention and treatment, and suggested solutions and priorities for action in malaria in prevention and treatment.

4.6.2 Policy and Guidance

The main interventions used to prevent malaria in pregnancy (MIP) in Ghana are the use of Intermittent Prevention Treatment in pregnancy (IPTp) and Insecticide Treated Nets (ITNs). These have been proven to contribute to a reduction in Low Birth Weight (LBW) and neonatal mortality compared with newborn babies of mothers with no such protection [Eisele et al, 2012]. International studies have shown that IPTp was associated with a 61.3% reduction in neonatal mortality (Menéndez *et al, 2010). In Ghana, no analysis has been cited linking IPTp use and ITN use to a decrease in LBW and neonatal mortality.*

Number of doses of Sulphadoxine Pyrimethamine (SP)

The recommendation for three doses of SP as against 2 doses is still relevant. Studies show that the third dose of IPTp using SP halved the risk of placental malaria, LBW, and preterm births in all gravidae, compared with a 2-dose regimen [Maiga et al, 2011]. A recent report by the WHO states that more doses are permitted, allowing us to give at least monthly doses of SP up until delivery without safety concerns [WHO, 2012], [Thigpen et al, 2007].

Guidelines for the Treatment of Malaria:

First Trimester: The malaria policy guidelines recommend quinine for first trimester and quinine and Clindamycin as an alternative**.** ACTs may be used only if there are safety implications with the preferred options.

Second and Third Trimesters: ACTs are recommended for the second and third trimesters and peuperium. Quinine can be used only when these drugs are not available or not working.

4.6.3 Organization of MIP Service Delivery

Malaria in Pregnancy preventive interventions (ITN/LLIN and IPTp) are mainly executed in Ghana through the MCH network of services from district through the sub-district to CHOs in CHPS zones throughout the country. Treatment services are however provided through the routine integrated maternity and clinical services at health facilities.

4.6.4 Human resources, Training and Capacity Development

Midwives, Public Health Nurses, Community health Nurses, other CHOs as well as doctors and medical assistants are the key health staff that provide the above MIP services.

4.6.5 Annual Planning

MIP planning is part of the integrated MTEF and annual health plans at all levels of the health service. Special plans and proposals are however developed by the NMCP for additional funding and resources such as to Global Fund and other earmarked partner support.

4.6.6 Performance Indicators and Targets

By 2015, the performance indicators and targets for MIP as per the Strategic Plan are:

- Increase the number of children under-five and pregnant women sleeping under treated net from current levels to 85%
- 100% (All) pregnant women shall be on appropriate Intermittent Preventive Treatment (receive at least two or more doses of sulphadoxine-pyrimethamine under DOT).

4.6.7 Service Delivery Outputs and Outcomes

With respect to the objective of providing at least 2 doses of sulphadoxine-pyrimethamine (SP) under direct observation (IPTp2) to 95% of pregnant women by 2014, Figure 40 shows there was some modest increase recorded. IPTp2 coverage increased from 45.5% in year 2008 to 64.6% in 2011 (MICS 2011).

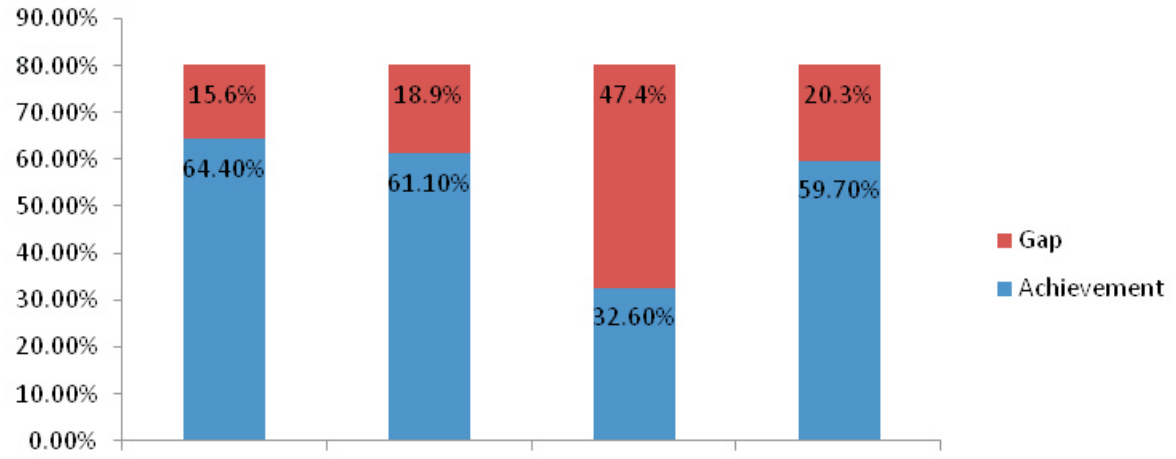


Figure 40: Progress towards 2015 RBM targets on malaria in pregnancy

A similar increase was recorded in the use of LLINs by pregnant women: from 17.4% in 2008 (GDHS) to 59.7% (SPH, 2012).

4.6.8 SWOT Analysis

Table 17: SWOT analysis, Malaria in Pregnancy

Strength ? Guidelines on MIP implementation and policy ? National network of MCH facilities to provide MIP services ? Strong partnership arrangement for MIP ?	**Weakness** ? Improper/ inconsistent documentation of ANC services due to what health staff refer to as the cumbersome nature of the ANC register and inability to document after outreaches
Opportunity ? Good CHPS system to complement other facility based services for MIP ? Integration with other public health interventions	**Threat** ? Inability of pregnant women to complete ANC visits ? Inadequate funding especially for commodities ? Practitioners may be reluctant to use the recommended medication during the first trimester because of the side effects of quinine monotherapy.

4.6.9 Successes, best practices and facilitating factors

The following are some of the successes, best practice and facilitating factors for malaria in pregnancy in Ghana:

- Availability of guidelines for MIP
- Extensive network of facilities up to CHPS level
- Good collaboration between Reproductive Health officers and other health staff
- Good support from partners for MIP interventions

4.6.10 Issues and challenges

Concerns on Policy Implementation

Even though Ghana has a significant percentage of pregnant women being G-6PD, testing for this is not mandatory; rather pregnant women are asked relevant screening questions but this is not followed by diagnostic screening.

There is concern that the use of 5mg folic acid supplementation in pregnancy may reduce the effectiveness of SP used for IPTp. The use of 400 micrograms is the preferred dosage [Ouma et al 2006] but NHIS does not reimburse this dose.

There is concern about the inadvertent use of ACTs in the first trimester.

There is also concern about the adverse effects of quinine including the suspicion that it is linked to bleeding and spontaneous abortion.

Improper/ inconsistent documentation of ANC services due to what health staff refer to as the cumbersome nature of the ANC register and inability to document after outreaches
Lack of documentary evidence on the adverse events that arise from taking SP for IPTp

4.6.11 Conclusion and recommendations

a) Conclusion

- There is a guideline on malaria in pregnancy and it was last updated in 2009. The policy document has components on case management, intermittent preventive treatment and ITNs.

G6PD and SP Used for IPTp

The current guidelines state that all pregnant women should be screened through history (using screening questions) and where facilities are available through laboratory investigations to exclude those not eligible. These investigations may include tests to screen for G6PD deficiency. This approach can be continued until further data is available since preliminary studies indicate that the level of AEs using SP for IPT in an unscreened population in Ghana is low (0.16%) [Doodoo et al., 2005].

Improved pharmacovigilance is now needed to confirm its safety and this needs to become a priority area to focus on since AE/ADR reporting has been very poor so far. It is thus important to continue to actively step up AE and ADR reporting for SP in its use in pregnant women at the antenatal clinics. Sensitisation and training of caregivers should be stepped up to ensure that the reporting is done. There can also be strategic collaboration with other agencies and departments to have all at risk clients screened (at birth for all children and for women at risk of pregnancy).

Folic Acid Supplementation and SP Use

There is concern that the use of 5mg folic acid supplementation in pregnancy may reduce the effectiveness of SP used for IPTp. The use of 400 micrograms is the preferred dosage. This may require that appropriate formulations are approved for use in the NHIS but tablets containing 5mg folic acid are not reimbursed by the NHIS when used for supplementation during pregnancy. These 5mg tablets may only be allowed in special circumstances (prior history of a fetus with Neural tube defect).

Synthesis of the NMCP performance in area of MIP

AREAS	SCORE				COMMENTS
	3: high adequate	2: adequate	1: present but inadequate	0 inadequate	
MIP interventions is implemented in all malaria endemic districts with routine screening, delivery of IPTp and adequate reporting .	X				
Malaria treatment guidelines include section on MIP	X				

b) Recommendations

- Assess the impact of IPT on pregnancy outcomes
- Ensure laboratory screening for suspected G6PD clients to prevent ADR
- Review the current guidelines on drug policy to include co-administration of 400ug of folic acid, and administration of IPT till delivery in the MIP guidelines
- Strengthen the system for ADR reporting and improve collaboration with FDA and GHS at all levels

4.7 Advocacy, BCC, IEC and Social Mobilization

4.7.1 Introduction

The Advocacy, Information, Education, Communication and Social Mobilization (ACSM) section reviews and assesses all communication and advocacy and social mobilization initiatives related to the Malaria Control in the country to date. Specifically to :

- Assess the advocacy, BCC, and community mobilization systems to support malaria control at all levels (strengths, weaknesses, opportunities and threat)
- Identify key issues and challenges that need to be addressed for scaling up delivery of ACSM
- Make recommendations for scaling up delivery of ACSM.

It involved an extensive literature review including, assessing program documents and campaign reports over the years to ascertain the extent of progress and gaps and to make recommendation to guide future program implementation.

4.7.2 Policy and Guidance

Ghana has a National Malaria Communication Strategy that guides the development, implementation and monitoring of the communication and behaviour change component of malaria control and prevention. This strategy makes improvement over a previous 2007 edition in the areas of universal ITN coverage, confirmation before treatment, alternative first line treatments, indoor residual spraying and home management of malaria.

In 2004, Ghana adopted a new malaria drug policy for the treatment of malaria. This called for an evidence based communication strategy to support the effective implementation of the new drug policy. A desk review of available behavioural studies on malaria was conducted followed by a target population formative assessment and a qualitative study to fill gaps in the existing behavioural research.

Informed by the additional findings, the National Malaria Behaviour Change Communication strategy, specifically, addressing the gaps on key benefits to target groups and barriers to positive malaria control behaviours was developed.

In 2005 the findings of these studies informed the coinage of the slogan "**Let's come together and drive malaria away"** now being used by all partners. This communication Strategy document was reviewed in 2010 in response to the revised guidelines by WHO on presumptive treatment with a shift to confirmation before treatment; and other strategic components including home management of malaria and Indoor Residual Spraying. In addition, Ghana shifted from targeted ITNs distribution to LLIN Universal Coverage.

The goal of the strategy was to guide the development, implementation, monitoring and evaluation of the communication, behaviour change and community mobilization components of malaria prevention and control. Since then the National Malaria Behaviour Change Communication Strategy Document has become a reference document for all partners involved in malaria communication interventions.

Consequently malaria communication interventions, campaigns and activities by partners and government sectors, have derived their contents and approaches from this strategy. The strategy document clearly outlines the magnitude of the problem, population at risk (the most vulnerable), and the operational strategies.

4.7.3 Organization

The Health Promotion Department of Ghana Health Service provides leadership and coordinates the implementation of malaria communication. At the national level, the malaria control programme in partnership with civil society organizations, the private sector, traditional leaders and the media commemorate World Malaria Day on 25th April each year. The Ministry celebrates Child Health Promotion Week annually. These events provide opportunity at the District level for individuals and households, particularly those in underserved communities, to have access to a package of maternal and child health services, including malaria prevention messages and commodities and care. At the regional and district levels, malaria communication is integrated into routine service.

4.7.4 Human resources, Training and Capacity Development

The Health Promotion Dept is responsible for development of policies on ACSM at the national level in partnership with NMCP and other partners. Regional Health Promotion Officers and malaria focal points are responsible for malaria advocacy, BCC and community mobilization activities at the regional level. Each region at least has one health promotion officer responsible for all health promotion activities, covering all technical areas, including malaria, at the regional level. These are supported usually by the regional malaria focal points. At the district level, there are no professional health promotion officers. Other health workers such as public health/community health nurse or information/disease control/nutrition officer are assigned

the responsibility for BCC and community mobilization. Where available the team is supported by partner supported project officers, recruited NGOs and staff of other agencies such as the Health Promotion Officers of Better Health Agenda Company. In communities with strengthened Community Health Committees they provide added capacity for malaria BCC and community mobilization efforts, at that level.

4.7.5 Annual Planning

Similar to other thematic areas, communication planning is part of the integrated MTEF and annual health plans at all levels of the health service. Special plans and proposals are however developed by the NMCP and Health Promotion Department for additional funding and resources such as to Global Fund and other earmarked partner support.

4.7.6 Performance Indicators and Targets

Key indicators under the three strategies include the following:

Advocacy:

- High-level political commitment to malaria control
- Country malaria Champions
- Malaria and malaria control a priority in national health sector planning and national development planning
- World Malaria Day event established

Behaviour Change Communication

- Functional national technical working group on malaria advocacy, behaviour change communication and Community Mobilization.
- National Malaria Communication Strategy available
- Focal Person or Unit for Behaviour Change Communication at the NMCP
- Malaria risk factors and risk behaviour identified
- Surveys conducted on knowledge, attitude, behaviour and practices on malaria control interventions
- Key Malaria control messages defined
- Information, education and communication materials (posters, pamphlets, flip charts etc.) developed and disseminated through appropriate media channels
- Best practices for malaria control regularly documented

Community Mobilization

- Community-based malaria control activities implemented in all malaria endemic districts
- Up-dated strategy for community-based malaria control activities
- Community and village health workers involved in malaria control
- School teachers, traditional leaders, religious leaders and political leaders involved in malaria control.

TARGETS

These are derived from the programme targets, emphasizing the behavioural content of the various targets.

1. 100% of households will own at least one ITN.
2. 80% of the general population will sleep under ITNs.
3. Increase the number of children under-five and pregnant women sleeping under treated net from current levels to 85%
4. 100% (All) of pregnant women shall be on appropriate Intermittent Preventive Treatment (receive at least two or more doses of Sulphadoxine-Pyrimethamine under DOT).
5. 90% of caretakers and parents will be able to recognize early symptoms and signs of malaria

4.7.7 Service Delivery Outputs and Outcomes

- NMCP worked very well with the different partner agencies and programmes (such as [VOICES, BCS and ProMPT] to advocate and promote health behaviour actions related to all prevention and control areas, with guided intensity and synergy.

- There is more intensified, structured and consistent follow-up community engagement around malaria prevention and control activities in partner supported focused Regions and Districts, e.g. Western, Central and Greater Accra Regions for BCS and UNCEF and the 7other Regions for ProMPT and UNICEF.

- Partner funded projects had senior level positions for ACSM, (at least two rounds of partners funded ACSM projects (each of 4-5 years duration) were implemented during the period), and these complemented the human resource capacity for effective ACSM design, implementation and monitoring. Advocacy for malaria has been consistent for a 6-7 year period through VOICES.

- The National Malaria Communication Committee (NMCC) was established in 2005 as the Technical Working Group on malaria ACSM.

- The National Malaria Behaviour Change Communication Strategy, revised in 2010 has been a useful handbook for all malaria partners. It has been a useful guide for coherent, reinforcing advocacy, BCC and community mobilization interventions.

- Every year Ghana joins the rest of the world to celebrate World Malaria Day which normally falls on 25th April under specific theme.

- The launching of such celebrations is normally done by the President of the nation or the Minister of Health. Statements made by other high profile personalities also go a long way to advocate for support and more resources for malaria control.

- Caregivers Knowledge of Malaria.

Findings of KABP study undertaken in 2010 indicates that caregivers' knowledge of the causes of malaria which most of them attributed to mosquito bites had improved (over 92%). This

finding is corroborated by studies in Dangbe West and parts of Accra by Agyepong and Manderson who suggest that the better knowledge was probably a result of information provided by the media, (radio, television and newspapers) and health workers.

- Studies by Owusu-Adjei et al.[2009] revealed that health care seeking behaviour for malaria treatment has also improved as a result of the NHIS. The studies reviewed also that health seeking behaviour for malaria treatment follows a similar pattern in all the study areas. Except for pregnant women, all cases of malaria are treated first at home using herbal concoctions, then with drugs from chemical sellers and traditional healers. When these treatments do not yield the desired results, then the patient may report to the hospital or clinic.

- Brown et al found that 69%, 93% and 70% of mothers and caregivers in Gomoa, Ejisu-Juaben and Wa districts respectively whose children had fever reported to the CBAs within 24 hours for appropriate treatment as compared to 13%, 2% and 16% of mothers/carers who reported after 48 hours.

Brong Ahafo Region: Key Results Before & After the Hang-Up Campaign

Ownership and use of ITNs

- The proportion of households owning at least one ITN significantly increased from 53.8% before the Hang-Up Campaign to 94.9% after ($p<0.001$). The proportion of households with at least one ITN for every two persons sleeping in the household also significantly increased from 22.8% before the Hang-Up Campaign to 70.3% after ($p<0.001$).

- Significant improvements were found in the use of ITNs, increasing from 26.7% to 68.2% use by all individuals ($p<0.001$), from 42.0% to 75.7% use by children under five ($p<0.001$) and from 36.1% to 69.8% use by pregnant women ($p=0.005$) before and after the campaign. [Ghana Health Services, Dodowa Research Center and the London School of Hygiene and Tropical Medicine, 2012]

Central Region: Key Results Before & After the Hang-Up Campaign

Ownership and use of ITNs

- The proportion of households owning at least one ITN significantly increased from 32.5% before the Hang-Up Campaign to 79.7% after ($p<0.001$). The proportion of households with at least one ITN for every two persons sleeping in the household also significantly increased from 13.0% before the Hang-Up Campaign to 41.1% after ($p<0.001$).

- Significant improvements were found in the use of ITNs, increasing from 16.8% to 45.0% use by all individuals ($p<0.001$), and from 27.9% to 53.4% use by children under five ($p<0.001$) before and after the campaign. An increase in ITN use by pregnant women from 29.9% to 45.5% was of borderline significance ($p=0.06$) (Table 3.6). However, ITN use still remains well below the GHS universal coverage targets of 80% of all individuals, and 85% of under-fives and pregnant women.

A summary of survey results associated with the Hang up campaign in the three regions in the North.

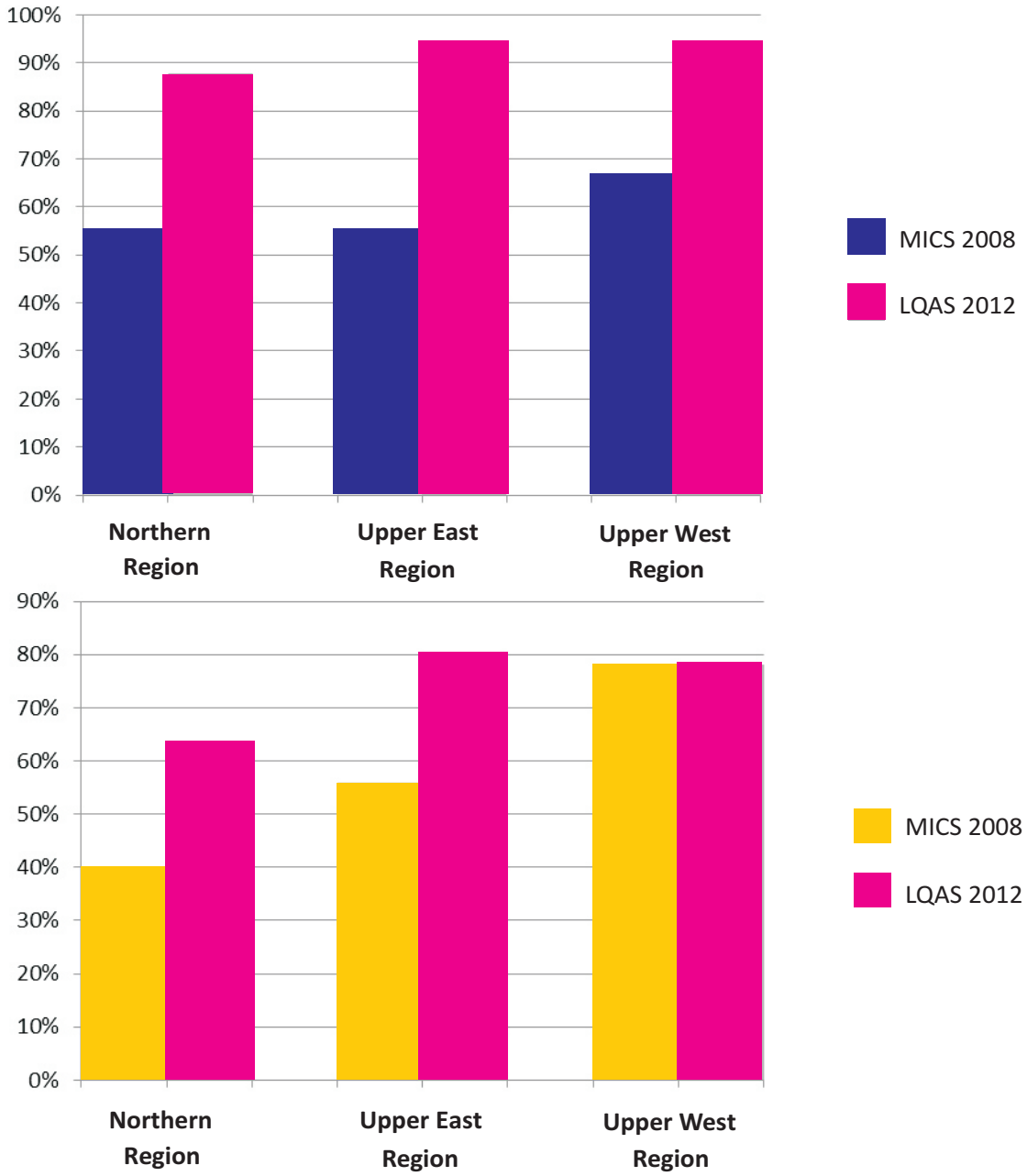


Figure 42: Proportion of Children Under Five Years Who Slept Under a LLIN the Night Preceding the Survey

4.7.8 SWOT Analysis

Despite the progress made towards achieving the objectives of the Nation Behaviour Change Communication Strategy, the review identified some strengths and opportunities that can be maximized on as well as weaknesses and threats that need to be responded to, ensuring achievement of the objectives of the Strategy.

Advocacy

Several factors contributed to making malaria prevention and control visible in the country. The review found the following strengths and weaknesses as well as opportunities and threats for malaria advocacy implementation:

Table 18: SWOT analysis, ACSM

Strengths	Weaknesses
Goodwill and leadership on the part of Ministry of Health (NMCP) and other agencies like Ministry of Trade and Industries Customs – tax exemption on malaria commodities	Far more focus was placed on health partners with little or no engagement with other sectors like Ministries of Agriculture, Education, Tourism, Roads and Transpor t, etc.
More Implementing partners coming on board especially with regards to nets distribution Existence of partner supported programmes like USAID PMI, UNICEF, DFID, WHO, Bill and Belinda Gates etc. that support malaria advocacy Active involvement of local government(MCAs, District Assemblies, etc under the DMAT implementation) Engagement of traditional and community leaders (strong support from the leaders to advocate (VOICES documentary) and during the nets distribution Strong support by the media gatekeepers and journalists (these have given malaria high priority at all levels) Private Sector support especially in the implementation of AMFm- (aid in distribution of ACTs to the rural areas Celebration of World Malaria Days- (President and other influential leaders played key role)	
Continued engagement of community and traditional leaders, Local Government, Partners and Programmes who appreciate the magnitude of the problem and need for intensified advocacy.	Uncertainties associated with external funding as a result of perceived available resources from Oil discovery and Ghana attaining Middle income status

Opportunities	Threats
Regional Health Declarations e.g. Abuja Declaration	Emerging global and regional emergencies which h ave the potential of reducing resources for and attention on malaria prevention and control.
Continued visits by high -level delegations of partner countries to view on -going malaria prevention interventions which, if managed properly can lead to their ad vocacy in support of malaria prevention and control.	

BCC/Community Mobilization

Strengths	Weaknesses
Coordination of partners in doing BCC/Social mobilization	Distribution and utilization of printed materials at the region to the lower level is weak
Harmonization of all malaria materials done to ensure message consistency	Inadequate communication from members handling commodities to beneficiaries creates risk for communication team.eg. ITN, drugs
Community engagement and ownership of malaria programmes	Non availability of health pro motion officers at the district level
Availability of commodities to back communication intervention	Low level of education on interventions after campaigns Conflicting/Competing programs Lack of supervision/monitoring Lack of team work in some regions and districts

Opportunities	Threats
Maximize on upcoming partner supported projects	Folding up of some key implementing agencies
Exploiting media interest	Dwindling of funds due to Ghana's current status as middle income country & oil discovery
Celebrations of International Days eg. World malaria Day	Inadequate internal funds to intensify and sustain communication activities
	Progress and performance in achieving annual targets and strategic targets

4.7.9 Successes, best practices and facilitating factors

- National Coordination, Delivery Capacity, Structures and Systems with identification of National Communication focal point for Program and Partners.
- Reasonably functional National Malaria Communication sub Committee (NMCC) responsible for coordinating all malaria communications activities.
- Availability of a National Malaria Behavior Change and Strategic Communication and work plan 2010- 2015 (Reference Document for all partners).
- National Champions for malaria control- parliamentarians, traditional, religious and community leaders (strong support from the leaders to advocate as Malaria Champions during the nets distribution.
- Strong support by media gatekeepers and journalists (Media Advocacy Against Malaria, African Media and Malaria Research Network).
- Some partner supported projects had malaria advocacy as their core mandate e.g. the VOICES. The three phased project first built national, traditional and professional leaders advocates as well as a solid Media and NGO Networks to support consistent malaria advocacy at all levels. The District Advocacy for Malaria Control (DMAT) concept reached maturity during the second phase leading to District Assemblies taking responsibility for malaria control through the use of the 1% District Assembly Common Fund for Malaria Initiative. Reaching out to the private sector and parastatal companies and supporting malaria control strategy development and implementation by these institutions, has been key strategies, recently, in pushing the malaria advocacy agenda wider. Now institutions such as the Football Federation, VRA, Volta River Estates Limited, Akosombo Textiles, Atlas Copco, Accra Breweries, the Ghana Revenue Authority are supporting malaria control among their staff as well as communities they operate in.

- Private Sector involvement in the implementation of various malaria advocacy activities also included Ghana Football Association (GFA) /National Sports Authority (United Against Malaria).

- Celebration of World Malaria Days- (President and other influential leaders played key role)

- Formation of Media and NGO Networks for malaria control

- Advocacy materials developed and used e.g. -Nine Steps (district Malaria Advocacy Model; A guide to understanding the use of 1% of DACF for malaria initiatives, Training Kits and Media Packs, 2-page malaria alert bulletins, T' shirts, posters and pull-ups etc.

- Tax waiver on LLIN and ACTs

4.7.10 Issues and Challenges

- ❖ Inadequate staff (Health Promoters) at DHMT level and below
- ❖ Inadequate funding
- ❖ Inadequate skills for BCC/SM design, implementation and monitoring at the various levels
- ❖ Non inclusion of ACSM indicators in general malaria indicators.
- ❖ Lack of structures at grass root level for effective BCC/SM beyond district levels
- ❖ Research- No clear cut advocacy related KABP showing Advocacy impact on malaria control identified.

4.7.11 Conclusion and Recommendations

a) Conclusion

There have been significant achievements in malaria control in Ghana; the contribution of Advocacy, Behaviour Change Communication and Community Mobilization to these strides is evident to all. Through well-coordinated advocacy, behaviour change communication and social mobilization strategies the programme and its partners have moved up the behaviour change ladder increasing the positive adoption of health products and practices. The health system can boast of successful interventions such as increased ITNs ownership and usage, timely and full course uptake of IPTp, proper and complete case management including rapid diagnosis and the use of ACTs.

Unfortunately, documentation of communication effects related to other components of the programme other than ITNs have been limited and this needs to be addressed. This could be due to various factors including lack of coordination among partners, lack of knowledge and consensus on terminology and concepts, and the difficulty in demonstrating efficiency as well as showing tangible results of communication activities. However there are limited availability of IEC/BCC tools at district, sub district, health facility and community levels as well as inadequate skills for BCC/SM design, implementation and monitoring at the various levels.

It is therefore important to consider surveys to prove effectiveness and efficiency in the implementation of malaria advocacy, BCC and community mobilization covering all the components of the prevention and control programme.

Synthesis of the NMCP performance in area of ACSM

AREAS	SCORE				COMMENTS
	3: high adequate	2: adequate	1: present but inadequate	0 inadequate	
Advocacy		X			
Behaviour Change and Communication		X			
Community moblisation for malaria control			X		

b) Recommendations

These are reflected in the recommendations of the team

- Recruit and deploy health education officers at the district level and build their capacity for ACSM planning, implementation and evaluation
- Intensify advocacy and BCC campaigns at all levels especially at the community level and carry them out in a more systematic and co-ordinated manner in order to ensure optimal utilization of resources.
- Ensure access to existing ACSM materials and others to be developed though multiple distribution channels
- Strengthen the collaboration between the DHMT and NGO, and other community based organizations and agents
- There should be research to understand better the factors that influence adherence to treatment regimes. These studies should investigate among others the potential of home visitations to the sick and caregivers by health workers and patient confidence in the health worker to improve adherence.
- Document successes and challenges, Best Practices to help in future campaign designs and message development(all partners involved)
- Health care workers and CSOs need to be retrained to increase their knowledge on communication skills of malaria, its causes and prevention, and appropriate treatment protocols. Such training should also aim at giving the trainees a new image of concern for the total wellness of clients. This will increase client confidence in the health worker and drug compliance.
- Finally health workers at all levels should be oriented in effective monitoring of BCC/SM activities and documentation of success stories or experiences both at facility and household leve

4.8 Malaria in Emergency Situation and Response Preparedness

4.8.1 Introduction

Ghana has been hyperendemic for malaria over the years with transmission of infection all year round even though there is increased incidence during the raining seasons. Malaria epidemics have not been reported in Ghana. However, with increase in population movements, possibility of climate change effect on malaria transmission and epidemiology, occurrence of natural

disasters, civil strives with complex emergencies occurring in the sub-region with implications for Ghana, in addition to changing malaria endemicity due to the impact of control measures and pockets of malaria-free areas, malaria epidemics could occur and the country should prepare for it. The time has come for the country to develop national and district specific threshold levels (as part of an integrated disease surveillance and response system) for early detection and control of possible malaria epidemics in Ghana.

4.8.2 Methods

Disease control and prevention programs have been successful when resources were dedicated to detecting a targeted disease, obtaining laboratory confirmation of the disease, and using thresholds to initiate action at the district level [IDSR 2nd edition 2011]. This approach has guided all surveillance, disease control and response activities in the country for any health emergency including epidemics and pandemics.

4.8.3 Organization and policy framework

The National Disaster Management Organisation (NADMO) is a government institution set up by an Act of Parliament, i.e. Act 517of 1996 to manage disasters and similar emergencies in the country, as well as to develop the capacity of communities to respond effectively to disasters and emergencies through the coordination of resources. NADMO has a national secretariat based in the capital, ten regional offices, 170 district offices as well as zonal offices in the communities.

MISSION

To manage disasters by coordinating the resources of governmental institutions and non-governmental agencies, developing the capacity of communities to respond effectively to disasters and improve their livelihood through social mobilisation, employment generation and poverty reduction projects.

STAFF INVOLVED

The National Coordinator is the Chief Executive Officer of the organisation and is supported by two (2) Deputy National Coordinators, Chief Disaster and Deputy Chief Disaster Control Officers. These are Senior Management personnel in charge of various units and responsible for the designing and implementation of projects, programmes and activities on Disaster Risk Reduction, Climate Change Management, Alternative livelihood support and Employment Generation. NADMO responds to disasters through coordination of personnel and resources from all the Ministries, Departments and Agencies (MDAs), NGO's, Private Sector, and Civil Society groups across the country.

The NADMO Head office is staffed as follows:

1. The National Coordinator
2. Two (2) Deputy National Coordinators
3. Eight (8) Chief disaster control officers for
    i. Administration

ii. Monitoring, information and training
iii. Fires and Lightning disasters
iv. Hydro meteorological disasters
v. Climate change and manmade disasters
vi. Pest and Insect infestations
vii. Relief and reconstruction
viii. Finance

4. Six (6) Deputy directors in
   i. Operations
   ii. Disease and Epidemics
   iii. Geological Disasters
   iv. Nuclear and Radiological
   v. Information Technology
   vi. Human Resource

GHS

From the health sector perspective, the PHD, through its Surveillance Department, is responsible for developing systems for detection and managing all health emergencies in partnership with regional, district and sub-district health administrations. They carry out their mandate by working closely with NADMO at all levels, as well as MMDAs at decentralised levels. Guidelines for surveillance in Ghana are contained in the revised "Technical Guidelines, Integrated Disease Surveillance & Response Ghana, 2nd Edition May 2011".

The specific objectives of IDSR are to:

- Strengthen the capacity of countries to conduct effective surveillance activities: train personnel at all levels; develop and carry out plans of action; and advocate and mobilize resources.
- Integrate multiple surveillance systems so that forms, personnel and resources can be used more efficiently.
- Improve the use of information to detect changes in time in order to conduct a rapid response to suspected epidemics and outbreaks; monitor the impact of interventions: for example, declining incidence, spread, case fatality, and to facilitate evidence-based response to public health events; health policy design; planning; and management
- Improve the flow of surveillance information between and within levels of the health system.
- Strengthen laboratory capacity and involvement in confirmation of pathogens and monitoring of drug sensitivity.
- Increase involvement of clinicians in the surveillance system.
- Emphasize community participation in detection and response to public health problems including event based surveillance and response in line with IHR
- Trigger epidemiological investigations in detection, investigation and reporting of public health problems, and in the implementation of effective public health interventions.

The IDSR document was harmonised with the International Health Regulations (IHR) (2005), the purpose of which is to prevent, protect against, control and provide public health response to the international spread of disease in ways that are relevant and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade.

4.8.4 Determinants of Emergencies And Risk Factors

Emergencies and risk factors are determined by a number of factors depending on the nature of the condition under surveillance. Climatic factors, rainfall patterns, humidity and vegetation all are risk factors for malaria and other emergencies. Other factors may include natural disasters such as floods and earthquake, as well as man-made factors such as increasing movements of the population and civil strife situations.

4.8.5 Preparedness and Planning In Emergency Situation

In 2005, following the outbreak of H5N1, a multi-sector task team was put together to develop a "Preparedness and Response Plan for Avian and Human Pandemic Influenza (2005-2006)". When the outbreak of Pandemic Influenza H1N1 occurred in 2009 the original Plan was revised and a "***National Action Plan for Human Pandemic Influenza*** 2009-2010" was developed to take care of all pandemics, including Human Pandemic Influenza.

The plan is organized into five key thematic areas and serviced by thematic sub-committees:

- Planning and Coordination
- Surveillance, Situation Monitoring and Assessment
- Prevention, Containment and Management
- Communications
- Humanitarian Response

The specific objectives of each thematic sub-committee are:

Planning and Coordination sub-committee

- Providing high level political support for the development and implementation of the national human influenza plan
- Providing policy and strategic direction
- Ensuring involvement and commitment of all sectors
- Coordinating and providing enabling environment and resources for effective and efficient implementation of the plan

Surveillance, situation monitoring and assessment sub-committee

- To put in place a sensitive surveillance system countrywide for early detection and appropriate response to influenza pandemic
- To build national and regional capacity for detection and response of new influenza pandemic
- To strengthen laboratory capacity to confirm suspected cases

Prevention, Containment and Management

- To contain and reduce transmission among humans and limit morbidity and mortality
- To reduce the risk of co-infection in humans and thereby minimize opportunities for virus re-assortment leading to more pathogenic strains of the virus
- To stockpile and deploy antivirals, protective equipment and other logistics for effective response

Communication sub-committee

- To raise awareness on and build knowledge on pandemic influenza and other potential pandemic diseases

- To promote behavioural change which, will reduce the risk of transmission
- To ensure coordinated and consistent routine and emergency communications between authorities in all sectors, within and between government agencies, with other organizations and with the public

Humanitarian Response

- To mitigate the impact of the pandemic influenza on the general society in the areas of food security and sustainable livelihoods.

Additional detailed guidelines for planning to deal with emergencies in general have been described in the Technical Guidelines Integrated Disease Surveillance & Response Ghana, 2nd Edition May 2011.

4.8.6 Rapid response to Malaria in Emergency Situation

As has been mentioned already, there is no separate specific plan for a rapid response to malaria in emergency situation, as Ghana has not encountered any malaria epidemic.l

4.8.7 SWOT Analysis

Table 19: SWOT analysis, malaria in emergency situation and response preparedness

Strengths	Weakness
? Strong well developed guidelines for IDSR in Ghana ? Good collaboration with PHRL and NMIMR for laboratory confirmation support ? Good partner support including technical support from WHO ? Strong political support at National level through NADMO ? System for capacity building of field epidemiologists in place	? Weak collaboration at decentralized level ? Inadequate funding for emergencies in context of competing priorities
Opportunities	**Threats**
? Linkage with other international partners such as CDC, Red Cross	? Climate change affecting incidence and prevalence of diseases ? Emerging and re-emerging pandemics • Increasing globalisation facilitates easy spread

4.8.8 Successes, best practices and facilitating factors

- Strong well developed guidelines for IDSR in Ghana
- Good collaboration with PHRL and NMIMR for laboratory confirmation support

- An M.Phil in Applied Epidemiology and Laboratory Training programme (GFELTP) started in October 2007 at SPH has trained together a cohort of medical officers, veterinary doctors and Laboratory Scientists.
- Good partner support including technical support from WHO
- Strong political support at National level through NADMO

4.8.9 Issues and Challenges

- Increasing globalisation facilitates easy spread
- Already overburdened health system struggling to deal with other endemic diseases
- Ineffective surveillance systems for early detection, confirmation and response at community level
- Inadequate laboratory system for confirmation
- Disruption of on-going programmes with onset of epidemics
  - Strain on human resource
  - Inadequate funding hence diversion of scarce financial resource
  - Political pressure
- Weak human resource capacity
- Sustainability of the GFELTP at SPH due to financial constraints
- Exposure of health and other staff to dangerous infections due to poor safety prevention procedures and equipment

4.8.10 Conclusion and Recommendations

Conclusion

- There is a strong surveillance system for the early detection and response of epidemics and pandemics
- Malaria epidemics have not been reported in Ghana. However, with increase in population movements, occurrence of natural disasters, civil strives with complex emergencies occurring in the sub-region with implications for Ghana in addition to changing malaria endemicity due to the impact of control measures and pockets of malaria-free areas, malaria epidemics could occur and the country should prepare for it.

Recommendations

- Review current IDSR to reflect malaria control issues in emergency situations
- Ensure that emergency preparedness and response for malaria is well developed at all levels as part of IDSR
- Monitor malaria transmission pattern on account of possible climate change and other effects
- Maintain the collaboration with all partners especially NADMO to deal with any health emergencies

4.9 Surveillance, Monitoring and Evaluation

4.9.1 Introduction

The National Malaria Programme in collaboration with stakeholders has developed a Surveillance, Monitoring and Evaluation Strategic Plan as a component of the National Strategic Plan (2008 – 2015).

Malaria Surveillance System

Data to be collected/Indicators

The indicators for surveillance and monitoring trends of malaria morbidity and mortality (suspected malaria cases, suspected malaria cases that receive a parasite-based test and confirmed malaria case, malaria admissions and deaths/Case fatality by age under five , five and above and pregnant women, by time and health facility and districts) are obtained through the Routine Surveillance System which is passive. Although the whole population is under surveillance for malaria, children under five years and pregnant women who are at higher risk of malaria morbidity and mortality have been targeted for surveillance under the program.

The system has evolved from three routine malaria surveillance systems. These are the system through the DHIMS of the Centre for Health Information Management (CHIM), collecting monthly out-patients and in-patients morbidity and mortality returns; the Integrated Disease Surveillance and Response (IDSR) system that collects similar information but with focus on priority diseases including malaria; and the vertical malaria surveillance system established by the NMCP. However, the process was started in 2009 to integrate the three systems into a web based system, the Ghana Health Service District Health Information Management System (DHIMS1) and now DHIMS2. This web-based system is centrally hosted by the CHIM, it provides a platform for collecting data nationwide from government, private, faith-based and quasi-government facilities. The process of integrating the three systems however, did not materialize until 2012, when the NMCP finally started relying on DHIMS2 for data for routine surveillance for monitoring of indictors.

4.9.2 Policy, Guidance, Coordination

The reports from the health facilities and regional and district health administrations are submitted on weekly, monthly or quarterly basis. The weekly reports are to be sent before the Tuesday of the ensuing week. For the monthly report, they are to be sent from the facilities to the districts by the 5th of the ensuing month, to the Regions by the 15th and to the National level by the 25th. Quarterly reports are to be sent by the 25th of the first month in the ensuing quarter. With the introduction of the DHIMS2, data are to be entered into the system by the 25th day of the ensuing month.

4.9.3 Malaria country profile, risk mapping and stratification

Refer Epidemiology section 3.1, 3.2, 3.3

4.9.4 Human resources, training and capacity development

There are malaria focal persons at the District and Regional level who are responsible to ensuring that reports on malaria are transmitted to the National Level. At the National, there are zonal officers overseeing the three ecological zones who also oversee data collection and

reporting. Registers and other data collection tools that are regularly printed nationally are distributed to the districts and facilities for the purpose of data collection. The National Malaria Control Programme has supplied computers to districts and hospitals to strengthen the health information system. Health workers have been trained on the use of the out-patient and inpatient registers as well as how to fill in the monthly data collection tools.

A standard operating procedure manual have been developed to ensure standardization of the data that is collected from the health facilities and staff at all levels have been trained in use of DHIMS2 for data collection, collation, analysis and reporting.

The National and Regional officers provide some supportive supervision to the health facilities and districts to facilitate the data quality improvement.

4.9.5 Routine Information Systems

See 4.7.9 and 4.7.10 for details

4.9.6 Sentinel Surveillance Systems

Currently, with the exception of 10 sites for drug efficacy testing, there are no sentinel sites manned by NMCP. There are plans however to establish about 25 sentinel sites for monitoring malaria parasite prevalence and other indicators, including vector bionomics. This will be complemented by other to be set up by AGAMaL IRS programme to make over 50 of such sites. There is the need however to collaborate and coordinate efforts for efficiency and minimize duplications.

4.9.7 Monitoring and Evaluation Plan

Malaria Control M&E

There is a National Malaria control M&E plan which objective is strengthening and/or developing systems to collect, process, analyze and manage malaria transmission and disease burden data, including data on treatment and prevention programs, enhancing management capacity to assure implementation, accountability and appropriate feedback and for resource allocations to achieve expected outcomes and impacts. The plan defines indicators to monitor inputs, processes and outputs and outcome and impact measurements. The input indicators cover human and financial resources, drugs, supplies and logistics, technical assistance, information and physical structures. The process indicators include planning, training, meetings, technical assistance, advocacy and communication. The outputs are policy guidelines, treatment policy, persons trained, IT procured and distributed, coordination mechanisms, partnership, supervision and tools for M&E. Improved health sector performance, increased access and utilization coverage and quality are the outcome measures and morbidity, mortality and socio-economic well-being the impact measures.

There are several reports and documentation in Ghana at the national level (NMCP, MoH, GSS-DHS, UNICEF-MiCS) and also in the regions, districts and health institutions, where the results of these indicators are published, sometimes with trends.

There are mechanisms for data validation at the Programme and CHIM level to improve data quality and consistency but there is room for improvement. Private sector malaria control data is almost absent from the national aggregates, a weakness the programme recognizes and plans to address [NMCP 2009]

4.9.8 Malaria Surveys and Evaluation

A number of surveys are conducted which provide information on malaria. Surveys in Ghana include the Demographic and Health Surveys (DHS). In Ghana, DHS is conducted every five years, the most recent DHS survey was done in 2008. Others are the multiple indicator cluster survey (MICS), Malaria indicator survey (MIS), by UNICEF and Health Research Unit/NMCP/GHS respectively. In addition several surveys are conducted by various research institutions in Ghana, sometimes in collaboration with the NMCP. These institutions include the Noguchi Memorial Institute for Medical Research; the universities; Kintampo, Dodowa, Navrongo Research Centres as well as the headquarters of the Research and development Department of the Ghana Health Service in Accra. Other health management teams and private institutions undertake surveys to meet the needs of their areas. The results of some of these surveys are not widely disseminated and therefore their use may be limited to the institution which conducted them. Additional evaluations are undertaken by Funding institutions like Global Fund or other external institutions.

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4.9.9 Malaria Reporting

The main source of data for the malaria surveillance system is the routine service data coming from the health facilities. The out-patients, in-patient, ante-natal and the maternity registers are the primary data collection tools in the routine surveillance system for malaria. Data from these registers are summarized unto standardized reporting forms, including the malaria data collection forms like the Case Reporting forms for malaria. These forms are sent to the District Health Directorates where they are put into the DHIMS2, or sent directly to the NMCP through the regional malaria focal persons.

Data collection, Analysis and Reporting

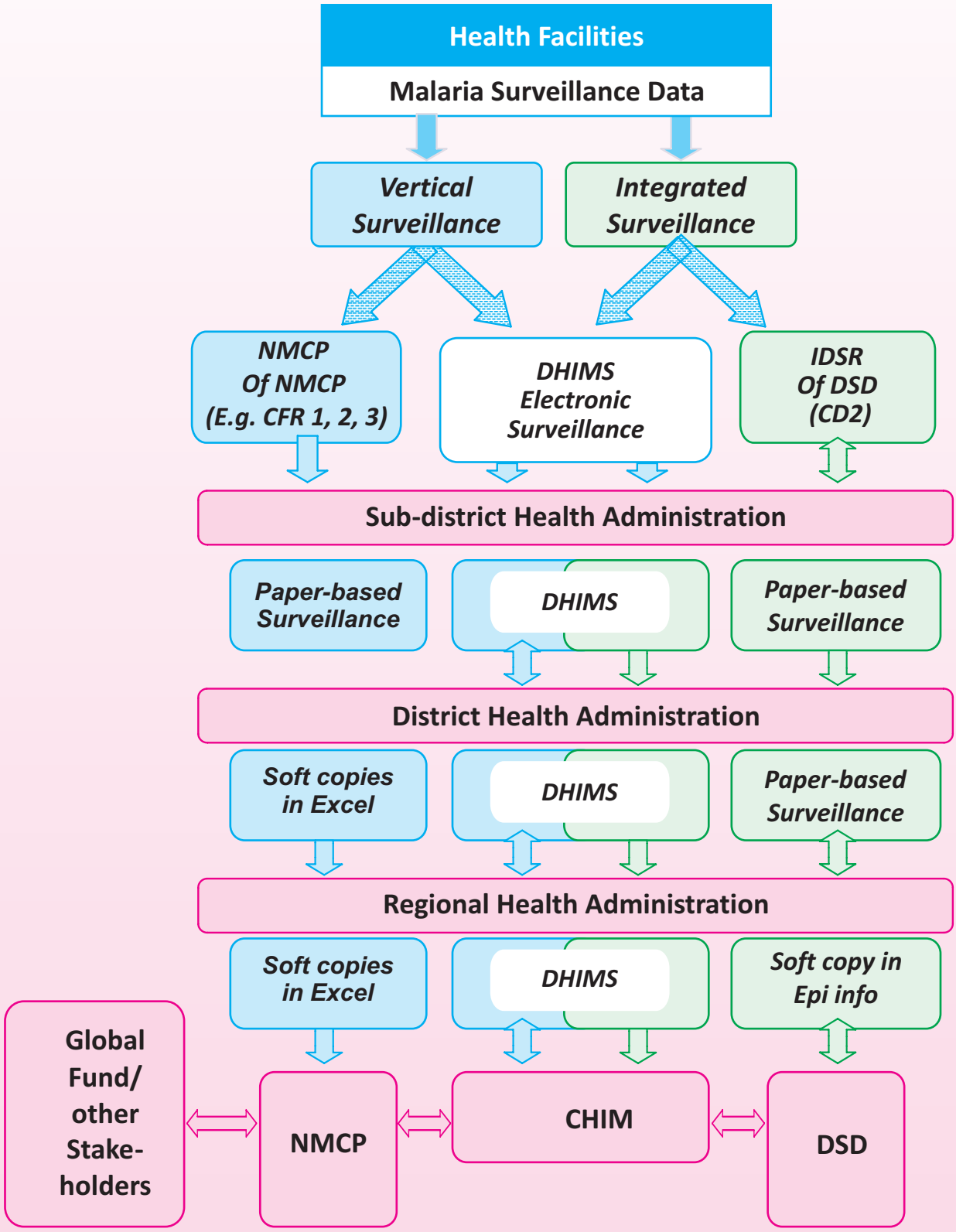
Data collected on malaria are the cases of malaria seen in the facility, their sex, age, whether they had a test for malaria done, their test results, how they were managed whether on outpatient basis or admitted and the treatment that they were given. Routine data collected from client care are first recorded into standard registers. Data are then collated from these registers into standardized reporting forms. These reporting forms are then submitted to the District Health Directorate (DHD) on a monthly basis for entry into the District Health Information Management System (DHIMS 2). Standardized reporting forms used to collect malaria data from the OPD, antenatal and inpatient registers are the OPD monthly morbidity form, the monthly midwife reporting form, the inpatient summary form, the weekly and monthly IDSR reporting forms. The National Malaria control program also uses the following forms to collect data from the districts. These are the Malaria Case reporting forms, antenatal/maternity monthly malaria data return, and monthly malaria data returns on ACTs, CBA monthly reporting form. These forms were developed by the NMCP to satisfy their programme information needs. As mentioned above these forms are now being incoorperated into DHIMS2.

Information Flow

The flow of information from the community level through health facilities, sub-districts Health Administration, District Health Administration, Regions to CHIM, DSD and NMCP and to the Global fund and other stakeholders are shown in Fig 42

Fig 42: Data communication flow chart in the GHS

DATA COMMUNICATION FLOW CHART



(Source: Carl Osei 2011)

Available Data

The available data from the three sources , the integrated disease surveillance system, the district health information system and the national malaria control programme had varying levels of quality and completeness. Data from all these sources were often not timely.

The parallel system of reporting resulted inconsistencies in the data on malaria reported by the districts to the National level. Some of these inconsistencies arise from the different level of data completeness for the forms being used. The decision to use the DHIMS2 for all malaria data was taken in 2012. This hopefully will correct the inconsistency that is seen in the routine data from the two sources as shown Table 19 & 20.

Table 19: Comparing the trend of Total OPD and Total malaria cases using two data sources NMCP and DHIMS

Year	TOTAL OPD NMCP	Total OPD DHIMS	Total Malaria Cases Seen at OPD NMCP	Total malaria cases seen at OPD-DHIMS	Proportion of Total OPD due to malaria NMCP	Proportion of total OPD due to malaria DHIMS
2000	12,621,010	8,316,971	4,866,937	1,672,178	39%	20.10%
2001	7,405,420	9,199,549	3,013,115	2,647,099	41%	28.80%
2002	7,847,146	9,753,634	2,982,560	3,140,980	38%	32.20%
2003	8,288,870	10,219,021	3,552,896	3,359,191	43%	32.90%
2004	9,024,280	11,071,254	3,416,027	3,379,527	38%	30.50%
2005	9,273,804	11,650,188	3,452,946	3,799,158	37%	32.60%
2006	9,838,406	12,241,163	3,551,452	3,861,348	36%	31.50%
2007	9,259,343	15,775,799	3,123,147	5,384,685	34%	34.10%
2008	11,204,284	18,075,258	3,205,447	5,401,025	29%	29.90%
2009	12,957,665	19,747,839	3,695,371	7,095,769	29%	35.90%
2010	10,077,319	22,754,261	3,849,536	8,147,071	38%	35.80%
2011	10,313,505	26,669,010	4,154,261	9,718,894	40%	36.40%
2012*	18,449,754	29,289,037	7,182,733	10,597,651	39%	36.20%

Table 20: Comparing Trend of Total Under five admissions, deaths and case fatality rate using two data sources- NMCP and DHIMS						
	Under five admissions for malaria NMCP	Under five admissions for malaria DHIMS	Under five deaths NMCP	Under five deaths DHIMS	Under five case fatality rate NMCP	Under five case fatality rate DHIMS
2000	27,478	n/a	3,952	3,952	14.40%	n/a
2001	43,363	n/a	2,717	2,717	6.30%	n/a
2002	42,887	74,718	2,914	2,914	6.80%	3.90%
2003	131,148	66,515	2,195	2,195	1.70%	3.30%
2004	196,429	51,111	1,380	1,380	0.70%	2.70%
2005	38,840	72,357	2,026	2,026	5.20%	2.80%
2006	10,602	77,370	973	2,089	9.20%	2.70%
2007	22,019	51,708	1,241	1,241	5.60%	2.40%
2008	99,217	n/a	1,697	n/a	1.70%	n/a
2009	122,575	n/a	1,505	n/a	1.20%	n/a
2010	137,319	148,709	1,812	2,043	1.30%	1.40%
2011	129,110	157,276	1,539	1,328	1.20%	0.80%
2012*	177,836	187,728	1,129	1,458	0.60%	0.80%

Table 21: League table for average data completeness for whole of 2012

POSITION	REGION	% COMPLETENESS (N=49)
First	Ashanti	79.3%
Second	Brong- Ahafo	78.9%
Third	Upper East	78.7%
Fourth	Greater Accra	54.7%
Fifth	Upper West	52.7%
Sixth	Eastern	50.8%
Seventh	Western	47.9%
Eight	Central	47.1%
Night	Volta	45.1%
Tenth	Northern	30.8%

Source: PPME GHS 2013

The league table above shows that data completeness throughout the regions was a major problem in 2012 and plans are being put in place to address this and other deficiencies in data management system.

Feedback and dissemination

At the district, regional and national level, data on malaria are analyzed to generate indicators which are important for monitoring trends and evaluation of the programme. At the district level, this is done as part of an integrated monitoring and evaluation framework. In this district monitoring framework malaria indicators are captured as part of a broad performance monitoring matrix. These analyses are used to generate annual and half year reports of district performances. These reports are shared with the Local Governments authorities in the districts. The regional reviews organized annually provide a platform for dissemination of service indicators of performance. The National Malaria Control Programme at the National Level organizes half year and annual review meetings where information on the malaria situation in the country is shared with all stakeholders. Annual reports are written by the National level and shared with stakeholders.

4.9.10 Malaria database and Informatics System

All reporting forms are supposed to be kept for life or archived electronically if there is need to destroy the hard copies. The District Health Directorate provides an archival system to ensure the storage of the registers from the facilities that might require it. The NMCP has provided some cabinets for the storage of registers and forms by the districts. This has enabled the District Health Directorates to ensure that facilities have adequate secure space for documents storage.
For electronic storage like the DHIMS2 data is backed up remotely daily. Physical back-ups on external drives are done weekly. District and Regions have been instructed to copy their data in the DHIMS2 every month and archive them.

4.9.11 Assessment of Progress Towards Achievement of Targets

Achievements of Goal, Objectives, Targets of Global Targets and Strategic Plan

The assessment of key indicators is done with colours: green indicates indicator has been achieved, yellow means progress has been made but lags behind, and red indicates that indicator has not been achieved and extra effort needs to be put in place.

The Global Malaria Targets (African Summit on RBM, World Health Assembly and **RBM's Global Malaria Action** are as indicated below:

- **Africa Summit on Roll Back Malaria, Abuja, Nigeria 2000**
  - **At least 60% coverage of the population with appropriate prevention & treatment by 2010**

Performance

Coverage for prompt and effective treatment of malaria in health facilities was 93.7% in 2011 (MICS 2011).

Use of LLIN/ITN in children under-five years was 39% in 2011 [MICS 2011]
IPTp2 coverage increased to 64.6% in 2011 (MICS 2011).

  - **halving the burden of malaria by 2010**

Performance

Under-five malaria case fatality rate has been dropping consistently: a **94.4%** reduction from 14.4% in 2000 to 0.8% in 2012.

Deaths due to malaria: **47%** reduction from 2000 to 2011
Malaria cases reported in 2000 was 250/1000 population which reduced to 160/1000 population in 2010, a decrease of **36%.**

Summary: All the RBM Abuja targets were achieved by 2010 with the exception of use of ITN/LLIN in children under-five years which lagged behind.

- **World Health Assembly 2005**
  - **Ensure a reduction in the burden of malaria - at least 50% by 2010 and 75% by 2015**

Performance

Deaths due to malaria: 47% reduction from 2000 to 2011

Malaria cases reported in 2000 was 250/1000 population which reduced to 160/1000 population in 2010, a decrease of 36%.

Unfortunately there are indications of increase in reporting of cases recently which can be a threat to achieving the 2015 target of 75% reduction.

Summary: There is mixed performance in reaching the W orld Health Assembly 2005 targets. While targets for 2010 were almost achieved, there are concerns about achieving the 75% reduction in incidence of malaria by 2015 if concrete measures are not put in place as discussed in the report.

- **RBM's Global Malaria Action Plan targets**
  - **By 2010, universal (80%) coverage with interventions compared to 2000;**

Performance

Use of LLIN/ITN in children under-five years has increased from 4% in 2000 [GDHS 2003] to 53.9% in 2008 [GDHS 2008].

IPTp2 coverage increased to 64.6% in 2011 from 1.3% in 2003 (MICS 2011).

  - **By 2010, malaria cases reduced to 50% and to 75% by 2015 compared to 2000**

Performance

Malaria cases reported in 2000 was 250/1000 population which reduced to 160/1000 population in 2010, a decrease of 36%.

Unfortunately there are indications of increase in reporting of cases recently which can be a threat to achieving the 2015 target of 75% reduction.

  - **By 2015, preventable mortality reduced to near-zero**

Performance

CFR in 2012 was 0.8%.

Summary: Reasonable progress was made in achieving the RBM's Global Malaria Action Plan targets. While targets for 2010 were almost achieved, there are concerns about achieving the 75% reduction in incidence of malaria by 2015 if concrete measures are not put in place as discussed in the report.

- **National strategic Malaria Plan (2008-2015)**

The **Goal** of malaria control in the second national strategic Plan (2008-2015) was to reduce morbidity and mortality by 75% by 2015. The **specific objectives**, by 2015, were as follows:

- **100% of households will own at least one ITN**

Performance

Ownership of LLINs increased to 96.7% in 2012.

- **80% of the general population will sleep under ITNs**

Performance

Only 48% slept under ITN as per MICS 2011.

- **Increase the number of children under-five and pregnant women sleeping under treated net from current levels to 85%**

Performance

Use of LLIN/ITN in children under-five years increased to 77.6% in 2012 (SPH, 2012).

A similar increase was recorded in the use of LLINs by pregnant women: from 17.4% in 2008 (GDHS) to 59.7% (SPH, 2012).

- **100% (All) pregnant women shall be on appropriate Intermittent Preventive Treatment**

  (Receive at least two or more doses of sulphadoxine-pyrimethamine under DOTS)

Performance

IPTp2 coverage increased from 45.5% in year 2008 to 64.4% in 2011 (MICS 2011).

- **90% of all structures in targeted districts will be covered through indoor residual spraying**

Performance

Between 92.7% to 94% of all structures in targeted districts were covered by IRS in 2012.

- **All (100%) health facilities will provide prompt and effective treatment using ACTs**

Performance

All public health facilities provide prompt and effective treatment using ACTs

- **90% of all patients with uncomplicated malaria will be correctly managed at public and private health facilities using ACTs**

Performance

85.5% of patients put on ACTs [DMIS2] in 2012

- **All (100%) communities will have access to community-based treatment for uncomplicated malaria**

Performance

HBC has been scaled up to all regions across the country. However, the proportion of children under five with fever in the past two weeks receiving treatment by CBAs with appropriate antimalarials (ACT) increased from 2% (MICS 2006) to only 3.1% (MICS 2011).

- **90% of caretakers and parents will be able to recognize early symptoms and signs of Malaria**

  96.4% of mothers and caregivers know the cause, symptoms and treatment of malaria (MICS, 2011).

- **90% of children under five years of age with fever will receive an appropriate ACT within 24 hours of onset.**

Performance

Proportion of children under 5 with fever who are treated with appropriate anti malaria drugs *(ACTs) was 42% in 2011.*

Summary: In relation to the specific objectives of the National Malaria Strategic Plan (2008-2015), it was assessed that 5 out of 11 has been achieved already as at 2012, another 5 are on course and only one indicator is lagging seriously behind (i.e communities with access to community-based treatment for uncomplicated malaria as measured by the proportion of children under five with fever in the past two weeks receiving treatment by CBAs with appropriate antimalarials (ACT).

The NMCP maintains additional intermediate malaria-specific targets under Strategic obj2 to be achieved by 2011:

- **Reduce incidence of U5 malaria from 242/1000 (2006) to 150/1000;**

Performance

Malaria incidence rate was 160/1000 population in 2010.

- **Reduce U5 malaria CFR from 2.7% (2006) to 1.0% (2011);**

Performance

CFR was 1.2% in 2011

- **Reduce incidence of malaria in pregnant women from 7/1000 (2006) -3/1000;**

Not Available

- **% U5 sleeping under ITN from 35.6% (2006) to 55% (2011);**

Performance

Use of LLIN/ITN in children under-five years was 77.6% in 2012 (SPH, 2012).

- **ITN use among pregnant women from 46% (2006) to 75% (2011);**

Performance

Use of LLINs by pregnant women was 59.7% (SPH, 2012).

- **Household ITN availability from 21.6% (2006) – 50% (2011);**

Performance

Ownership of LLINs was 96.7% in 2012 [SPH 2012]

- **% suspected malaria cases confirmed by microscopy from 15% to 30%;**

Performance

34.7 % of suspected malaria cases are confirmed by microscopy [DHIMS 2012]

- **% pregnant women receiving IPT2 from 25.6% - 60% (2011).**

Performance

IPTp2 coverage was 64.6% in 2011 (MICS 2011).

Summary: Of the 8 intermediate malaria specific targets envisaged to be used to monitor performance by 2011 (excluding reduction in incidence of malaria in pregnancy where reliable data was not available) , all of them were achieved with the exception of use of LLINs by pregnant women that fell short of the target.

4.9.12 Successes, best practices and facilitating factors

- Integrated computerized database (DHIMS2) from district, region and national levels
- Well developed M&E plan with defined indicators and targets

4.9.13 Issues and challenges

- Parallel data collection system
- Weak validation of data along the chain
- Sustainability of DHIMS2 due to financial challenges

Table 19: SWOT Analysis, Surveillance, Monitoring and Evaluation

Thematic Area	Strengths	Weakness	Opportunities	Threats
Malaria surveillance	? Established sentinel sites for anti-malaria drugs efficacy testing ? Improved DHIMS exist ? Well trained staff ? Standard operating procedures have been developed to ensure standardization ? Timelines for data submission have been defined ? Performance indicators have been developed	? No stratification of malaria endemicity at the district level ? No clear cut age stratification for malaria endemicity ? No sentinel sites for monitoring insecticide resistance ? Malaria Data not effectively used at the district level	? District data already exist ? District malaria focal person available ? Have institutional capacity to set up insecticide resistance monitoring sentinel sites	? Inadequate resources ? Inadequate personnel ? Different organizations doing surveillance which is not supervised

Thematic Area	Strengths	Weakness	Opportunities	Threats
Malaria surveillance	? Monitoring and evaluation plan developed and disseminated ?	? No harmonization of monthly data collection tools. ? Multiple tools collecting same variables at the facility level ? Poor timing for the introduction of tools ? Parallel data collection systems which places a burden on health facilities		
Information	? Standardized data collection tools have been developed ? Official data sources have been designated	? Inadequate funding for the DHIMS ? Incomplete malaria data and delayed reporting from the facility ? Lack of collaboration between stakeholders, especially private sector data collection		? Different organizations presenting confusing malaria data
Surveys	? Good collaboration among NMCP and research Institutions	? Results of quite a number of surveys are not widely disseminated to inform policy		? Inadequate funding for surveys
Operational Research (OR)	? Technical expertise is available in the country	? Very few Operational Research (OR) being carried out	? Have research Institutions that can be used to carry out OR	

4.9.14 Conclusion and Recommendations

a) Conclusion

- Data surveillance and M&E data management system has evolved from three parallel routine malaria surveillance systems. These are the system through the DHIMS of the Centre for Health Information Management (CHIM), the Integrated Disease Surveillance and Response (IDSR) system, and the vertical malaria surveillance system established by the NMCP. Currently, there is improved integration of data through migration to DHIMS2.

- Private sector malaria control data is almost absent from the national aggregates, a weakness the programme recognizes and plans to address.

- There is a well developed National Malaria control M&E plan.

- There are multi-systems in place for conducting malaria surveys to complement routine data collection. They include DHS, multiple indicator cluster survey (MICS), Malaria indicator survey (MIS), by UNICEF and Health Research Unit/NMCP/GHS respectively, the Noguchi Memorial Institute for Medical Research; the Data surveillance and M&E data management system has evolved from three parallel routine malaria surveillance systems. These are the system through the DHIMS of the Centre for Health Information Management (CHIM), the Integrated Disease Surveillance and Response (IDSR) system, and the vertical malaria surveillance system established by the NMCP. Currently, there is good integration of data through migration to DHIMS2.

- A number of inconsistencies exist between data from NMCP and DHIMS but this is improving. For instance, U-5 CFR using NMCP data for 2002 was 6.8% compared with 3.9% using DHIMS, while in 2011 it was 1.2% (NMCP) and 0.8% (DHIMS).

- Overall malaria parasite prevalence has dropped from the 51-75% in 2002 levels to 27.5% in 2011.

- Under-five malaria case fatality rate has been dropping consistently: a 94.4% reduction from 14.4% in 2000 to 0.8% in 2012.

- There has been progress in the promotion of prompt and effective treatment of malaria in health facilities, from 44.2% in 2003 (DHS 2003) to 93.7% in 2011 (MICS 2011).

- There is an increase in the proportion of children under five receiving appropriate treatment within 24 hours of onset of malaria/fever, from 23.7% in 2008 (DHS 2008) to 35% in 2011 (MICS 2011). There is however wide variation between poorest (27%) to richest (40%).

- There is also an improvement in the knowledge of mothers and caretakers, such that, as many as 96.4% know the cause, symptoms and treatment of malaria (MICS, 2011).

- IPTp2 coverage increased from 45.5% in year 2008 to 64.6% in 2011 (MICS 2011).

- Use of LLIN/ITN in children under-five years has also recorded tremendous progress: the figure increased from 28.2% (GDHS) in 2008 to 77.6% in 2012 (SPH, 2012). A similar increase was recorded in the use of LLINs by pregnant women: from 17.4% in 2008 (GDHS) to 59.7% (SPH, 2012). The problem is the differing sources of data.

*In summary, d*ata quality is not optimal. Sentinel sites for monitoring the efficacy of antimalarial medicines exist in 10 sentinel sites and the latest report was in 2011. Monitoring of vector susceptibility to insecticides used for IRS is an on-going activity in AGAMaL and Noguchi Memorial research Institute but a national plan for this exercise is now being developed for implementation.

In the field of operational research, the programme collaborates with a number of institutions. There is the need to consider implementing SMC on pilot basis as part of the operational research agenda.

There are other challenges such as: a parallel and multiple data collection system, limited local capacity to sustain DHIMS 2, weak health information management system, capacity for data collation, analysis and use at district and sub-district level. There is also lack of information on routine malaria indicators including ACSM indicators and there are no display of trends of malaria indicators in health administrations/facilities.

Synthesis of the NMCP performance in area of M&E

AREAS	SCORE				COMMENTS
	3: high adequate	2: adequate	1: present but inadequate	0 inadequate	
Surveillance, Monitoring and Evaluation Plan		X			
Surveillance, Monitoring and Evaluation Capacity		X			
Surveillance		X			
Sentinel Surveillance Sites			X		
Programme Monitoring	X				
Programme Evaluation		X			
Operational Research		X			
Data Storage, Use and Website		X			

b) Recommendations

1. Ensure the implementation of the NMCP M&E Plan.

2. Ensure total migration of relevant data into DHIMS2 and enforce compliance at all levels. The NMCP should consider discontinuing the usage of the CFR forms 1, 2, 3 in the NMCP system since a more complete version of this data can be automatically generated and reported even quicker by the DHIMS. The NMCP may need to collaborate more closely with CHIM to obtain the relevant data such as automatically generating the "monthly addendum to maternity returns" and monthly CD2 returns.

3. The DHIMS requires financial and technical support from all its stakeholders because it is the only electronic data management system used at all levels of the health sector that has survived the test of time, and stakeholders stand to benefit immensely from such investments.

4. The NMCP should conduct retraining of malaria focal persons during which the importance of timeliness and completeness of reporting must be emphasized. Focal persons should be encouraged to combine both strategies of passive and active collection of data returns from the health facilities in order to improve timeliness of reporting.

5. Ensure the implementation of routine data quality assessment and periodic data auditing at all levels of service delivery by initiating regular quarterly review meetings for stakeholders involved in malaria data collection to clean and reconcile data. This will not only improve data quality and timeliness of reporting but also provide regular motivation to stakeholders.

6. Strengthen supervision to enhance quality and ensure data analysis is being carried out at all levels of the heath delivery system.

7. Management of health facilities must ensure that there is more collaboration among different actors involved in data management within the health facilities. The sub-districts must be resourced and empowered to play their supervisory role in ensuring timely collation and submission of returns to the districts.

8. Document and share best practice to include ACSM

9. Undertake operational research to inform policy decision

KEY CONCLUSIONS

1. Assessment of Progress towards Achievement of Targets

Achievements of Goal, Objectives, Targets of Global Targets and Strategic Plan

a) **RBM Abuja Targets:** All the RBM Abuja targets were achieved by 2010 with the exception of use of ITN/LLIN in children under-five years which lagged behind.

b) **World Health Assembly 2005 Targets:** There is mixed performance in reaching the W**orld Health Assembly 2005** targets. While targets for 2010 were almost achieved, there are concerns about achieving the 75% reduction in incidence of malaria by 2015 if concrete measures are not put in place as discussed in the report.

c) **RBM Global Malaria Action Plan Targets:** Reasonable progress was made in achieving the **RBM's Global Malaria Action Plan targets.** While targets for 2010 were almost achieved, there are concerns about achieving the 75% reduction in incidence of malaria by 2015 if concrete measures are not put in place as discussed in the report.

d) **Specific Objectives of National Malaria Strategic Plan (2008-2015)**: It was assessed that 5 out of 11 of the specific objectives have been achieved already as at 2012, another 5

are on course and only one indicator is lagging seriously behind (i.e communities with access to community-based treatment for uncomplicated malaria as measured by the proportion of children under five with fever in the past two weeks receiving treatment by CBAs with appropriate antimalarials (ACT).

e) **Intermediate malaria specific Targets of National Malaria Strategic Plan (2008-2015):** Of the 8 intermediate malaria specific targets envisaged to be used to monitor performance by 2011 (excluding reduction in incidence of malaria in pregnancy where reliable data was not available), all of them were achieved with the exception of use of LLINs by pregnant women that fell short of the target.

2. Malaria Epidemiology

Malaria is endemic in Ghana. However, there is insufficient data to clearly define the current malaria epidemiological profile to the district level in Ghana. The National Malaria Control Programme has increased coverage and use of available intervention tools over the past 5 years and indications are that the endemicity levels could be changing.

The 2011 Multiple Indicator Cluster Survey (MICS) in children under five years has shown endemicity ranging from hypoendemicity in the Greater Accra Region, hyperendemicity in the Upper West Region and mesoendemicity in the rest of the country (14% in southern coastal areas, 28% in forest, and 44% in northern and central Savannah). With parasite prevalence of 39%, rural Ghana shoulders three times as much burden compared to urban settings (13%). Prevalence is much higher among children in families of lower wealth quintiles and less educated mothers. However, absence of prior population-based national surveys that measured parasite prevalence makes interpretation of epidemiological trends difficult.

Plasmodium falciparum is the predominant species causing malaria, mainly transmitted by ***An. gambiae s.l.*** **and** ***An. funestus*****, in all the ecological zones. So far** ***P. vivax*** **has not been reported in the country.** In view of the rapid urbanisation and possible effect of climate change there is the need to monitor parasite prevalence and malaria transmission on a continuous basis.

3. Programme management and Governance

The MPR assessed cross-cutting key management, policies and strategic issues relating to leadership, coordination, planning and financing. Malaria is a priority in the national development plan and National health agenda. Ghana has updated policies, guidelines and other operational documents. While Malaria strategic plan and coordination exist at the national level there is need to strengthen the operational planning and coordinating structures at all levels. Private sector participation is weak, particularly in information sharing. Funding for malaria control is heavily dependent on external donor support, however opportunities exist to mobilize domestic resources for the malaria control programme. There are national guidelines on malaria interventions at central and regional levels, but limited copies were observed at district and health facility levels.

4. Procurement and supply chain management

There is a functional technical working group for quantification that meets on ad-hoc basis. There is no standard operating procedure (SOP) for procurement and supply management (PSM) but there is SOP for stores and supplies. Delays in procurement of essential commodities for malaria control and periodic stock-outs of antimalarial commodities, especially

Artemisinin-based Combination Therapy (ACTs) and Rapid Diagnostic Tests (RDT), have resulted in challenges in meeting set targets. Systems are in place for estimating commodities using store issues data (ACT, RDT and other health products). There is no functional system for tracking commodities supplied to lower levels using batch numbers. National Quality Assurance plan for antimalarial medicines and commodities for laboratory diagnosis is inadequate. Quality control system for testing of RDTs in the country is weak.

There is potential conflict between the relevant divisions of Ministry of Health (MOH) and Ghana Health Service (GHS) for malaria commodities procurement and there is a need to clearly define their roles. There is weak Logistics Management Information System (LMIS) at all levels of the health care system and there is there is also proliferation of inventory management soft-wares at the various levels.

5. Integrated Vector Management

The NMCP and Partners are implementing the full complement of the Integrated Vector Management (IVM) strategy for the control of Malaria in the country. During the period 2011-2012, using the door to door long lasting insecticide nets (LLIN) hang up campaign strategy, 12,481,336 LLINs were distributed and hanged to cover a registered population of 21,716,830. LLINs were distributed to reach an administrative coverage of 98%. Sustainability of the continuous distribution of LLIN to maintain universal coverage is ongoing.

Capacity for vector surveillance and insecticide monitoring exists in the Anglogold Ashanti (AGA) malaria control programme but linkage with the National Malaria control programme is weak in terms of coordination and information sharing but this is improving. Indoor Residual spraying (IRS) is being implemented in 4 regions in the country; Northern, Upper West, Upper East and Ashanti regions. A system for monitoring the efficacy of the insecticides used in the country is now being established. There is inadequate collaboration and coordination of Labiofam larviciding project with the NMCP. Findings of the evaluation by Labiofam need to be validated. There is a threat of galamsey (surface illegal mining) activities to malaria vector control.

6. Malaria Diagnosis and Case Management

Malaria diagnosis and case management as part of the overall malaria control effort in Ghana is aimed at ensuring all people who live in Ghana have access to prompt and effective diagnosis and treatment that conforms to international standards of care and prolongs the life of the medicines. There is over-consumption of ACTs due to presumptive diagnosis of malaria. Local manufacturers' capacity should be enhanced to facilitate the local manufacturing of ACTS taking into consideration World Health Organisation (WHO) prequalification and Good Medicine Practice (GMP).

There is a huge gap in knowledge between the curriculum in pre-service training institutions and what is practiced in service.

A recent study conducted indicated that the availability of monotherapy including artesmisinine monotherapies in the community pharmacies is still high.

Sustainability system for Outreach Training and Supportive Supervision (OTSS) in quality assurance for diagnostic services does not exist. There is currently no reimbursement of laboratory diagnostics for malaria by National Health Insurance Scheme (NHIS).

The rolling out of Home Based Care (HBC) in all the regions for universal coverage to community is inadequate. Performance of Community Health Officers (CHOs) is inadequate in the area of promotion of LLINs, diagnosis, treatment and tracking or follows up of malaria cases.

7. Malaria in Pregnancy

Malaria in Pregnancy preventive interventions (ITN/LLIN and IPTp) are mainly executed in Ghana through the Maternal Child Health services provided from district through the sub-district to the CHPS zones. There is a guideline on malaria in pregnancy and it was last updated in 2009. The policy document has components on case management, intermittent preventive treatment and ITNs. Challenges for MIP implementation include: Low up-take of second dose of Intermittent Preventive treatment in pregnancy (IPTp) and assessment of the impact of IPTp. There is a concern of client with Glucose-6-Phosphate Dehydrogenase (G6PD) deficiency and possible adverse reactions following administration of sulphonamide based medicines. There is also concern about effectiveness of Sulphurdoxine pyremethamine with folic acid co administration which needs to be addressed. The system for Adverse drugs reaction (ADR) reporting is weak.

8. Advocacy, BCC, IEC and Social Mobilization

The Health Promotion Department of Ghana Health Service provides leadership and coordinates the implementation of malaria communication. At the national level, the malaria control programme in partnership with civil society organizations, the private sector, traditional leaders and the media commemorate World Malaria Day. The Ministry celebrates Child Health Promotion Week annually. These events provide opportunity at the District level for individuals and households, particularly those in underserved communities, to have access to a package of maternal and child health services, including malaria prevention messages, commodities and care. At the regional and district levels, malaria communication is integrated into routine services and also specific Behaviour Change Communication (BCC) campaigns are organised. However there are limited availability of IEC/BCC tools at district, sub district, health facility and community levels.

Other challenges include inadequate staff (Health Promoters) at District Health Management Team (DHMT) level and below, inadequate skills for ACSM design and poor implementation and monitoring at the various levels. There is also poor coordination with existing local structures for the promotion of Malaria ACSM.

9. Malaria in Complex Emergencies

Currently Ghana is not in a malaria emergency situation but there is an existing plan for emerging epidemics. The effect of climate change on malaria transmission and epidemiology should be considered.

10. Surveillance, Monitoring and Evaluation and Operational Research

There is a monitoring and evaluation plan (M&E) for the period 2008 – 2015. Data quality is not optimal. Sentinel sites for monitoring the efficacy of antimalarial medicines exist in ten (10) sentinel sites and the latest report was in 2011. Monitoring of vector susceptibility to insecticides

used for IRS is an on-going activity in Anglogold Malaria (AGAMAL) and Noguchi Memorial research Institute but there is no national plan for this exercise.

In the field of operational research, the programme collaborates with partners such as School of Public health, (SPH), Nogumchi Memorial Research Institutue (NMRI), Kwame Nkrumah University of Science and Technology (KNUST), Ministry of Health (MoH) research centres in Accra, Kintampo, Navrongo, Doduwa in conducting research on a wide range of issues related to malaria in the country. There is the need to consider implementing Seasonal Malaria Chemoprophylaxis (SMC) on pilot basis as part of the operational research agenda.

There are other challenges such as: parallel and multiple data collection system, limited local capacity to sustain District Health Information Management System (DHIMS 2), weak health information management system, capacity for data collation, analysis and use at district and sub-district level. There is also lack of information on routine malaria indicators to include ACSM indicators and the display of trends in malaria prevalence in health facilities.

11. Financial Management and Economics of Malaria

Malaria is not only a health problem but also a developmental problem in Ghana. It places significant financial hardships on both households and the economy. The burden of malaria is therefore a challenge to human development, manifesting itself as a cause and consequence of under-development.

Evidence from macroeconomic studies show that malaria has a negative effect on real GDP growth. Growth per capita from 1965-1990 for countries with intensive malaria has been 0.4% per year, while average growth for other countries has been 2.3%, over five times higher.

We can conclude from the financial management assessment that there exists limited internal financial support for the prevention, control and management of malaria cases in Ghana. The bulk of the supports for such activities are from external sources and this poses challenges to the sustainability of the key interventions that are being implemented currently.

The current financial crisis has made future commitments uncertain, especially from the Global Fund, the main donor for malaria. This funding crisis represents a window of opportunity for malaria endemic countries like Ghana to invest more in health and make their own contributions towards healthy populations.

There is also room for more coordination of plans and budgets on malaria prevention, control and management among all stakeholders. While the software being used by the NMCP at the national level is good, its current utilization is sub-optimal.

ACTION POINTS/KEY RECOMMENDATIONS FOR GOVERNMENT OF GHANA/MINISTRY OF HEALTH

1. Translate high political commitment to increased funding up to and beyond Abuja target of 15% minimum, taking opportunity of oil discovery.
2. Develop innovative funding mechanisms to improve domestic investments in malaria control including mobilizing funds from the corporate/private sector.
3. Support the Affordable Medicines Facility for malaria (AMFm) programme to ensure the availability and affordability of quality ACTs.

4. Enforce the ban on prescription, importation and use of monotherapies for the treatment of uncomplicated malaria.
5. Regulate the widespread use of local herbal antimalaria medicines through the Food and drug Authority (FDA).
6. Follow up and evaluate the results of the ongoing phase III clinical trial for 5 current herbal extracts with antimalaria property for possible inclusion in treatment protocol.
7. Continue to engage the local manufacturers to achieve WHO prequalification.
8. Request Labiofam to provide all study methodology and other documents to validate their findings.
9. Bring all larviciding activities under the National Malaria Control Program for effective monitoring and national ownership.
10. Enforce environmental management laws and by- laws at district, regional and national levels by Local Government especially in areas where illegal mining activities are being practiced.
11. Expedite the process of ongoing procurement reform for public health commodities.
12. Develop a financial sustainability plan for malaria commodities to minimize the overdependence of the program on donor funding.

FOR GHANA HEALTH SERVICE/NATIONAL MALARIA CONTROL PROGRAMME

1. Undertake surveillance of P. vivax infection since its presence could have programmatic implications in Ghana
2. Improve integrated supportive supervision to include malaria programme from National to Regional level and from Regional to the district levels.
3. Review the zonal malaria coordinating structure for improved performance.
4. Disseminate widely policies and guidelines for malaria control interventions especially to sub regional levels and consider wider dissemination through the internet and provision of soft copies.
5. Strengthen Logistics Management Information System (LMIS) to capture consumption data at the regional, district and facility levels and monitor this centrally for proper forecasting and quantification.
6. Establish a Task team with terms of reference (TOR) to look into RDT quantification, selection, procurement, storage, supply and rational use.
7. Revise the current vector control policy to include the Continuous Distribution (CD) strategy and update it to include the current Demographic Health survey (DHS) ownership and usage figures.
8. Undertake continuous monitoring of IRS activities with regards to insecticide resistance development.
9. Build capacity for entomological surveillance at national and regional levels.
10. Strengthen infrastructure and capacity for malaria microscopy, technical supervision, quality assurance and control at regional and district health facilities.
11. Ensure regular updates of malaria control strategies in the package for pre –service training institutions and support them as required such as provision of current malaria documents and training of tutors and facilitators in the current malaria policies and guidelines.
12. Ensure adequate funding for targeted scale-up of HBC for Community Case Management and follow up on the recommendations of the National Coordination Committee on the implementation of the HBC.

13. Prioritize malaria control activities as part of core delivery of CHO activities during outreach services at CHPS zones.
14. Ensure screening for suspected G6PD clients to prevent Adverse drug reaction (ADR). The initial screening should be verbal and those with previous reaction should then undergo laboratory screening.
15. Review the current guidelines on drug policy to include co-administration of 400ug of folic acid as well as administration of IPTp services to pregnant women till delivery.
16. Strengthen the system for ADR reporting and improve collaboration with Food and Drug Authority at all levels.
17. Recruit and deploy health education officers at the district level and build their capacity for ACSM planning, implementation and evaluation.
18. Intensify BCC campaigns and carry them out in a more systematic and co-ordinated manner in order to ensure optimal utilization of resources.
19. Strengthen the collaboration between the DHMT and Non-Governmental Organization (NGO), and other community based organizations and agents.
20. Ensure that emergency preparedness and response for malaria is well developed at all levels as part of IDSR.
21. Conduct parasite prevalence stratification up to the district level and monitor malaria transmission pattern on account of possible climate change.
22. Establish malaria parasite and vector sentinel surveillance sites to provide information on malaria parasite prevalence, vector bionomics and other routine indicators.
23. Ensure the implementation of routine data quality assessment and periodic data auditing at all levels of service delivery.
24. Ensure total migration of relevant data into DHIMS2 and enforce compliance at all levels.
25. Develop a financing sustainability strategy, including a financial risk management plan, for malaria prevention, control and management in Ghana to address threats to sustainability.

FOR PARTNERS

1. Support the initiative of MOH to develop innovative funding mechanisms to improve domestic investments in malaria control including mobilizing funds from the corporate/private sector.
2. Partner with GHS/NMCP to assure the sustainability of the Affordable Medicines Facility for malaria (AMFm) programme to ensure the availability and affordability of quality ACTs.
3. Support the move to bring all larviciding activities under the National Malaria Control Program for effective monitoring and national ownership.
4. Collaborate with NMCP to establish vector surveillance sites in the country to respond to insecticide resistance management plans and provide information on vector bionomics.

ANNEXES

ANNEX 1:

AGENDA FOR ALL THE PHASES OF THE MPR

PHASE	TIMELINE	EXPECTED OUTPUT
PHASE I	AUGUST-JANUARY 2013	• Developed Protocol • Protocol submitted to WHO • TORs for consultant submitted to WHO • Stakeholders' Meeting on MPR • Thematic groups inaugurated
PHASE II	FEB-MARCH 2013	• Internal Desk Review Report (thematic areas report)
PHASE III	APRIL , 2013	• Joint Field Report • Validate Finalized Report • Consultant's draft report • Stakeholders meeting
PHASE IV	APRIL -MAY, 2013	• Consensus on final report • Plan for revision of strategic plan • Dissemination of final report

DETAILED TIME LINE FOR THE 3rd PHASE

DATE/ TIME	ACTIVITY	RESPONSIBLE	OBSERVATION/ RESOURCES REQUIRED
TUESDAY 2nd APRIL 2013			
14.00 – 22.00	Arrival of WHO Staff	Dr B. Ameneshewa, Dr T. Arowolo, Dr S. Tohon	Joint WHO Team
WEDNESDAY 03rd APRIL 2013			
08.30 – 10.00	Briefing with NPO/ATM Briefing with the WR – Ghana	WHO Team	
11.00 – 17.00	Briefing with the NMCP Working session on preparation of the Review/validation of the Report of the Thematic desk review	NMCP/PM, WHO Team	
THURSDAY 04 APRIL 2013			
10.00 – 17.00	Coalition of NGO for Malaria, USAID, WB,UNICEF, CCM Chair, CDC, DFID, RNE-Royal Netherlands		
17.00	Courtesy visit to her Excellency MOH	NMCP/PM, WHO Team	
FRIDAY 05 APRIL 2013			
Entry meeting: **1. Briefing and team building between internal and external review teams** **2. Technical briefings and consensus building on the review thematic areas** **3. Review and adapt data collection tools for central and field visits**			
8.00 – 8.30	Registration		
8.30 – 8.45	Welcome and Introductions	Dr C. Bart - Plange	
8.45 – 9.05	Overview on MPR process: objectives, outputs and outcomes	WHO Team	Power point Presentation
9.05 – 9.20	Overview of policies and structures of the national health system In Ghana	Dr G. Amofah	Power point Presentation
30 min for each presentation			
9.20 – 9.50	Epidemiology, M&E – To include key findings (SWOT), gaps, conclusions, recommendations	M&E Team	Power point Presentation

DATE/ TIME	ACTIVITY	RESPONSIBLE	OBSERVATION/ RESOURCES REQUIRED
FRIDAY 05 APRIL 2013			
9.50 – 10.20	Vector Control – To include key findings (SWOT), gaps, conclusions, recommendations	Vector Control Team	Power point Presentation
10.20 – 10.50	Case Management – To include key findings (SWOT), gaps, conclusions, recommendations	Case Management Team	Power point Presentation
10.50 – 11.05	Cocoa Break		
11. 05 – 11.35	Commodity security – To include key findings (SWOT), gaps, conclusions, recommendations	Commodity security Team	Power point Presentation
11.35 – 12.05	Advocacy IEC and Soc. Mob. – To include key findings (SWOT), gaps, conclusions, recommendations	Advocacy IEC Team	Power point Presentation
12.05 – 12.35	Program Management – To include key findings (SWOT), gaps, conclusions, recommendations	Program Management Team	Power point Presentation
12.35 – 01.05 pm	Finance and Economic – To include key findings (SWOT), gaps, conclusions, recommendations	Finance and Economic Team	Power point Presentation
01.05 – 02.00 pm	Lunch Break		
02.00 – 03.00 pm	Presentation of field tools for inputs by thematic Groups	Internal & External Review Team	
03.00 – 05.30 pm	Thematic working groups to define the priority issues, success, gaps in the national program and adapt data tools	Thematic Groups	

DATE/ TIME	ACTIVITY	RESPONSIBLE	OBSERVATION/ REQUIRED
SATURDAY 06 APRIL 2013			
08.30 – 10.00	Presentation, adaptation and finalisation of data collection tools	Internal & External Review Team	
10.00 – 10.15	Cocoa Break		
10.15 – 13.00	Methodology for the field work Final preparations for the training and field work	Internal & External Review Team	Data collection tools
13.00 – 14.00	Lunch Break		
SUNDAY 07 APRIL 2013			
	Others	External reviewers	
	Arrival of the 4 th WHO Staff	Dr J. Sillah, WHO – Sierra Leone	
MONDAY 08 APRIL 2013			
08:30 – 17:00	Stakeholders meeting for Familiarization with data collection tool for field visits		Data collection tools (English)
	Training of field teams for field work/ Orientation of data collection teams for field review		
TUESDAY 09 – SATURDAY 13 APRIL 2013			
Central Level Visits			
08:30 – 17:00	Working visit to Ministry of Health/Chief Director	Internal & External Review Team	Central level tools
	Interview with Director of Public Health	Internal & External Review Team	Central level tools
	Interview with departmental and divisional heads in MoH	Internal & External Review Team	Central level tools
	Interview with partners in research and academic institutions and other RBM stakeholder	Internal & External Review Team	Central level tools
	Interview with the NMCP	Internal & External Review Team	Central level tools
TUESDAY 09/04/2013 – Regional Teams depart for the field			

DATE/ TIME	ACTIVITY	RESPONSIBLE	OBSERVATION/ RESOURCES REQUIRED
WEDNESDAY 10 – SATURDAY 13 APRIL 2013			
Regional, District and community visits			
	District level	Health facility 1	Health facility 2
08:30 – 17:00	District review team meeting with the DHT (Names of Selected Districts)	District review team District headquarters (DHT office)	
	District presentation on District malaria situation	Health facility teams depart for assigned health facilities after picking up designated guide from the DHT	
	Meeting with District malaria 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 from hospital/clinic-Health Posts , pharmacy	FGD with community members and VDCs	FGD with community members and VDC
		Feedback to health facility	Feedback to health facility
	Meeting with hospital teams Hospital presentation on malaria situation		
	Data collection with Hospital Teams		
	Visit to hospital OPD, ANC clinic, Lab, Pharmacy, maternity ward and medical ward		
	Teams prepare summary report for district		
	Brief written assessment summary and quick feedback to District Health Team including Hospital Management		
SUNDAY 14 APRIL 2013			
08:30 – 17:00	Back to Accra from the field visit Preparation of the field visit report		Report outline
MONDAY 15 APRIL 2013			
Sharing of reports and presentations from central and district visits and consensus on key findings			
9.00-10.30	Update district reports and Thematic area: SWOT, achievement success, best practices. Lessons learnt from central and district field visits	Team Leaders & Team	Power point Presentation

DATE/ TIME	ACTIVITY	RESPONSIBLE	OBSERVATION/ RESOURCES REQUIRED
11.00-12.00	Thematic area: SWOT, achievement success, best practices. Lessons learnt from central and district field visits	Group work by thematic areas	Power point Presentation
12.00-13.00	Thematic area: Challenges, problems, solutions and recommendations from central and district field visits	Group work by thematic areas	Power point Presentation
14.00-15.00	Thematic Areas Presentations (Key findings, Challenges, Solution and recommendations- New Orientation- Way forward-Action Points ')	External Team leaders thematic areas	Power point Presentation
Preparation of draft report and aide memoir with Malaria Technical Working Groups & technical partners			
15.00 – 16.00	Preparation of draft report and *Aide memoir*	Internal and external review chairs, NMCP manager and secretariat	Outline of the MPR Report and Aide Memoire Power point Presentation
16.00 – 16.15	Tea break		
16.15 – 17.30	Preparation of draft report and aide memoir	Internal and external review chairs, NMCP manager and secretariat	Aide Memoire Power point Presentation
TUESDAY 16 APRIL 2013			
08.30 – 10.00	Preparation of draft report and aide memoir	Internal and external review chairs, NMCP manager and secretariat	Power point presentations (Report)
11.00 – 12.00	Presentation of draft report (Key Issues and Action point) and aide memoire to Malaria Reference Group, UN group and all technical Partners (Health focal points)	Internal and external review chairs, NMCP manager and secretariat	

DATE/ TIME	ACTIVITY	RESPONSIBLE	OBSERVATION/ RESOURCES REQUIRED
14.00 – 17.00	Preparation of executive summary, aide memoir and press release.	Internal and external review chairs, NMCP manager and secretariat- Public relations officer	
WEDNESDAY 17 April 2013			
Stake holder presentation of review findings, recommendations and press release – press conference **Signing of aide memoire Recommendation Implementation and Quarterly Review**			
8.00 - 9.30	Presentation of review findings and recommendations to stakeholders	Internal and external review chairs, NMCP manager and secretariat	**Chairperson Ag. Chief Director MoH**
11.00-13.00	Planning for phase IV – follow up of recommendation	Internal and external review chairs, NMCP manager and secretariat	
14.00-15.30	Presentation of plan for phase IV follow-up of recommendations	Internal and external review chairs, NMCP manager and secretariat	
14.00- 17.00	Presentation of draft Road Map scaling up malaria control	NMCP secretariat and internal review facilitators	
THURSDAY 18 April 2013			
08.30 – 17.0	Finalisation of different documents		
	Debriefings with WR and DPH/MoH		
FRIDAY 19 APRIL 2013			
	Departure of the External Reviewers		

ANNEX 2:

THEMATIC REVIEW TEAMS

NAME		POSITION
DR. GEORGE AMOFAH	SPH ORGANISATION	LOCAL MPR CONSULTANT
DR. FELICIA AMOO-SAKYI	NMCP/GHS, HQ	COORDINATORMPR
DR. STEPHANE TOHON	WHO	EXTERNAL REVIEW TEAM LEADER
DR. TOLU AROWOLO	WHO	EXTERNAL REVIEW TEAM
DR. JACKSON SILLAH	WHO	EXTERNAL REVIEW TEAM
DR. BIRKENESH AMENESHEWA	WHO	EXTERNAL REVIEW TEAM
DR. KYEI – FARIED	GHS/DCD	CHAIRMAN-PROGRAM MANAGEMENT
DR. AGUIMA F. TANKOANO	PROMPT-GHANA	PROGRAM MANAGEMENT TEAM MEMBER
PHILIP ANUM	NDIRC	PROGRAM MANAGEMENT TEAM MEMBER
DR. PAUL PSYCHAS	PMI/CDC	PROGRAM MANAGEMENT TEAM MEMBER
JAMES FRIMPONG	NMCP/GHS	PROGRAM MANAGEMENT TEAM MEMBER
PROF. E. A. AFARI	SPH	CHAIRMAN-EPIDEMIOLOGY, SURVEILLANCE AND M&E
DR OWUSU ANTWI	WHO	EPIDEMIOLOGY, SURVEILLANCE AND M&E TEAM MEMBER
DR. KEZIAH MALM	NMCP/GHS	EPIDEMIOLOGY, SURVEILLANCE AND M&E TEAM MEMBER

NAME	ORGANISATION	POSITION
DR. ANTHONY OFOSU	PPMED-GHS	EPIDEMIOLOGY, SURVEILLANCE AND M&E TEAM MEMBER
MR. WAHJIB MOHAMMED	NMCP/GHS	EPIDEMIOLOGY, SURVEILLANCE AND M&E TEAM MEMBER
DR. SAMUEL DADZIE	NOGUCHI	EPIDEMIOLOGY, SURVEILLANCE AND M&E TEAM MEMBER
MR. KOFI OSAE	NMCP/GHS	EPIDEMIOLOGY, SURVEILLANCE AND M&E TEAM MEMBER
MR. FRANK AMOYAW	AGA	EPIDEMIOLOGY, SURVEILLANCE AND M&E TEAM MEMBER
DR. J. AMANKWA	GHS	CHAIRMAN-INTEGRATED VECTOR CONTROL TEAM MEMBER
FELIX NYANOR-FOSU	EPA	INTEGRATED VECTOR CONTROL TEAM MEMBER
ABA BAFFOE-WILMOT	NMCP/GHS	INTEGRATED VECTOR CONTROL TEAM MEMBER
LAWRENCE ALATO	AGA	INTEGRATED VECTOR CONTROL TEAM MEMBER
DR. MAXWELL APPAWU	NMIMR. LEGON	INTEGRATED VECTOR CONTROL TEAM MEMBER
IGNATIUS WILLIAMS	MOFA (PPRSD)	INTEGRATED VECTOR CONTROL TEAM MEMBER
LOVELACE SARPONG	NETWORKS GHANA	INTEGRATED VECTOR CONTROL TEAM MEMBER

NAME	ORGANISATION	POSITION
MRS. MARTHA OSEI	BCS/USAID	CHAIRPERSON-ACSM Group)
MRS. CHARITY NIKOI	UNICEF OFFICE (GHANA)	ADVOCACY, IE&C TEAM MEMBER
MR. MAURICE OCQUAYE	INDEPENDENT CONSULTANT	ADVOCACY, IE&C TEAM MEMBER
ELEANOR SEY	HPD/GHS	ADVOCACY, IE&C TEAM MEMBER
SURANI ABEYESEKERA	UNICEF	ADVOCACY, IE&C TEAM MEMBER
KWAME GAKPEY	NMCP/GHS	ADVOCACY, IE&C TEAM MEMBER
DR. ADDAI DONKOR	SSDM/GHS	CHAIRMAN-COMMODITY SECURITY
LAUD BADDOO	DELIVER	COMMODITY SECURITY TEAM MEMBER
KWASI BRENYAH	PSM FOCAL PERSON-NMCP/GHS	COMMODITY SECURITY TEAM MEMBER
SAMUEL BOATENG	DIRECTOR PROCUREMENT AND SUPPLIES-MOH	COMMODITY SECURITY TEAM MEMBER
DR. FELICIA AMOO-SAKYI	PROGRAM OFFICER-NMCP/GHS	COMMODITY SECURITY TEAM MEMBER
PETER ARHIN	DIRECTOR TAMD MOH	CASE MANAGEMENT TEAM MEMBER
OBED EBO ASAMOAH	NETWORKS GHANA	CASE MANAGEMENT MANAGEMENT TEAM MEMBER
DR. DINAH BAAH-ODOOM	ICD/GHS	CASE TEAM MEMBER
DR. EUGENIA OFORI-ADJEI	UNIV. OF GHANA HOSP	CHAIRPERSON-CASE MANAGEMENT TEAM MEMBER
DR. CONSTANCE BART-PLANGE	PROG. MANAGER -NMCP/GHS	CASE MANAGEMENT TEAM MEMBER

NAME	ORGANISATION	POSITION
SAMMY OPPONG	DATA MANAGER, NMCP/GHS	CASE MANAGEMENT TEAM MEMBER
AIMEE MILLER	CHAI	CASE MANAGEMENT TEAM MEMBER
NAA KORKOR ALLOTEY	NMCP/GHS	CASE MANAGEMENT TEAM MEMBER
VIVIAN AUBYN	NMCP /GHS	CASE MANAGEMENT TEAM MEMBER
FRANCIS OCLOO	NMCP /GHS	CASE MANAGEMENT TEAM MEMBER
DANIEL OSEI	PPME/GHS	**CHAIRMAN,** FINANCIAL MANAGEMENT AND BURDEN OF MALARIA
CHARLES A. ACQUAH	PPMED/GHS	FINANCIAL MANAGEMENT AND BURDEN OF MALARIA
JOEL NAA BALBAARE	NMCP/GHS	FINANCIAL MANAGEMENT AND BURDEN OF MALARIA
STEPHEN APPIAH	NMCP/GHS	FINANCIAL MANAGEMENT AND BURDEN OF MALARIA
MAURICE OCQUAYE	CONSULTANT	FINANCIAL MANAGEMENT AND BURDEN OF MALARIA
LILY BOATEMAA SAMPONG	NMCP/GHS	FINANCIAL MANAGEMENT AND BURDEN OF MALARIA
IVY FORSON	NMCP/GHS	FINANCIAL MANAGEMENT AND BURDEN OF MALARIA
H.A. MUSTAPHA	PR/FD/GHS	FINANCIAL MANAGEMENT AND BURDEN OF MALARIA

ANNEX 3:

FIELD TEAMS

CENTRAL LEVEL	
DR ALHAJ IBRAHIM BIN (TEAM LEADER)	FORMER RDHS-AR
EDITH GAVOR	GNDP
DR. FELICIA AMOO-SAKYI	PROGRAM OFFICER NMCP
DR. JACKSON SILLAH(WHO)	WHO
GREATER ACCRA	
DR. JAMES AKPABIE (TEAM LEADER)	DDPH-UER/GHS
SUSAN WUMBE	GHS-ICD
AKUA KWARTENG ADDO	USAID
MS. BIRKENESH	WHO
DANIEL YAYEME	UNICEF
DOROTHY ABUDY	MFP – GHS/GAR
ASHANTI REGION	
CHARLES ACQUAH (TEAM LEADER)	PPME-GHS/HQ
LAUD BADDO	DELIVER
PETER ARHIN	MOH-TAMD
DR TOLU AROWOLO	WHO
CENTRAL REGION	
DR. FELICIA OWUSU-ANTWI(TEAM LEADER)	WHO- GHANA
MR. ANTHONY OFORI	MFP-GHS/BAR
GODFRED OWUSU KYERE(GHS-GAR)	BIOSCIENTIST
MR. MOSES ASANTE	MFP-CR/GHS
UPPER WEST REGION	
DR. SAMUEL DADZIE (TEAM LEADER)	(NOGUCHI
STEVEN DANOUR (NATIONAL PUBLIC HEALTH REFERENCE LAB./GHS-NR)	BIOMEDICAL SCIENTIST-NR
HYPOLITE YELEDOR	DDHS-UER
DR STEPHANE TOHON	WHO
JUSTINA ZOYAH	MAL FP/UWR

ANNEX 4:

PEOPLE VISITED AND INTERVIEWED

CENTRAL LEVEL INTERVIEWEES		
NAME	**DESIGNATION**	**INSTITUTION**
DR. CONSTANCE BART PLANGE	PROGRAM MANAGER	NMCP-GHS
KWAME ANKOBEA	MALARIA SPECIALIST	USAID
KOFI AGYEKUM ADDO	MD. KHS	KAMA HEALTH SERVICES
DR. APPIAH-DENKYIRA	DIRECTOR GENERAL	GHS-HQ
FRANK BOATENG	CCM-CHAIR	
DR. J. AMANKWAH	DIRECTOR PUBLIC HEALTH	GHS-HQ
DR. E. AGONGO	DIRECTOR PPME	GHS-HQ
DAN OSEI	DD PPME	GHS-HQ
DR. ADDAI DONKOR	DIRECTOR SSDM	GHS-HQ
DR. A. OFOSU	AG.DD CHIM	GHS-HQ
MR. S BOATENG	DIRECTOR PROCUREMENT	MOH
PROF.K. KORAM	DIRECTOR NMRI	NOGUCHI MEMORIAL RESEARCH INSTITUTE
PROF. E. AFARI	COORDINATOR OF FIELD EPIDEMIOLOGYSCH. OF PUBLIC HEALTH	SCHOOL OF PUBLIC HEALTH
PROF. R. ADANU (COURTESY CALL)	DEAN , PUBLIC HEALTH SCHOOL	SPH
KWASI BRENYA	PSM SPECIALIST	NMCP-GHS
MRS WILMOT	ENTOMOLOGIST	NMCP

CENTRAL LEVEL INTERVIEWEES		
NAME	**DESIGNATION**	**INSTITUTION**
MR KOFI OSAE	M&E NMCP	NMCP-GHS
KWAME GAKPEY	ACSM SPECIALIST-NMCP	NMCP
COLLINS AGYARKO NTI MD HAFISA	PRESIDENT COALITION OF NGO AG. DIR PPME	COALITION OF NGO FOR MALARIA MOH
ZAKARIA		
SALIMATA ABDUL SALAM	CHIEF DIRECTOR	MOH
ELLEN GYEKYE	PROGRAM OFFICER WASH	
MR. GYIMAH	HEAD CENTRAL MEDICAL STORES (CMS)	MOH
MRS. MIMI DARKO	HEAD OF SAFETY MONITORING UNIT	FOOD AND DRUG AUTHORITY
DR. OPUNI		
JAMES FRIMPONG	PROG OFFICER -SZ	NMCP
CAROLINE SUNNERS	HEALTH ADVISOR	
DR. SAMUEL KABA AKORIYEA	DIRECTOR ICD	GHS
HON. YIRE KYIREH	CHAIRMAN PALIAMENTARY SELECT COMMITTEE ON HEALTH(MP)	
OB. ACHEAMPONG	DIRECTOR RESEACH –NHIA	NATIONA;L HEALTH INSURANCE AUTHORITY
DR. FRANCIS ASENSU	DEP. DIR. RESEARCH-NHIA	NHIA
GABRIEL AMOAKU	RESEARCH MANAGER-NHIA	NHIA
RUBY MENSAH	PHARMACIST NHIA	NHIA

CENTRAL LEVEL INTERVIEWEES

NAME	DESIGNATION	INSTITUTION
DR. OPARE	HEAD OF DEPARTMENT	PUBLIC HEALTH REFERENCE LABORATORY-GHS
MR. MICHEAL AMAKYE –ARKO	SNR. TECH. OFFICER	PHRL-GHS
ROWLAND ADUKPO	BIOMEDICAL SCIENTIST	PHRL-GHS
THERESA SEBEPHIA	PRINCIPAL NMTC	MOH
DR. BANSKOTA	HEALTH SPECIALIST	UNICEF
MARTHA LUDTHEROT	CHIEF PHARMACIST	MOH
DR. DOCIA SAKA	REGISTRAR-HEALTH FACILITY REGULATION GENCY	GHS-HQ
NAA KORKOR ALLOTEY	PHARMACIST FP(MIP	NMCP
NANA YAA WILLIAMS	TECHNICAL OFFICER –FP-DIAGNOSITIC	NMCP-HQ
VIVIAN AUBYN	AMFM FP	NMCP-HQ
DR. FELICIA AMOO-SAKYI	CASE MANAGEMENT FP	NMCP-HQ
LOVELACE SARPONG	EPA REP.	ENVIRONMENTAL PROTECTION AGENCY
DR. HANSON	PRIVATE PRACTIONER	PRIVATE MEDICAL AND DENTAL PRACTITIONERS' ASSOCIATION
MR ARHIN	TAMD	MOH

CENTRAL REGION		
NAME	**DESIGNATION**	**INSTITUTION**
MR. PETER KYEREMATENG	DEP. DIRECTOR (PS)	RHD-GHS
MR. DEITER	REGIONAL DIS. CONTROL OFFICER	RHD-GHS
MR. KWABENA ENNIN	REGIONAL ACCOUNTANT	RHD-GHS
MR. MOSES ASANTE -	REGIONAL MALARIA FOCAL PERSON	RHD-GHS
MR. SIMONS KWAKU	REG HEALTH INFORMATION OFFICER	RHD-GHS
GREATER ACCRA REGION		
NAME	**DESIGNATION**	**INSTITUTION**
DR LINDA VAN OTOO	REGIONAL HEALTH DIRECTOR	RHA-GHS
MR. AUGUSTINE YAW BOAMAH	HEALTH SERVICES ADMINISTRATOR	RHA-GHSGHS
DR MRS CYNTHIA KWARKYI MACLEAN	DEPUTY DIRECTOR PUBLIC HEALTH	RHD-GHS
MR ALFRED APINGA	ACCOUNTANT (DEPUTY)	RHD-GHS
MRS DOROTHY ABUDEY	REGIONAL MALARIA FOCAL PERSON	GHS
MR PIDA WORLANNYO	SENIOR BIOMEDICAL SCIENTIST	GHS
MRS ANGELINA LARBI	DEPUTY DIRECTOR PHARMACEUTICAL SERVICES	GHS
MS MARGARET ADJEI BOADI	SENIOR NURSING OFFICER (OUT PATIENT DEPARTMENT IN-CHARGE)	GHS

GREATER ACCRA REGION		
NAME	**DESIGNATION**	**INSTITUTION**
MS JANET WANYAMI	PRINCIPAL MIDWIFE (ANC IN-CHARGE)	GHS
MRS PATRICIA KONDUAH	PRINCIPAL MIDWIFE (MATERNITY WARD INCHARGE)	GHS
MRS LILY OSEI WUSU	PRINCIPAL NURSING OFFICER (MALE WARD IN-CHARGE)	GHS
MS CYNTHIA TEI	SENIOR NURSING OFFICER (IN-SERVICE TRAINING COORDINATOR)	GHS
HEALTH CENTRES		**GHS**
MR GEORGE AHORLU	PHYSICIAN ASSISTANT	GHS
MS MERCY GORDON	SENIOR NURSING OFFICER	GHS
	(IN-CHARGE OF CLINICAL CARE)	
MS SUSANA DELE	SENIOR NURSING OFFICER (IN-CHARGE OF PUBLIC HEALTH)	
MS STELLA ASIAMAH	PHYSICIAN ASSISTANT	
MS EVELYN BOAKYE	NURSING OFFICER (PUBLIC HEALTH)	
MS SENATU HAMIDU	MIDWIFERY OFFICER	
MS VIVIAN BLAGOGEE	COMMUNITY HEALTH NURSE IN-CHARGE	
MS EVELYN ACKAH	COMMUNITY HEALTH NURSE	
MS CYNTHIA EDZII	YOUTH EMPLOYMENT STAFF	
DR. J. D. ANNAN	AG. DDHS, MED. SUPT.	

GREATER ACCRA REGION		
NAME	**DESIGNATION**	**INSTITUTION**
MR. FRANCIS S. ZURADOM	DIS CONTROL OFFICER	
MR. AGYEI SARPONG	DHIO	
MRS. KATE THOMPSON	DPHN	
MR. PHILIP K. BREW	ADMINISTRATOR	
MS. ANITA KANKAM	PHARMACIST	
MR. BEMPAH	BIOMED SCIENTIST, HOD LAB.	
MRS. JULIANA MARTELS HUGHES	MEDICAL ASSISTANT	
MS. CYNTHIA AMADZOR	I/C PAEDIATRIC WARD	
MRS. RUTH DJABAN	NURSE, PAEDIATRIC WARD	
IN-CHARGE	MATERNTY WARD/ANC	
BIOSTATISTICIAN		
MR. BENJAMIN ASARE	MEDICAL ASSISTANT	
SETH	COMMUNITY HEALTH NURSE	
PUBLIC HEALTH NURSE		
MRS. JOSEPHINE AMISSAH	I/C, MIDWIFE	
COMMUNITY HEALTH NURSE		
MRS. ERNESTINA ADDO	COMMUNITY HEALTH NURSE	
MR. ABOAGYE AGYEI	COM. HEALTH COMMITTEE	

GREATER ACCRA REGION		
NAME	**DESIGNATION**	**INSTITUTION**
MISS JANE THOMPSON	COM. HEALTH COMMITTEE	
MISS DORCAS DANKWA	COM. HEALTH COMMITTEE	
HUMPHREY AMOABENG	BETTER GHANA	
MR. STEPHEN TIETOH-	DDHS	
MR. STEPHEN ANKOMAH		
MR. EMMANUEL ADJAH	DDCO	
MS. FELICIA COFIE	DHIO	
	DPHN	
MADAM MARY CUDJOE	NURSE I/C	
MR. PAUL INTERKUDZIE	PHYSICIAN ASSISTANT I/C	
MR. CLEFORD KONADU	ADM/ACCOUNTANT	
MRS PATRICIA KYEI FRIMPONG	NURSE	
MR. ERIC NSEEBI ACQUAH -	CHO I/C	
MRS GRACE ANKAMAH -	CHO I/C	
NANA AKOMA ASIEDUWAA	QUEENMOTHER	
RICHARD MANU	CBS VOLUNTEER	
MARGARET FRIMPONG	VHC SECRETARY	
JOSEPHINE NSIAH	COMM.MEMBER	
NANA ADDAE	KUROWURA	

GREATER ACCRA REGION		
NAME	**DESIGNATION**	**INSTITUTION**
NANA ADWOA GYAPOMAA	QUEEN MOTHER	
KWASI KUMI	VHC TREASURER	
DEBORA ASSUMING	GROWTH PROMOTER	
AGYEMAN POKU	COMMUNITY CHAIRMAN	
& 8 OTHERS		
MR. AGYEI FRIMPONG	ADMNISTRATOR	
DR. ANYADU	HEAD, CLINICAL	
MR. CHARLES AMPIAH	REG. BIOMEDICAL SCIENTIST, HEAD-LABORATORY	
MR. ASAMOAH	HEAD, PHARMACY	
I/C MATERNITY WARD	MATERNITY WARD	
I/C ANC	ANC	
I/C	PAEDIATRIC WARD	

ASHANTI REGION		
NAME	**DESIGNATION**	**INSTITUTION**
DR. AARON OFFEI	REGIONAL DIRECTOR OF HEALTH	RHA, ASHANTI
DR. JOSEPH ODURO	DEPUTY DIRECTOR, PUBLIC HEALTH	RHA, ASHANTI
MR. KOFI SRODA	REGIONAL BIOMEDICAL SCIENTIST	RHA, ASHANTI
ALHAJI KOFI BAYERH	DEPUTY DIRECTOR, PHARMACEUTICAL SERVICES	RHA, ASHANTI

ASHANTI REGION		
NAME	**DESIGNATION**	**INSTITUTION**
MRS. CHARLOTTE SENA AGYARE	DISTRICT MALARIA FOCAL PERSON	KWABRE DISTRICT
ERIC SARPONG	AG. DISTRICT DIRECTOR OF HEALTH	KWABRE DISTRICT
ERIC OWORAE	DISTRICT ACCOUNTANT	KWABRE DISTRICT
EDMUND KWASI HOGGAR	DISTRICT HEALTH INFORMATION OFFICER	KWABRE DISTRICT
BEATRICE MENSAH	HEAD OF MIDWIFERY	MAMPONGTEN HEALTH CENTRE
CHARLOTTE DARKOAH	MIDWIFE	MAMPONGTEN HEALTH CENTRE
JANET SAKYIWAA	MIDWIFE	MAMPONGTEN HEALTH CENTRE
DR. KWAKU GYARTENG	MEDICAL SUPERINTENDENT	KWABRE DISTRICT HOSPITAL
MR. CLEMENT OWUSU BEMPAH	HEALTH INFORMATION OFFICER	KWABRE DISTRICT HOSPITAL
SAMUEL MIREKU	LABORATORY TECNICIAN	KWABRE DISTRICT HOSPITAL
KATE BOAFOA	MATRON	KWABRE DISTRICT HOSPITAL
MILLICENT AMOAKO	MIDWIFE	KWABRE DISTRICT HOSPITAL
FRANCISCA ESINAM AHIAVIH	DISTRICT NUTRITION OFFICER	KWABRE DISTRICT HOSPITAL
ATTAA AKUA BOATENG	COMMUNITY HEALTH OFFICER	ASONOMASO SUB DISTRICT

ASHANTI REGION		
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	SNR. PHARMACY TECHNOLOGIST	KWABRE DISTRICT HOSPITAL
TOMOTHY AKANMAAH	PHYSICIAN ASSISTANT	KENYASI HEALTH CENTRE
JOANA ASARH	COMMUNITY HEALTH OFFICER	KENYASI HEALTH CENTRE
ROSE AMAKYE	COMMUNITY HEALTH OFFICER	KENYASI HEALTH CENTRE
SANDRA MAWULORM	COMMUNITY HEALTH OFFICER	KENYASI HEALTH CENTRE
CYNTHIA KRIKARI	COMMUNITY HEALTH OFFICER	KENYASI HEALTH CENTRE
CHARLOTTE ADUTWUMWAA	COMMUNITY HEALTH OFFICER	KENYASI HEALTH CENTRE
GABRIEL DANSO	MUNICIPAL DISEASE CONTROL OFFICER	MAMPONG MUNICIPAL HEALTH DIRECTORATE
KOFI OPPONG-DAMOAH	MUNICIPAL DISEASE CONTROL OFFICER	MAMPONG MUNICIPAL HEALTH DIRECTORATE
SAMUEL OSEI KWADWO	DISEASE CONTROL OFFICER	MAMPONG MUNICIPAL HEALTH DIRECTORATE
CECILIA BESSIG	MUNICIPAL PUBLIC HEALTH NURSE	MAMPONG MUNICIPAL HEALTH DIRECTORATE
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ASHANTI REGION		
NAME	**DESIGNATION**	**INSTITUTION**
EMMANUEL DWOMOH	MUNICIPAL MALARIA FOCAL PERSON	MAMPONG MUNICIPAL HEALTH DIRECTORATE
GEORGE ADU GYASI	MUNICIPAL ACCOUNTANT	MAMPONG MUNICIPAL HEALTH DIRECTORATE
COLLINS KESSE	HOSPITAL ADMINISTRATOR	MAMPONG MUNICIPAL HOSPITAL
DOMINIC OKYERE	DISTRICT PHARMACIST/ MUNICIPAL HOSPITAL PHARMACIST	MAMPONG MUNICIPAL HOSPITAL
RICHARD GANYE	LABORATORY TECHNICIAN	MAMPONG MUNICIPAL HOSPITAL
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LANTANA ALHASSAN	ENROLLED NURSE	ADIDWAN HEALTH CENTRE
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SULEMANA DORKURUGU	COMMUNITY HEALTH OFFICER	ADIDWAN HEALTH CENTRE
EVA AMOAK	COMMUNITY HEALTH OFFICER	ADIDWAN HEALTH CENTRE
ANCILLAR KUSI APPIAH	COMMUNITY HEALTH OFFICER	ADIDWAN HEALTH CENTRE
OHENE AMOAH	PHYSICIAN ASSISTANT	SDA HEALTH CENTRE
SAMUEL PEPRAH ACHEAMPONG	NURSE MANAGER	SDA HEALTH CENTRE

ASHANTI REGION		
NAME	**DESIGNATION**	**INSTITUTION**
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AFUA DANSOA SEFA	PUBLIC HEALTH NURSE	OBUASI MUNICIPAL HEALTH DIRECTORATE
SYLVESTER SEGBAYA	DIRECTOR	ANGLOGOLD ASHANTI MALARIA PROGRAM
ERIC OBU BUETEY	HEAD OF OPERATIONS	ANGLOGOLD ASHANTI MALARIA PROGRAM
AMADU SALIFU	IEC/BCC MANAGER	ANGLOGOLD ASHANTI MALARIA PROGRAM
RHODA CUNDO	HUMAN RESOURCES MANAGER	ANGLOGOLD ASHANTI MALARIA PROGRAM

UPPER WEST REGION		
HEALTH STRUCTURE	**NAME**	**PROFESSION/ POSITI ON**
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	DR KOFI ISSAH	DEPUTY DIRECTOR PUBLIC HEALTH
	ZOYAL JUSTINA	REGIONAL MALARIA FOCAL PERSON
	TENGEY NANI	RHIO
	WALTER N. LAWRENCE	DDNS
	OWUSU – ANSAH	DDCC
	HADZI R. K.S.	DDPS
	BASINGNAA TONY	REG. BMS
	LAAR JAMES	DISEASE CONTROL OFFICER
WA WEST DISTRICT	KWABENA OWUSU	HEALTH INFORMATION
	SAAKA K. SANDA	DISEASE CONTROL
	NKRUMAH K. ENOCH	NUTRITION
	YUSSIF ABUBAKARI	NUTRITION
	DIEKUU JOSEPH	FIELD TECHNICIAN
	ZIBHTA MUSA	NUTRITION
	AWINI SIMON	NUTRITION
	DOBARA DAVID	PHYSICIAN ASSISTANT

UPPER WEST REGION		
HEALTH STRUCTURE	**NAME**	**PROFESSION/ POSITION**
WA WEST DISTRICT/WECHIAU POLYCLINIC	APPUL DANIEL	PHARMACY TECHNICIAN
	GYEEDU K. JOSEPH	NURSE
	ANTWI GODWIN	T.O. LAB TECH
	ANAGBEY COMFORT	MIDWIFE
	KLEESAH S. LUCY	MIDWIFE
	OWUSU JAMES	TECHNICAL OFFICER
	KULAA JOSEPH K.	RGN
WA WEST DISTRICT/LASSIA HEALTH CENTRE	IDDRISU SEIDU	DISEASE CONTROL
	MUMUNI ABOUBAKARI	ENROLLED NURSE
	YRINEBE WILLIAMS	HEALTH PROMOTION ASSISTANT
	DOGKODEME FLORENCE	HEALTH PROMOTION ASSISTANT
	ABDULAI FUZIEMATA	ENROLLED NURSE
	LAWOR EUNICE	H. E. W.
	GYIEN W. DANIEL	HEALTH PROMOTION ASSISTANT
	YAHAGA MAHAMA I	COMMUNITY HEALTH NURSE

UPPER WEST REGION		
HEALTH STRUCTURE	**NAME**	**PROFESSION/ POSITION**
WA WEST DISTRICT/LASSIA HEALTH CENTRE	IDDRISU SEIDU	DISEASE CONTROL
	MUMUNI ABOUBAKARI	ENROLLED NURSE
	YRINEBE WILLIAMS	HEALTH PROMOTION ASSISTANT
	DOGKODEME FLORENCE	HEALTH PROMOTION ASSISTANT
	ABDULAI FUZIEMATA	ENROLLED NURSE
	LAWOR EUNICE	H. E. W.
	GYIEN W. DANIEL	HEALTH PROMOTION ASSISTANT
	YAHAGA MAHAMA I	COMMUNITY HEALTH NURSE
WA WEST DISTRICT/ LASSIA HEALTH CENTRE /VARIMPERE CHPS	BRAIMAH RUPHINA	COMMUNITY HEALTH OFFICER
	MWENGU ANGELINA	HEALTH PROMOTION ASSISTANT
	ISSAHAKU ZULFATA	HEALTH PROMOTION ASSISTANT
	MAABOBRKU U FAUSTINA	HEALTH PROMOTION ASSISTANT
	ADAMS SEIDU IDRISU	HEALTH PROMOTION ASSISTANT
	MAHAMA NASALA	HEW

UPPER WEST REGION		
HEALTH STRUCTURE	**NAME**	**PROFESSION/ POSITION**
WA WEST DISTRICT/POYENTANGA HEALTH CENTRE	SIUNYE EMMANUEL	PHYSICIAN ASSISTANT
	DASSAH PASCHAL	STAFF NURSE
	OBENG PETER	SFI
SISSALA WEST DISTRICT	MR EMMANUEL ORMOUH	DDCO
	FAKEIH MAHAMOOD	DISTRICT ACCOUNTANT
	RICHARD DOGOLI	MALARIA FOCAL PERSON
	GARIBA C, SULEMANI	DNO
	NAGUMO JOHN BOSCO	ADMIN. ASSISTANT
	DR. ZAKARI BUKARI	DDHS
	OBENG RAHMAN	DCO
SISSALA WEST DISTRICT HOSPITAL/HEATH CENTRE	ROBERT JUAH	PHYSICIAN SPECIALIST
	CATHERINE BETITAME	SSM
	CHABAHIRI M. MAINTUANA	PBMS
	WAHAB ALIDU	LABORATORY ASSISTANT
	VENU KUNEI SALIFU	EN
	GBEI ABDUL-MIMON	PHARMACY TECHNICIAN

UPPER WEST REGION		
HEALTH STRUCTURE	**NAME**	**PROFESSION/ POSITION**
JEFFISI HEALTH CENTRE	MWINTOME RICHARD	FIELD TECHNICIAN
	DASSAH JOHN YENSIE	COMMUNITY HEALTH NURSE
	PULSON ABDUL-MUBARAK	COMMUNITY HEALTH OFFICER
	NAVEI A. ALHASSAN	ENROLLED NURSE
SORBELLE CHPS ZONE	KUUDEGR K. JUSTICE	COMMUNITY HEALTH OFFICER
DUWIE CHPS ZONE	GBANNI SALAMATU	COMMUNITY HEALTH OFFICER

ANNEX 5:

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ANNEX 6

NMCP ROUTINE DATA (REPORTED MALARIA CASES FROM HEALTH FACILITIES) – 2000-2012

Table A1: Malaria Morbidity (OPD-) 2000-2012

	Total OPD Cases		Under five		5 years and Above		Pregnant Women	
Year/Age	Total OPD Cases	Total OPD Malaria Cases	<5 OPD Cases	<5 OPD malaria cases (Clinical & Confirmed	5years and Above OPD Cases	5years and Above OPD malaria cases (Clinical & Confirmed	Pregnant Women OPD Cases	PW OPD malaria cases (Clinical & Confirmed)
2000	12,621,010	4,866,937	1,411,860	516,337	11,180,529	4,344,022	28,621	6,578
2001	7,405,420	3,013,115	1,645,378	684,420	5,713,171	2,315,872	46,871	12,823
2002	7,847,146	2,982,560	1,184,624	518,081	6,625,257	2,453,488	37,265	10,991
2003	8,288,870	3,552,896	1,208,151	483,668	7,047,810	3,060,900	32,909	8,328
2004	9,024,280	3,416,027	1,485,451	513,449	7,496,981	2,894,017	41,848	8,561
2005	9,273,804	3,452,946	1,757,833	562,941	7,477,501	2,882,619	38,470	7,386
2006	9,838,406	3,551,452	1,772,727	579,947	8,040,672	2,967,178	25,007	4,327
2007	9,259,343	3,123,147	3,417,098	1,056,331	5,804,720	2,060,771	37,525	6,045
2008	11,204,284	3,205,447	2,852,073	1,472,246	7,343,968	1,598,356	1,008,243	134,845
2009	12,957,665	3,695,371	3,635,219	1,003,612	8,208,577	2,563,664	1,113,869	128,095
2010	10,077,319	3,849,536	2,028,508	1,082,673	7,501,154	2,672,667	547,657	94,196
2 011	10,313,505	4,154,261	3,130,270	1,709,549	7,183,235	2,362,285	469,832	82,427
2012	18,449,754	7,182,733	5,999,707	3,125,069	11,304,593	3,856,144	1,145,454	201,520

Table A2: In -patient Malaria Cases – 2000-2012								
	Total Inpatient Cases		Under five		5 years and Above		Pregnant Women	
Year/Age	Total In-patient Cases	Total In-patient Malaria Cases	<5 In-patient Cases	<5 In-patient malaria cases	5years and Above In-patient Cases	5years and Above In-patient malaria cases	Pregnant Women In-patient Cases	PW In-patient malaria cases
2000	263,269	84,091	98,507	27,478	112,353	47,695	52,409	8,918
2001	268,598	87,236	121,037	43,363	102,394	37,911	45,167	5,962
2002	310,793	116,600	133,963	42,887	122,993	68,418	53,837	5,295
2003	356,631	115,401	517,566	131,148	204,874	87,699	43,939	4,952
2004	997,079	338,862	844,091	196,429	303,382	128,533	49,606	3,900
2005	922,198	303,568	165,786	38,840	733,604	262,884	22,808	1,844
2006	257,222	75,107	52,429	10,602	185,377	61,842	19,416	2,663
2007	556,036	157,628	113,952	22,019	363,321	125,288	78,763	10,321
2008	900,242	272,802	181,427	99,217	573,970	152,716	144,845	20,869
2009	772,603	277,047	250,796	122,575	420,340	139,391	101,467	15,081
2010	852,994	298,372	222,559	137,319	492,900	141,837	137,535	19,216
2011	777,916	273,880	343,085	129,110	302,361	125,230	132,470	19,540
2012	1,100,352	427,419	280,762	177,836	603,377	213,193	216,213	36,390

Table A3: In-patient Malaria Deaths - 2000 - 2012								
	Total Inpatient Deaths		Under five		5 years and Above		Pregnant Women	
Years	Total In-patient Deaths	In-patient malaria Death	< 5 Deaths	< 5 malaria Deaths	5years and Above Deaths	5years and Above malaria Deaths	Pregnant Women Deaths	Pregnant Women malaria Deaths
2000	18,323	6,108	8,872	3,952	9,139	2,102	312	54
2001	14,512	4,220	7,804	2,717	6,265	1,441	443	62
2002	15,079	4,333	8,713	2,914	5,913	1,360	453	59
2003	13,904	3,603	7,636	2,195	5,982	1,376	286	32
2004	12,178	2,812	5,727	1,380	5,886	1,354	564	78
2005	26,996	6,046	6,610	2,026	17,532	3,922	845	98
2006	13,498	4,479	3,305	973	8,766	3,461	422	45
2007	18,395	4,622	5,263	1,241	12,755	3,338	437	43
2008	21,112	3,789	4,901	1,697	15,726	2,063	485	29
2009	19,939	3,378	6,106	1,505	13,555	1,847	278	26
2010	19,764	3,856	5,345	1,812	14,836	2,070	481	48
2011	17,981	3,259	5,225	1,539	11,838	1,658	918	62
2012	22,278	2,815	5,044	1,129	16758	1670	476	16